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## P R E F A C E.

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A PREFACE to the yearly volume of 'The Zoologist' pertains to an annual stock-taking, for it must be judged largely by our contributors' additions to zoological knowledge.

The Mammalia have received special attention. The paper by Prof. J. C. Ewart on "Zebra-Horse Hybrids" may prove to be of an epoch-making nature both in Africa and India. The Indian fauna has again asserted its interest, while Mr. Oldfield Thomas has proposed a canon of nomenclature for British mammals. On the species of our own fauna many valuable notes have appeared.

The class Aves still remains the favourite study of very many of our contributors, and our pages have again contained new facts in British Ornithology. Mr. Ernst Hartert has called attention to an "hitherto overlooked British bird" in a Marsh Tit, *Parus salicarius*, Brehm. The presence of the White Wag-tail (*Motacilla alba*) in Ireland, the Pectoral Sandpiper (*Tringa maculata*) in Norfolk and Kent, the Barred Warbler (*Sylvia nisoria*) in Lincolnshire, the continued visitation of the Melodious Warbler (*Hypolais polyglotta*) in South Devon, and the nesting of the Nightingale so far west as Wells in Somerset, are among some of the many avian records we have received and published.

Reptilia and Pisces have not been neglected, and we are glad to see the Crustacea more prominent on our literary menu. The Stalk-eyed Crustacea of Great Yarmouth, and the Malacostracous Crustacea of a section of Australia have been detailed; while a note on "The Struggle for Existence among Hermit Crabs" shows the vast interest attaching to observations on the lives of these creatures. The same remark applies to the Arachnida, on

which, as found in South Africa, more than one contribution has appeared.

When we turn to the many classes of animals still practically ignored in our pages, we are reminded of the yet unexplored areas in animal bionomics which it is the self-constituted province of 'The Zoologist' to explore. This Journal has always, and will always, seek to understand the economy of animal life, and endeavour to reveal the polity and life-secrets of our fellow-creatures—using that term in its wider and zoological sense. We may on this point quote the words of Emerson :—" I hold an actual knowledge very cheap. Hear the rats in the wall, see the lizard on the fence, the fungus under foot, the lichen on the log. What do I know sympathetically, morally, of either of these worlds of life?"

The Editor, in his annual acknowledgment to his contributors, trusts to their renewed acquaintance during the succeeding year—the *fin de siècle*—with all best wishes to them, belief in the future of the science we study, and hope in a renewed value and usefulness of our next volume.



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## NEW SPECIES OF BRITISH ANIMALS DESCRIBED IN THIS VOLUME.

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# THE ZOOLOGIST

No. 679.—January, 1898.

## INDIAN WILD CATTLE: THE TSINE AND THE GAUR (MISCALLED BISON).

BY COLONEL POLLOK.

I WAS very glad to see the article in 'The Zoologist' (1897, p. 489), by Surgeon-Captain Henry S. Wood, on the Tsine (*Bos sondaicus*). Very little is known of that animal, and any detailed account of it must be interesting to all zoologists. The account given by naturalists of the Indian wild cattle is very meagre, for very few of them have been personally acquainted with these beasts in their wild state. I have no pretensions to be considered a scientific naturalist, for I know nothing of anatomy, and very little on the subject of species, genera, &c. But I have observed to the best of my opportunities, and having been a fairly successful sportsman, I trust I may be excused for offering the following observations. Tsine are certainly kittle cattle. During thirteen years' wanderings in Burma I only succeeded in killing three bulls and two cows, and four of them only just before I left India. I agree with Dr. Wood's description and remarks, with the exception that I never saw the warts he mentions, and that those killed by me had the whitish rings round the eyes. Can there be two varieties? Mine were shot at the foot of the Yomahs, on the Sittang side. The bulls also were of a deep red, but I have seen them in the distance almost as dark as a middle-aged Gaur (*Bos gaurus*), that is, coffee-coloured, but never could get at them; nor did I notice the "thickened portion of skin devoid of hair,

and of a greyish black colour, the general surface smooth, but in patches very warty, like the skin of a Rhinoceros." Could this have been caused by the animal rubbing his forehead to get rid of parasites? as all Sambur have in May a bare spot about the size of a shilling on the neck, caused, the Burmese said, by their rubbing it on fallen trunks to rid themselves of parasitic pests. There is a dorsal ridge, of course, like in the other wild cattle, but not nearly so pronounced as in the Gaur or Gayal, and not more than in the Wild Buffalo. Mr. Carter, a well-known naturalist and sportsman ("Smoothbore," of 'The Field'), wrote as follows:—

"Colonel Pollok, when referring to the Tsine, says that it has a slight dewlap, which is not always apparent," whilst Jerdon, writing of the same animal, says it resembles the Gaur more than the Gayal, and it wants the dewlap."

I do not think Jerdon had ever seen a Tsine. I can see no resemblance between a Tsine and a Gaur, but a very great one, especially at a distance, between the Gaur and the Gayal. I am glad to see that the doctor says the bull he shot had a slight dewlap, about three inches in its greatest breadth. But whilst his bulls were wanting in the white patches on the buttocks, mine had them very distinctly. The bulls are certainly savage, and attack most pluckily after being wounded,—at least mine did. The first and only one I shot for years was in company with Capt. Hill (now Governor of H. M.'s Jail, Manchester), and he came at us with a will, but had no chance, as Hill used a breech-loading rifle of mine, and I had two heavy two-grooved No. 10-bore rifles by Joseph Lang.

#### THE GAUR (*Bos gaurus*).

This Wild Bull is found, not only in Southern India and the Trans-Gangetic provinces, but it has been shot at the foot of the Himalaya Mountains, usually called the Terai. I have seen splendid heads brought down from the Mishmee Hills. There are thirteen pairs of ribs. The chest is broad, the shoulder deep and muscular and the fore legs short, with the joints very short and strong, the arm exceedingly large and muscular. The skin on the neck, shoulders, and thighs is very thick—about two inches—and is very valuable for the soles of shooting-boots.

Many old bulls have so little hair that they appear as if they had been shaved. When the bull arrives at maturity, which is at

about six or seven years, rings begin to form at the base of the horns, and it is said one is added each year; if so, I must have shot bulls thirty-five or forty years of age. They prefer hilly ranges with flat table-land at top, at an altitude of about 2500 ft.; but they have been killed up to 5000 ft., and traced up even higher. It is a wonderfully active animal for its size and bulk. They browse on young bamboo shoots, and are also fond of grazing on the young grass which springs up after the annual fires. They retire during the heat of the day, either to forests, or force their way into heavy patches of long elephant-grass, and lie there to escape the gadflies, which otherwise torment them dreadfully. As a rule they are inoffensive, but a solitary bull has been known to charge without provocation; if closely followed, all Gaur are apt to prove pugnacious. They are not difficult to kill; a bullet well placed behind the shoulder, in the middle of the shoulder, or behind the ear, or a raking shot forward, will account for one—I have known one paralyzed by a shot through the dorsal ridge. When alarmed their enormous strength and weight enable them to crash through tree and bamboo jungle as if they were but reeds. I have known them when alarmed to snort, and stamp with their feet before retiring. The tongue and marrow-bones are unexceptionable; the only portion of the beast fit to eat by Europeans is the middle layer on either side of the dorsal side, just below the hump; the tail makes very good ox-tail soup.

Mr. Sanderson shot a Gaur in Assam, and as its name and that of the Gayal is "Mithûn," he came to the conclusion that there were no wild Gayal; but although "Mithûn" is usually applied to both the Gaur and Gayal, yet, if pressed, the people will own to an "Asseel Mithûn" or true Gaur, and a "Mithûn" (or bastard Gaur) the Gayal. In a Natural History lately published\* it has been asserted that the Gaur has been tamed, and that they are kept in captivity by natives on our North-Eastern Frontier, but this is altogether erroneous. The very old bulls are either driven away from the herds, or retire and become solitaires, and are the best worth shooting, but they are wary, and difficult to

\* 'The Royal Natural History,' evidently misled by Mr. Sanderson. Although a Gayal at a distance looks very like a Gaur, the heads are totally dissimilar; the Gaur's has a semi-cylindrical crest and a concave forehead; the Gayal possesses neither.

get at. Other conditions being favourable, wherever there are salt-licks, that is, depressions where a whitish clay impregnated with natron is found, these wild cattle, Deer, and even the Felidæ, will abound. It is the Gayal that are in captivity, and not the Gaur. When I first went to Burma I wrote to Mr. Blyth, the curator of the museum in Calcutta, that the Burmese Gaur appeared to me to be larger, and to differ somewhat from the Indian, but he wrote back I must be mistaken, as the Gayal took its place in that country, the true Gaur being absent. However, I was soon able to correct him by sending him heads, and as he shortly after visited the province, he convinced himself that I was right, and wrote that not only were there the true Gaur in the country, but that the skulls and horns were superior to those from Southern India. I pointed out to "Smoothbore," many years ago, that there were two distinct varieties of this Wild Bull, but he was incredulous until he visited Calcutta and spoke to Dr. Anderson, who said, "Pollok is quite right; here are skulls of both." The discrepancies may be due to climatic influences and abundance of food; undoubtedly the Gaur of Burma and of our North-Eastern Frontier are larger than the Indian. I have shot a bull within an ace of 21 hands at the shoulder, and General Blake, an old sportsman, shot a cow 19 hands, whereas the largest bull killed by him in India was of the same size, and the largest he ever saw killed in the Wynand but two inches higher. Even in India Gaur vary; those of the Western Ghâts being larger, and with a profile like a Ram, in that respect resembling their Burmese brethren. Not only does the Burmese Gaur stand higher, but the dorsal ridge extends further back, to within a span of the croup, the dent in the forehead is deeper, the cylindric crest higher, the horns larger, heavier and more truncated, and but seldom worn at the tips as in the Indian. I fancy food is so plentiful they have no need to grub up roots. The heads of the females are, if anything, longer than those of the males, and the nose is more arched.

Those in the Northern Circars of the Madras Presidency, where I shot a great many, have, comparatively speaking, shorter heads, and less of the Ram look; the dorsal ridge terminating about the middle of the back. Then, too, there is the dewlap—has the Gaur one or not? Up to a few years ago the opinion was—not. But

the question cropped up about two years ago. Mr. Bartlett, the late superintendent of the "Zoo," wrote that the one that lived in the Gardens had a well-developed one. Elliot, Jerdon, Campbell, Sterndale, all said he had none, and I too was of that opinion; but "Smoothbore" writes: "A planter of many years' experience in Travancore, and a keen observant sportsman, states that in some examples the Gaur have scarcely any dewlap, and that in others it is strongly developed. So marked is this difference, that the natives divide them into two castes, calling one 'Katu Madoo' or Jungle Cow, and the other 'Kat-erimy' or Jungle Buffalo. He has shot old bulls with at least six inches of skin hanging clear of the chest and throat. This seems extraordinary, when naturalists have mostly described the Gaur as having little or no dewlap. Dewlap originally meant the loose fold descending from the chest, which when the animal was grazing swept the dew: thus, in 'Midsummer Night's Dream,' hounds are described as 'dew-lapped, like Thessalian bulls'; but in the humped Indian cattle the fold extends from the throat downwards, and in the Mysore draught bullocks and in the Brahmini bulls is enormous, whilst in the ordinary village cattle the development is small."

The following notes on the Gaur will be interesting to most readers. Mr. A. F. Martin, of Travancore, writes:—

"When the Kaunan Devan Hills in North Travancore were opened out for tea and cinchona, some years ago, the felling of the forest restricted the wild beasts, particularly the Elephants and Bison, when passing across the estate, to one or two pathways. One particular track was, however, left to them for about ten years, when further cultivation led at last to the blocking up of even this right of way. The animals were at first much puzzled, and both Elephants and Gaur took to wandering about the cultivation. The Elephants accommodated themselves to the altered conditions and used the estate paths. The Gaur, more suspicious, took a straight line for their grazing grounds over the rotten felled timber and through the older cinchona plantations, but were often brought up by the sight of white-washed walls surmounted by a corrugated iron roof.

"At last they settled down to a pathway between the old cinchona and a natural belt left between it and the new clearing.

A pit 10 ft. long, 8 ft. wide, and 8 ft. deep, was dug on the boundary, covered with a mat made of reeds and bamboos, over which earth and dry leaves were scattered. The smell of the fresh earth, however, turned them off. Once a Gaur got his fore feet down the side of the pit, but made a bold jump and cleared it.

“After some months the tracks of a large herd were found making for the pit, and it turned out that a Gaur had fallen in, but managed to jump clean out again. It was evident that 8 ft. was not deep enough, and rock in the bottom prevented its being sunk deeper. Another pit was therefore dug some distance away on the same boundary. The ground was on the side of a steep hill, so that whilst the lower wall was 10 ft., the upper was 14 ft. deep.”

After a while a cow Gaur fell in, but whilst Mr. Martin was watching her, and waiting for coolies to help in putting logs across the pit, she managed to scramble out; and although she followed the path to the old pit, she avoided it and escaped. Two days afterwards a bull fell in and was secured. Mr. Martin describes the trouble they had with this huge animal:—Getting logs across the top of the pit, with the Gaur charging madly about, was exciting work, and the feat was successfully accomplished only after the utmost difficulty and danger.

“The appearance of any one near the pit always caused a furious demonstration on the part of the Gaur, who dug big caves in the side of the pit with his horns, and thus an approach to the edge was rendered dangerous. In ten days’ time he had become somewhat tame. He tossed about the grass thrown in to him, and trampled it into the mud, eating but a small quantity. His only drink was water poured into the pit, and which collected in the holes he had made in the mud with his feet. Matters were very little improved by having bundles of grass lowered by a long piece of cane fastened round, for he charged them furiously, and got a lot of the grass on the ground only to trample it into the mud.

“By degrees he began to eat more and to throw less about. Water was a great difficulty, any attempt, too, at lowering a bucket to him was futile, and only ended in the bucket being flattened out.

“It became imperative, therefore, to get him out of the pit.



To attain this end, a stockade about thirty feet square was made round the pit, consisting of stout poles, fifteen feet high at the lower, and ten feet high on the higher part of the ground. They were each sunk about three feet in the ground, eighteen inches apart, and lashed together with cross sticks and fibre, and formed an almost solid wall. A sheet-iron trough was fixed in one corner. When complete, large quantities of brushwood, ferns, and grass were thrown into the pit, until by degrees it became half full and the Gaur was enabled to jump out. His first act was to charge the corner whence he was being watched, but the only harm done was to himself, his frontal ridge being slightly cut. His attention was then attracted by the water-trough, which he knocked about considerably, but finding the water, he took one good long drink before finally knocking it to pieces. During his examination of his new quarters he once more fell into the pit, and this enabled us to repair damages; but before they were quite completed he jumped out again and caused a general stampede. Having twice hurt his head against the stockade, he never again made any attempt to test its strength. The sheet-iron trough seemed to annoy him more than anything else, and was soon rendered useless. A three-cornered wooden trough was then inserted in a corner and protected by stout poles across the corner of the stockade, and this having been satisfactorily arranged, the Gaur soon became comparatively tame. He allowed the measurements of his horns to be accurately taken, through a window left in the stockade, and very fine horns they were, too, measuring  $34\frac{1}{2}$  in. across, from outside to outside of sweep. Although the pit was filled up level with the ground, his previous experience led him to conclude that it was dangerous, and he never crossed it. The result was that the narrow space between the pit and the stockade became ploughed up, and he was up to his hocks in mud. It therefore became necessary to enlarge the enclosure for about a hundred yards in length, taking a bit of jungle in for shelter, and a small ravine which would hold water. A small shed was erected, with sliding bars on the outside and inside, with a view of introducing a domestic Cow as a companion, and so if he approved of her she might be let into the stockade.

“He took to his new quarters very kindly, and soon got to

know that grass was left for him at the inner gate of the shed. In a short time it was found that he liked having his nose and head rubbed, and licked the clothes of the person who rubbed him. He took salt from the hand, but did not at first seem to care about it, probably because it was not mixed with earth as in salt licks, which he was accustomed to, spitting it out if he got too much in his mouth at one time. After two months he became quite tame, and permitted his captor to come into the enclosure, not even moving if he happened to be lying down. After the third month he began to shed his hair, and liked it rubbed off with a wisp of grass, allowing the operator to sit on him whilst cleaning him, but he did not like his hind legs or tail to be touched, kicking out as if he were tickled when this was done.

“After four months a domestic Cow was put into the shed, and the two ate from the same bundle of grass, one on the outside, and the other from the inside of the shed. When the Cow was let into the stockade neither of the animals took any notice of the other, so the Cow was taken out. Although so tame with a European, the Gaur would never allow a native to come near him; and it was unsafe to be in the enclosure if a native came anywhere near, as the bull would jump up, snort, and rush about the place in a very excited manner. The cost of bringing grass for him (of which he ate 2 cwt. per diem) was so considerable that it was thought advisable to put a ring through his nose and have him led out to graze with the domestic cattle. A rope was tied round his horns and his head securely fastened between two bars of the stockade; it would then have been easy to ring his nose from the outside, and it is a thousand pities that this was not done. His terror was, however, so great, that the attempt was given up for that day, and it was settled to postpone the operation until he had become accustomed to have his head tied up. Alas! as will be seen, the glorious golden opportunity was lost in this wise:—

“It will be remembered that there was a shed in one corner of the stockade, built with a view of introducing a domestic Cow to bear the Gaur company. In this shed was kept Guinea-grass, to be given to him in the mornings. One night, however, he thought he would prefer having this grass, of which he was inordinately fond, without waiting for daybreak. He managed to

push aside one of the sliding bars of the gate, break a lower one down, and raise the top bar sufficiently for himself to get through, he ate the bundle of Guinea-grass, and when this was finished he repeated the performance with the outer bars of the shed and walked out to freedom. We are all wise after the event, but it was great carelessness in not pinning the bars, as is done in all well-managed stables in India. If this plan had been adopted, this magnificent animal, 16 hands  $1\frac{1}{2}$  in. fair vertical height, might by this time be enriching the 'Zoo,' where nothing but a miserable two-year-old calf has ever been exhibited."

From one cause or other, no two observers agree as to the colour of a Gaur. Mr. Martin's notes on this adult bull are therefore interesting and instructive:—

"Slaty grey on the dorsal ridge, deepening to intense black on the sides and shoulders; coffee-brown on the hind quarters, turning to black on the flanks; hoofs white; legs white to two inches above the knees and hocks on the outside, and to one inch above the knee and hocks on the inside; hair, inside the thighs and armpits, bright chestnut; neck black, with a large dewlap covered with coarse black hair, hanging down to a little below the level of the knees; head, frontal ridge, slaty grey, black down the front and sides of the face; the muzzle bare and dark slate. Colour of the iris of the eye mottled light brown; pupil slaty blue. But these differ in colour in accordance with age, the very old being black, with the exception of the stockings and forehead, which are dirty white."

In another instance a large bull Gaur was caught in an elephant-pit on the Annemullie Hills, and this animal took water freely from a bamboo spout. The gentleman who caught it, not being in a position to keep and tame the bull, released it; but it was ungrateful, and resented its capture by charging down on its captor whilst the latter was taking its photograph as it emerged from the pit, and he had to fly ignominiously, but not before he succeeded in photographing the animal.

Whether the Gaur would interbreed with tame cows like the Gayal remains to be proved, but I see no reason why it should not. I believe that there are hybrids on the continent between the Java variety of Tsine and tame cattle, but I do not think a Tsine has ever been on show in our Zoological Gardens.

MEASUREMENTS OF AN INDIAN BULL AND A BURMESE BULL AND  
COW GAUR.

	INDIAN.	BURMESE.	
	1 BULL.	2 BULL.	3 COW.
	Hnd. in.	Hnd. in.	Hnd. in.
Height at shoulder.....	19 0 $\frac{1}{2}$	20 3 $\frac{1}{2}$	19 0
Height at croup .....	18 0	19 1	18 0 $\frac{1}{2}$
	Ft. in.	Ft. in.	Ft. in.
Girth behind shoulder .....	7 10	8 6	7 6
Tail and tuft .....	3 3 $\frac{1}{2}$	3 4 $\frac{1}{2}$	3 3
Snout to crown of forehead .....	2 0 $\frac{1}{2}$	2 3 $\frac{1}{4}$	2 4
Length of ears .....	0 9	1 1	1 0 $\frac{1}{2}$
„ fore hoof .....	0 8 $\frac{1}{4}$	0 8 $\frac{1}{2}$	0 7 $\frac{3}{4}$
Horns (outside curve) each .....	2 0 $\frac{1}{2}$	3 1	2 1
Terminal between the tips.....	2 7	3 4	1 9
Girth of horn at base.....	1 6	1 11	1 5
Nape to root of tail, straight.....	7 5 $\frac{1}{2}$	7 10	6 10 $\frac{1}{2}$
Girth of fore leg near chest .....	2 8 $\frac{1}{2}$	3 0 $\frac{1}{4}$	2 4
Total length from upper lip over fore- head to tip of tail, following curve of hump and dorsal ridge .....	14 0	14 0	13 3

The ears of No. 1 were much torn and split, and the tips of the horns had disappeared altogether. Those of Nos. 2 and 3 were perfect, as were their horns also.

## THE VOICE-REGISTERS OF BIRDS.

BY CHARLES A. WITCHELL.

MUSICIANS have distinguished several ranges of tone in human voices, and, with the object of rendering vocalization even and harmonious, teachers of singing have always laboured to smooth out these breaks or cracks in the voice. Although some teachers deny that these breaks are natural, and contend that they are due to a vitiated style of singing, the breaks are very noticeable in the passionate crying of a baby, and therefore must be considered as quite natural. The most distinct breaks in adult voices are to be found in basses and contraltos, whose deep song notes are widely different from their alto and soprano notes. The jodelling with which lads in the street sometimes amuse themselves very clearly illustrates this subject.

My present purpose is to draw attention to a seemingly analogous break in the voices of many birds. The subject is difficult to discuss, but not, I believe, devoid of scientific value. Perhaps the most obvious break in a bird-voice occurs in the Goose, whose discordant cries strongly suggest the first attempt of a person to play a clarionet. In man the upper register is merely the survival of the child's voice, but it is very difficult to determine whether the same survival of the infantile voice occurs in birds' songs, for half-grown birds rarely sing. It must at the same time be observed that the first songs of young Blackbirds and Thrushes are much like the high squeaky notes to which the voices of the adults often change abruptly from the full song.

In some birds we hear what may be termed the "chest voice" (corresponding, say, to our contralto and bass), and a "head voice" (analogous to our alto and soprano). The Blackbird affords the commonest instance. Its song consists of a few full whistled notes (the number increases as the season advances), never slurred from one to the other; and these, in every successive phrase, are immediately succeeded by some harsh squealing

toneless notes, to which the voice breaks from the song. It is suggestive of what would be heard if one of our rich basses concluded every phrase by jodelling hysterically, like a Swiss. The same incident is very noticeable in the Mistle Thrush, whose very brief snatches of full-toned song (consisting of from two to four or five notes) are followed by a few high discordant sounds. In the Common Thrush this break hardly ever occurs as distinctly as in the Blackbird; but, whereas in the Blackbird the sounds are never given except after the full notes, in the Thrush they may constitute the entirety of several successive phrases; and this is especially the case when two Thrushes are about to fight.

In the Nightingale the terminal break in the voice is reduced to an occasional very brief high note. Bechstein observed this, and has carefully rendered it in a very good syllabification of the bird's song, from which the following is an extract:—

“*Tio, tio, tio tix.*

*Tzu, tzu, tzu tzi.*

*Dzorre, dzorre, hi.”*

This little final note is never repeated or prolonged.

The Blackcap has distinct “falsetto” notes, which precede the full notes and never follow them. I have heard the Blackcap in September uttering a little song of the false notes, without any of the usual full notes.

The Lesser Whitethroat, like the Blackcap, commences its song with harsh notes; and the succeeding full tones, lacking the variety of the Blackcap's warble, are given at one pitch, and form a strain like that of the Cirl Bunting, but more musical.

In the Willow Wren there is a rapid succession of high notes at the beginning of the song, quite distinct from the immediately succeeding sweet full tones. The initial notes are given at about the same pitch. There is never one of these false or harsh notes at the end of the song.

The Robin and Starling seem not to revert to infantile cries in song, except that the former, in August and September, makes great use of the call-note and of the “distress-note,” and sometimes forms brief phrases of these cries only. In September the young Thrushes twitter a good deal, but even at this season they sometimes utter full notes. In mid-September last I heard three Thrushes, near Eltham, singing a few very full notes. Similarly,

early in October, near Stroud, a Blackbird was singing softly, but in a full deep voice; and in the middle of the month a Mistle Thrush near Eltham was singing very loud phrases of two notes each.

In the Finches the song generally follows a definite course in which several breaks of tone may occur, as in the Greenfinch and Linnet.

In the Yellow Bunting there are two high final notes quite distinct from the other part of the song, and never uttered except at the end of the song. Are they a survival or an acquisition?

I have no evidence that among wild birds the songs of the females have most resemblance to the immature warblings of the young. The female Starling, which I have often heard, sings in much the manner of her mate, but less loudly. In most races the infantile cries are abandoned as the birds approach maturity, as in the *Columbidæ*, whose squeaky notes are not heard from the adults. In the common Shellduck is a survival of the peeting, whistling cry of the young; while in other common Ducks this cry of infancy is lost when the birds attain their full size.

## STRIDULATION IN SOME AFRICAN SPIDERS.

By R. I. Pocock, of the British Museum.

To most readers of 'The Zoologist' the Spiders which form the subject-matter of the following pages are probably best known by the comprehensive title "Mygale," a term which was applied to the group of which they are members in the first decade of this century, and has been almost up to the present time universally adopted for them by the compilers of text-books, and the writers of articles on popular natural history. They are also sometimes called Crab-Spiders, presumably from the great size to which most of the species attain; sometimes Bird-eating Spiders, from their alleged propensity for capturing and devouring small birds, a propensity which suggested to Lamarck the generic term *Avicularia*, still in use for one of the South American genera. But during the last fifty years our knowledge of this group has increased by leaps and bounds; the genus has expanded into a family, represented by numbers of genera which are rapidly becoming more and more accurately defined and classified.

Apart from their large size and usually heavy build, these Spiders, referred to a family variously termed *Mygalidæ*, *Theraphosidæ*, and *Aviculariidæ*, may be recognized from the vast majority of other Spiders by possessing two pairs of lung-sacs, and by the circumstance that the mandibles or jaws project horizontally forwards; while the fang closes almost longitudinally backwards.

So far as habits are concerned, it may be added that none of the species spread nets for the capture of prey. Most of them live on the ground beneath stones, or in deep burrows which they excavate in the soil, and line with a layer of tough silk to prevent the infall of loose particles of earth or sand. At nightfall the Spiders may be seen watching at the entrance of their burrows for passing insects, and during the breeding season the females



are to be found at its further extremity mounting guard over their egg-cocoon. Other species again live in trees, and spin a silken domicile either between forked branches or in the hollow trunk, or in large leaves rolled up for the purpose. There is no doubt that their food consists almost wholly of insects of various kinds. Nevertheless cases are on record of the destruction of small reptiles, mammals, and birds by these monstrous Spiders.

The discovery of stridulatory organs in the members of this family dates back to the year 1876, when Prof. Wood-Mason came across one in an Assamese species now known as *Musagetes stridulans*. Since that year organs like that which he described have been found, not merely in the solitary species as he and most of his successors appear to have thought would be the case, but in a great number of genera ranging from India to Queensland. For the proper comprehension, however, of the mechanism of this and the other organs of like nature described in this paper, it is necessary to add a few words in explanation of a spider's external anatomy. The fore part of the body, the part namely that lies in front of the waist, and is termed the cephalo-thorax, is furnished with six pairs of appendages arranged radially round its margin. The first appendage on each side, known as the mandible, consists of a short stout basal segment, covered above with hair and furnished below with a thick fringe of bristles, called, from its proximity to the mouth, the oral fringe (Fig. 1, c). Articulated to the tip of this basal segment is the second segment, modified to form a long stout pointed fang (Fig. 1, a). Behind the mandible on each side comes a short leg-like appendage called the palp, and consisting of six segments, of which the basal is usually termed the maxilla, from its function as a chewing organ. Its inner surface is furnished above with a suture, and below with an oral fringe (Fig. 2, B). Following the palp are the four walking legs, each of which is composed of seven segments, the basal being known as the coxa, and the second, like the second segment of the palp, as the trochanter.

Now these appendages are so arranged that their coxæ, and to a lesser extent their trochanters, are in contact with the corresponding segments of the appendage in front or behind; so that when a limb is raised upwards the adjacent surfaces of the segments in question slide over one another. These surfaces

therefore are areas favourable for the development of stridulating organs; for in the great majority of cases—the Cicada, by the way, being a notable exception—stridulation in the articulated animals results from the friction of two mutually roughened adjacent chitinous areas.

Strictly speaking, however, this is not the case with the stridulating organs that have been found in the Spiders now under discussion; for in all cases these organs consist of modified bristles. In the Oriental members of the family two such organs exist, namely, the one discovered by Wood-Mason, and another discovered by myself in several more genera.\* In both cases the organ lies between the outer surface of the mandible and the inner surface of the maxilla—the basal segment of the palp; and each consists of a set of vibratile bristles, which are set a-twanging by a series of spines. But whereas in Wood-Mason's instrument the vibratile bristles or notes are placed on the maxilla, and the spines or scraper on the mandible, exactly the opposite obtains in the other instrument, the notes being on the mandible and the scraper on the maxilla.

In some of the African *Theraphosidæ* I have also had the good fortune to discover two stridulating organs, which are not only quite different from each other, but also quite different from those possessed by the genera inhabiting Tropical Asia. One of these organs occurs in the genus *Harpactira*, the common "Mygale" of Cape Colony. It occupies the same position as the analogous organs existing in the Oriental species, being situated between the mandible and the maxilla. A glance at Fig. 1 will show the construction of the organ. The outer surface of the mandible (A) is furnished with a large pad of feathery hairs (b), and on the area between this pad and the oral fringe (c) are two sets of bristles, both of which, judging from their colour and structure, originally formed part of the oral fringe, and have been derived from it. Those of the upper series are long, and have their free ends bent over and more or less interlacing with each other. Those of the lower series are less regularly arranged. In the species figured they are short and spiniform; but in some allied forms they are much less distinctly differentiated from the

\* For descriptions and figures of these instruments, see 'Natural Science,' vi. pp. 44-50, 1895.

adjacent hairs of the oral fringe, being longer and more bristle-like, as, for example, in *H. tigrina*. These two rows of bristles are evidently designed to catch against and shake the tips of the long feathery bristles which rise up amongst the hairs clothing the area upon the maxilla between the suture (Fig. 1, B, *d*) and the oral fringe (B, *e*).

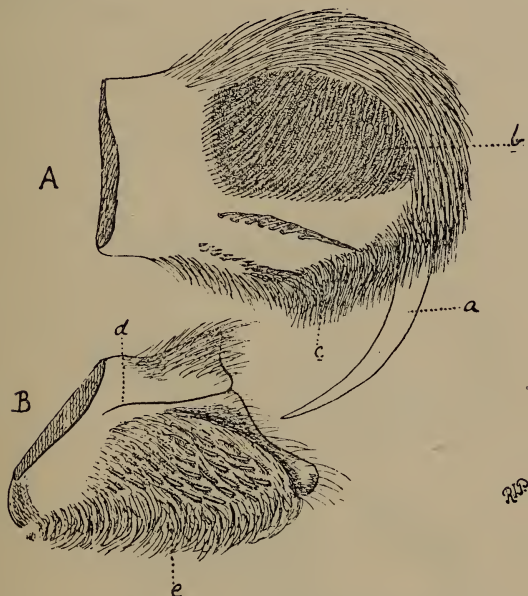


FIG. 1.—Stridulating organ of *Harpactira chrysogaster*.

A. Outer surface of mandible, showing *a*, fang; *b*, pad of feathery hairs; *c*, oral fringe and two rows of modified bristles between the pad and the fringe.

B. Inner surface of maxilla, showing the cluster of plumose bristles between the suture *d* and the oral fringe *e*.

Structurally, this organ, characteristic of *Harpactira*, calls to mind the organ possessed by the Oriental genera *Citharognathus*, *Phormingochilus*, &c. In these, too, the outer surface of the mandible is furnished with a pad of feathery hairs, and the notes or vibrating bristles are also plumose; they are not, however, situated on the maxilla, as in *Harpactira*, but upon the mandible, and result merely from the enlargement of a few of the hairs of the feathery pad.

The next organ to be described, though resembling the others in principle, differs entirely in position. Instead of being lodged

between the mandible and maxilla, it is lodged between the palp and the first leg. It has been found in several genera (*Hystero-crates*, *Phoneyusa*, &c.), ranging all over Central Africa, from Old Calabar and the Congo on the west, to Masailand on the east; and also in genera met with in Socotra and Madagascar. If a leg of the first pair in any of these genera be detached, it may be noticed that there is a fringe of hairs bordering the front edge of the upper surface of the first and second segments (coxa and trochanter). On the coxa immediately beneath this fringe, and partially buried in it, there are one or two long stout clavate spines, and some smaller ones as well (Fig. 2, A, a). On the

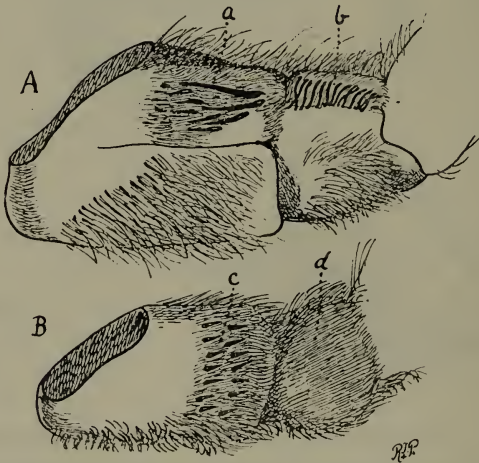


FIG. 2.—Stridulating organ of *Phoneyusa* sp.

A. Anterior surface of first and second segments of leg of first pair, with club-shaped bristles *a* on coxa and row of erect spines *b* on trochanter.

B. Posterior surface of first and second segments of palp, with rows of short spines *c* on maxilla and rigid brush-like bristles *d* on trochanter.

trochanter there is beneath the fringe a series of upstanding long curved spines (Fig. 2, A, *b*). When the limb is at rest in its normal position the front surface of these two segments are closely in contact with the posterior surface of the corresponding segments of the palp. It is here therefore that the remainder of the organ is found. It consists of a couple of irregular rows of spines on the basal segment (Fig. 2, B, *c*), and of a thick brush of very fine but stiff bristles upon the trochanter (Fig. 2, B, *d*). When the Spider is allowed to dry after removal from alcohol a

distinct stridulation may be easily produced artificially by rubbing the leg and palp together, the long "notes" on the coxa of the first leg giving rise to a distinct "click, click" when scraped against the spines on the maxilla; while the spines on the trochanter of the first leg, when rubbed against the stiff brush of hairs on the trochanter of the palp, gives out a sound resembling the rustling of a silk dress.

But what is to be said respecting the function of these organs, and what evidence, it may be asked, can be adduced in support of the view that they subserve stridulation? To this question the answer must be that so far as the African species are concerned there is no direct evidence based upon observation of the living animal to show what part they play in the Spider's economy. But that their true and probably sole function is the emission of sound, as has been claimed in the preceding pages, is so strongly supported as to reach practical certainty from what is known of the function of the analogous organ detected by Wood-Mason in the Assamese genus *Musagetes*.

Mr. Peal, it appears, was the first to notice the phenomenon. His gardener, while engaged in digging up a field, unearthed one of these great Spiders, and, not being a collector, naturally enough proceeded to strike at it with his hoe, with the object of ridding the world of such vermin. Thereupon the Spider raised itself upon its two pairs of hind legs, brandished the two remaining pairs in the air, opened its jaws, and waved its palpi up and down, scraping the basal segment to and fro against the outer surface of the mandible, and emitting a sound subsequently described by Wood-Mason as resembling that produced by rapidly dropping shot on a china plate. Fortunately Mr. Peal rescued this historic Spider from the gardener, and afterwards had the satisfaction of seeing it repeat the performance when attacked by a cat. In confirmation of this story, it may be added that Mr. E. W. Pickard-Cambridge told me recently, in course of conversation, that one day, when leaving his bungalow at Coremia in Assam, he met one of these Spiders coming up the steps, and on his approach the beast reared itself up, waved its legs, and hissed at him. And lastly, Prof. Baldwin-Spencer has made similar observations upon an allied genus *Phlogius*, observed by him in Australia, his account being accompanied by a beauti-

fully executed illustration of the organ by which the sound is produced.\*

From the knowledge thus supplied touching the function of the instrument in the Spiders just mentioned, one is perfectly justified in concluding that organs constructed upon the same principle, and occupying the same or similar positions, will in all probability be found to perform the same office; and no further basis need be sought for the belief that the African Spiders, *Harpactira* and *Phoneyusa*, and their allies, can stridulate as well as their Oriental relations.

Two other little points connected with the organs may here be mentioned. These are the fringes of hair surmounting the "notes" or vibrating bristles on the leg in *Phoneyusa*, and the pad of hair above the two series of bristles on the mandible of *Harpactira*. From the position of these hair-tufts it may be inferred that they serve to keep the bristles below them free from dirt, which would of course seriously interfere with the performance of their function.

What now is the use to the Spider of the sounds that these organs give forth? It has been suggested that, like the call of the Cicada and the chirrup of the Cricket, they have a sexual significance, and serve to inform one sex of the whereabouts of the other. This belief, however, has no foundation in fact; for, in the first place, there is not a particle of evidence that these Spiders possess an auditory sense; and, in the second place, these stridulatory organs are equally well developed in the males and females, and are not, like the sexual stridulating organs known in other groups, confined to the male, or at all events better developed in that sex than in the female. Moreover, they appear in the young at an early age, and become functionally perfected long before the attainment of sexual maturity. So the supposition that they act as a sexual signal may be regarded as unsupported by evidence.

As a matter of fact, the true key to their function is supplied by the behaviour of the living Spiders. From the accounts above quoted from Mr. Peal and Mr. Cambridge, it is evident that the Spiders emit the sound when on their defence and acting

\* Rep. Horn Exped. pt. ii. Zoology, pp. 412-414, pl. xxviii.

under the stimulus of fear or anger, in exactly the same way as the Rattlesnake makes use of its rattle. So far as I am aware, the only explanation that has been suggested touching the function of the snake's rattle is that it serves as an advertisement of the whereabouts of the poisonous reptile, so that it may be avoided by enemies which might otherwise inadvertently injure it. Similarly poisonous and noxious insects are decked with warning colours, so that they may be readily recognized and not slain in mistake for harmless or edible species. If this be the true explanation of the so-called warning coloration of the insects in question, and of the whirring noise made by the Rattlesnake, there seems to be no reason to doubt that the same significance is to be attached to the stridulation emitted by the peculiar organs recently discovered in the great African Spiders and described in the preceding pages.

## NOTES AND QUERIES.

## MAMMALIA.

## CARNIVORA.

**Polecat in Suffolk.**—On Dec. 21st I received as a present a fine specimen of *Mustela putorius*, killed a day or two previously in or near Mildenhall Fen, which is in the north-western corner of this county. The fur was in beautiful order, and when skinning and setting up the animal I was surprised at the almost entire absence of any unpleasant smell. In our neighbourhood these animals are now very rare, but they still exist in some numbers in the fen country, where the voles, frogs, and eels provide them with an abundance of prey. 'The Zoologist' for 1888 (pp. 183, 221) contains some interesting information on the subject of Suffolk Polecats.—**JULIAN G. TUCK** (Tostock Rectory, Bury St. Edmunds, Suffolk).

## RODENTIA.

**The Indian Hispid Hare (*Lepus hispidus*).**—This somewhat rare and but little known rodent is fairly plentiful in the Dooars, along the base of the Bhootan Hills, and I have seen them near the banks of the Brahmapootra river below Dhoobri. Its general colour is dark or iron grey, with an unbrowned ruddy tinge. Limbs and body shaded externally with black, the tail rufescent both above and below; the inner fur short, soft, downy, of an ashy hue; the outer longer, hispid, harsh, and bristly, some of the hairs annulated, black and yellow-brown, others pure black and longer, the wholly black hairs more abundant than the lighter ones. The ears are very short and broad. Length: head and body,  $19\frac{1}{2}$  in.; tail,  $2\frac{3}{8}$  in.; ear,  $2\frac{3}{4}$  in. This curious Hare is of a very dark hue, of a heavy make, and Rabbit-like appearance, with small eyes, short and stout limbs, and short whiskers. It is often called the Black Rabbit at Dacca, and the shikaries declare that at times it burrows like the ordinary "bunny." It frequents jungly places, long grass, bamboos, &c., shunning observation, and, from its retired habits is very difficult to observe and obtain. The flesh is white. I generally shot one or two each trip that I made into the Dooars, and occasionally they were for sale in the bazaar in Dacca, having been trapped by native shikaries. The natives assert that it brings forth as many as six at birth. Like the Rabbit, when this Hare is shot its bladder should be emptied at



once, or the flesh is apt to get tainted.—F. T. POLLOK (Eversal, Luton Road, Harpenden).

## A V E S.

**Pale-coloured Dipper.**—On Dec. 12th, 1897, I saw a Dipper (*Cinclus aquaticus*) with the white coloration extending from the breast right up over the eyes and down the back of the neck as far as the shoulders. I was within twelve feet of the bird for upwards of three minutes, so that I had every opportunity of making quite sure of the extent of the pale coloration. Is not this a very rare variety?—WM. BOULSOVER (Ferndale, Bakewell).

[It may have been a young bird, which has more white than the adult.—ED.]

**Experiments on the Colours of the Nonpareil Finch.**—My Nonpareil Finch (*Cyanospiza ciris*), mentioned in 'The Zoologist' (1897, p. 273), continuing in good health, I endeavoured last autumn, by special diet, to restore the scarlet colour of the breast, which had only been lost a few months before. Stage of moult on commencing experiment, Sept. 6th: feathers of head partly moulted, a few new feathers still in their sheaths over eyes, on the cheeks, and nape of neck; upper tail-coverts all shed, except a single feather; rectrices all gone; moult of breast and under tail-coverts commencing. The chief point of the new diet was the increase of animal food. On reference to my diary I find that in addition to seed the bird had fresh food, comprising cockroaches, bluebottles, house-flies, spiders, and "harvestmen"; also plenty of dried ants' eggs. Perhaps the food was too abundant, as the bird, which often fed from the hand, on one occasion refused some flies offered to it. When the experiment had been carried on for about three weeks new feathers began to appear on the breast, but unfortunately these were yellow. The yellow feathers rapidly increased in number, but I noted that, though the colours of my bird were again partly abnormal, there was no fading in the brightness of these colours, as is often said to occur in captive Nonpareils. When visiting the Liverpool Museum, on students' day, I carefully examined a wild specimen preserved there. I have also examined a normal live Nonpareil in the aviary of the Manchester Zoological Gardens. As compared with these, my bird differs in having the under parts yellow, with a distinct green tinge; circumorbital feathers pale yellow; upper part of breast yellow with orange tinge. Research on the original scarlet feathers of this bird, carefully put aside last year for the purpose, has thrown little light on the nature of the pigment; I do not think, however, it is the coloured fatty oil zoonerythrin, as it is insoluble on boiling with absolute alcohol. In conclusion, I must express my thanks to Dr. Butler for his kind suggestions regarding food, &c., and regret that I was unable to keep the bird in an open-air aviary during the experiment.—GRAHAM RENSHAW (Sale Bridge House, Sale, Manchester).

Brood of Young Starlings in mid-November.—We have had many instances recorded of the unusual mildness of the last autumn. It will perhaps be interesting to state that during a walk on Nov. 14th I saw a family party of Starlings (*Sturnus vulgaris*), the young in the slate-coloured plumage of the nestling stage, in a meadow at King's Heath.—F. COBURN (Holloway Head, Birmingham).

Common Roller in Sussex.—A second specimen of *Coracias garrulus* was shot at Catsfield, near Battle, on Oct. 12th. It is a male, and a much brighter bird than the one I recorded in the last volume of 'The Zoologist' (p. 469). The man who secured the hen bird says that he believes that there is still another one in the neighborhood. Mr. Bristow, taxidermist, of St. Leonards, has had the two birds through his hands for preservation.—GEORGE W. BRADSHAW (Hastings).

Montagu's Harrier breeding in Ireland. Correction.—I am sorry to have to correct the statement I made in 'The Zoologist' (1897, p. 467). The specimen of the supposed *Circus cinerascens* shot in Co. Kerry has again been examined by Dr. Sharpe, and he has after all pronounced it to be only a young cock Hen Harrier.—JOHN H. TEESDALE (St. Margaret's, West Dulwich).

Nesting of the Hobby in Hants.—I have much pleasure in recording the fact of *Falco subbuteo* having nested last year in Hampshire, although I do not suppose that this is the first instance of its having bred in that particular county. A farmer's lad took three young birds from a Crow's nest near Basingstoke, some time during the nesting season, and sold them to my friend Mr. Blaine. Only one of the birds was a male. My friend purchased the Hawks with the object of training them for falconry. They arrived at his home in Bath safely enough, but after he had kept them for a short time one of the females escaped. I believe it had the "jesses" on when it got away. The other two birds he kept in a large room with a female Merlin, which is trained to fly at Larks. One sad day the Merlin and the remaining female Hobby set upon and devoured the little male Hobby, which was by far the tamest of the lot. I saw two of these Hobbies soon after my friend received them, and was much struck with the beauty of their plumage and graceful pose.—C. B. HORSBRUGH (Richmond Hill, Bath).

Brent Goose in Warwickshire.—On Nov. 6th, 1897, an adult male example of *Bernicla brenta* was shot at Earlswood, Warwickshire, and forwarded to me. This is the first record I have of this bird for Warwickshire, although each of the neighbouring counties has recorded it.—F. COBURN (Holloway Head, Birmingham).

Ferruginous Duck in Ireland.—On Nov. 27th, 1897, I purchased, in our Market Hall, a young male example of *Fuligula nyroca*, which I was assured—and I have no reason to doubt the accuracy of the statement—was received with Mallard and other produce from the South of Ireland. But the dealer could not say which county it came from, as consignments were constantly received both from Limerick and Dublin, and these being indiscriminately mixed, it was impossible to distinguish this bird from the other small Ducks they had. It was fortunate I detected it, among a bundle of other Ducks, when I did, as it would certainly have been plucked the same night.—F. COBURN (7, Holloway Head, Birmingham).

Corncrake in December.—It may be worth mentioning that I have received a specimen of *Crex pratensis*, shot last Dec. 2nd in Scotland.—F. COBURN (7, Holloway Head, Birmingham).

Pectoral Sandpiper in Norfolk.—While punting on Breydon, Norfolk, on Aug. 18th, 1897, with my brother, we procured a female Pectoral Sandpiper (*Tringa maculata*). It was near the mouth of the large dyke known as the "Ship Run," and was in company with some Ring Plovers and Dunlins. The whole flock rose, and we killed several. The Sandpiper remained on the flats alone, and on being flushed flew very fast and low, making no noise whatever, and was secured by my brother. It is an adult female, and shows the arrow pencillings on the breast. In measurement it is slightly less than the Caister specimen in the Norwich Museum. Through the kindness of Prof. Newton I have been able to compare it with a set of skins, both of *T. maculata* and *T. acuminata*, and am convinced that my bird belongs to the American race.—J. L. NEWMAN (62, Jesus Lane, Cambridge).

Variety of the Common Guillemot.—A beautiful variety of *Uria troile* was caught on Dec. 4th in Scarborough Harbour. Its entire under parts and head are white, whilst its back and wings are of a whity-brown colour, and its bill, feet, and legs yellowish white. A bird of this description is extremely rare. A similar one was obtained a few years ago at Filey. The writer has visited Speeton Cliffs for many years during the breeding season, and amongst the vast numbers of birds which annually resort there for breeding purposes has never seen but one creamy-coloured Guillemot. The bird in question was placed in my hands for preservation.—J. MORLEY (King Street, Scarborough).

On the reported Summer Appearance of two Species of Birds in Lapland.—In 'The Zoologist' (1897, p. 498) is a narrative of a walk across Finmarken by Messrs. Playne and Wollaston. The authors state that on a small lake not far from Alten they saw a specimen of *Bernicla*

*brenta* with five young birds; and on a small pool of shallow water at Kautokeino found three *Phalaropus fulicarius*. Are they sure that the identification should not be *Anser erythropus* and *Phalaropus hyperboreus*, as neither of the first-named species are known to occur on the European continent as summer breeders? The question is one of considerable interest both to me and to ornithologists generally. If no mistake has been made these observations are of great value. All the other species which they saw are known as Finmark birds. It may be that the three Phalaropes were really *fulicarius*, either young (not breeding) or already on migration.—R. COLLETT (Zoologisk Museum, Christiania).

Winter Notes from Haddiscoe.—A Swallow, and we suppose it to be the last, was busy hawking for flies in the village on November 28th. Rather more Snipe than usual have appeared with us this season on the marshes, besides some thousands of Lapwings, but Golden Plovers have been scarce. Snow Buntings are numerous, and can be seen in very large flocks. The loud whistle of a few straggling Curlews have indicated their presence. Two Whooper Swans crossed the marshes on November 29th, and a specimen of the Eider Duck was shot on Breydon mud-flats. Whilst out on the bicycle on December 5th, I noticed the fir-trees at Herringfleet literally swarming with Gold-crested Wrens; I also heard the note of the Little Spotted Woodpecker, and observed Jays to be fairly common in woods; several Tree Creepers likewise attracted my attention. At Ashby I rode up close to a fine specimen of a White House Sparrow. I have seen three White Sparrows during the last six months, and have also an account of two residing at the railway-station at Great Yarmouth. This variety seems to be locally on the increase at the east end of Fritton Lake, near the decoyman's house. I found a large number of Mallards, Wigeons, Teal, Coots, and Moorhens, resting on the water, seemingly enjoying themselves within a few paces of the deadly decoy-pipes. Whilst crossing St. Olave's Bridge I heard the scream of a Kingfisher; the bird crossed the river and perched upon a yacht. I have seen three Kingfishers lately on the marshes. Fieldfares are scarce, and Redwings less in evidence. Owing to the open weather, Herons, Moorhens, Rails, &c., are having a good time, and few wildfowl have been shot in the district. The game stalls in the market-place of Great Yarmouth exhibit some Mallards, Golden Eyes, and Tufted Ducks. Woodcocks are conspicuous by their absence. We have had a considerable number of Partridges and Pheasants, whilst Hares have also been found in plenty. The company of Pied Wagtails have been noticed daily, and a Common Redshank came quite close to me on December 15th. The Snipe have now gone further afield, as have also the majority of Lapwings. On December 22nd eight Bean Geese appeared at rather a long range, but with small shot from my small-bore gun I succeeded

in securing one which weighed 7 lb. — LAST C. FARMAN (Haddiscoe, Norfolk).

Popular Ornithological Fallacies.—Mr. W. Storrs Fox ('The Zoologist,' 1897, p. 514), writes like an honest lover of truth and an enemy to hasty deductions. But has he not tumbled headlong into the identical trap against which he warns others? Methinks so. It is a grievous blunder to generalise from a single instance. Mr. Fox says he would be "glad to know whether experienced field-naturalists consider it a 'preposterous notion' to suppose that a Lapwing may attempt to draw the attention of man or dog from her nest." It matters nothing to me, nor should I be in the slightest degree influenced by, what opinion experienced field-naturalists in general may hold on the subject; it is sufficient that I never said what is so specifically attributed to me—*was* a preposterous notion. Mr. Fox continues:—"Ten years ago last May I came suddenly upon a sitting Lapwing. She rose hurriedly from her nest, and tumbled along the ground, as if she could neither fly nor run." Then follows a little literary *plaisanterie*, in which Mr. Fox invokes a very remote and far-fetched contingency, but which is obviously clearly intended to embody his own incredulity. It would be affectation on my part to take this seriously.

Now I, too, have had similar experiences as the one recorded by Mr. Fox, but they are unquestionably the exception. What I wrote in the October issue of 'The Zoologist' was, that it was a preposterous notion to suppose, that "sitting Lapwings (that is, females)"—note the use of the plural number, please—"decoy intruders from their nests by their devices." And so I say again. I had in my mind the usual habits of the species when disturbed from their nests under ordinary circumstances; not the unusual mode of procedure induced by the fact of a sitting bird having been come upon "suddenly" and unawares. My *ipsissima verba*, "sitting Lapwings," surely imply that eggs were in my thoughts, not young birds. When the eggs are hatched, vastly different tactics prevail; both parents are then assiduous in their clamorous endeavours to draw intruders away from where the young are ambushed.

It is notorious that in olden days the great majority of writers on Ornithology were wholly at fault in the conclusions they had formed on the point at issue. Even Seebohm, whose loss we all so deeply deplore, was prompted to write that the old bird, having glided stealthily off the nest, rose in the air, "to flutter recklessly above the intruder's head." Only a few years ago, through my initiation, the nesting habits of the Lapwing were made the subject of an interesting correspondence in the 'Field.' Mr. F. Boyes, of Beverley, amongst others, entirely agreed with me that Selby alone, of the various authorities then referred to, had hit the true nail on the head. Let us hear Selby:—"The female birds invariably, upon

being disturbed, run from the eggs, and then fly near to the ground for a short distance, without uttering any alarm-cry. The males, on the contrary are very clamorous, and fly round the intruder, endeavouring by various instinctive arts to divert his attention." Quite true. The solitary flaw, to my thinking, in the paragraph I have reproduced, is the introduction of the word "invariably." There is no rule without an exception, it is said. Still, it is manifest to me that Selby took his description from the birds themselves in their nesting haunts. The question of Ducks quitting their young and flapping along the water in front of an intruder has no bearing whatsoever on the points involved. Eggs are one thing; young birds another. In the case of the latter, the maternal affection is infinitely stronger. I have stroked a Partridge sitting on her nest; she seemed not at all disconcerted. I have also walked suddenly on to the top of a brood of "cheepers," and been furiously attacked, after a fashion, by the old bird—the female. It is frequently only when cunning is at a discount that birds and animals have recourse to strategy of another kind.

I, too, have picked up Swifts and tossed them into the air—so long ago, alas! as the summer of 1865; but this in nowise affects or discredits my original contention—that tens of thousands of people are under the impression that Swifts can *not* rise from the ground,—any more than does the fact of Mr. Fox having ten years ago found an individual Lapwing doing only what I should have expected it to do under somewhat novel circumstances, invalidate what I said on the subject of that species being the medium of a popular fallacy.—H. S. DAVENPORT (Ormandyne, Melton Mowbray).

#### PISCES.

Notes from Scarborough.—Whilst Codling fishing off Filey Brig on October 10th, 1897, I found in the stomach of one of my captures a Pogge, or Armed Bullhead (*Agonus cataphractus*). This is, I believe, a common fish in many places, but is only the second time it has come under my notice in the Scarborough district.\* During the heavy sea which prevailed during November 6th and 7th, a Garfish (*Belone vulgaris*) was picked up on the North Sands, and a living example of the Lesser Forkbeard or Tadpole-fish (*Raniceps trifurcus*) was also stranded. It was unfortunately mutilated by some lads before I obtained possession of it.—W. J. CLARKE (44, Huntriss Row, Scarborough).

\* Abundant off Great Yarmouth ('Zoologist,' 1897, p. 546).

## INSECTA.

Spider versus Wasp.—In 'The Zoologist' (1897, p. 476), just to hand, I find an interesting note by the Editor on the above subject, and it may therefore be useful to submit a little further evidence. So far as my experience in South Africa goes the balance is undoubtedly in favour of the Wasp. On three occasions I have been fortunate enough to observe a very large black Pompilid stocking its burrow with the body of a huge Mygaloid Spider. In two instances the Spider had already been vanquished by its powerful and active foe, and was being dragged off in a comatose condition for interment. Its weight must have been at least three times that of the Wasp, which was unable to lift it more than half an inch from the ground, progressing thus in short flying leaps, though more frequently the Spider was dragged along, the Wasp running backwards, and buzzing loudly and triumphantly all the while. An interesting feature of the performance was the manner in which the Pompilid managed to find its burrow. In one of the instances I measured the distance traversed, which amounted to no less than thirty yards. When first observed the Wasp was in a narrow footpath, but it shortly left this and entered the grass, which was then some six or eight inches high—a veritable forest in proportion to the insect; through all the denser parts it travelled *backwards*, dragging its prey over or around innumerable obstacles without any hesitation right to its hole, for which it did not have to search in any way. When the method of progression, the distance travelled, and the impediments encountered be taken into consideration, the directness of the course it took after leaving the path seemed little short of marvellous. The third case referred to was perhaps more interesting in that the contest had not concluded when I came upon the scene. The arena was an open roadway, and my attention was attracted at some distance by the movements and angry buzzing of the Wasp. On reaching the spot I found a monster Spider at bay in the middle of the road, with cephalo-thorax erect and the two anterior pairs of thick hairy legs uplifted, ready to strike at a moment's notice; he looked the very embodiment of envenomed rage. Round him circled his implacable enemy, stooping now and then hawk-like in its endeavours to sting his unprotected abdomen, but swerving off again as, quick as thought, the "Mygale" faced round in self-protection. This feinting and parrying would continue for a few moments, when the Wasp would settle on the ground a little way off, running backwards and forwards with its quick jerky gait, and rapidly flirting its black glossy wings, after the manner of its kind—all typical marauders. During these intervals the Spider sat crouched, up, apparently in terror, awaiting the next onslaught, though once he made an attempt to gain the shelter of a neighbouring plant; the insect, however, drove him back towards the open by

feigned attacks from that direction. The general attitude of the "Mygale" was clearly one of defence, for only twice did he attempt any determined attack on his sable foe, and then in vain, for quick though he was the Wasp was quicker. At last the latter, in one of its circling flights, made the fatal swoop. Then for the space of a second all I could see was a whirling jumble of Spider and Wasp, which ended by the latter shooting several feet up into the air, and then flying off to a little distance, where it sat cleaning its legs and antennæ and smoothing its ruffled wings. A glance at the Spider was sufficient to show who had come off best in the tussle, for it stood there dejected and quivering; the powerful sting had evidently had its effect. A few minutes later the Wasp made a second attack, and was resisted much more feebly by the Spider, which soon afterwards became sufficiently lethargic to enable the Wasp to seize him with impunity and insert the requisite amount of poison. Here I intervened, and, under protest from the Wasp, took possession of the Spider, which is now in the British Museum Collection.

That the conflicts between these two creatures always end in this manner I strongly doubt, but that they do so in the majority of cases seems evident, for otherwise these giant *Pompilidæ* would cease to use such powerful Spiders as food for their young through the all-compelling agency of Natural Selection. There are several species of Mason-Wasps in South-East Africa which stock their cells with Spiders, but one in particular is thoroughly familiar to all residents from its predilection for building its mud-cells in human dwellings. It is an elegant insect, with its black thorax and abdomen and very long thin yellow waist, but it is an unmitigated nuisance at times, as, for instance, in the case of a friend of mine, who was continually having his American organ deranged by the persistent efforts of one of these insects to use its interior as a nursery. It is perhaps worth noting that this species does not always build external mud-cells, but sometimes bores holes in mud-walls, &c., instead, as I have observed on several occasions, and particularly when living in an "adobe" house in Natal, the walls of which were riddled by these Wasps; and it was an unpleasantly frequent occurrence to have a stupified Spider dropped into one's plate or cup whilst at meals by a startled insect. The Mason-Wasps content themselves with much smaller fry than their relatives mentioned above, and I have frequently noticed that the species which they specially patronize are all dully or else protectively coloured, and for the most part retiring creatures, which hide themselves away in nooks and crannies of foliage, &c. The complete absence of any of the brightly coloured Spiders which sit conspicuously in their webs during the day, such as *Nephile*, *Argiope*, *Gasteracantha*, &c., leads me to believe that these latter are protected by the possession of some distasteful or unwhole-



some qualities. Particular Wasps seem to prefer particular Spiders, and in nearly all the nests I have examined there has been a marked preponderance of one species. The favourite species varies of course in different districts, but there seems further to be a certain amount of individual preference.

With regard to the other side of the picture, I have seen much fewer cases. The most daring Spiders that have come under my notice are the protectively coloured crab-like species which frequent flower-heads, and I have not unfrequently seen them engaged in sucking various small species of stinging Hymenoptera, which they seem almost always to seize by the neck between the head and thorax; but these Spiders themselves frequently fall a prey to the larger Mason-Wasps. Among the web-Spiders, I have seen Hymenoptera most often eaten by the curious little Sociable Spider, which lives in societies, forming a thickly felted nest varying in size from that of a cricket-ball to a man's head, and traversed throughout by intersecting galleries, being surrounded on all sides by an irregular and sometimes far-reaching snare. In this case, however, the Wasp is caught in the highly glutinous web during the day, and struggles on till sundown, when at last the Spiders emerge; three or four of them set on him, and with a quick bite here and a bite there soon despatch him in his tired state, and the body is then dragged off to the nest to be discussed; for these Spiders do not enshroud their victims. The Sociable Spiders feed principally on crepuscular beetles (*Melelonthidæ* for the most part), but I have found many different and unlooked-for insects in their webs, such as large *Mylabridæ*, migratory locusts, &c., all of which had been eaten.

In experiments I have made in putting Wasps into the webs of a species of *Nephile*, the Spider has either beat a hasty retreat to its lair or else promptly cut the intruder loose. Indeed, so far as my small experience goes, it certainly seems the exception for a web-Spider to attempt to make a meal off anything in the shape of a Wasp.—GUY A. K. MARSHALL (Salisbury, Mashunaland).

## NOTICES OF NEW BOOKS.

*With Nature and a Camera.* By RICHARD KEARTON, F.Z.S.  
Illustrated by 180 Pictures from Photographs by CHERRY  
KEARTON. Cassell & Company Limited.

THIS is one of those delightful books which, though on the border land of science, can be read by the naturalist with pleasure and instruction, and will arouse the jaded appetite of the general reader. It is the record by two naturalists—for we can scarcely choose between the one who writes so well, and the brother who photographs so fearlessly—of “adventures and observations whilst wandering up and down the British Isles in search of subjects for our camera and note-book.”

Photography is now becoming a valuable adjunct to zoology, and a new weapon for the collector and field naturalist. To obtain an exact reflection of a bird in its natural pose or in some little known attitude, to portray the nest in its natural surroundings and with the incubator in position, is surely more to be desired than the effigies which can so often be truly described as “stuffed specimens.” Whilst on the other hand such photographs will render possible the highest results in artistic taxidermy. But even more original work can now be done with the aid of a magnesium flash-light. We find on p. 233 the photograph of a Thrush at roost in a hedgerow, taken at nine o'clock on a January night, for which the authors claim, as far as they know, that it is “the first photographic study of a wild bird on its natural roost ever made.” The portrait of a Barn Owl achieved by the same means in an old barn in Essex, and a view of a red underwing moth in the act of sampling an entomologist's “sugar” from the trunk of a tree, also afford suggestion as well as interest.

The volume commences with the narrative of an expedition made to that “paradise of British ornithologists,” the island of St. Kilda. The brave and kindly inhabitants of this isolated region, so near our own shores, have an anthropological interest

of their own. "One of the civilities demanded by the etiquette of the place is that you shall shake hands with everybody you come in contact with night and morning." This practice of excessive hand-shaking seems common to simple folk who live much alone or by themselves, and recalls the same awful ordeal with the Transvaal Boers.\* "The married women are distinguished from the unmarried ones by a white frill which is worn in front of the head-shawl or handkerchief, and serves the part of a wedding-ring, which is unknown in St. Kilda." To judge from the illustration, this emblem of matrimony is not unlike the badge which widows adopt among ourselves. These St. Kilda ladies have other more universal traits, as when the minister's servant-maid "asked permission to take the hearth-rug to church by way of a shawl."

The ornithological fauna of the island may well attract both ornithologist and oologist. The claims of the St. Kilda Wren to be considered specifically distinct from the mainland bird are well set out, and photographs given of the eggs and fledglings of both birds. It would, however, be unwise to accept the ornithological lore of the natives, as Mr. Kearton was told, "in all good faith and sincerity, that Great Northern Divers make no nest at all, but hatch their single egg under their wings," in which position his informant "had himself seen a bird carrying one."

Chapter V., on "Nests, Eggs, and Young," is one of the most interesting in the book, both by its illustrations and subject-matter. Mr. Kearton is of opinion "that birds, like human beings, possess individually varying degrees of intelligence, skill, and energy, and that differences in any of these qualities are to the close observer plainly marked in the constructive character of their work." There are many illustrations of strange nesting sites; of old birds on, and young birds in, their nests; while the chapter closes with a charming vignette of a spider's web covered with hoar frost.

We have read this book with pleasure, and closed it with regret.

\* Other similar traits belonging to these widely separated and isolated peoples are their tastes for sweets, in St. Kilda "especially 'bull's-eyes' and peppermint lozenges"; while nothing delights these islanders more "(men and women alike) than to hear that the enemy is being smitten hip and thigh." The Transvaal Boer should spend a sea-side holiday at St. Kilda.

*Observations on the Coloration of Insects.* By BRUNNER VON WATTENWYL. Translated by EDWARD J. BLES, B.Sc. Leipsic: Wilhelm Engelmann.

THIS sumptuous folio production, with nine magnificently coloured plates, is a distinct challenge to the theory of Natural Selection, and being based alone on the coloration of insects, to which the author has devoted twenty years of study, the argument is much narrowed, and the area of discussion curtailed into reasonable dimension and clearly defined. As well observed in the Introduction, the consideration of the question is no longer as formulated by the old school of naturalists—"How is man benefited by this phenomenon? The new query which takes its place is: What benefit does the particular species derive from the phenomena observed in connection with it? Teleology has become democratic."

The philosophical conception which permeates most biological teaching of to-day is that all peculiarities of structure and markings are the results of the process of natural selection, by which the living creature has survived as the fittest in the struggle for existence, and that where the result cannot be justified or demonstrated by our theory, the failure is caused by our present ignorance of all the reactions of the phenomena concerned. Brunner von Wattenwyl is quite outside this plane of thought, and considers that there are "a large number of phenomena devoid of benefit, and often, indeed, burdensome, to the animals and plants concerned"; and, further, that "this fact alone is sufficient to demonstrate that the plan of creation does not strive exclusively towards perfecting a species for its own sake."

The markings and coloration of insects are distinguished under nineteen sectional plans, many of which are considered as purposeless for the benefit of the species, while contrary evidence is not discarded. Thus, section 15 is devoted to "Changes of pattern due to Adaptation," and section 18 to "Coloring in relation to Position."

From this brief summary it will not be unexpected that the author decides that: "If one, therefore, calls modification through natural selection 'Darwinism,' a new name must be introduced for the undoubtedly demonstrable occurrence of phenomena in the

whole living world which have no relation to their owners or are occasionally harmful to them, and hence are certainly not the result of selection." In fact, in the coloration of insects, "we meet with an arbitrariness striving to produce attributes without regard for their possessors, and, therefore, obviously to be looked upon as the emanation of a Will existing above the Universe."

Probably no greater service can be rendered to evolutionary speculation than by thus clearly marshalling every objection. We become nauseated by simple advocacy, which is often little more than an advertised assent. Brunner von Wattenwyl has here detailed a number of observations which he considers unexplainable by the theory of Natural Selection, and to support his own views on the subject. These are tersely detailed and well illustrated, and though not likely to destroy the Darwinian doctrine, are well calculated to modify dogmatic and hasty generalizations. We can well imagine the hearty welcome Darwin would have given these alleged contradictions to his theory, and the candid manner in which he would have discussed and probably re-explained them.

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*The Life of Sir Stamford Raffles.* By DEMETRIUS CHARLES BOULGER. Horace Marshall & Son.

SIR STAMFORD RAFFLES, whose name is interwoven with that of our Eastern possessions as the founder of Singapore, has a more peculiar claim on the memory of our readers as the founder of the Zoological Society, and as one whose name is frequently used in the specific designation of many species of Eastern animals; and though the details of his life belong principally to the administration of Eastern islands, the time he thus passed was also fruitful in the study of, and assistance rendered to, Zoology. Raffles commenced his career without the flotation acquired by what—if we recollect aright—Huxley once called "social corks"; and though he may well be spared the indignity of that vague term, so much in vogue, "a self-made man," it cannot be disputed that he early formed lofty aims and achieved a very large measure of success. He was born at sea, on board a merchant-ship commanded by his father, left school at the age

of fourteen and entered the secretary's office of the East India Company, rapidly rose in preferment, sailed for the East, and became enrolled as one of Britain's great administrators. With this part of his career 'The Zoologist' is necessarily out of touch, but we cannot forbear to mention that in governmental duties he took as his motto Lord Minto's observation: "While we are here, let us do all the good we can."

During his sojourn in the East it is only by side lights that we are able to observe the naturalist and forget the Proconsul. He met Horsfield on his first visit to Surakarta, and "from that time forward, both in Java and Sumatra, Dr. Horsfield served with Raffles in a scientific capacity, and, after the death of his chief, the doctor bore testimony to "the zeal, ardour, and liberality, with which Sir Stamford both pursued and patronized science." He received little encouragement in the formation of zoological collections. When, in 1820, he forwarded home the first half of a collection illustrating the natural history of Sumatra, "he received in reply a coldly worded despatch, remonstrating with him on his extravagance, and forbidding him to expend any of the Company's funds in such directions." But fortune was still to deal a heavier blow. On his final return, in 1824, with the remainder of his collections—both manuscripts and specimens—the ship that bore him was destroyed by fire and the whole of this precious cargo was consumed. The loss may be estimated in his own words. Besides the literary treasures, "all my collections of natural history; all my splendid collections of drawings, upwards of *two thousand* in number, with all the valuable papers and notes of my friends Arnold and Jack; and, to conclude, I will merely notice that there was scarce an unknown animal, bird, beast, or fish, or an interesting plant, which we had not on board; a living Tapir, a new species of Tiger, splendid Pheasants, &c., domesticated for the voyage; we were, in short, in this respect, a perfect Noah's Ark."

During his stay in London, in 1817, he had discussed with Sir Joseph Banks a plan "for establishing in London a zoological collection and museum, which should interest and instruct the public." This may be taken as the inception of an idea matured in 1825, when the prospectus of the new Zoological Society was drawn up and issued on the 20th of May. Sir Stamford Raffles

was the first President of a Society vastly developed since then, and now one of our famous scientific institutions. To have done this is alone sufficient to enshrine Raffles in the annals of the vast zoological enterprise which has been achieved by our own countrymen.

The last years of Raffles were clouded by many worries and ill-health. The success of his career had ensured envy, hatred, malice, and all uncharitableness. He died suddenly, in his forty-fifth year, was buried in Hendon Parish Church, "but, owing to differences with the vicar, a member of a slave-owning family, no monument was erected at the time, and the actual site of the grave has not been ascertained."

This is a book that may well be studied by Colonial politicians, imperialistic or otherwise, and the naturalist will read the life-history of the founder of our Zoological Society.

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*All about Animals.* George Newnes, Limited.

THIS book may be described as a Zoological Photographic Album, in which each portrait is supplied with a basal paragraph affording characteristic details of the animal represented. It thus fulfils the promise contained on its title-page: "For Old and Young. Popular, interesting, amusing." Most of the animals have been photographed while in captivity, though a few have been portrayed with their natural surroundings, of which "In the Jungle"—Elephants with a back-ground of palm trees—is particularly pleasing.

The first idea on turning over these pages, is, that here is another excellent zoological incentive for young people, and certainly no more attractive volume can reach the hands of juveniles with a taste for natural history, as from personal experience we can bear witness. But the zoologist has still much to learn of the natural attitudes and physiognomy of many living creatures, which on more than one occasion artists have created from "stuffed specimens," and which photography applied to living animals is now beginning to reveal. It is difficult to appraise the suggestive and modifying influences which photography has brought, and will bring, to bear on many zoological

conceptions. To the cabinet naturalist in particular it is almost an instruction in field observation, and, having proved the charm in many recent works, will in time be demanded when animated nature is illustrated. As the writer of the text well observes, in reference to a fine photograph of the head of "The Prairie King": "This portrait of the head of the Great Bison will be a valuable document if ever the living animal disappears from the New World. No one could reconstruct from the thousands of skulls and bones which lie bleaching on the prairie the exact features and lineaments of the extinct Prairie King." Already of many animals now extinct we know as little of their natural appearance as we do of the features of most of the ancient philosophers.

Of the many illustrations we may mention the open mouth of the Hippopotamus, which is a fine study; the Secretary Bird is good, but its attitude is modified by confinement, and this bird particularly requires to be seen in its natural condition; the Common Seal rising above the water is a living picture; the Serval's Leap is probably not taken from life; the angry Cobra is a demonstration in ophidian attitude; the Mute Swans with their surroundings and shadows form a very happy production; while a Rhea sleeping, and the "final shower of an Elephant's bath" are revelations.

The work is produced at a very reasonable price, and we trust that it may achieve a success sufficient to encourage the production of a further series.



## EDITORIAL GLEANINGS.

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THE welcome appearance of the 'Zoological Record' for 1896 took place last November. The only missing contribution is that on the Echinodermata, which is promised in combination with that of 1897, in the next volume. We may form some estimate of the zoological activity displayed in the year 1896 by an enumeration of the "titles" of separate communications, papers, or memoirs dealing with the different branches of Zoology.

Mammalia .....	291		Crustacea .....	206
Aves .....	639		Arachnida .....	114
Reptilia and Batrachia .....	307		Myriopoda & Prototracheata	56
Pisces .....	240		Insecta .....	1264
Tunicata .....	30		Vermes .....	251
Mollusca .....	391		Cœlenterata .....	122
Brachiopoda .....	20		Spongiæ .....	57
Bryozoa .....	21		Protozoa .....	190

As usual the Insecta have attracted the largest number of workers, and it appears by a computation made by Dr. Sharp, the Editor, that no fewer than 8907 species and 1040 genera and subgenera have been described as new by entomologists.

The above enumeration provokes one other reflection, and that is—what a number of different groups of living creatures are at present neglected in these pages.

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WITH the December number of the 'Annals and Magazine of Natural History,' Dr. William Francis resigns the responsible editorship to his son. For sixty years from the time of its inception Dr. Francis has been connected with this well-known and valued Natural History Magazine, of which 120 volumes have now appeared. Since 1859 he has acted in an editorial capacity. This is an unique record, and thanks for the past and best wishes for the future, from many sources, will follow both Dr. Francis in his retirement and his son in the editorial chair.

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Mr. H. M. EVANS has written, and Messrs. W. Brendon & Son, of Plymouth, published, a 'Comparative Status of Birds found in the British Isles and in the County of Devonshire, with the Habitat and Range of each

Species." The method pursued is in alternate columns—Status of British Isles, and Status Devonshire,—to denote whether the species is Resident, Summer Visitor, Winter Visitor, or Straggler. Recent additions to the British List are appended.

As to Devonshire, Mr. Evans reports that the "county, as might be expected from its great extent and varied physical characteristics, is visited by an extraordinary number of species. It can claim, approximately, three-fourths of the resident nesting-birds of our islands, two-thirds of the summer residents, forty-two out of forty-three winter residents, and seven-eighths of the stragglers. There are, in fact, eighty-four residents, thirty-four summer residents, forty-two winter residents, and one hundred and twenty accidental visitors—all together, four-fifths of the birds ever found in the whole kingdom."

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MR. G. W. MURDOCH, the well-known editor of the Science and Natural History Department of the 'Yorkshire Weekly Post,' is engaged in the production of a new Guide to Lakeland, in which special chapters will be given on "Natural History," "Angling," "Scandinavian Elements in Lakeland Places, Names," &c.

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'L'INTERMÉDIAIRE des Biologistes ; organe international de Zoologie, Botanique, Physiologie et Psychologique' has recently appeared, and the second number (20th November, 1897) is now before us. It is published in Paris, under the direction of Dr. Alfred Binet and Dr. Victor Henri, issued by C. Reinwald, with Schleicher Frères as "éditeurs." It is largely a means of communication between naturalists and others by questions and answers, in fact, on the principle of our well-known literary weekly, 'Notes and Queries.' It also professes to give a 'Sommaire de Périodiques' on General Biology, but this seems confined to a list of contents only.

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'LEITFADEN für Aquarien- und Terrarienfreunde,' von Dr. E. Zerneck, published at Berlin by Gustav Schmidt, is the latest addition to the literature on the successful management of Aquaria and Vivaria. Plants suitable for the aquarium are not only well described and illustrated, but their growth and management also dealt with. Amongst the suitable inhabitants of the fresh-water aquarium, several fish are enumerated and figured which are somewhat seldom seen in aquaria in this country, such as members of the tropical and subtropical American genera *Pimelodus* and *Callichthys*, as well as the "Paradise" and "Telescope" fishes (*Polyacanthus*), the Gurami (*Osphromenus*), and the "Kletterfisch" or, as known to ourselves, "Climbing Perch" (*Anabas scandens*), from the Oriental region. The

Marine (das Seewasser) Aquarium is treated with much greater brevity, though more space is afforded to the Vivarium (das Terrarium), and some suitable plants for the same detailed. Altogether the last section has been more fully treated by the Rev. G. C. Bateman (*vide* 'Zoologist,' 1897, p. 478); but Dr. Zernecke's volume is well illustrated, and will prove a useful handbook on a subject as yet none too well known.

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GENERAL Nicolas de Depp, who is evidently an enthusiastic pisciculturist, has contributed to the 'Bull. Soc. Nat. d'Acclimatation de France' (October, 1897), under the title 'L'Aquarium-Serre,' a description, with plans and views, of aquaria and necessary buildings which he has constructed on his residential property at Odessa. Many useful hints as to structure and appliances are given, while the combination of plant-conservatory and aquarium is not only to be highly commended, but is also a sequence which in its infrequency creates surprise.

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'ON *Chlamydoselachus anguineus*, Garm., a remarkable Shark found in Norway, 1896,' is the title of a memoir recently published at Christiania, by Prof. R. Collett. This Shark which was only described in 1884, and of which there are at least fifteen specimens preserved in the different museums of Europe and America, is one of the most remarkable of living fish. It is not "closely related to any present variety of Shark, or to any that have become extinct in later periods of the earth's existence," but its "ancestors belonged to the older palæozoic formation—the Devonian—when there lived forms of Sharks whose teeth were comparatively of the same nature as those of the present specimen. No known vertebrate has thus its nearest kindred so far back towards the dawn of organic existence. In other words—*Chlamydoselachus* is the oldest of all living types of vertebrates." The fish under notice was caught in a net at Bugøenæs, in the Varanger Fjord (69° 45' N. lat.), on the 4th August, 1896, which had been set at a depth of about 100 to 150 fathoms for catching Coal-fish (*Gadus virens*).

Prof. Collett remarks:—"When one regards the eel-like construction of its body, the almost serpentine head, its deeply cleft mouth, the frilled and protruding gill coverings, and its formidable array of teeth, which call to mind the python's, one's thoughts turn to that mythical creature which, with more or less regularity, is annually described, or even depicted, in the columns of newspapers, whose existence, however, has never been confirmed, but which, as a rule, is believed in by all (except by naturalists), namely, 'the Sea Serpent'; and the *Chlamydoselachus*, in fact, appears to satisfy most demands of an ideal sea serpent."

SOME interesting figures concerning the sums paid to the late Rev. J. G. Wood, the naturalist, for his popular books, are given by Mr. Newton Crosland in his autobiography, 'Rambles Round My Life,' recently issued. "If I recollect rightly," says Mr. Crosland, "he got £30 for each of his books 'The Common Objects of the Country' and 'The Common Objects of the Seashore.'" Mr. Crosland remonstrated with Mr. Wood on his humble opinion of himself, so when he undertook his great publication, the 'Natural History,' in three volumes, he asked £2000 for the work, and he got it.

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THE International Congress of Zoology meets on Aug. 23rd at Cambridge. The following executive Committee has been formed:—

*President*: The Right Hon. Sir John Lubbock. *Vice-Presidents*: The Vice-Chancellor of the University of Cambridge, Dr. W. T. Blanford, Sir W. H. Flower, The President of the Linnean Society (Dr. A. Günther), Prof. E. Ray Lankester, Prof. A. Newton, Dr. P. L. Sclater, The President of the Entomological Society (Mr. R. Trimén), Sir William Turner, and Lord Walsingham. *Treasurers*: Prof. S. J. Hickson and Dr. P. L. Sclater. *Secretaries*: Prof. F. Jeffrey Bell, Mr. G. C. Bourne, and Mr. A. Sedgwick. *Ordinary Members*: Dr. Gadow, Mr. F. D. Godman, Lieut.-Col. Godwin-Austen, Sir George F. Hampson, Mr. S. F. Harmer, Prof. Howes, the Hon. W. Rothschild, Mr. H. Saunders, Prof. Seeley, Dr. D. Sharp, Mr. A. E. Shipley, Prof. C. Stewart, and Dr. H. Woodward.

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MR. LOUIS BECKE, in the 'Pall Mall Gazette,' has recently contributed some particulars of vessels attacked by infuriated Whales:—

"Only three years ago the writer saw in Sydney Harbour the barquentine 'Handa Isle,' which, on the passage from New Zealand, had been so attacked. She was a fine vessel of three hundred tons, and was sailing over a smooth sea with a light breeze when two large Sperm Whales were sighted. They were both travelling fast, and, suddenly altering their course, made direct for the ship. Then one sounded, but the other continued his furious way, and deliberately charged the barquentine. He struck her with terrific force just abaft the mainmast and below the waterline. Fortunately the barquentine was laden with a cargo of timber, otherwise she would have foundered instantly. The blow was fatal to the cetacean, for in a few minutes the water around the ship was seen to be crimson with blood, and presently the mighty creature rose to the surface again, beat the ensanguined water feebly with his monstrous tail, and then slowly sank.

"Some of these onslaughts upon ships were doubtless involuntary; as

where a Whale, attracted by the sight of a ship, had proceeded to examine her, misjudged his distance, and came into collision with disastrous effect to both. But there are many instances where the Whale has deliberately charged a ship, either out of pure 'devilment,' or when maddened with the agony of a wound inflicted by a harpoon. Some years ago a small school or 'pod' of Sperm Whales was sighted off Strong's Island, in the Caroline Archipelago, by a New Bedford barque and a Hawaiian brig. Both ships lowered their boats at once, and in a very short time Captain Wicks, of the Hawaiian brig, got fast to a large bull who was cruising by himself about half a mile away from the rest of the 'pod.' As is not uncommon among Sperm and Hump-backed Whales, the rest of the school, almost the instant their companion was struck, showed their consciousness of what had occurred, and at once crowded closely together in the greatest alarm, 'lying motionless on the surface of the water as if listening, and sweeping their huge flukes slowly to and fro as a cat sweeps its tail when watching an expected spring from one of its own kind. So terrified were they with the knowledge that some unknown and invisible danger beset them, that they permitted the loose boats—five in number—to pull right on top of them.' Four of the boats at once got fast without difficulty, leaving three or four of the Whales huddled together in the greatest fear and agitation."

One of the largest bull Whales which had been wounded, after destroying one of the boats, suddenly appeared twenty minutes later close to the Hawaiian brig. He was holding his head high up out of the water, and swimming at a furious speed straight towards the ship, which he struck a "slanting blow just for'ard of the forechains." Everyone on board was thrown down by the force of the concussion, and the ship began to make water fast. Scarcely had the crew manned the pumps when a cry was raised, "He's coming back." Looking over the side, the Whale was seen some thirty feet below the surface, swimming round and round the ship with incredible speed, and evidently not injured by his impact. In a few moments he rose to the surface about a cable length away, and then, for the second time, came at the ship, swimming well up out of the water, and apparently meaning to strike her fairly amidships. This time, however, he failed, for a bomb was fired into him from another boat which occasioned almost immediate death.

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IN last year's 'Zoologist' (p. 287) we drew attention to the projected expedition of Lieut.-Col. H. W. Fielden and Mr. H. J. Pearson to the Petchora River and the coasts of Siberia. The expedition has been successfully accomplished, and the naturalists have returned. The zoological results have been communicated in abstract to a meeting of the Royal Geographical Society. Col. Fielden and Mr. Pearson started in the 'Laura' from Skaars

on June 17th, and sighted Kolguev on the 25th, whence they set their course for the island of Dolgoi. Soon after they came upon the pack ice, which prevented their advance. It was extremely dirty, covered with gravel and silt, and with branches and logs scattered over it. Finally they forced their way into Dolga Bay, on Waigatz Island. Eventually they continued their voyage to Novaya Zemlya, and anchored in Cairn Bay on June 26th, where there is a Samoyede settlement. With regard to the scientific results of the voyage, the ornithology of Waigatz, Novaya Zemlya, and the North Island has been practically worked out, and the results of their observations will soon be published. The botanical collections were satisfactory, and several interesting plants had been added. But by far the most important discovery was the finding of what had hitherto been considered the rarest and most inaccessible of flowering plants, the *Pleuropogon sabinii*, growing in the greatest profusion both in Novaya Zemlya and Lutke Land. Collections of rocks and fossils, insects, and marine invertebrates have also been made.

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*A propos* to the subject of "Wasp *v.* Spider," discussed in 'The Zoologist' (1897, pp. 475-76, and *ante*, p. 29), Mr. Richard M. Barrington has contributed to the 'Irish Naturalist' (1897, p. 325) an account of a combat between a large Spider and a Wasp which he one day placed in its web. In this encounter victory remained with the Spider, but the writer adds:—"I don't think this would have been quite possible save for the apparent power possessed by the Spider of lassoing a dangerous enemy by shooting out its glutinous threads by a sort of centrifugal jerk when sweeping past its victim." In 'Knowledge' (vol. xx. 1897, p. 301), Mr. Enock describes an experiment of "presenting a large Bumble-bee *tail* first to the side of the silken tube of a British Trap-door Spider. The Spider seized it, but was wonderfully careful in so manipulating it that without seeing the Bee (the aerial part being quite opaque), she managed to turn it completely round until she had firm hold of the head; *then* she promptly pulled the Bumble-bee through and down."

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MR. WILLIAM THORPE has presented to the British Museum the shell of a giant Tortoise which lived for upwards of two hundred years in the grounds of Plantation House, in the island of St. Helena. It was frequently the object of much curiosity on the part of the great Napoleon during his enforced stay on the island.

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WITH the gradual extinction, as evidenced by a recently-issued return of the Cape Agricultural Department, of the various species of big game

in South Africa, it is not surprising to learn from a report just made to the Colonial Office that Monkey-skins are scarcer than formerly on the Gold Coast, the increasing warfare which is carried on against these unfortunate animals having resulted in a total extermination of the species in the less distant provinces. In 1894 no fewer than 168,405 skins were exported, valued at £41,001, whereas last year the number fell to 67,660.

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ACCORDING to the 'Temps' correspondent at Antananarivo, a special fine net made entirely of Spiders' webs is being manufactured in the professional school at Antananarivo. The process is a very simple one. The thread of several dozen Spiders is wound on winders, the quantity produced by each Spider ranging from fifteen to forty yards. The covering of the web is removed by repeated washing, and the web made into a thread of eight strands. When the thread is spun it is easily woven into a gauze, which is very fine but very strong. It is to be used for an experimental covering of a navigable balloon by M. Renard, the head of the French military balloon school at Chalais, near Paris, who has been engaged for many years in experimenting in aerial navigation. It is believed that the difference in the weight of an ordinary covering and the Spiders' web-net will make a great improvement.—*Dalziel*.

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A MONSTER Swordfish was brought to the market at Taiping recently. It was 30 ft. long, and its flesh and bones weighed 900 catties, or 1,200 lb., fat 230 catties, entrails 400, and the sword 30 catties. Total weight, 2,070 lb.—*Penang Gazette*.

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AT Stevens's well-known Sale Rooms, on the 6th December last, there was sold the collection of stuffed birds formed by the late Mr. Richard Ashby, of Egham. This collection was interesting as containing many birds that were acquired at the Henry Doubleday sale. There was also sold at the same time a skeleton of the Moa, at the *price of forty-eight guineas*, which was really made up of "the bones of one species," and had been set up by Capt. F. W. Hutton from the Enfield deposit, who wrote: "After rejecting bones of young birds and others too imperfect for measurement, I had 1,031 leg-bones left." The Enfield deposit was described by Mr. H. O. Forbes in 'Nature,' March, 1892. Since then other collections have been sold in mournful sequence, such as the Lepidoptera formed by the late Rev. A. Matthews, of Gumley.

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ANOTHER of the monographs devoted to the "North American Fauna," and published by the United States Department of Agriculture, has reached

our hands. This is No. 13, and is a "Revision of the North American Bats of the Family *Vespertilionidæ*," by Gerrit S. Miller, Jun. This publication has the good fortune to be founded on ample material. The collection of Bats, which consists of more than 3000 specimens, chiefly in alcohol, has been brought together during the past few years by the field naturalists of the Survey. In addition the writer has examined the Bats in the United States National Museum, the American Museum of Natural History, and several private collections, making a total of about 2,700 specimens of American *Vespertilionidæ*. With these animals, however, alcoholic preserved specimens are not the only thing needful, and Mr. Miller regrets that so few well-preserved skins are available for comparison. "Without good series of dry specimens it is impossible to determine the limits of individual variation in colour, as conclusions of the most general kind only can be based on specimens that have been subjected to the action of alcohol." Forty-six species and subspecies of *Vespertilionidæ* are recognized as occurring in America north of Panama and in the West Indies.

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WE have received from the "Department of Agriculture" of the Province of British Columbia an excellent publication on "Insect Pests and Plant Diseases, containing remedies and suggestions recommended for adoption by farmers, fruit-growers, and gardeners of the Province." Mr. R. M. Palmer, Inspector of Fruit Pests, in his Report for the year ending 1896, speaking with reference to his work in visiting and inspecting orchards in the different section of the Province, says:—"The necessity of this work has been emphasized by the discovery of the most dangerous scale-insect enemy of fruit-trees known—the San Jose Scale (*Aspidiotus perniciosus*)—in two orchards on Vancouver Island, and although, so far as known, this pest has not spread, it is hardly possible that the infestation is limited to these cases. . . . It has cost the fruit-growers of California and Oregon hundreds of thousands of dollars to fight the San Jose Scale, and the war against it still continues. . . . The appearance of San Jose Scale in orchards and gardens in Ontario, and some of the Eastern and Southern States, has created widespread consternation amongst fruit-growers there, and a demand for legislative assistance from the respective governments in dealing with the pest, similar to that enacted in the Pacific Coast States and British Columbia, has sprung up."

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ORNITHOLOGISTS who care for the by-paths of their Science will find a paper on "The Mythology of Wise Birds," by H. Colley March, in the 'Journal of the Anthropological Institute,' just published (vol. xxvii.



p. 209). "Literature abounds in poetical allusions to the wisdom of birds, to the warnings they desire to deliver, to the tidings they are ever ready to carry. 'We bear our civil swords and native fire,' says Prince John (2 Hen. IV. v. 5), 'as far as France, I heard a bird so sing. 'Curse not the king,' says the Preacher, 'for a bird of the air will carry the matter' (Eccl. x. 20). Such allusions are poetical only; but the voices that primeval man heard, primeval whether in time or only in civilization, were as real to him as the visions he saw. The history of demonology conclusively declares them to have been neither romance nor make-believe." As the author further remarks, "It was natural that in different countries men should have been attracted by different orders of birds. The Grallatores, or Waders, whilst they were esteemed throughout the Old World, were chiefly venerated in Egypt; and the same may be said of the Accipitres, such as Eagles, Hawks, and Vultures. The Columbæ were much admired in the East; and of the Passeres, the suborder Conirostres found most favour in Europe." The subject is a most interesting one; we all recall the Bennu (*Ardea bubulcus*), sacred among the ancient Egyptians to Osiris, and the use of the Dove in early Christian art.

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'SCIENCE' announces the death of the eminent entomologist, Dr. George H. Horn, at Philadelphia, on Nov. 25th last, at the age of fifty-eight. He has bequeathed his valuable entomological collections and books and an endowment of 200 dols. per annum to the American Entomological Society. From the residuary estate, after the death of his sister, further bequests will accrue to the Entomological and other scientific societies. Dr. Horn was a renowned coleopterist, and was a contributor to Godman and Salvin's 'Biologia Centrali-Americana.'

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JOHANNES FRENZEL, formerly Professor of Zoology at Cordoba University, in the Argentine Republic, and of late years director of the biological and fishery station on the Müggelsee, near Berlin, died on Oct. 21st, owing to an accident on the lake. Dr. Frenzel was only thirty-nine years old at the time of his death — *Natural Science*.

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SINCE the advent of the rinderpest at Groote Schuur, Mr. Rhodes's well-known residence at the Cape, the following animals have died of the disease:—One Eland Bull, one Koodoo, one Hartebeeste, one Klipspringer, one Steinbuck, and one Antelope. One Eland Cow, which took rinderpest and was inoculated, has since recovered.

A NEW fish has come to light. In the 'East London Dispatch' the menu of the St. Andrew's dinner, is thus reproduced:—*Soup*—Cockie Leekie and Clear. *Fish*—Scotch Haggis.

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WE regret to announce the death of Mr. Henry Stacy Marks, R.A., which occurred at his house near Regent's Park on Sunday, Jan. 9th. He was born in London on Sept. 13th, 1829. His diploma picture, "Science is Measurement," is one of his most characteristic paintings. It shows an old naturalist, himself almost a skeleton, measuring the skeleton of a huge bird, and combines the artist's dry humour with his knowledge of bird anatomy. Every visitor to the Duke of Westminster's fine home at Eaton Hall will remember the twelve panels of birds—gorgeous in colouring, accurate in drawing—which adorn that palatial residence. It was as a painter of curious and humorous bird-life that Mr. Stacy Marks was supreme. He studied the quarter of the birds at the "Zoo" with untiring patience, and the result was to be seen in several Academy canvases and in more than one private exhibition of water-colour studies, remarkable for dexterity of handling, colour, and humour. Mr. Marks's favourite bird-sitter probably was the Adjutant Stork, but Flamingoes always found in him a congenial painter, and his Parrots, Cockatoos, and Macaws are very highly prized possessions of those collectors lucky enough to secure them.





Fig. 1.—Matopo. (Photo. by Swan Watson.)



Fig. 2.—Matopo. (Photo. by Reid.)



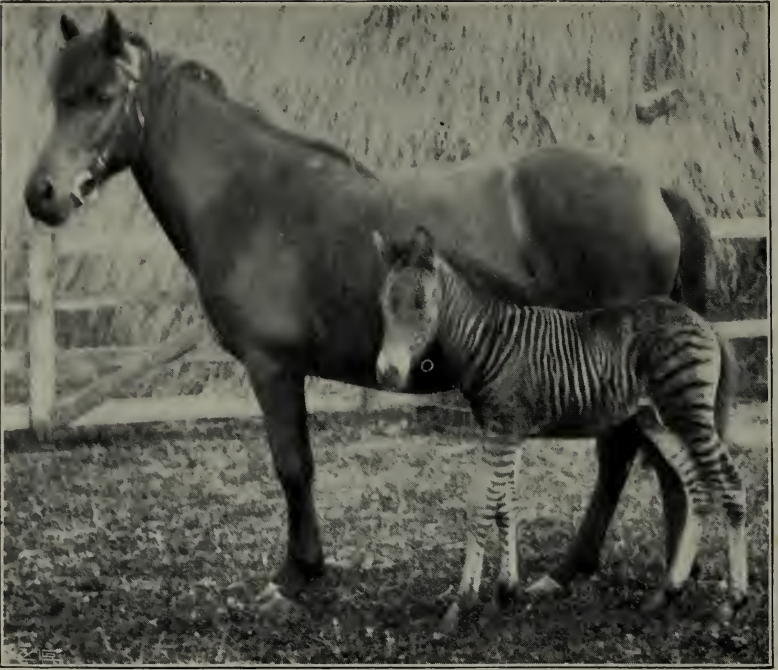


**Fig. 1.**--Romulus: Twenty-seven days old. (*Photo. by Reid.*)



**Fig. 2.**--Brenda: Two months old. (*Photo. by Swan Watson.*)





**Fig. 1.**—Romulus (Seven days old), and his dam, Mulatto.



**Fig. 2.**—Romulus: One year old. (*Photos. by Swan Watson.*)



# THE ZOOLOGIST

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No. 680.—February, 1898.

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## ON ZEBRA-HORSE HYBRIDS.

BY J. C. EWART, F.R.S.

Regius Professor of Natural History, University of Edinburgh.

(PLATES I., II., III.)

### THE ZEBRA SIRE OF THE HYBRIDS.

DURING the last two years I have bred five hybrids by crossing mares with a Zebra (*Equus burchelli* var. *chapmani*). The first hybrid was born on Aug. 12th, 1896; the others were born during the summer of 1897. The dams of the respective hybrids are (1) an Island of Rum pony, (2) a Shetland pony, (3) an Iceland pony, (4) an Irish mare, (5) a cross-bred Clydesdale mare.

The sire ("Matopo") of all the hybrids is a handsome 12.3 hands Burchell's Zebra, probably from the Transvaal. As fig. 1 (Pl. I.) shows, Matopo is well formed, with powerful legs and, for a Zebra, a fine neck and fairly good shoulders. In his movements he is almost perfect. When trotting, the fore legs move gracefully, without suggesting the hammering action of the hackney; and when galloping he seems to bound along as if without effort, and with but little expenditure of energy.

If Zebras deserve the ill character they have hitherto borne, Matopo must be an exception to the rule. We are too apt to forget that until Zebras have been under domestication for some generations, it is unfair to judge them by the Horse standard, which after all is not so very high. I have known several

perfectly docile captured Zebras, and I have had in my possession a filly (taken when quite young in the Transvaal) which from the first was as docile, tractable, and trustworthy as any pony that was ever foaled. I have refrained from handling Matopo for obvious reasons, yet there is never any difficulty in managing him, unless when he is herding mares, or unusually excited. When in a field with mares he is unapproachable, for, regardless of consequences, he attacks all who venture into his vicinity. Galloping up open-mouthed, uttering his characteristic call, he endeavours to seize intruders by the legs. On one occasion, in a small paddock, he guarded a dozen mares so well, that it took four of us nearly two hours to drive them into their boxes. He is, however, easily upset by unusual noises, and there is nothing that drives him into a state of frenzy so readily as carpet-beating, or that cows him so effectually as a coil of rope. I have often wondered if the rhythmic beating of carpets reminds him of the day when in far-off Africa he lost his freedom; of the time when Boers entangled his limbs to music made by Zulus beating their shields with their assegais.

The more characteristic stripes of Matopo are seen in figs. 1 and 2 (Pl. I.). I have already described at some length\* the plan of the striping in various Zebras, and hence only a short account of Matopo's markings need here be given.

Fig. 2 (Pl. I.) shows a series of pointed brow arches, some of which end in a frontal tuft nearly two inches in length. Continuous with the frontal stripes are a number of vertical stripes. These stripes extend to the muzzle, the dark skin of which is sparsely covered with short light hairs, except above the nostrils where there are dark brown "nostril patches." There is usually a distinct shoulder-stripe in Zebras, passing downwards from the withers to bifurcate about the level of the shoulder-joint. In fig. 2 (Pl. I.) the shoulder-stripe is double, while in fig. 1 it has blended with a humeral stripe. Between the shoulder-stripe and the occipital crest there are usually twelve cervical stripes, all of which run up into the mane to form, with a corresponding number of white bundles, a series of black and white tufts. Lying between the two upright rows of tufts, and continuous with the dorsal band, is the mane proper, consisting of more or

\* 'Veterinarian,' November, 1897.

less upright black hairs. The most anterior part of the mane, instead of forming a forelock, extends beyond the level of the ears, and projects forwards at right angles to the long axis of the face. Behind the shoulder-stripe there are, on the left side, five broad, nearly vertical stripes, all but the last reaching the dorsal band above, while all but the first reach the ventral band below. Behind the fifth vertical stripe are a number of broad oblique stripes, with indistinct "shadow" stripes between them. One of these oblique stripes, beginning at the root of the tail, runs forward to pass over the point of the ilium (hip) before bending sharply downwards to reach the ventral band. I have named this the great flank-stripe. Below this flank-stripe a second, having a similar course, may be known as the intermediate flank-stripe. The intermediate stripe is followed by a third, which, starting some distance below the root of the tail, runs obliquely across the quarters to bifurcate over the stifle, the anterior division proceeding towards, but not actually reaching, the ventral band. This may be known as the lower or stifle flank-stripe. These three flank-stripes are equally distinct on the right side, the bifurcation over the stifle being especially evident.

In the space formed by the splitting of the shoulder-stripe are several indistinct arches, and below these arches are the transverse bars of the leg. In some cases this V-shaped space contains portions of seven arches, and the legs may be striped to the hoofs. Below the stifle-stripe there are first oblique and then nearly transverse stripes across the hind leg, with sometimes shadow-stripes between. In Matopo the stripes are indistinct on the lower part of the hind leg, but in many Zebras they become more distinct and relatively broader as the hoof is reached. It will be further observed from the figures (*a*) that the upper part of the tail is distinctly striped, and that, as in an Ox, only the lower part of the tail carries long hairs; (*b*) that though there is a large wart (chestnut) on the fore leg, there is no vestige of a wart on the hind leg, and (*c*) that there is no tuft of hair at the fetlock.

It may be mentioned that in no two Zebras, or on the two sides (Plate I., figs. 1 and 2) of the same Zebra, is the striping alike, that in some cases there are nearly as many shadow as there are

ordinary stripes on the neck and body; that even in some Burchell's Zebras there are stripes across the croup and rump which suggest the "gridiron" of the Common Zebra (*E. zebra*); and that while in summer the dark stripes are nearly black and the light stripes cream-coloured, in winter the dark stripes are occupied by fairly long brown hairs, while the light stripes are made up of equally long white hairs; the light tufts at the side of the mane, however, are white summer and winter. It may be added that Matopo, like the majority of the Burchell group of Zebras, being adapted for a life on the plains, has rounded hoofs and comparatively short ears. He thus differs from the Mountain Zebra (*E. zebra*), and from his stable companion, a white Egyptian Donkey, in which the hoofs are long and narrow, while the ears measure  $11\frac{1}{2}$  in., five inches more than in Matopo.

#### THE HYBRID "ROMULUS."

The oldest hybrid (Romulus), as already noted, was born on the 12th of August, 1896, the period of gestation being three hundred and forty-two days,—in the mare it is usually from three hundred and forty to three hundred and fifty days. The dam of Romulus was a 13-hands, black Island of Rum pony, lent for the experiments by Lord Arthur Cecil, of Orchardmains, Kent. The well-bred black ponies of the Scottish Western Highlands and Islands, which have long been under observation, form a distinct breed, well adapted in many ways for crossing with Zebras. Their resemblance to Eastern Horses has been accounted for by saying they have descended from sires which escaped from the ships of the Spanish Armada.\*

Romulus, when a few days old, was the most attractive little creature I have ever seen (Plate III., fig. 1). He seemed to combine all the grace and beauty of an Antelope and a well-bred Arab foal. Instead of, like his sire, looking as if freshly painted for a Lord Mayor's Show, he was faultless in colouring and in the disposition of the stripes, spots, and bands. The body colour was chiefly of a bright golden yellow, while the stripes and spots were of a rich dark brown; but what was especially remarkable was the indescribable sheen of his coat, the dark bands being especially

\* Further particulars as to Mulatto, the dam of Romulus, will be found in the 'Veterinarian' for November, 1896.

lustrous. A casual glance showed that in the plan of his striping Romulus was utterly unlike his sire, and, when a careful examination was made, it became evident that in the number and arrangement of the markings he was not unlike a Somali Zebra. As fig. 1 (Pl. II.) shows, the brow has been tattooed as if to represent a huge finger print. Instead of the four or five acutely-pointed frontal arches of his sire, there are fourteen rounded arches, that remind one of the face of the Somali Zebra. Instead of twelve cervical stripes, as in Matopo, there are in Romulus twenty-four cervical stripes, all of which can be traced into the mane. In having so many cervical stripes, he seems to be more primitive than even the Somali Zebra (in which I have never seen more than fourteen cervical stripes), but closely agrees with one of my Zebra mares when the shadow stripes are included. The shoulder stripe bifurcates higher up than in Matopo, and there are seven indistinct arches in the triangular space below the point of bifurcation. Behind the shoulder stripe there are nine (Plate III., fig. 1) fairly distinct vertical stripes instead of five, as in his sire (Plate I., fig. 1). Apparently corresponding to the three flank stripes so often seen in Burchell Zebras, there are in the hybrid three stripes in front of the stifle, which first run upwards and then arch backwards to end below the root of the tail (Plate III., fig. 1). In the triangular space between the first flank stripe and the ninth vertical body stripe are numerous narrow indistinct lines, some of which proceed towards the ventral band, while others join the first or great flank stripe. In line with these nearly transverse stripes there were at birth numerous spots arranged in nearly transverse rows over the loins and rump. Now that the hybrid is over a year old (Plate III., fig. 2) most of the spots have united to form somewhat zigzag narrow bands, almost identical in their direction with the narrow stripes over the hind quarters of the Somali Zebra. On the left side the blending of the spots has advanced further than on the right. Counting from the shoulder stripe to the root of the tail there are forty-three stripes in the hybrid,—about the same number as in the Somali Zebra; in Matopo there are only five transverse stripes behind the shoulder stripe (Plate I., fig. 1). It seems to me the blending of the spots over the hind quarters of Romulus goes a long way towards proving that stripes are in

many cases first represented by spots or interrupted zigzag wavy lines. Between the stifle or third flank stripe and the point of the hock there are a number of dark bands (between some of which are shadow stripes), while below the hock there are first several distinct transverse bars, and then a number of less distinct oblique lines, right down to the hoof. Similar bars and lines occur on the fore-limb. These leg bars were at birth more distinct than in the Zebra sire. Continuous with the mane is a well-defined dorsal band (with a narrow yellow band at each side) which extends some distance into the tail. The tail in the hybrid had, at birth, long hairs right up to the root, but, notwithstanding this, there were three distinct bars visible at each side; similar tail bars I have once seen in a Horse.

Though the ears look long in some of the photographs, they are now relatively very little longer (though rounder at the apex) than in the majority of Horses. The nostrils, in their shape, position, &c., are Zebra-like, and the eyes and eyebrows may be said to be intermediate; but the eyelashes are long and curved, and quite unlike the short almost straight eyelashes of Zebras and Horses. The feet of Romulus suggest the Zebra more than the Horse. They seem to be made of excellent stuff, and to stand a good deal of wear. In his movements, the hybrid takes more after his sire than his dam. A few minutes after birth he was rushing about his box, impatient apparently to join the parental troop. What has struck me from the first has been his alertness and the expedition with which he escapes from suspicious or unfamiliar objects. When quite young, if caught napping in the paddock, the facility with which he, as it were, rolled on to his feet and darted off was wonderful. The principal enemy of the Zebra seems to be the Lion. To escape from the Lion, great and sustained speed is not so requisite as a decided and rapid bound when the Lion makes his spring, or when he is accidentally met with in the veld. This rapidity of getting out of the way has been strongly inherited by all the hybrids. Zebras, as far as my experience goes, are difficult to handle, not so much because they are vicious or intractable, as because they are afraid. At any moment they may be seized by panic,—when they imagine there is a Lion in the path,—and, regardless of consequences, rush, it may be, against a wall or a hedge, or into

a ditch, reins and bits counting for little or nothing. In schooling the hybrids, this habit will require to be allowed for, and the tendency to bound or rush slowly combated. As it has been completely overcome by careful training in some Zebras, there should be comparatively little difficulty in breaking the hybrids. As a matter of fact, Romulus leads anywhere, is perfectly docile, allows his feet to be trimmed and his teeth to be examined, and, when little more than a year old, seemed quite willing to carry a small boy on his back.

I mentioned Mulatto is just under 13 hands, while the Zebra sire is nearly 12.3 hands. At birth (August 12th, 1896) Romulus measured  $34\frac{1}{2}$  in. (from the withers to the ground); at two months  $38\frac{1}{2}$  in.; at six months 43 in.; and at twelve months  $45\frac{1}{2}$  in. The rate of growth has been extremely inconstant,—*e.g.* from the 12th of February to the 12th of April he only increased half an inch,\* and from the 12th of June, 1897, to the 12th of September, 1897, he only increased three-quarters of an inch †; but from the 12th of September, 1897, to the 12th of December, 1897, he increased one and a quarter inches. He now measures (January 12th)  $47\frac{1}{2}$  in., nearly 12 hands, and the circumference of the fore-shank is  $6\frac{1}{8}$  in., the knee being 10 in., and the girth  $52\frac{1}{2}$  in.

The foals of the black Island of Rum ponies are frequently of a mouse-dun colour, with at times an indistinct dorsal band, and a cloudy patch over the shoulder. Usually after the first coat is shed the pure-bred foals are dark brown, and later nearly black, with sometimes indistinct dappling over the flanks and hind quarters. As already mentioned, the body colour of Romulus at birth was chiefly of a yellow tint, the yellow approaching bright orange on the brow, while it approached a straw colour at the muzzle and below the knees and hocks. Under the neck and under the belly the prevailing body colour was dark brown, the ventral band being very indistinct.

The ears were lined with fine bright orange-coloured hairs. When only a month old, the hybrid began to shed his foal's coat.

\* He was weaned on the 14th of February, and fretted not a little for some time after.

† During the greater part of this period he was shedding his old and growing a new coat.

The light-coloured hairs began to drop out from the face and neck about the middle of September, and by the end of September he looked considerably darker. The yellow and also the dark brown hairs continued to fall out, except over the back, all through October, and by the middle of November only the orange-coloured lining of the ears was left to remind one of the rich coat he wore during the earlier weeks of his life. By the end of November the new coat was established. The bright orange facial bands were replaced by much paler bands, the muzzle was nearly brown in colour, the neck and body intermediate spaces approached a mouse-dun colour, while the lower parts of the legs were of a dark brown tint. From the withers to near the root of the tail the hair was especially long and thick. For a time the hair over the croup and the greater part of the rump was so much longer than the hair around the root of the tail that it looked as if part of the hind quarters had been previously clipped. The new coat consisted of a thick layer of woolly hair, from half an inch to nearly two inches in length, and of a less complete coat of stronger hairs, many of which were nearly three inches in length. Near their roots all the body hairs were light in colour, which implies that had the hybrid been clipped, there would have been little or no indication of stripes left. In the Zebra, on the other hand, the dark pigment extends to the roots of the hair, and hence, however short the hair may be, the banding is quite evident. Recently the skin around the root of Matopo's tail was injured, with the result that the hair, together with some of the epidermis, was shed; but even before the points of the new hair could be detected, the position of the dark bands was perfectly distinct. The skin of the Zebra has been described as uniformly black, even under the white bands; but it would be more accurate to say it is of a nearly uniform dark grey colour.

About the middle of March the long hairs began to drop out, and by the end of March they came away in handfuls. As the long hairs were shed from the body, the long hairs were shed from the upper half of the tail, with the result that for a time the tail of the hybrid was little better covered than the tail of his sire. By the end of May all the long hairs—light and dark—had vanished, and early in June the dark and mouse-coloured woolly hairs



were coming out. By the 6th of June the dark lustreless winter coat had sufficiently gone around the base of the ears and above the eyes to indicate the colour of the summer coat. All through June and July the process of shedding continued, but by the 12th of August—the hybrid's first birthday—the summer coat was fully established. The dark stripes, which consisted chiefly of strong flattened hairs, looked very prominent. The intermediate bands were of a reddish brown colour over the brow, but elsewhere reminded one of the summer coat of a Stag. Taken as a whole Romulus was very decidedly darker as a yearling than during the early weeks of his existence.

As the long hairs were shed from the body and the root of the tail, numerous hairs dropped from the mane. In an ordinary mule (the foal of a New Forest pony) which I have had for some time, all the long hairs of the mane were shed last summer; but in Romulus, either some of the long hairs were retained, or the new hairs came in before the old ones were lost. At any rate, though the mane was shorter and less bulky and consequently more upright during August, it always consisted of numerous long hairs. At present the mane, which consists of wavy hairs from seven to nine inches in length, tends to fall slightly to one side,—the mane falls slightly to one side in some Zebras.

By the middle of September Romulus had again lost not a few of the brighter coloured hairs, and since then he has been getting again gradually darker. Probably because of the extreme mildness of the season the long hairs have already (January) begun to fall out in much the same way as they did last March.

All the experts who have seen Romulus agree in considering him a decided improvement on his sire, and more attractive and shapely than his dam. Having been handled from the first, he is, as a rule, extremely quiet. Occasionally, however, he clearly indicates he has plenty of courage and no lack of speed. At present he is particularly attached to a small thoroughbred mare. When separated from this mare he is sometimes as restless as his sire when upset by some change in his surroundings. Last week a strange Horse was galloped in the paddock where Romulus happened to be for the day. The hybrid became excited, and gave an excellent demonstration of his trotting and galloping powers, and of how proudly he could carry himself, and this

continued for some time after the intruder left the field. Romulus was recently described by an excellent judge of Horses in the 'Scottish Farmer' as "a bonnie colt, with rare quality of bone, . . . and with the dainty step and dignity of the Zebra." There is nothing about the hybrids, strange to say, that suggests the ordinary mule or hinny.

#### THE HYBRID "REMUS."

The dam of Remus is a three-parts bred, 14.1-hands Irish mare. "Biddy" has been in my possession since 1893, and is now nine years old. She is a bay, with black points, but no white hairs anywhere, and Remus is her first foal. She is a very gentle quiet creature, and has always been in excellent condition, winter and summer alike.

Evidently the Zebra, before coming here, had not made the acquaintance of any of his equine relatives. When first introduced to Mulatto, he rushed into a corner with his tail between his legs, and uttered peculiar little sounds which strongly suggested abject fear. Some of the ponies rushed at him open-mouthed; others deliberately pelted him with their heels. On the other hand, a bay Arab stallion and various mares could not have been more alarmed had he been a Tiger, or, when he called "Quacha," "Quacha," a troupe of Lions. To give him a chance of discovering what sort of an animal a Horse is, I turned him loose one evening with a good-natured but very plucky bay Shetland pony. The pony proceeded to tease the Zebra, who very soon began to show fight. He was soon circling round the pony with the object of seizing her legs. For a time the pony was unprepared for this mode of attack, but ere long adopted similar tactics, with the result that the Zebra was several times brought to his knees.\* After a couple of hours the duel came to an end,—the damage being very slight on either side,—and ever afterwards Matopo and "Sheila" were excellent friends. But even during the spring of 1896 the Zebra was ridiculously timid, and even now a very small demonstration leads him to beat a

\* I may mention that when his legs are touched with a rope or stick he almost invariably drops on to his knees, or lies down altogether. This is, I think, the result of his having been periodically thrown before he came here that his hoofs might be looked to.

hasty retreat. Bidly was the first fairly large animal he ventured to approach. One day I tied her up in a court about forty feet square, a cloth having been previously bound over her eyes. The Zebra in course of time ventured within a few yards; later he laid his head across her quarters, and then, for quite a long time, across her withers. He next licked her lips, and ended by gently nibbling at her ears. Evidently at length satisfied a big Horse was after all not so terrible an object, he retired to his box and finished his corn. Having once learned the peculiarities of a mare he never forgets them. Some of the mares he dislikes, while he is very fond of others, getting quite excited when they pass his own particular quarters. Donkeys, however, he completely refuses to take the smallest notice of.

Remus—born on the 18th of May, 1896—was, at birth, relatively smaller and far less active than Romulus; the period of gestation was three hundred and forty-six days. When a day old he measured  $35\frac{1}{2}$  in., his girth being 28 in. On the 18th of June he had increased to  $38\frac{3}{4}$  in., the girth being 36 in. When six months old he measured  $44\frac{7}{8}$  in., the girth being  $47\frac{1}{2}$  in., the circumference at the knee  $9\frac{3}{4}$  in., and below the knee  $5\frac{3}{4}$  in. Romulus at six months was 42 in.

From the first Remus has been extremely friendly, and yet in some respects he is more Zebra-like than Romulus. For some days he was little more than a machine,—an automaton capable of following a moving object and of sucking. All the special sense organs were apparently at work, but the brain seemed incapable of making much use of the information collected. If I moved away he followed me, and sucked at my fingers or anything else offered him. He heard his dam when she called, but he was unable to discover whence the sound came, and when he saw her at a few yards distance he failed to recognize her. He seemed to like aloes and water quite as much as sugar and milk, and did not mind either strong smelling-salts or freshly-made mustard. Though he kicked aimlessly when pinched, he paid no heed to the application of either warm or very cold substances to his skin. When a dog was first introduced to Romulus, his excitement was intense. He rushed about at a furious rate, striking as opportunity offered with his fore-feet, and holding his head high and stepping high, as if

moving through long grass, where other enemies might lie concealed. Remus, on the other hand, when two days old, allowed a yellow collie to lie down within six inches of his muzzle, and only got up as a Dalmatian approached when a warning note was uttered by his watchful parent. When the four hybrids and two pure-bred foals were eventually weaned, Remus seemed to mind very little. While one of the hybrids and a half Arab foal were biting and kicking and rushing about as if demented, Remus simply stood looking over the fence. But by-and-by, when the others settled down, he set to walking backwards and forwards behind the wall of his court, exactly like his Zebra sire, and though he still keeps this up as if he were a caged Lion, none of the others have followed his example. When Romulus was weaned, he for some days rushed about, as much as a Zebra when highly excited, as his sire when upset by the beating of carpets. Recently it was necessary to give the hybrids milk containing thymol. The pure-bred foals offered but little resistance, but all the hybrids fought till they were exhausted, and nothing would persuade Remus to swallow the first dose.

As might have been expected, Bidley's foal is much lighter in colour than Mulatto's. With the exception of the muzzle and the lower part of the legs, the body colour is a rich light bay; the muzzle and legs were, at birth, more of a mealy colour, but are now of a bay colour. The bands are much lighter, and consequently less distinct than in Romulus. As a rule they are of a dark reddish brown hue, being especially evident on the brow, the forearms, and above and below the hocks. The plan of the striping is the same as in Romulus; but even at birth several of the rows of spots across the croup had already united to form narrow bands. The face, measured from the occipital crest to a line connecting the upper margins of the nostrils, was slightly longer than in Romulus; but the ears were the same length—six inches.

Sometimes when a Horse utters a warning call all the members of the herd hurriedly collect together and rush about in an excited manner. It seems to be of the utmost importance for wild *Equidæ* to at once make out the direction of any given sound. Probably the longer the ears the quicker this is accomplished. If the length of the ears, as is most probable, counts

for much, one can understand why they almost reach their full size at birth. Foals are given to straying in all directions, and unless they hear and at once recognize the call of their respective dams, and the direction from which the sound comes, their chances of surviving in a wild state would be greatly reduced. At birth, the ears of Romulus were longer than in his dam, and only slightly shorter than in his sire. In the case of Remus they were the same length as in his dam, *viz.* six inches along the inner aspect.

The eyes in Bidley's foal are hazel-coloured and gazelle-like in their mildness, and the eyelashes are particularly long and curved. The mane was at first made up of soft hairs, which bent over to the right side. The mane, however, soon assumed an upright position, and now, when nearly eight months old, it consists of nearly erect but not very stiff hairs. It looks as if the mane will always be as upright and as short as in his sire. The tail contains fewer hairs than any of the other hybrids, and has three bars across the root. On the other hand, unlike ordinary Mules, there are chestnuts on the hind legs as well as on the fore. The front chestnuts are large, level with the skin, and Zebra-like; the hind chestnuts are raised above the level of the skin, and, though narrow and only half an inch in length, are Horse-like. That the Zebras and Asses have no chestnuts on the hind legs may perhaps be due to the absence of chestnuts in their remote ancestors; their absence points, I think, to Asses and Zebras having sprung from a different ancestor (perhaps Hipparion) than the Horses, which may have descended straight from Protohippus. If Remus survives, he may reach a height of nearly 14 hands, and be the most handsome and fleetest of all the present crop of hybrids.

As in the case of Zebra foals, the hair over the back and hind quarters of Remus soon increased in length, and formed a thick woolly covering. The hair of the first coat usually falls off soonest from the face and neck, then from the legs, especially at the knees and above and below the hocks. Some of the hair was shed from the face by the end of the first month, but there was still some left on the muzzle and brow at the end of the third month, and the legs retained some of the foal's coat at the end of the fourth month. The second coat, which was completed by

the end of the fifth month (*i.e.* about the middle of October), consists of a thick inner coat of bay and brown fine wavy hairs, averaging an inch and a half in length, and of an outer but much less abundant coat of stronger hairs, many of which are  $2\frac{1}{2}$  in. in length. Neither the long nor short hairs nor the hairs of the mane have yet (January) begun to fall out.

#### THE HYBRID "BRENDA."

The dam ("Lady Douglas") of Brenda is a cross-bred Clydesdale mare, built on the lines of the "Douglas" breed, once common in the Hamilton district. Like Bidy, she is a bay with black points, but, unlike the Irish mare, she has a large "blaze" on the face, a heavy mane and tail, and a liberal amount of hair at the fetlock joints. Lady Douglas is 15 hands high, the circumference at the knee is  $13\frac{1}{2}$  in., and below the knee 9 in. The face is longer than in Bidy by nearly an inch, and the ears by three-quarters of an inch. I expected Brenda (the Clydesdale's first foal) to closely resemble Remus in colour and markings, but in breeding, more especially in cross-breeding, the unexpected often happens. We are too apt to forget that, even when the sire belongs to a different and very distinct species, the progeny may take after the cross-bred dam. It was evident soon after Brenda (Plate II., fig. 2) was foaled that she differed not a little both from Romulus and Remus. In the first place her ears looked extremely long; they were at birth  $6\frac{1}{2}$  in., only a quarter of an inch shorter than the ears of her dam, and quite as long as the ears of her sire. The ears now measure seven and a half inches; on the other hand the head is relatively short—shorter than the head of a 12-hands Iceland pony's hybrid. The height at the withers was 43 in., one inch more than in Remus, and four inches more than in the Iceland hybrid. At birth Brenda, apart from her ears, looked not unlike an ordinary bay foal, but soon faint stripes began to show themselves, and in a day or two the stripes, though indistinct, were seen to closely agree in their arrangement with those of the other hybrids. Now that the "Clydesdale" hybrid is nearly seven months old, she at a little distance might easily be mistaken for an ordinary foal. Compared with Remus the head is shorter and finer, while the joints are larger and the shanks thicker. At six months the circumference at the knee

was  $10\frac{1}{4}$  in., and below the knee  $6\frac{1}{8}$  in.—almost exactly the same as in Romulus when seventeen months old. The mane, at first nearly upright, short and Zebra-like, is now made up of hairs from eight to ten inches in length (nearly as long as in an ordinary foal of the same age). Except near the withers and between the ears the mane arches freely to the right side, some of the hairs almost touching the neck. The hair between the ears already projects forwards to form a forelock. In Remus, as already mentioned, the mane is still upright, and shorter than in his sire. The tail in Brenda has also from the first been heavier than in any other of the hybrids, and fewer hairs have been shed from its base; further, almost from the first there have been a few hairs at the fetlock joints. The hairs around the small ergots are now over two inches in length.

The chestnuts on the fore legs in the Zebra are large and smooth, and on a level with the skin; in Romulus and Remus they are also large, and hardly if at all above the level of the skin, but they occasionally give off thin scales. In Brenda the front chestnuts, though relatively nearly as large as in a Zebra, project as far above the level of the skin as in a pure Clydesdale foal. The left hind leg carries a small prominent chestnut about a quarter of an inch in diameter, but there is no rudiment of a chestnut on the right hind leg. The hoofs are the hoofs of a Zebra, and considerably smaller than would be the hoofs of a Clydesdale foal of the same age. They are wide behind and rounded in front, but the bars are relatively short, *i. e.* they do not extend as far back as the frog. I may add, the nostrils are in their shape a little less Zebra-like than in the other hybrids; that the muzzle suggests the dam more than the sire, the lower lip being, as in the dam, somewhat long; and that the rounded ears are tipped with white, as is occasionally the case in dun ponies as well as in Zebras. As might have been expected, the trunk and hind quarters are more massive than in Remus, while the shoulders are less upright, and perhaps as a consequence of this the action at all times is less Zebra-like than in any of the other hybrids. As fig. 2 (Pl. II.) indicates, there is a "swirl" nearly three inches in length extending down the centre of the face between the eyes. The same figure also indicates fairly well the extent of the marking at the end of the second month. The

brow arches (hardly visible in the figure) are nearly as pointed as the frontal arches in a Norwegian pony in my possession, and as in the Amsterdam Quagga. This is very remarkable, as in all the other hybrids the brow stripes form rounded arches. The cervical, and in fact all the other stripes as far as they go, agree with the corresponding stripes of Romulus. In the region of the shoulder the markings are very faint, and over the hind quarters only a few indistinct spots and portions of bands can be detected. The lower parts of the legs are only faintly striped, and even the bars across the forearm and the hock are more obscure than usual. But although none of the stripes are very pronounced, there are, strange to say, faint lines between several of the cervical and vertical body-stripes. These lines suggest "shadow" stripes, and seem to correspond to some of the numerous indistinct vertical stripes seen in Zebra-Ass hybrids. In having faint intermediate vertical stripes, this, on the whole, Horse-like hybrid may be said to be, in at least one respect, more primitive (to have reverted further) than either of the other hybrids already described. If this hybrid continues to thrive, she ought to grow into a powerful, active, shapely cob, about fourteen hands in height, hardier and with more staying power than an ordinary mule.

#### THE HYBRID "NORNA."

The most attractive of last summer's crop of hybrids has for its dam a good-looking 11-hands Shetland pony ("Nora"). This pony, which will be six years old in the spring, had a foal in 1895 to a small black prize Shetland pony ("Wallace"). Nora is in many ways a small edition of Mulatto, and her foal Norna may be said to be a small edition of Romulus. When a few days old Norna, in her colouring, movements, and make, was more fascinating than Romulus at a similar age; and now that she has increased from thirty inches (her height when foaled on June 8th) to nearly forty-one inches she looks (notwithstanding her single hoofs) as if she belonged to some bygone age. Norna has been from the first more intelligent than any of her contemporaries, and always very much on the alert without being at all nervous or frightened. She followed her dam through a crowd of some thousands of people on Jubilee Day without any hesitation, or evincing any signs of fear, and she now leads quietly and allows herself to be



measured without offering any resistance. At birth Norna generally resembled Romulus, both in colouring, markings, and shape; but her head was relatively smaller, and the ears relatively shorter. There was, however, a very important and interesting difference between Norna and the other hybrids. As already pointed out, the croup and rump of Romulus were at the outset marked by numerous rows of spots having on the whole a transverse direction. When his new coat was completed, in August last, I noticed that many of the spots had united to form somewhat zigzag bands that in their direction agreed closely with the stripes on the hind quarters of the Somali Zebra. In Norna, instead of spots over the hind quarters, there were from the first numerous narrow and hardly at all wavy stripes, which line for line almost agreed with the markings in the Somali Zebra. But, further, many of these all but transverse stripes reached, or all but reached, a stripe running obliquely across the hind quarters in almost the same position as the oblique stripe in the Somali Zebra which I have elsewhere referred to as the upper *femoral* stripe. The remarkable difference between the markings over the hind quarters of Norna and her sire Matopo, and the equally remarkable resemblance between these markings in Norna and the Somali Zebra, seem to me to throw a flood of light on the relationships of the stripes in the various species and varieties of Zebras, and at the same time strongly to support the view already advanced, that the difference between the stripes of the sire and his various hybrid offspring is in all probability due to atavism or reversion.\* If this is the correct explanation, it follows as a matter of course that at least in the markings the Somali is the most primitive of all the known recent Zebras.

That the hybrids have reverted in at least their markings towards a somewhat remote ancestor—it may be a common ancestor of both the Horses and Zebras—is also indicated by the presence of faint “shadow” stripes on the neck. From Matopo having twelve cervical stripes and some Zebras having in addition nine or ten “shadow” stripes, and from Romulus having twice as many stripes as Matopo, it may be inferred the typical number of cervical stripes in Zebras is twenty-four or thereabout. But in Norna, in addition to the twenty-four

\* See the ‘*Veterinarian*,’ December, 1897.

cervical stripes, there were at least five faint "shadow" stripes. In Zebra-Ass hybrids there are usually many indistinct stripes on the neck and body, and numerous spots over the hind quarters. I consider Zebra-Ass hybrids more primitive in their markings than Zebra-Horse hybrids. In having numerous cervical stripes Norna approaches Zebra-Ass hybrids, and the only explanation of this that occurs to me is that in Norna we have, in the striping of the neck, a further reversion than in any of the other hybrid offspring of Matopo.

During the first three months the mane of Norna was quite upright, though thicker than in the other hybrids. During the last four months the mane has been increasing in length, and it is now no longer upright; the posterior half hangs over to the right side, the part between and in front of the ears forms a thick forelock, while the intermediate portion hangs to the left side.

Norna with her short head, peculiarly tattooed face, and the heavy mane hanging partly to one side and partly to the other, looks very quaint, and seems to differ quite as much from her sire as she does from her dam the black Shetland pony. The coat is now very heavy, the long hairs over the body measuring over three inches, while many of the hairs over the brow are nearly two inches in length. If Norna develops after the fashion of Romulus, she will—a year hence—be a compact small striped pony from 11 to 11.2 hands in height. As is the case with Romulus, there is nothing about Norna that suggests either an ordinary mule or a hinny. She has excellent well-formed feet, only a few short hairs at the fetlock, and not a rudiment of warts on the hind legs.

#### THE HYBRID "HECKLA."

Heckla's dam is a 12-hands skewbald Iceland pony. There is so much white in this pony (Tundra) and the yellow is so pale that I thought her hybrid foal would be nearly as light as a pure-bred Zebra. As it happens, Heckla is the darkest of all the hybrids, and the stripes are nearly as obscure as in the "Clydesdale" hybrid Brenda. As she lay by her dam shortly after birth, she looked like an overgrown Hare with an unusually long head and relatively long ears. From the first her coat has consisted of long coarse hairs, and the warts on the front legs are prominent, as in her dam. Measuring  $32\frac{1}{2}$  in. at birth, she

was 43 in. at six months, and is now (January 12th)  $43\frac{1}{2}$  in.; the circumference of the knee being  $9\frac{1}{2}$  in., and the fore-shank  $5\frac{1}{2}$  in. Though Heckla has always carried a heavy coat, and is dark in colour with white tips to her ears, she generally agrees with Romulus in her build and markings; but her action is freer, and more like that of a hackney than a Zebra. She promises to be quite as large and as active as Romulus, and more able than Romulus to withstand cold and to flourish under adverse circumstances.

The length of the head and the shortness of the neck suggest that the Iceland ponies belong to a different race than the black Oriental-looking West Highland ponies. They may be direct descendents of the Horses hunted by the men of the Reindeer Period. Their ancestors may have gradually worked their way northwards with the Tundra fauna which then as now lived near the edge of the ice. If Heckla owes her dark colour to reversion, it may be inferred her ancestors were of a mouse-dun colour.

It is too soon to offer any opinion as to whether Romulus or any of the Zebra-mare hybrids will prove fertile or specially useful either at home or abroad, and it is equally impossible to say whether they will withstand the African Tsetse fly, or have better constitutions than either ordinary mules or Asses, but this much may be said, they all seem very hardy. Romulus has been in perfect health from the first, as indeed has been his Zebra sire, while nearly all my mares and Horses have had colds and other ailments. Quite recently the four hybrid foals and three ordinary foals have been suffering from the presence of *Strongylus armata*. One of the pure-bred foals (Mulatto's second foal to an Arab Horse) died from the effects of the parasite on the 1st of January, and a thoroughbred foal has been reduced almost to a skeleton; but the four young hybrids, though no longer so bright or in so good condition, are evidently rapidly recovering, and will, I trust, be soon all right again.

The editor of the 'Scottish Farmer' believes Romulus "will be invaluable for driving or riding on account of his hardiness," and he has stated that all the hybrids "have feet and legs like whalebone, with the kind of pasterns that Clydesdale men fancy."\*

\* 'Scottish Farmer,' Nov. 27, 1897.

It is well known that Captain Lugard and Major von Wissmann have advocated steps being taken to breed Zebra hybrids.

Captain Lugard, in his work on 'Our East African Empire,' writes:—"Some years ago I advocated experiments on taming the Zebra, and I especially suggested that an attempt should be made to obtain Zebra mules by Horse or Donkey mares. Such mules I believe would be found excessively hardy and impervious to the 'fly' and to climatic diseases. . . . I would even go further and say that their export might prove one of the sources of wealth and revenue in the future; for, as every one knows, the paucity of mules both for mountain batteries and for transport purposes has long been one of the gravest difficulties in our otherwise almost perfect Indian Army Corps." Since this was written much information has been gained as to the dreaded Tsetse fly, but apparently there is extremely little chance of Horses being made immune, being so treated by inoculation or otherwise that they will be able to survive if once infected by the peculiar minute organism so intimately associated with the all too fatal disease.

Further, owing to the destruction of cattle by the rinderpest, the transport difficulties have been increased in Africa, while the Frontier wars have enormously increased the demand for mules in India. On the other hand, it has been proved that it is a comparatively simple matter to cross various breeds of mares with a Burchell Zebra, and if experts are to be trusted the hybrids (Zebra-mules as some call them) promise to be as useful and hardy as they are shapely and attractive. The preliminary difficulties having been overcome, it remains for those in authority to take such steps as may be necessary to ascertain of what special use, if any, Zebra hybrids may be in the various parts of the Empire, but more especially in Africa and India.

As I am anxious to obtain as much information as possible bearing on equine hybrids—on crosses between Zebras, Horses and Asses—and as to the fertility of the various kinds of hybrids (mules, hinnies, &c.), I shall be most grateful for accounts of any experiments hitherto made, more especially with Burchell and other kinds of Zebra. I have not yet heard of ordinary mares having been crossed with Burchell's Zebra in South Africa; but doubtless some of the readers of 'The Zoologist' may be able to give me information on this subject.

## NOTES ON THE SEAL AND WHALE FISHERY, 1897.

BY THOMAS SOUTHWELL, F.Z.S.

THE take of Seals by the Newfoundland steam sealers in the past season has been the smallest it has fallen to my lot to record in the seventeen years over which my notes have extended, and that notwithstanding the exceptional success of two of the vessels. The twenty ships, of the aggregate capacity of 6232 tons, and manned by 4572 seamen, captured only 126,628 Seals, of the net value of £32,564, as compared with 187,516 Seals, valued at £55,362, in the previous season, itself a very disastrous one. In addition to these about 22,000 were got by the schooners, but the catch is said to have been the worst for eighty years, with the exception of that of 1864. The 'Aurora' heads the list with 27,941, followed by the 'Iceland' (23,014), and the 'Newfoundland' (15,102). These are the only three vessels which exceeded 15,000 Seals. Two others—the 'Nimrod,' with 14,042, and the 'Harlaw,' with 11,614—exceeded 10,000 each; but the remaining fifteen vessels only averaged 2327 each. The 'Mastaff' had the misfortune to be jammed in the ice inside Cape Ray, and only secured 264 Seals. The 'Iceland' and the 'Nimrod' made second trips for 939 and 453 Seals respectively.

The failure of the voyage appears to be due to a variety of causes, the chief of which perhaps was the prevalence of stormy weather, and the consequent unfavourable condition of the ice. It is also thought that the Seals are not so numerous as formerly, but with regard to this there is considerable divergence of opinion; also that the young Harps took to the water earlier than usual this season, owing to the disruption of the ice. There is no doubt, however, that with two or three exceptions the steamers sought the Seals too far to the north. Formerly the sealing steamers all cleared from St. John's, but of late years they have in increasing numbers been taking their departure from more northerly ports; the wisdom of this course appears to be open to

doubt, and some of the most experienced sealers still continue to make the port of St. John's their point of departure. Should the vessel strike the ice to the north of the breeding Seals, there is nothing to form a guide to the position of the pack; but on the other hand, should it be too far south, there is nearly always some indication which points to that fact, such as the presence of birds or old Seals. There appears also to be a natural inclination to work to the north in search of the Seals rather than to the south. It happened this year that the fierce gales from the N. and N.W., which prevailed from the 1st to the 20th of March, drove the ice on which the young Seals were then, well off the land, rapidly south to the neighbourhood of Cape Race, and thus they were missed by the majority of the vessels.

As affording some indication of the severity of the season, and of the hardships endured by the crews, I will give a brief outline of the voyage of the 'Aurora,' as reported by Captain Arthur Jackman, one of the most experienced of the commanders. Leaving St. John's on March 10th, the 'Aurora' struck the Seals on the 15th, about 150 miles off Cabot Island, and on that day and the 16th the crew killed 24,000 Seals. On the 17th, while the men were on the ice, "a terrible swell began to heave among the ice, smashing it up, and leaving the men battling for their lives on the floating pans; it was with the utmost difficulty they were got on board." From March 17th to April 7th the crew were engaged in picking up Seals at the risk of their lives, the ship often rolling rail-under; the result was that out of some 60,000 Seals killed only 27,900, nearly all young Harps, were recovered. The 'Aurora' then bore up for home, being at that time about 390 miles S.E. of Cape Race. Capt. Jackman never remembers Seals being taken so far south. Some conception of the terrible hardships and dangers of the voyage may be formed from the fact that four of the crew succumbed to cold and fatigue, and the report states that as many as one hundred men (out of a crew of 298) were laid up at one time with colds. The 'Terra Nova' also lost one of her crew. The 'Iceland,' which went to the Gulf of St. Lawrence, is said to have made the quickest trip on record; she struck the Seals off Rose Blanche, and commenced to kill on March 15th, reaching Harbour Grace, on her return, with 22,000 young Harps, on the 23rd. The

'Harlaw' made her catch of 11,600 in the neighbourhood of Cape Ray.

In a paper on "Seals and the Seal Fishery," printed in the 'Transactions' of the Norfolk and Norwich Nat. Soc. vol. iii. p. 482, as well as in my Notes for 1884, I explained the nature of the practice known as "panning" or "binging," and pointed out its wasteful character; this was perhaps never more fully exemplified than in the past season. The 'Nimrod' lost nine pans of Seals through the ice, under stress of weather, suddenly breaking up; one lot of 250 she recovered eighteen miles distant from the flag which marked their original position. The 'Aurora,' as already mentioned, is said to have killed 60,000 Seals for the 27,000 she brought home, having lost sixty-four flagged pans through the ice being ground up and turned over by the heavy swell. Surely some less wasteful method of securing a cargo could be devised; and in the interest of the future would it not be to the advantage of the sealers themselves that no more Seals should be killed than could at once be taken on board? This destructive practice of killing and panning all the young Seals within reach and leaving it to chance to recover them must before long lead to the most disastrous consequences, and it is not to be wondered at that the shore sealers, whose catch in the past season has been *nil*, should complain of this shocking waste. The large number of young Harps (see 'Aurora' and 'Iceland') taken so early in the season is unusual, and is probably owing to the disturbed state of the ice, the immense sheets on which they are whelped not usually breaking up so as to allow the Seals to be approached until the young ones are able to take to the water. 106,678 of the total catch were young Harps, an unusually large proportion; 2188 were young Hoods; 11,133 were "Bedlamers," or young Seals of the second or third season which had not yet bred; and only 6629 old Seals of both species.

Some of the old sealing captains are men of great intelligence and wide experience, and their interest leads them to appreciate minute differences in the appearance and habits of the Seals which to a casual observer would pass unnoticed. One of these veterans, in conversation with Mr. Thorburn, after alluding to the two "spots" of Hooded Seals in the Gulf of St. Lawrence, stated that the Seals in the western patch whelp about a week

earlier than those in the eastern patch ; also that the females in the former are much larger than in the latter, and that the reverse is the case with regard to the males. The western patch is found in the neighbourhood of St. Paul's Island, and the other considerably to the eastward. He also confirms the statement that there are two distinct patches of Harp Seals, one whelping inside St. Paul's Island (see Notes for 1896, Zool. 1897, p. 57), and that a similar disparity in weight exists as is observed in the case of the Hoods, the old Saddlers in the one patch exceeding in weight those in the other by an average of about 25 lb. Referring to a summer which he once spent on the island of Anticosti, he mentioned having met there with a large dark-coloured Seal, one of which he shot, "larger than a Hooded Seal, and with a head like a horse or cow," and which, he said, frequents that island during the summer.

None of the Dundee vessels were present at the Greenland young sealing, and the captures in Newfoundland by the 'Esquimaux' (1903) and 'Terra Nova' (3501) represent all the Seals taken by the Scotch vessels, with the exception of a few old Seals, some 400 in all, taken in Greenland by the 'Active' and 'Polar Star.' The 'Alert' brought home from the settlement in Cumberland Gulf, with other produce, 4700 Seal skins and seventy tons of Seal and Whale oil. I do not receive statistics of the Norwegian sealing in the Greenland Seas, but Prof. Collett has kindly informed me that in 1893 about 100,000 were killed, some 20,000 of which were old Seals, and the rest young Harps and Hooded Seals ; in 1894 the number was not quite 100,000, 9000 old and the rest young and Hooded ; in 1895 rather less than 80,000, of which 9000 were old ; and in 1896 between 90,000 and 100,000, 11,000 of which were old Seals. This branch of the sealing trade has quite reverted to the Scandinavians ; the same may be said of the Bottle-nose fishery, no Scotch vessels having taken part in it for the last few years. It seems, however, to be successfully prosecuted by the Norwegians, and Prof. Collett tells me that in 1893 they killed 2701 ; in 1894, 2905 ; in 1895, 2872 ; and in 1896, 3301. The figures for 1897 are not yet available.

The Greenland whaling, for reasons which will be fully explained further on, was a complete failure ; only one Whale was captured, and one other seen. The condition of the ice in



the North Atlantic has been the most remarkable on record, and it happens that an unusual number of observers were present to report on its phenomenal absence which has characterized this very exceptional season. In my Notes for the year 1887, I mentioned that Capt. David Gray's experience led him to the conclusion that there is a certain periodicity in the movements of the ice in the Greenland Seas, the eastern or western limit of its margin reaching its maximum about every five years alternately; so that every tenth year may be expected to produce an "east-ice year," and *vice versa*. The year 1881 was an "east-ice year," that is, the ice extended far to the eastward from the east coast of Greenland. Capt. Gray, in a communication published in the Proc. Roy. Geo. Soc. for 1881, p. 740, with map, recorded this remarkable eastward extension of the ice, and made some remarks with regard to its probable cause. The year 1886 was so far a "west-ice year," the ice being close packed on the east coast of Greenland (that is, on the west side of the Greenland Sea) that there was no hope of penetrating it in search of Whales; Capt. Gray therefore, ever willing to add exploration to his legitimate business when possible, attempted unsuccessfully to visit Franz Josef Land, but met with very little obstruction until he reached  $36^{\circ} 44'$  E. longitude, in the parallel of  $75^{\circ}$  (Dr. Robert Gray, Zool. 1887, p. 124). It was not till the next year (1887), however, that the ice receded to its farthest west. In 1891 there was again an enormous accumulation of ice off the east coast of Greenland, extending far away to the eastward. According to Capt. Gray's theory, therefore, the year 1897 should be a maximum "west-ice year," and such has been the case to a remarkable extent; where in 1881 Capt. Gray forced his way three hundred miles through floe-ice into the Spitzbergen land water, in the past season the Greenland whalers encountered no obstruction, and the 'Balæna' found no difficulty in passing round the south of Spitzbergen through the Barents Sea to Franz Josef Land, where she cruised amongst the islands of the archipelago, and hunted Walruses in lat.  $81^{\circ}$  N., accompanied by the 'Active' and the 'Diana.'

All the reports which we have from the eastern polar seas this season, and they have been unusually numerous, extending over a wide area—the Dundee whalers in the Greenland and

Barents Seas, and afterwards to the west of Franz Josef Land, where Mr. Jackson confirms their report that very little difficulty was experienced from ice up to the 80th parallel; Mr. Arnold Pike and the captain of the 'Balæna' to the east of Spitzbergen and Wyche's Land; and Colonel Feilden to the eastward of Novaya Zemlya and the Kara Sea;—all bear testimony to the remarkable absence of ice. The causes which contribute to bring about these extensive variations in the limits of what may be regarded as the polar ice fringe are too complicated for me to attempt any explanation here, even were I at all competent to do so (Capt. Gray offers some very pertinent suggestions in the paper before quoted), but, confining my remarks to the Greenland Seas, there can be no doubt the chief cause of the recent packing of the ice on the east coast of Greenland was the long prevalence of E. and N.E. gales. The 'Balæna' reports that she reached the N.E. fishing grounds about the end of April, and experienced there the worst weather on record.

On May 1st, following a few days of mild foggy weather, there came a succession of N.E. gales, which lasted till the middle of the month, and forced the vessels to seek partial shelter in the pack-ice. This "blizzard" was followed by strong easterly winds; gale succeeded gale until June 20th, and the severity of the weather is described as exceeding anything within the memory of the oldest man in the fleet. The result of this state of things was that the ice became "hammered" against the east coast of Greenland, and was so compacted, that where in ordinary years a belt exists extending seaward from 150 to 200 miles, with open floes such as the Whales love to frequent, in the past season it did not reach more than fifty miles from the shore, and was packed so tight as to be perfectly impenetrable. This condition of the ice was of course fatal to the fishery, as the vessels were unable to search for the Whales in their favourite feeding grounds; and it was not till May 29th that a fish was found. This the 'Balæna' was fortunate enough to capture, and the only other Whale seen in the Greenland Seas during the entire season was sighted about the middle of June, but could not be approached.

There being no prospect of success in the Greenland waters, the fleet, consisting of the 'Active,' the 'Balæna,' and the 'Diana,'

had to look elsewhere for a cargo ; and the glowing reports of the great abundance of Walruses observed on the shores of Franz Josef Land by Mr. Leigh Smith, Dr. Nansen, and Mr. Jackson, as might be expected, attracted them in that direction, and they took their departure for this new hunting ground on June 25th. The 'Balæna' was the first to arrive, sighting Cape Flora after a twelve days' passage, and she made a clean sweep of the coast, killing 600 Walruses, and leaving little or nothing for those which followed, the 'Active' only securing seventy and the 'Diana' eighty-four. Great was their disappointment, as they expected to find something approaching the numbers seen by Mr. Lamont on the Thousand Islands in 1852, where a herd of three or four thousand was seen, and nine hundred killed by two small sloops, a sight which will probably never again be witnessed. To add to the disappointment, almost all those met with were females and young, and a few young bulls ; it was evidently the nursery of the species. Where the old bulls were was not discovered, but the females and their young were exterminated. In the Greenland Seas the Walrus has already become a rare animal, in Davis Strait it is rapidly becoming scarce, and the enormous numbers which formerly inhabited Behring's Strait are subject to such exhaustive demands that they cannot long survive. When we take into consideration the ease with which these animals can be approached, and their slow rate of reproduction, it is safe to predict that the time is not far distant when the species will become totally extinct. It is curious how a new industry may affect the very existence of an old species. I am told that the greater activity in the search for Walruses is due to the sudden demand which has arisen for their hides, which are extensively used by the makers of bicycles for forming buffers ; their value has greatly increased in consequence, and good thick bull-hides weighing 350 lb. and upwards sell for as much as 1s. 6d. per lb. The hides brought home this year from Franz Josef Land being those of females and young animals, therefore thin and of light weight, did not realize anything like this price, some being worth as little as 2½d. per lb. The tusks, I am told, realize about 2s. 6d. per lb., and the oil £18 per ton.

In marked contrast to the Greenland fishery, that of Davis

Strait has been a decided success, and the number of Whales seen was considerable. Three Scotch vessels, the 'Eclipse,' the 'Esquimaux,' and the 'Nova Zembla,' were present. Capt. Milne, of the 'Eclipse,' reports that from the middle of September till the middle of October Whales were very plentiful, and that he never saw so many during all his experience. Leaving Dundee on March 30th, he experienced a long and stormy passage, arriving in Davis Strait too late for the north-west and east side fishery. Disco was reached on May 28th, and the passage through Melville Bay presented no difficulties. The west side of the Strait was reached on June 15th, on which day the first Whale was seen. On the following day a large number of fish were seen, and one struck but lost; and a second also broke away. On the 20th, however, a good fish was secured. In Lancaster Sound the three Dundee vessels were caught in a heavy gale and beset for a week. About Oct. 8th a great many Whales were sighted, twenty miles off Cape Kater, but owing to heavy seas and unsettled weather more than one was missed; and on the 13th so rough was the weather that a large fish which had been got alongside broke adrift and was lost. On the 16th, however, they were more fortunate, and secured a fine fish of 11 ft. 4 in. bone, but not till after an exciting experience—by a stroke of the Whale's tail one of the boats was upset and her crew of six men thrown into the water. Fortunately all were rescued, but not till one of them was in a very exhausted condition. Many more Whales were seen by the 'Eclipse' near Hopper Island, and one taken; had she not had the misfortune to lose five Whales owing to stormy weather, doubtless the 'Eclipse' would have returned a full ship; as it was she had three good Whales and three Walrus. The 'Nova Zembla' succeeded in capturing four Whales; her experience was much the same as that of the 'Eclipse.' Many Whales were seen in the longitude of Cape Warrander, Pond's Inlet, Coutts Inlet, and in the vicinity of Clyde River. The 'Esquimaux,' which had been to the Newfoundland sealing, sailed from Cape Breton on May 20th, and took her only fish in Pond's Bay on June 16th. Although in her autumn passage down the west side of the Strait several other Whales were seen, the weather conditions rendered their pursuit impossible; in fact, it was the prevalence of

untoward weather, not the absence of Whales, which prevented their returning all "full ships." All three vessels bore up for home about Oct. 27th.

The total produce of the Whale fishery in the past season was 9 Right Whales and 772 Walruses, yielding 143 tons of Whale oil and 120 cwt. of bone. In addition to this the 'Alert' brought home from Cumberland Gulf station 3 cwt. of bone, the yield of a very small Whale of 4 foot bone, and 70 tons of oil, part of last season's catch; and the 'Perseverance,' which had wintered for three seasons at Rowe's Welcome, had the bone of three Whales (30 cwt.), and part of the oil (15 tons), the rest of the blubber having been lost. During her stay in Rowe's Welcome the 'Perseverance' got six Whales, the produce of the other three having been previously sent home by the Hudson Bay Company's ship 'Erik.' It is rather difficult to value this miscellaneous produce; but, taking the 228 tons of Whale oil at £18 per ton, or £4104, and the 153 cwt. of bone at £1600 per ton ("size bone," I am told, has been sold at £1800 per ton) or £12,240; the 772 Walrus hides at, say, £5 each, or £3860; and the ivory, which was light and mostly female tusks, at, say, £200, the total produce would represent a sum of about £20,404, as compared with £16,207 in the previous season.

The Norwegian Fin-Whale fishery, Prof. Collett tells me, is still flourishing, and several of the companies have also established themselves on one of the Faroes, where they are doing well. The Whales taken last year were for the most part *Balænoptera borealis*; also several *B. sibbaldii* and *B. megaptera*; but commonly *B. musculus* is the most numerous. The Cabot Whale-fishing Company, formed at St. John's to prosecute the Fin-Whale fishery after the Norwegian fashion mentioned in my last year's communication (p. 59), has not yet commenced operations, but is expected to do so shortly.

In my last notes on this subject (Zool. 1897), p. 58, fourteen lines from the bottom, for 'Arctic,' read 'Active.'

As on so many previous occasions, I have to tender my best thanks to Mr. David Bruce and Mr. Kennes of Dundee, and to Mr. Michael Thorburn, of St. John's, for their kind assistance.

THE INSECT VISITORS OF FLOWERS IN  
NEW MEXICO.—I.

BY T. D. A. COCKERELL,

Entomologist of the New Mexico Agricultural Experiment Station.

WHILE much has been written on the relations between insects and flowers, it must be confessed that the information we possess on this fascinating subject is fragmentary indeed in comparison with what might be known; in other words, there is no locality where flowers grow and insects fly in which new and interesting observations may not be made, while there are whole regions from which we have practically no records.

Hermann Müller, in his 'Fertilisation of Flowers,' gives what might at first sight seem a very complete array of facts, but we find him strongly insisting on the incompleteness of his researches. In America the subject has only been seriously attacked by one observer, Mr. Charles Robertson, whose observations are confined to Illinois and Florida.

The subject is more complicated than might at first be imagined. Repeated observation only confirms the validity of the following rules:—

(1.) Observations made in one year should be repeated in other years, as the results of different years may greatly differ.

(2.) Observations made on a plant in one locality should be repeated in other localities throughout the range of the plant, as the insect visitors are often different in different parts of the plant's range.

(3.) Observations made on plants growing in cultivation, away from their natural habitat, prove little regarding the natural visitors of the plants.

(4.) Observations on the Honey-bee prove little regarding the actions of wild bees; each species of bee must be observed separately, its habits cannot be certainly inferred from observations on other species.

(5.) Observations should be made at different dates during the period of blooming of the plant studied; the visitors at one period may be very different from those at another.

(6.) In every case it is important to state the names of the insects observed. This is perhaps the chief stumbling-block to observers. Even H. Müller in Europe had to leave many of his captures unrecorded, because he could not find out their names. In other countries, where much less is known about the insect fauna, and many of the species are undescribed, the difficulty is much increased.

The object of the present series of papers is to put on record a number of new observations made in New Mexico, adding such comments as the facts may suggest. It will be necessary to introduce more botanical matter than usually appears in the pages of 'The Zoologist'; in fact, similar papers have appeared in botanical journals, their botanical aspect being as important as the entomological.

(1.) *Ranunculus cymbalaria*, Pursh.—A good patch in flower by the Rio Grande, Mesilla, April 19th, 1897. An ochreous *Thrips* was pretty common on the flowers, but no other insects, except a single specimen of the small fly, *Eugnoriste occidentalis*, Coquillett.

(2.) *Argemone platyceras*, L. & O. (*Papaveraceæ*).—At Santa Fé, Aug. 3rd, in the afternoon, found many plants with closed flowers, inside which were numbers of bees, all more or less sleepy, crawling but not flying when disturbed. A beetle, determined by Capt. Casey as *Carpophilus pallipennis*, was also common in the flowers. The bees were as follows:—

(a.) *Podalirius occidentalis* (Cresson).—Twenty-eight specimens. I have never taken this on any other flower.

(b.) *Diadasia enavata* (Cresson).—Three. Visits other flowers.

(c.) *Melissodes menuacha*, Cresson.—Seven.

(d.) *M. agilis* var. *aurigena* (Cresson).—Nine.

(e.) *Andrena argemonis*, Ckll.—Two. This species was described as new (1896) from these specimens, and no others are yet known.

One specimen of an Otiiorhynchid beetle, *Peritaxia hispida*, Lec., was also taken from the flowers. The consideration of the above case suggests that flowers which are not particularly attractive to bees when open may gain something by affording good sleeping places when closed in dull weather. The bees, when the flowers opened, would fly away, carrying more or less pollen with them, which they might transfer to other flowers. This idea did not occur to me when the observations were made, so I neglected to note the facts which might confirm it.

(3.) *Eschscholtzia mexicana*, Greene (*Papaveraceæ*).—On April 21st, near Dripping Spring, Organ Mountains, the flowers were visited by *Augochlora neglectula*, Ckll., and *Halictus lusorius*, Cresson, var. These are short-tongued bees.

(4.) *Nasturtium sinuatum*, Nuttall (*Cruciferæ*).—By the Rio Grande at Mesilla, April 19th, 1897. The following occurred on the flowers:—

(a.) Diptera.—Several *Eugnoriste occidentalis*, Coq.; also a Syrphid.

(b.) Coleoptera.—*Phyllotreta pusilla*, Horn, and a *Collops*.

(c.) A black Chalcidid.

(d.) Bees.—*Andrena salicinella*, Ckll., one female; *Prosavis mesillæ*, Ckll., two males; *Halictus subobscurus*, Ckll., one female; and *Halictus* sp., four females.

(5.) *Streptanthus carinatus*, Wright, var. (*Cruciferæ*).—At Little Mountain, Mesilla Valley, March 26th, took the following on the flowers:—

(a.) Bees.—*Apis mellifera*, L., 1758 (*mellifica*, L. 1761); *Agapostemon melliventris*, Cresson; *A. texanus*, Cresson; *Halictus bardus*, Cresson; *H. sisymbrii*, Ckll.

(b.) Diptera.—*Calliphora erythrocephala*, Meig. (det. Coq.); *Paradidyma magnicornis*, Towns. = *singularis*, Towns. (det. Coq.).

(6.) *Dithyræa wislizeni*, Engelm. (*Cruciferæ*).—On April 9th, on the campus of the N. M. Agricultural College, Mesilla Valley, the flowers were visited by *Prosavis mesillæ*, Ckll. (male), *Anmophila*, and *Halictus*. At Mesilla, May 29th, the flowers were visited by *Calliopsis australior*, Ckll.

(7.) *Pyrus communis* (cultivated pear)—On the farm of the N. M. Experiment Station, Mesilla Park, April 12th, the following were seen at the flowers:—*Apis mellifera*, several; *Pyrameis cardui*, many; *Diabrotica 12-punctata*, one, eating the petals. I do not find pear-blossoms at all attractive to native bees in New Mexico; in Europe, on the contrary, Müller observed seven different bees.

(8.) *Prunus* (cultivated plum).—In Mesilla, April 18th, 1897, I found at the flowers three butterflies—*Synchlœ lacinia*, *Euvanessa antiopa*, and *Anosia archippus*; also a Tachinid fly, *Archytas lateralis*, Macq., and the bees *Augochlora neglectula*, Ckll. (quite numerous), and *Halictus pectoraloides*, Ckll. (a few). The Tachinid was identified by Mr. Coquillett.

(9.) *Pyrus malus* (cultivated apple).—In Mesilla, April 18th, 1897, there were plenty of honey-bees at the apple flowers, but practically no wild bees. I caught on a flower a single *Augochlora neglectula*. An ochreous *Thrips* was fairly common on the flowers at one place. One example of *Eugnoriste occidentalis* was taken. *Anosia archippus* was visiting the flowers of the topmost branches. Müller found nine bees visiting apple flowers in Europe.

(10.) *Bigelovia wrightii*, Gray (*Compositæ*).—I have at different times recorded many insects from the flowers of this plant. The following are



some additional data :—In September, close to the Agricultural College, Mesilla Valley, were collected the following :—

- (a.) Parasitic Hymenoptera, determined by Mr. Ashmead :—*Labeo* sp., male ; *Bracon politus*, Prov. ; *Chelonus electus*, Cr., male ; *Apanteles* sp. ; *Microplitis* sp. ; *Cremnops vulgaris*, Cr., female ; *Agathis tibiator*, Prov., male ; *Microdus fulvescens*, Cr., male ; *Mesostenus* sp. ; *Cremastus* sp. ; *Perilampus platygaster*, Say, female ; *Eurytoma bigeloviæ*, Ashm., male ; *Torymus cyaneogaster*, Ashm., female ; *Catolaccus incertus*, Ashm., female ; *Eupelmus cyaneiceps*, Ashm., female.
- (b.) Diptera determined by Mr. Coquillett :—*Euphorocera claripennis*, Macq ; *Tachina orgyia*, Towns. ; *Sepsis violacea*, Meig. ; *Oedopa capito*, Loew.

The following Fossorial Hymenoptera, mostly determined by Mr. Fox, are from the flowers of *B. wrightii*. The *Paratiphia* was taken at Albuquerque ; all the others in the Mesilla Valley :—

- Scolia* sp. aff. *consors*, Sauss.—Sept. 11th.  
*Astatus elegans*, Cr., var.—Sept. 11th.  
 „ *bellus*, Cr.—Sept. 11th.  
 „ *bigeloviæ*, Ckll. and Fox.—Sept. 11th.  
*Myzine hyalina*, Cr.—Sept. 12th.  
*Gorytes bigeloviæ*, Ckll. and Fox.—Sept. 12th.  
 „ *eximius*, Prov.—Sept. 11th.  
*Nysson solani*, Ckll.—Sept. 11th.  
*Aphilanthops laticinctus*, Cr.—Sept. 12th.  
 „ *taurulus*, Ckll.—Sept. 12th.  
*Eucerceris canaliculatus*, Say.—Sept. 12th.  
*Ammophila pruinosa*, Cr.—Sept. 11th.  
*Crabro abdominalis*, Fox.—Sept. 12th.  
*Paratiphia albilabris*, Lep.—Aug. 16th.

## NOTES AND QUERIES.

## AVES.

**Wagtails eating Trout.**—Both the Pied and Yellow Wagtails (*Motacilla lugubris* and *M. raii*) have been observed to take Trout fry. They regularly frequent the nursery ponds here in the spring. Each pond is fitted with a fine screen of perforated zinc at its outlet, which collects a considerable amount of floating matter, consisting for the most part of aquatic and other plants. Amongst this floatage a good many insects occur, and these naturally prove an attraction to the birds. Occasionally, however, a small Trout gets too near the screen, and is washed on it by the current, when the Wagtails take advantage of such an occurrence to secure the fish and to devour it. I need hardly say that they are made welcome to any fish they take in this way, as no one here would think of molesting them. The habit, however, seems worth recording.—J. J. ARMISTEAD (Solway Fishery, Dumfries).

**The Kingfisher in Surrey.**—When so much is written about the extermination of *Alcedo ispida* in England, it is pleasant to be able to record that this bird is frequently to be seen so near London as Surrey. The Kingfisher still exists on the Wey and the Mole, the two chief rivers in the county, as well as on their smaller tributaries. About three winters ago I saw a specimen on the river Mole at Cobham; in October, 1897, another on the Pip-brook near Dorking; in the same month another at Bramley, near Guildford, in the valley of the Wey. On the Tillingbourne stream, which rises on Leith Hill and flows westward into the Wey, I have frequently seen Kingfishers; several times near Abinger Hammer, and in May, 1896, at Shere. There is a certain pond in the valley where I suspect a pair nested last season, for I made several expeditions to see them, and was generally rewarded. I am inclined to think that this species has increased in the county these last years; certainly I do not remember having ever seen so many. Can we attribute this to the Wild Birds Protection Acts? A correspondent of the 'Field' recently reported that a pair of Kingfishers had for some time frequented the lake in Battersea Park, a very uninviting part of Surrey one would think. It would be interesting to know whether the birds are still to be seen there.—HAROLD RUSSELL (Shere, Guildford, Surrey).

[The bird is also to be seen on the Wandle.—ED.]

**Hobby nesting in Hants.**—In reference to the note on this subject (*ante*, p. 24), I many years ago knew of a pair of *Falco subbuteo* nesting in the county not far from Stockbridge. The eggs were hatched in the nest of a Magpie, from which I subsequently took one of the young birds, which became very tame, and made a most interesting pet. It lived for several years, but was at last pounced upon by a cat when resting after a heavy meal, and although it succeeded in driving off the enemy, it was mortally wounded in the fray, one of the cat's claws having punctured the skull, as was found on dissection afterwards. The bird was very fond of insects, which formed a portion of its food. — J. J. ARMISTEAD (Solway Fishery, Dumfries).

**The Sanderling in Australia.**—Referring to my note in 'The Zoologist' (1895, p. 236) on the occurrence of the Sanderling (*Calidris arenaria*) in Australia, I can now further record having seen and handled specimens of this bird, shot in the vicinity of Point Cloates, as follows:—Sept. 22nd, 1895, one shot by myself; Dec. 30th, 1895, one shot by the Rev. Dr. Maclean; Dec. 12th, 1896, two shot by myself; and Nov. 5th, 1897, two shot and skinned by myself, and forwarded to the Perth Museum, West Australia. From these instances it would seem the bird is a regular visitant to these shores, as the average number of days in a year when I can spare time to walk on the beach with my gun does not exceed six. The Sanderlings shot were always in company with Turnstones and Little Sandpipers (*Actodromas australis*). I may also mention I shot, on Oct. 22nd last, a Barred-rumped Godwit and Allied Dotterel (*Ochthodromus inornatus*). — THOMAS CARTER (Point Cloates, West Australia).

**Eggs of the Roseate Tern.**—Mr. Grabham's remarks in 'The Zoologist' (1897, p. 510) respecting the eggs of *Sterna dougalli*, I unfortunately did not see until yesterday (Jan. 12th). As Mr. Grabham lives in or near the same city as I do, I am sorry he did not arrange to see my eggs of the Roseate Tern before stating he could not diagnose between the eggs of that Tern and those of allied species, and I feel sure had he seen my specimens he would not have made that declaration. I have conversed with other clever, if not eminent oologists respecting the eggs of this species, and they held the same opinion as Mr. Grabham evidently does, until they saw my series, when they were convinced as to their distinctness; and I shall be pleased to show Mr. Grabham my series. In forming my opinion I do not altogether rely upon the specimens in my possession. I will offer to make the attempt to pick out the Roseate Tern's eggs from a large drawer in which are placed two or three *genuine* eggs of that Tern among a large number of eggs of the Common and Arctic Terns, and I have little fear of being unsuccessful; but I must stipulate that the eggs are not what are called *authentic* American-taken specimens. Mr. Howard

Saunders, in a letter to me, admits that *he* has never seen any Roseate Terns' eggs taken in the Old World that run into some of the variations, &c., of Arctic Terns: "that is (he says), there is no bluish or greenish ground, and the shape is decidedly more elongated; *but* American eggs taken by men of *good repute so far* were not so distinct." I, like Mr. Grabham, have seen very elongated eggs of the Arctic Tern, but I should not mistake them for Roseate's. In my last note to 'The Zoologist' on this subject I put a ? after "late" when referring to the Rev. J. C. Atkinson, whom I am very pleased to hear is still hale and hearty.—E. G. POTTER (14, Bootham Crescent, York).

On the reported Summer Appearance of two Species of Birds in Lapland.—In answer to Prof. Collett (*Zool. ante*, p. 25), I can only say that to the best of my belief the birds in question were what Mr. Wollaston and myself reported them to be, namely, *Bernicla brenta* and *Phalaropus fulicarius*. We spent a long time watching the Geese, which were at no great distance from us, and we both had field-glasses. Mr. Wollaston went to the other side of the lake, and tried to drive the birds towards me, while I hid with the gun; but they would not move from the middle of the water. From the fact that they did not attempt to fly, it seems not improbable that the young birds were unable to do so. The Phalaropes were a great deal nearer to us, and we identified them as we did the Geese, while the birds were still before us, with the help of the 'Handbook of European Birds,' written by Mr. Backhouse. It is quite possible that the Phalaropes were on migration, as the date on which we saw them was Aug. 9th. Short of actually shooting them, I do not think we could have been more careful about the identification; and the picture of the Phalaropes with the other birds by that pool at Kautokeino has been so often in my mind since that I cannot help feeling glad we did nothing to disturb it.—HERBERT C. PLAYNE (Clifton College).

At what Hour of the Day do Birds most usually lay their Eggs?—It would be interesting, I think, to have on record the experiences of readers of 'The Zoologist' on this subject. It is almost a certainty that birds do not lay during the night, but rather in the early morning. My own experience is to this effect. However, I have known isolated cases where the daily egg must have been deposited *late* in the forenoon. I should say the most usual time, restricting the actual limits as much as possible, is between six and seven o'clock; that is, provided we take the month of May as a typical egg-laying month. I may explain my proof of this. In my morning walks, while living in the country, I have gone round those nests I happened to know of, between the hours of eight and nine, and found an additional egg deposited in every one. But on one

especially fine morning in May, of which I have clear recollection, I went out at five o'clock to find that not a single egg had been laid. Neither were the birds to be seen about any of the nests. I need not say that before I went out there had been about two hours of broad daylight. This experience of the habits of birds was new to me at that time, and I have not hitherto seen anything touching upon the matter in any of the journals.—  
J. W. PAYNE (Edinburgh).

**Popular Fallacies concerning the Cuckoo.**—*A propos* of the paragraph which appeared on this question in 'The Zoologist' for November (1897, p. 512), perhaps you may consider the Northumbrian version of this rhyme of sufficient interest for insertion. Although it does not differ materially from that in use in the midlands, several little dissimilarities will be noticed. Thus:—

“The Cuckoo is a pretty bird,  
She whistles as she flies;  
She brings us good tidings,  
And tells us no lies.  
She sucks little birds' eggs  
To make her voice clear,  
And never says 'cuckoo'  
Till summer is near.”

This is well known to, and repeated by, almost every school-boy in these parts; another equally popular rhyme being:—

“In Aperill she shows her bill,  
In May she sings both night and day,  
In June she changes her tune,  
In July away she must fly,  
In August go she must.”

The reference to the departure in August must be taken as applying to old birds only (and those are they which *sing*), for young ones remain with us several weeks longer; but how true is the allusion to the change in the song as summer advances! and how admirably is that change expressed in Heywood's lines:—

“In Aprill the Koo-coo can sing her song by rote,  
In June of tune she cannot sing a note;  
At first koo-coo, koo-coo, sing still she can do,  
At last koo-ke, koo-ke, koo-ke; six koo-kes to one koo.”

The “sucking of little bird's eggs” is generally accepted in the north, and I think rightly so, though positive evidence upon the point is always difficult to obtain when wanted. To instance a single case within my own experience, I may mention that one day, a good many years ago, I recollect

seeing a Cuckoo under circumstances which left no doubt upon my mind that she was guilty. I was lying concealed in a boggy bit of ground watching for a Water Rail, when a Cuckoo flew out of a bush near by, and settled upon a post and rail which filled up a gap in the hedge. Not being on the alert for proof of egg-eating, I did not pay particular attention to the Cuckoo, and could not say whether or no she carried an egg with her ; but on visiting the spot afterwards I certainly did find the recently broken shell and part of the albumen of a Blackbird's egg upon the top of the post where she had been sitting, and in the bush from whence she came was a Blackbird's nest containing three fresh eggs. Had a closer watch been kept upon the Cuckoo no doubt I should actually have witnessed her eat the egg, and perhaps also carry it from the nest ; but unfortunately the chance was missed, and such opportunities do not recur every day.

Another trait in the habits of the Cuckoo, which seems sometimes to be doubted, is that she lays her egg upon the ground, and afterwards deposits it with her bill in the nest which she has chosen ; but upon our Border moors, where the Meadow Pipit, or "Cheeper," as it is called, is by far the most frequent foster-parent to the young Cuckoo, the fact has long been known to that most observant race of men, the hill-shepherds. I have indeed frequently heard it asserted by these men that if you see a Cuckoo being closely pressed by a Cheeper, which seems particularly angry, while the Cuckoo flies silently and low, you may be certain that she has an egg in her mouth, and is seeking an opportunity of placing it in the Pipit's nest. The natural inference drawn is that the Pipit hopes by her attack to make the Cuckoo drop or break her egg. Should the latter succeed in safely depositing the egg in the nest, no further molestation is offered her ; while it is said that she frequently utters her chattering notes as she flies off, as though chuckling to herself over her success.

The following rhyme is also well known upon the Borders, though perhaps scarcely so often heard as the two above quoted :—

" The Cuckoo comes in mid March,  
And cucks in mid April ;  
And gangs her ways at Lammas-tide,  
When the corn begins to fill."

March is so exceptionally early for the arrival of the Cuckoo that it is curious to find that month so often alluded to in these old rhymes, particularly in north-country ones. In very forward springs, however, the always welcome notes have been heard in Northumberland by the first week in April, and, in 1896, so early as March 25th ; while in that year a Cuckoo was recorded as having been heard in Berwickshire on Feb. 20th—"a unique record for Scotland"—and apparently believed in !

Another "popular fallacy" concerning the Cuckoo was that it hyber-nated, and this also has been reduced to rhyme:—

“Seven sleepers there be—  
The Bat, the Bee, the Butterflee,  
The Cuckoo, and the Swallow,  
The Kittiwake, and the Corncrake,  
All sleep in yon little hollow.”

But the subject is inexhaustible, and I shall only quote one more of these rhymes and have done; premising, for the benefit of south-country readers, that however oddly the vernacular may read, the rhythm is good when it comes from the lips of a native:—

“In Mairch, gin ye sairch, ye may find a Cuckoo,  
But it's April afore ye can hear her;  
When wor weel into May, she sings night an' day,  
Wi' a voice that graws clearer an' clearer.  
Come in June, very soon she'll alter her tune,  
An' cry kook, kook, kook, kook-coo,  
Wi' a kind o' a chetter, which, gin ye come at her,  
Ye'll find is the out-comes o' *two*.  
By Julee, o'er the sea she's preparin' to flee,  
An' man stairt, or the wether gets cader;  
In August gan she must, an' her young man jist trust  
To the Cheeper, until they get ader.  
An' dod its gey queer, how the time o' the year  
The young be ther sells can remember,  
But whatsoever the cause, maist a' body knows  
They'll a' be away wi' September.”

—GEORGE BOLAM (Berwick-on-Tweed).

**Cuckoos sucking Eggs.**—I must express my indebtedness to Mr. J. H. Gurney for his very interesting paper in the December issue of 'The Zoologist' (1897, p. 568). I quite accept the evidence he has tendered on the question at issue. I am equally of opinion with Mr. Gurney that to describe Cuckoos as habitually sucking eggs by choice is misleading. When I originally alluded to Cuckoos sucking eggs as a popular fallacy, I of course had in my mind not a few peccadilloes of this kind on the part of individual Cuckoos, but a very generally entertained belief amongst humble folk who have frequently accounted to me for broken eggs in nests early on in April by saying, "Ah! that's the Cuckoo's work." To such and sundry it is of little moment that *Cuculus canorus* seldom proclaims its presence in this country much before the middle of April.—H. S. DAVENPORT (Ormandyne, Melton Mowbray).

## PISCES.

Fishes of Great Yarmouth. — I read with great pleasure in the December issue of 'The Zoologist' (1897, p. 539) Mr. Patterson's long and interesting list of the Fishes of Great Yarmouth. There is, however, one point I wish to pass a remark upon, *viz.* in speaking upon *Scorpæna dactyloptera* he says: "Found a specimen of this rare British fish (the second for Great Britain) in a shrimper's catch on April 29th, 1894." This species is of quite frequent occurrence along the east coast of Scotland. I have seen them in the Aberdeen market many times within the past twenty years, often in dozens at a time, and on several occasions from 1 to 4½ cwt., the latter being on July 9th, 1890. For observations on this species I would refer Mr. Patterson to the 'Annals of Scottish Natural History' for October, 1893.—GEORGE SIM (52, Castle Street, Aberdeen).



## NOTICES OF NEW BOOKS.

*Wild Traits in Tame Animals; being some Familiar Studies in Evolution.* By LOUIS ROBINSON, M.D., &c. William Blackwood & Sons.

IT is in such books as these that we recognize the vast influence exercised by Darwinism in the direction of zoological study. In endeavours to trace back the habits of animals to antecedent factors in the struggle for existence, which have received the imprimatur of natural selection, we often seem to meet teleology under a new name, like Pagan customs under more modern creeds. In fact, the evolutionary Dr. Pangloss proclaiming that this is the very best possible system of nature, and that Natural Selection tells us all about it, is not uncommon. On the other hand, there is a quiet undercurrent pervading all zoological work which is the strength of the new teaching, which finds that Darwin's key opens most locks, though not necessarily all, and that patient skill and observation and not forensic sledgehammers are needful at the still closed gates.

These prefatory remarks are necessary to introduce the contents of this most interesting and suggestive book, and to indicate the philosophical conception which has evidently prompted the composition of every page. Dr. Robinson is an observer, and many of our readers and contributors will appreciate the remark that "most of the future discoveries of great moment to the naturalist will be made, not in the remote and minute ramifications of science such as are occupying the attention of so many of our learned investigators, but among the everyday phenomena which are open to the eyes of all." Some may likewise possibly agree with the remark that "there seems also a tendency on the part of a larger number of professional naturalists to assume *quasi*-manorial rights in certain regions of nature's kingdom."

In our author's suggestions as to the "wild traits in tame animals" and his theories thereon, it must be remembered, as we once heard the late Prof. Rolleston remark, that not every shot hits the bull's-eye; and we might add that whilst unproven

theories are held as suggestions and not as facts we cannot complain, especially when they are the result of careful observation and deliberate thought as are those in this volume. We can only refer to some, and must leave their consideration to the reader, who will also meet with the arguments for the propositions. The speed and endurance of the Horse is considered to have been primitively acquired by the pursuit of wolves. "The wild horses which in ancient times swarmed over nearly all the great plains of the world, and from which all our modern steeds have sprung, would never have developed the swiftness and staying power which they undoubtedly possessed before they became captives," save for the persecution of the "grim grey wolf," with his "perpetual hunger and untiring gallop." The dread of asses to entering running water, which Darwin considered as indicating that the Ass originally came from a region where water was scarce, is differently interpreted by Dr. Robinson: "Crocodiles and similar reptiles were much more plentiful in the past than they are now. The rivers in all the warmer parts of the world once swarmed with them. If, as is probable, the wild asses' forefathers have inhabited a Crocodile-infested country ever since the Tertiary epoch, they must have had business relations (of a very unprofitable sort for the poor jackass) with these voracious saurians for hundreds of thousands of years. It would be a matter for surprise, especially when we consider the rigidly conservative principles of the donkey tribe, if such a connection had left no traces in the instinctive habits of the race." The original progenitor of the "tabby" Cat is considered as having been a "distinct natural variety which no longer exists as a wild animal." This animal—a true tabby—it is suggested is a "remarkable instance" of "protective mimicry," inasmuch as when curled up asleep it resembles the appearance of a coiled serpent.

We will conclude with one observation made on less debatable ground, which our author believes "has not been alluded to by any naturalist." It relates to the alliance of the Redshank and the Lapwing. "The herdsmen of the Essex marshes are well aware of this compact, and if they find a Redshank's nest they invariably search about with the expectation of finding the eggs of a Plover within a few yards' distance."

## EDITORIAL GLEANINGS.

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IN Prof. Newton's 'Dictionary of Birds' (Introd. p. 2) it was stated that there still seemed to be need of a report by an ornithologist with regard to the species of two of the Geese in the celebrated fresco found in a tomb at Maydoom. Mr. G. E. H. Barrett-Hamilton has recently contributed to the 'Ibis' some results of a careful examination he made of this fresco during a visit to the Ghizeh Museum. There are six Geese in the picture, and, as Prof. Newton states, "four of these figures can be unhesitatingly referred to two species (*Anser erythropus* and *A. ruficollis*)." Of the two larger Geese in question, Mr. Hamilton considers they are "very poor representations of *A. segetum*, and rather resemble the non-descript kind of Geese which may be seen frequently in farmyards in Egypt." His opinion is that "either the artist did not know of the characters which distinguish the various species of Grey Goose among themselves (with the exception of the White-fronted species), or else his intention was to depict both wild and tame Geese together—a course of procedure which would, I think, be quite in keeping with the methods of the artists who produced the beautiful series of animal drawings on the Tomb of Thi, at Sakkârah, which are said to date from about B.C. 3500. The latter drawings show conclusively, I think, that the Egyptians of those early times had both tame Geese and tame Ducks."

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"THE Birds of London" are the subject of a most interesting article in the last number of the 'Edinburgh Review.' The author defines his area as comprised within a radius of four miles from Charing Cross. Among the record of many interesting facts we may mention that last year there was but one rookery in London. The Dabchick, or Little Grebe, is a regular visitor to St. James's Park. "It is not uncommon in the early hours of the morning for wandering Cuckoos to make their way into the parks, and last spring, about seven in the morning, one even roused the inhabitants of the Temple by its call." The last record of the Nightingale's appearance in London comes from Lincoln's Inn (April, 1897). It is at least singular that while most birds are diminishing, there is a "gradual invasion of London by the Wood Pigeons."

IN the 'Strand Magazine' for January, Mr. James Scott has written and illustrated a paper on some experiments he has made to test "Insect Strength." The house-fly and the earwig were selected as the most suitable for the purpose. Mr. Scott appears to rather mix up the Coleoptera and Orthoptera, but his experiments with the earwig cannot be misunderstood, and one of these insects was ingeniously harnessed to a cart 1 in. long and  $\frac{3}{4}$  in. wide, formed with a piece of cardboard, having its sides bent down, between which two pieces of lead-pencil (after the lead had been removed therefrom) were pivoted by means of a couple of needles. To this conveyance was attached the farther end of the cotton connected to the earwig, and then the service of the insect was patiently awaited. After having fully investigated the peculiar "snake" which encircled it, it showed signs of vigour, and made off at what "I suppose must be called a trot, dragging the cart quite easily behind it. Then a match was loaded upon the waggon, making apparently but little difference to the earwig. Matches were successively added until the load comprised an accumulation of eight. At this point the insect showed signs of a faint struggle, such as a horse does when slipping about the roadway with a somewhat heavy burden. Although he managed to propel a heavier load than this, it would be equivalent to overwork if he dragged more than eight. I placed the eight matches upon the scales, and found that their combined weight was twenty-four times that of the insect. Each piece of timber was four times longer than the carrier, making in all a load of wood thirty-two times longer than the earwig. A horse is thicker in depth than breadth; whereas an earwig's breadth exceeds that of its depth. In length (proportionately) there exists little noticeable difference; so that, for the purpose of description, it may be assumed that, except for the difference in the number of legs, a horse corresponds in proportion to an earwig." Mr. Scott has pictorially represented a front view of a horse laden with pieces of timber each of the comparative length of a match. There would be eight of these huge beams, and it "may be fairly doubted whether an ordinary horse (or even a pair of horses) would be endowed with sufficient strength to enable it to shift the load, without expecting the animal to drag it with tolerable ease."

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THE 'Revue Scientifique,' in its first number for this year, contains an interesting note on "La mémoire des poissons." It is copied from 'Le Chasseur français,' and the incident was related by M. Mœbius. He placed a Pike in an aquarium with some small fish, which he afterwards separated from the "fresh-water shark" by a plate of glass. The Pike at first made desperate efforts to reach his prey, knocking himself furiously against the invisible obstacle till he was frequently giddy and apparently half-killed by the violence of the shock. Little by little, however, his

greed succumbed to pain, and he left his desired victims in peace. At the end of three months the plate of glass was removed, and the Pike had thus free access to the fish that were formerly preserved by this obstacle; but, strange to say, he never approached them. The idea of pain, doubtless appreciable to his senses, had become so dominantly connected with the small fish as to prevent any further attack. This experiment—easy to renew—adds much light to the psychology of fishes.

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MR. PERCY SELOUS, in the 'Bulletin de la Société Zoologique de France' (1897, p. 187), contributes some more observations on the habits of Rattlesnakes. In past years his *Crotales* had fed on nothing but mice, but now they took birds with avidity. Once he introduced a sparrow in a cage containing two large snakes, when both struck at it simultaneously, the bird escaping; but the largest snake had struck the other one by the head, and Mr. Selous had much trouble in separating them. The head of the smaller snake swelled rapidly, and he was afraid it would die, but after some time the swelling disappeared, and the wounded individual swallowed a mouse. This went to prove that their poison is somewhat harmless to the snakes themselves. Another strange observation was that sometimes these snakes disgorge pellets composed of hairs and feathers, after the manner of owls. Mr. Selous was bitten by one of these snakes. He immediately enlarged the wound with his knife, and sucked the same vigorously, till he thought he had extracted the poison, when he filled the wound with permanganate of potash. But the next day he was very ill, and, becoming worse, had to seek medical assistance, when he was ordered strychnine pills. He suffered, however, for some time, and still felt the effect at the time of writing.

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IN 'A Handy Guide to Fish Culture,' written by J. J. Armistead, and published by "The Angler, Limited," Scarborough and London, the amateur pisciculturist will find much invaluable advice, and the zoologist may glean a few facts. It is a condensation in brochure and very inexpensive form, of a larger work by the same author. Not only is the rearing of Trout described, but the construction, planting, and stocking of a fish-pond made clear to anyone who either wishes to follow the pursuit as a study, amusement, or as a business or source of profit. We have recently noticed several publications connected with aquaria; in this small treatise the reader may advance his knowledge from that afforded by the glass tank to what may be obtained from the fuller experience of a dam, or fish-pond, with its aquatic vegetation which is indispensable, its surrounding trees and plants which afford entomological provender, and the varied animal-life which must be introduced to afford the nutriment of fish.

A REPRESENTATIVE of Reuter's Agency has had an interview with the Hon. David W. Carnegie, son of the Earl of Southesk, who has just returned to England after a thirteen months' journey across the Great Victoria and Great Sandy Deserts of Western Australia. During his travels, which were from the south to the north of the Colony, Mr. Carnegie traversed nearly three thousand miles of unmapped and unexplored desert in the interior of Western Australia. In this country he met very small tribes of wandering blacks. They are nomadic, and this may be explained by the fact that their wells soon became exhausted, and they have always to be on the move in order to obtain water. Their method of hunting, too, causes them to be always moving. They set light to a tract of "spinifex" and then surround the burning bush, and throw sticks and spears at the Lizards and Rats that try to escape. Naturally in a very short time the country gets burnt up. Speaking of the natives in the interior Mr. Carnegie said:—"The people are very dark, and add to their blackness by smearing themselves with grease and ashes, a fact which makes their presence known at a considerable distance. They are very ugly—more like monkeys than anything else, with their flat foreheads and protruding lips. As a rule they are very thin, and of small stature—on two occasions only I saw men upwards of six feet in height. Men, women, and children are all stark naked. They make no houses, and have no villages. They simply scoop out a hole in the sand and squat in it. When they first saw our camels and caravan they were greatly excited, never having seen a white man before. We never suffered any hurt from them, but when any of them got us alone they tried to be nasty, and no doubt would have proved troublesome if they had been given much opportunity. They are only one degree removed from animals. It was only from the smoke caused by their hunting fires that we were able to track them, and so find water. After following their smoke we would suddenly come upon an encampment of them crouching in their holes, with their spare weapons hung up in the few surrounding parched-up trees."

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MR. R. B. TOWNSHEND, in a recent communication to the 'Westminster Gazette,' contravenes a published statement that the American Wolf has hitherto proved more than a match for any Dogs that could be brought against him, the matted hair round his throat making him invulnerable. The report went on to say that a new attempt was to be made against the scourge of the flocks and herds of the West with a pair of Irish Wolf-hounds which had been specially imported for the purpose, and were now being trained "on a treadmill" at Louisville, Kentucky. Mr. Townshend writes that the new attempt is not new, except, perhaps, as regards the "treadmill" part of the business. Ten years ago an Irish Wolf-hound,

"Leprechaun," bred by him, was taken to the neighbourhood of Fort Calgary, to hunt the Wolves of that district, which were destroying calves and foals. The ranchman who took out his "Lep." also took with him two others, "Patrick" and "Sheelah." They killed forty Coyotes the first winter, 1888-89, and he wrote an account of a run they had with a big Grey Wolf. The Coyote is about the size of a Collie; the Grey Wolf may be anything, from that of a Stag-hound to a Boar-hound. His informant said that "Lep." ran into the Grey Wolf first and the pair rolled over; they sprang to their feet and stood up on their hind legs, tearing at each other, and trying to beat each other down with their fore feet. It was a terrific battle, and twice "Lep." threw the Wolf, and twice the Wolf got away only to be collared again. Then "Paddy" and "Sheelah" came up and joined in, and the three finished him off. The American Wolf is undeniably a very formidable foe, but that time he met his match.

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AT a January meeting of the Zoological Society of London, the Secretary exhibited, on behalf of Professor Collett, a specimen of a supposed hybrid between the Fieldfare (*Turdus pilaris*) and the Redwing (*T. iliacus*).

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WE have received the Annual Report (1896-97) of the Curator—Prof. Alex. Agassiz—of the Museum of Comparative Zoology at Harvard College. We learn some particulars as to the official arrangements made by Prof. Agassiz for his expedition during this winter to the Fiji Islands, for the purpose of studying the coral reefs of that group. He was to be accompanied by Dr. Woodworth and Dr. Mayer, as assistants.

"The steamer 'Yaralla' has been chartered in Sydney for the expedition, and she is to meet us at Suva late in October. The outfit for the expedition has been shipped to Sydney to be placed on board the steamer we have chartered. In addition to the usual apparatus, for photographic purposes, for sounding and dredging, and for pelagic work, we take a diamond-drill outfit, and hope to find a suitable locality for boring on the rim of one of the atolls of the Fijis. The boring machinery will be in charge of an expert sent by the Sullivan Machine Company from whom this machinery was obtained. The Directors of the Bache Fund have made a large grant toward the expenses of this boring experiment.

"I am also indebted to Professor Brandt, of Kiel, for superintending for me the construction of a deep-sea self-closing tow-net, such as was used in the 'National' Expedition. Dr. Richard, of Paris, sent me a modified Giesbrecht net, such as is used by the Prince of Monaco on the 'Princess Alice,' and Dr. A. Dohrn kindly deputed Dr. Giesbrecht to send me one

of the Giesbrecht nets from the Naples Station. These, together with the old and new styles of Tanner net, which we take with us, as well as a self-closing net adopted by Dr. Townsend of the 'Albatross,' which he was kind enough to have made for me, will give us the means of comparing these different styles of deep-sea tow-nets, and of testing their comparative efficiency under similar circumstances."

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A 'CATALOGUE of British Birds' in the collection of Mr. E. M. Connop, of Rollesby Hall, Norfolk, has been compiled by our old contributor Mr. Thomas Southwell, and contains rather more than is usually expected in such enumerations. The preface is a digest of information respecting the principal private ornithological collections made in Norfolk and their ultimate dispersal. There are also some details as to the life-histories of professional gunners, who have done much for British ornithology, are a vanishing race, and will leave little personal record. The enumeration of the birds is accompanied with—in most cases—careful localisation; date and method of acquisition; if purchased, sale and lot number given; and many other items which will afford material for the British Natural History of the future, when an attenuated fauna will be principally described by the connection it will bear with the authentic records of the past. It is published at Norwich.

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In the January number of the 'Annals of Scottish Natural History,' Mr. J. A. Harvie-Brown has written on a subject to which he has paid much attention, "On the Minor Faunal Areas." His own words will give the best introduction to his memoir:—

"At the present time naturalists are endeavouring to arrive at conclusions regarding certain groups of phenomena relating to animal life, which phenomena have every appearance of being intimately associated with one another. These are: Bird Flight, Migration, Dispersal, and Distribution. As a first means towards their study I have long advocated the subdivision of larger areas into smaller sub-areas, and have illustrated my contention by treating this country of Scotland in such a manner. I have defined what we may call 'the Minor Faunal Areas of Scotland' from topographical and faunal standpoints.

"The Minor Faunal Areas of Scotland are at present defined either by the names of the principal river basins or from their isolated positions. 'Dee,' 'Forth,' 'Clyde' are examples of the former, and 'Outer Hebrides,' 'Orkney,' 'Shetland' are examples of the latter; whilst another group is indicated from their somewhat more general geographical position, independent of their great watersheds—and including these—such as 'Moray,' 'Sutherland,' 'West Ross,' or 'Argyll.'"





# THE ZOOLOGIST

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## THE TECHNICAL NAMES OF BRITISH MAMMALS.

BY OLDFIELD THOMAS, F.Z.S.

NOMENCLATURE, like linguistics or the structure of Greek names, is one of the collateral subjects which, however far from true zoology, have yet to be dealt with by every working zoologist; while it has the added inconvenience that, however it is done, whether rigidly or laxly, by rule or without it, its study is sure to bring down on the head of the worker the wrath of outsiders whenever unexpected results are arrived at.

This is especially the case in any group of animals which is particularly well known to outside, as opposed to technical, workers, and therefore any change in the nomenclature of so well-known a group as our British Mammals is to be greatly deplored from every point of view. But for this very reason, if technically unavoidable, changes should be adopted as soon and as widely as possible, so that the younger generation of naturalists may grow up knowing the proper names, and may not have to undergo the inconveniences we have all been put to.

An opportunity for a general revision of the names of our British Mammals seems now to have presented itself on the publication of a paper on the nomenclature of European Bats, showing what the proper names should be. These, as always happens, prove to be widely different from what we are accustomed to, and show how muddled and incorrect our current nomenclature has been.

The paper referred to is one by Mr. Gerrit S. Miller, a young American, who in the preparation of his monograph of North American *Vespertilionidæ*\* has investigated the nomenclature of all our European genera of that family, and has published the results in an English periodical.†

So great is the general dislike to change in nomenclature that after the publication of such a paper one finds that some people reject the changes altogether, while others adopt them, using the fresh names as occasion offers, the natural result being a long period of confusion and inconvenience. It is therefore thought that a concise list of the British Mammals, under the names believed to be correct on the most rigid principles of nomenclature, will be of use both to those who wish to form an opinion of their own on the subject, and to those who are willing to accept, if they know them, whatever names may be adopted by the world in general.

The object of nomenclature is to obtain a stable list of names, and while experience shows that such stability is unattainable while each author clings to what he or she thinks is the "well-known" name, it equally shows that at first a technical, and then a general, uniformity *may* be obtained by the rigid application of the principle of priority, whatever the temporary inconveniences of such a course may be.

One of the chief causes of the large number of changes necessary is that Linnæus gave certain names to certain animals in Scandinavia, and that these names were transferred to quite different animals in Central Europe and England under the erroneous idea that they were the animals Linnæus referred to. The most disastrous of these mistakes is that of "*Vespertilio murinus*," as worked out by Mr. Miller and explained below; but the Hares and Shrews have also been affected by the same kind of mistake.

The wrong use of *Vesperugo* for *Pipistrellus*, *Crossopus* for *Neomys*, *Synotus* for *Barbastella*, and *Arvicola* for *Microtus* are simple cases of defiance of priority, and can be corrected without confusion.

Lastly, although more debateable than priority, I would express

\* See 'Zoologist,' *ante*, pp. 45-6.

† Ann. Mag. N. H. (6), xx. p. 379, 1897.

my belief in the advisability of adopting the so-called "*Scomber-scomber* principle" on the score of its logicalness, simplicity, and exactness, the readiness with which the proper name of any species may be found under its guidance, and the exact indication it gives as to which is the type-species of a given genus. It unfortunately gives rise to some ugly compounds, although *Glis glis* or *Myotis myotis* are not so bad; but æsthetic considerations, full as they are of the personal equation, can hardly be allowed to have a preponderating influence in so prosaic a subject as nomenclature. Moreover, it so happens that of the animals to which *Scomber-scomber* names apply, several of the best known would still have strange and unfamiliar terms belonging to them even if the principle were rejected. Thus we should have *Meles europæus*, not *M. taxus* (which was based on the American Badger), and *Vulpes alopex*, not *V. vulgaris*; while the problem of what the name of the Polecat should be, if not *Putorius putorius*, is one which I have as yet quite failed to solve. There would therefore be no gain in the abolition of this much-abused principle so far as familiarity with the resulting names is concerned. In his editorial introduction to Lydekker's 'British Mammals,' Dr. Bowdler Sharpe has also advocated the same principle.

In the following list the Cetaceans are omitted, for, while there is probably but little wrong with their nomenclature, I have not worked at them sufficiently to care to be responsible for their names. It may, however, be noted that two of them—*Orca orca*, the Killer, and *Phocæna phocæna*, the Porpoise—take *Scomber-scomber* names; while it is evident that on a principle about preoccupied names nearly universally accepted, the Lesser Rorqual cannot bear a name based on "*Balæna rostrata*," Fabricius, 1780, when there was already a *Balæna rostrata*, Müller, 1776 (now *Hyperoodon rostratus*), in existence. Its name should apparently be *Balænoptera acuto-rostrata*, Lacépède. Finally, the Pilot Whale, whose generic name was originally formed in the feminine gender, should be called *Globicephala melæna* instead of *Globicephalus melas*, the universal rule being to alter the gender of the specific name to suit the generic, and not *vice versâ*.

## CHIROPTERA.

English Name.	Current Name.	Name Advocated.
Greater Horseshoe Bat	<i>Rhinolophus ferrum-equinum</i>	<i>Rhinolophus ferrum-equinum</i> .
Lesser Horseshoe Bat	„ <i>hipposiderus</i> .....	„ <i>hipposiderus</i> .
Long-eared Bat .....	<i>Plecotus auritus</i> .....	<i>Plecotus auritus</i> .
Barbastelle .....	<i>Synotis barbastellus</i> .....	<i>Barbastella barbastellus</i> .
Serotine .....	<i>Vesperugo (Vesperus) serotinus</i>	<i>Vespertilio serotinus</i> .
Parti-coloured Bat ..	„ „ <i>discolor</i>	„ <i>murinus</i> .
Noctule .....	„ ( <i>Vesperugo</i> ) <i>noctula</i>	<i>Pipistrellus noctula</i> .*
Hairy-armed Bat .....	„ „ <i>leisleri</i>	„ <i>leisleri</i> .
Pipistrelle .....	„ „ <i>pipistrellus</i>	„ <i>pipistrellus</i> .
Bechstein's Bat .....	<i>Vespertilio bechsteini</i> .....	<i>Myotis bechsteini</i> .
Natterer's Bat .....	„ <i>nattereri</i> .....	„ <i>nattereri</i> .
Daubenton's Bat .....	„ <i>daubentoni</i> .....	„ <i>daubentoni</i> .
Whiskered Bat .....	„ <i>mystacinus</i> .....	„ <i>mystacinus</i> .

## INSECTIVORA.

Hedgehog .....	<i>Erinaceus europæus</i> .....	<i>Erinaceus europæus</i> .
Mole.....	<i>Talpa europæa</i> .....	<i>Talpa europæa</i> .
Common Shrew.....	<i>Sorex vulgaris</i> .....	<i>Sorex araneus</i> .
Pigmy Shrew.....	„ <i>pygmaeus</i> .....	„ <i>minutus</i> ,
Water Shrew .....	<i>Crossopus fodiens</i> .....	<i>Neomys fodiens</i> .

## CARNIVORA.

Wild Cat .....	<i>Felis catus</i> .....	<i>Felis catus</i> .
Fox .....	<i>Vulpes vulgaris</i> .....	<i>Vulpes vulpes</i> .
Pine Marten .....	<i>Martes abietum</i> .....	<i>Mustela martes</i> .
Polecat .....	<i>Mustela putorius</i> .....	<i>Putorius putorius</i> .
Common Stoat .....	„ <i>erminea</i> .....	„ <i>ermineus</i> .
Irish Stoat .....	—	„ <i>hibernicus</i> .
Weasel.....	„ <i>vulgaris</i> .....	„ <i>nivalis</i> .
Otter .....	<i>Lutra vulgaris</i> .....	<i>Lutra lutra</i> .
Common Seal.....	<i>Phoca vitulina</i> .....	<i>Phoca vitulina</i> .
Ringed Seal .....	„ <i>hispida</i> .....	„ <i>hispida</i> .
Harp Seal .....	„ <i>grœnlandica</i> .....	„ <i>grœnlandica</i> .
Hooded Seal .....	<i>Cystophora cristata</i> .....	<i>Cystophora cristata</i> .
Grey Seal .....	<i>Halichærus gryphus</i> .....	<i>Halichærus grypus</i> .
Walrus .....	<i>Trichechus rosmarus</i> .....	<i>Odobænus rosmarus</i> .

## RODENTIA.

Squirrel .....	<i>Sciurus vulgaris</i> .....	<i>Sciurus vulgaris</i> .
Dormouse .....	<i>Muscardinus avellanarius</i> .....	<i>Muscardinus avellanarius</i> .
Common Rat .....	<i>Mus decumanus</i> .....	<i>Mus decumanus</i> .
Black Rat .....	„ <i>rattus</i> .....	„ <i>rattus</i> .
House Mouse.....	„ <i>musculus</i> .....	„ <i>musculus</i> .
Long-tailed Field Mouse .....	„ <i>sylvaticus</i> .....	„ <i>sylvaticus</i> .
Harvest Mouse .....	„ <i>minutus</i> .....	„ <i>minutus</i> .
Water Vole.....	<i>Arvicola amphibius</i> .....	<i>Microtus amphibius</i> .

\* Mr. Miller, following Dr. H. Allen, recognizes under the name of *Pterygistes*, Kaup., a genus for *noctula* and *leisleri* distinct from *Pipistrellus*. But for the present it seems better that the distinction should remain in abeyance until our knowledge of the exotic *Pipistrelli* is much further advanced.

RODENTIA—(continued).

English Name.	Current Name.	Name Advocated.
Common Field Vole ...	<i>Arvicola agrestis</i> .....	<i>Microtus agrestis</i> .
Bank Vole .....	„ <i>glareolus</i> .....	<i>Evotomys glareolus</i> .
Hare .....	<i>Lepus timidus</i> .....	<i>Lepus europæus</i> .
Varying or “Blue”		
Hare .....	„ <i>variabilis</i> .....	„ <i>timidus</i> .
Rabbit .....	„ <i>cuniculus</i> .....	„ <i>cuniculus</i> .

UNGULATA.

Red Deer.....	<i>Cervus elaphus</i> .....	<i>Cervus elaphus</i> .
Fallow Deer .....	„ <i>dama</i> .....	„ <i>dama</i> .
Roe Deer .....	<i>Capreolus caprea</i> .....	<i>Capreolus capreolus</i> .

NOTES AND EXPLANATIONS TO THE LIST.

CHIROPTERA.

With regard to the fundamental error about “*Vespertilio murinus*” referred to above, it may be explained that Linnæus, speaking in his ‘Fauna Suecica’ solely of Swedish animals, considered that there were two species of *Vespertilio* only—*V. auritus* with long ears, and *V. murinus* with short ears. The first is *Plecotus auritus*, and the second is certainly not the large continental species commonly so called, which does not occur in Scandinavia, but is either the Bat hitherto called *Vesperugo* (*Vesperus*) *discolor*, or *V. (Vesperus) nilssoni*, and in all probability the former, the doubt in no way affecting the generic changes involved. In the ‘Systema Naturæ’ the same names were used. It is clear therefore that *Vespertilio* must be adopted for the “*Vesperus*” group of *Vesperugo*, and since it seems on the whole advisable that that group should stand as a genus distinct from true “*Vesperugo*,” only two of our British Bats—the Serotine and the Parti-coloured\*—will fall into *Vespertilio* in its new sense. The other members of “*Vesperugo*,” as a matter of priority, must bear the easily remembered name of *Pipistrellus*. For those formerly called *Vespertilio* the proper name is *Myotis*.

Full references are given in the paper by Mr. Miller quoted above, as also in the case of *Barbastella* (1825), which antedates *Synotus* (1839).

\* Even this is doubtfully British,

## INSECTIVORA.

The nomenclature of the true Shrews has already been explained in 'The Zoologist.'\* That of the Water Shrew unfortunately involves a change, for the name *Neomys* was proposed as a generic title for it in 1829,† while *Crossopus* only dates from 1832.

## CARNIVORA.

The *Scomber-scomber* names in this group have already been referred to, and that of *Putorius nivalis* for the Weasel explained in 'The Zoologist.' ‡

Among the Pinnipedia, the vexed question of *hispida* versus *foetida* for the Ringed Seal has been settled by Mr. Sherborn's researches on the dates of the plates of Schreber's 'Säugethiere,' which give *hispida* a year's priority over its rival.

*Trichechus* is now universally admitted (even by people who refuse to adopt the alteration involved) to have been based on the Manatee. It should not therefore be used for the Walrus.

## RODENTIA.

The British Squirrel, Short-tailed Field Vole, and Common Hare have all lately been considered to be at least subspecifically different from the typical continental forms, as is also the Hebrides Field Mouse; while another form of *Mus sylvaticus* has been shown to be the same as the Danish "*Mus flavicollis.*" These refinements, however, while of great interest to the technical student, do not directly affect the specific nomenclature, and need not therefore detain us here.

Among the Voles, it seems time that the generic separation of the Bank Vole from the others, long universally recognized by technical writers, should be adopted in more popular works. The

\* 1895, p. 62.

† Kaup. *Entwick. Europ. Thierw.* p. 117, 1829. *Leucorrhynchus*, p. 118, and *Hydrogale*, p. 123, of the same work, become synonyms of *Neomys*. They would all antedate *Crossopus*.

‡ 1895, p. 177. In his adverse note on this paper, Mr. Harting ignores the fact that, in Scandinavia at least, the Weasel does usually have some black hairs at the end of its tail. Shortly after the paper was published Dr. Collett was good enough to send to the British Museum a Weasel agreeing exactly with Linnæus's diagnosis, and this specimen I should be delighted to show to anyone still doubtful about "*Mustela nivalis.*"

first-named, with the "Ruddy Vole" of Northern Europe, and the "Red-backed Voles" of North America, may be distinguished by its semi-rooted teeth and more murine skull from the true Voles, of which our Water Vole and Short-tailed Vole are representative. The latter must of course be called *Microtus*, not *Arvicola*; while for the Bank Vole and its allies Dr. Coues's term *Evotomys* is available.

Lastly, in the Hares we have a repetition of the ever-recurring Scandinavian muddle. Linnæus's *Lepus timidus* was of course the northern, varying Hare, to which alone the name should be restricted; the Common Hare should take Pallas's name, *Lepus europæus*.

ON SEXUAL DIFFERENCES IN THE FEATHERING  
OF THE WING OF THE SKY LARK (*ALAUDA  
ARVENSIS*).

BY ARTHUR G. BUTLER, Ph.D., &c.

IN Volume II. of 'British Birds with their Nests and Eggs' (p. 174), I have noted the fact that bird-dealers recognise cock Sky Larks, by the greater length of the second primary of the wing in that sex. I had intended to illustrate the well-defined sexual differences in this species by a process-block (*l. c.*), as I did in the case of the Linnet, but unhappily when the wings were needed Mr. Frohawk was utterly unable to obtain examples for illustration, whilst at that time I possessed the male wing only.

I now have before me eight wings, four of which (two right-hand wings of each sex) were secured, mounted, and kindly given to me by Mr. C. H. B. Grant, who shot these and other birds last December in Hampshire.

The wing of the male Sky Lark, as I have already stated elsewhere, is especially adapted for powerful and sustained flight, whereas that of the female is altogether weaker in construction; indeed, so greatly do the wings differ in old birds that a glance would enable the dullest observer to decide their sex; even in young birds the distinctions are well marked.

As is well known, the first primary in the Sky Lark (as in many Passerine birds) is very small; so that by a superficial observer it might easily be confounded with the coverts. The second, third and fourth primaries are, however, the longest in the wing, and in the male Sky Lark these three feathers terminate almost at the same level; thus when superposed there is hardly any noticeable difference, though the third primary is very slightly the longest. In the female the second primary is decidedly the shortest of the three and either the third or the fourth the longest, these three feathers in the female thus either forming an



angle of which the extremity of the third primary is the apex, or a regularly graded oblique line. It is therefore not strictly correct to say that the second to fourth primaries of the Sky Lark are almost of equal length, inasmuch as there is frequently (probably always) a considerable discrepancy in the length of those of the female.

The secondaries of the male are distinctly longer than in the female and slightly less contracted towards the tips, which are bilobed (or, more strictly, bispatulate) in both sexes, the lobe or spatula terminating the outer web being longer in proportion to that of the inner web than in the female: this is especially noticeable in the larger and presumably older birds.

There can be little doubt that the slightly greater width at the extremity of these feathers and their more even termination offer better resistance to the air, in flight, than those of the female, and, combined with the increase of length in these feathers, help materially in supporting the bird when soaring.

A comparison of a series of Sky Larks in the flesh shows that the males are distinctly larger than the females, and, comparing the general outline of the expanded wings, it will be at once observed that those of the males are decidedly longer in proportion to their width than those of the females.

When one critically examines the feathering, to see where the principal difference in measurement exists, it at once appears that the uncovered portion of the primaries in the male is disproportionately greater than in the female, and the emargination of the outer web in the third and fourth primaries commences considerably farther from their extremities, about half the edge of the outer web in the exposed portion being emarginate in the males, and about two-fifths in the females.

Later on I hope to publish additional notes on sexual wing-structure in other birds. As a rule, the male wing is specially modified to enable the bird to overtake its female; but sometimes the development seems to serve the purpose of sustained rather than rapid flight; and it must be remembered that in certain birds (such as the Dunlin) in which the wings of both sexes agree in expanse and hardly differ in the structure of the feathering, the inferior size and weight of the body in the male give him a considerable advantage in flight.

ORNITHOLOGICAL NOTES FROM NORFOLK  
FOR 1897.

BY J. H. GURNEY, F.L.S.

It will be remembered that last year the autumn migration was very marked indeed, such exceptional visitors as the White-winged Tern, Greater Shearwater, Barred Warbler, Gull-billed Tern, Icterine Warbler, Bluethroat, Aquatic Warbler, Sabine's Gull, Greater Spotted Cuckoo, Pallas's Willow Warbler, Black-breasted Dipper, and Red-breasted Flycatcher followed each other in Norfolk in bewildering succession, to say nothing of what occurred further along the coast. The autumn of 1897 was a contrast to that of 1896; August produced a Pectoral Sandpiper and a Barred Warbler, and October one Tawny Pipit, while September and November were quite uneventful. The saltwort bushes at Blakeney were reported by visitors as being very destitute of birds, day after day "not a bird in them," to quote from a letter. The only approach to a rush was on Oct. 22nd (T. E. Gunn), and the next day Mr. Caton Haigh marked the influx of birds at Humbermouth ('Naturalist,' 1898, p. 26). The explanation of this dearth of migrants must be sought for in the unusual weather, and the wind. From the returns made by Mr. Arthur Preston, F.R.Met.Soc., it appears that in 1896 the prevailing wind in September was S.W. (mean estimated force 3.7); in 1897 it was N.W. In November, 1896, it was N.E.; in November, 1897, S.W. From his notes the annexed table is abridged (Trans. Norf. and Nor. Nat. Soc. vi. p. 196 *et seq.*).

	1895.	1896.	1897.
August .....	W.	N.	W.
September .....	S.E.	S.W.	N.W.
October .....	W.	S.W.	S.
November .....	S.W.	N.E.	S.W.
	Medium Migration.	Strong Migration. (Twelve rare birds).	Slight Migration.

But, as was pointed out last year, Norfolk naturalists have not yet altogether learnt how winds govern the visits of rare migratory birds. What we have learnt is that rain and wind and mist and unsettled weather bring birds to Cley and Yarmouth more than fine open weather. These conditions delay a great many Warblers, Bluethroats, &c., on their south-westerly journey, and blow Gull-billed Terns and Greater Spotted Cuckoos out of their proper course, so that Norfolk obtains them. When, on the other hand, the weather is fine, the autumnal migration proceeds on its regular normal east to west course, the travelling birds pass high over Norfolk and Suffolk without descending, and for the most part by night, and no one sees them. Now 1897 has had an autumn and winter of quite exceptionally mild and open weather, in Mr. Preston's words, the "persistence of anti-cyclonic conditions resulting in an almost entire absence of strong winds on our east coast." To this fine weather we may fairly attribute the paucity of all kinds of migratory birds, without seeking for a further reason.

## JANUARY.

1st.—Two Common Gulls.

7th.—Shoveller at Hillington.

8th.—Green Sandpiper at Intwood.

9th.—Bean Goose at Yarmouth (A. Patterson).

11th.—Two Green Sandpipers at Haddiscoe (L. Farman).

13th.—Seventeen Shelducks on Breydon (A. Patterson).

23rd.—Snow-storm from the east. Partridges sheltering under hedges. Reports of Wild Geese and a supposed Polish Swan.

28th.—Good skating. A Little Auk brought alive to my brother at Northrepps, and about this time twenty others were notified in different places, one of which struck against a shed (Patterson), and another was picked up in a sheepfold, leading us for a few days to expect a repetition of 1895. Seventy Scoter Ducks were shot off Hunstanton; and seventy-eight Wood Pigeons were netted at Hempstead, which in some cases were voraciously filling themselves with the miserable remains of turnip-tops left by the farmers as too bad for pulling,

30th.—My son saw a Great Crested Grebe at Cley, and

about this time Mr. H. Pashley—to whom these Notes are, as usual, very much indebted—announced a marked migration of Slavonian, Red-necked, and Great Crested Grebes, all driven by the frost to the open water of the harbour. Local observers were reminded of the influx of Red-necked Grebes in 1865, and the same desire was observed on the part of everybody to kill them! I believe the migration extended to Boulogne, on the other side of the Channel.

During January a drake hybrid between the White-eyed Duck and the Pochard was taken on Saham Toney mere, and was subsequently recognized by Mr. A. W. Partridge as the so-called Paget's Pochard. It is now alive at Keswick, and agrees very well with my father's specimens of 1845 and 1859, which, with others, are fully described in Suchetet's '*Oiseaux Hybrides*,' pp. 152, 711. It has a yellow eye, the breast, instead of being black like a Pochard's, is a rich rufous, both head and neck the same, and a white bar on the wing not quite so distinct as in Mr. Wolf's plate in '*The Birds of Norfolk*.'

#### FEBRUARY.

2nd.—Quickly succeeding the Grebes, and from the same cause, flocks of Sky Larks were seen passing along our coast, escaping from the hard feeding-grounds inland, which after a fortnight's continuous frost and snow threatened them with starvation. At Sheringham, Beeston (H. Fitch), and Cromer numerous flocks were to be seen, winging their way S.E., and against the wind, no doubt as far as Yarmouth, where Mr. Patterson saw them, together with Fieldfares and Redwings, and on to the Suffolk coast.

3rd.—Sky Larks still coming over Yarmouth (Patterson).

4th.—Larks passing Blakeney, Cley, and Salthouse in thousands (Pashley), just as in January, 1879, when the same phenomenon was seen.

5th.—Larks still passing Cley.

8th.—Solitary Snipe shot near Cley (Pashley); an unusual date.

26th.—Wind strong. Egyptian Goose shot at Shadingfield (Daily Press).

## MARCH.

9th—Chiffchaff and Wheatear at Cley ('The Field').

23rd.—Chiffchaff at Earlham (T. Southwell) and Rollesby.

25th.—Norfolk Plovers already extremely plentiful at Thetford (W. G. Clarke, Zool. 1897, p. 248).

26th.—Swift at Lowestoft, seen by Professor and the late Sir E. Newton; a remarkably early date.

29th.—Yellow Wagtail at Haddiscoe (L. Farman).

31st.—Several Martins at Hickling (M. Bird).

## APRIL.

1st.—A cock Serin Finch caught in a garden on the Caister road, Yarmouth, and another seen, the pair having been about some days, and being at first taken for Siskins (W. Lowne), would, if let alone, possibly have nested. This is in every way a brighter example than the female, also in my collection, caught in April, 1893. The Serin seems to be an easy prey to birdcatchers, but, though often imported to London as a cage-bird, it is believed these occurrences are reliable, and, unless the birdcatchers have duped us, it has now turned up at Yarmouth six times. It is a common spring migrant to Switzerland, where it may be seen on fruit trees in gardens, but not after the fruit. [As additional to those enumerated in Suchetet's 'Oiseaux Hybrides,' three recently taken hybrids between the Linnet (*Acanthis cannabina*) and Greenfinch (*Ligurinus chloris*) may be here placed on record. On April 19th Mr. Connop obtained one of these anomalous birds, said to have been quite recently caught by a birdcatcher on Caister denes. On Oct. 26th another was taken at Rottingdean, in Sussex, and submitted to me by Messrs. Brazenor, of Brighton, who also received yet another, considered by its plumage to be a female, on Dec. 11th. Neither of these Sussex hybrids so much resembles a Greenfinch as the one my father had alive for some time. No. 10 of M. Suchetet's list.]

2nd.—Ten Shoveller Ducks, probably just paired, and a Garganey Teal, doubtless a summer migrant, arrived on Hickling Broad (M. Bird).

8th.—Grey Shrike shot at Barton Bendish (R. Clarke).

20th.—A Spoonbill arrived at Breydon, and remained a few days.

A Dipper seen at Selbrigge Pond, Hempstead, this month by Mr. Upcher; the second time only that this species has occurred in April.

#### MAY.

1st.—Mr. R. Gurney saw five pairs of Shelducks at Cley, and also washed-up bodies of a Slavonian Grebe, a Little Auk, a Gannet, and several Puffins, Razorbills, and Guillemots.

2nd.—Two Spoonbills on Breydon (S. Chambers).

3rd.—Spoonbills still on Breydon, flying from there to Hickling (W. Lowne).

4th.—Thirty Great Crested Grebes on Ormesby Broad (W. Lowne).

6th.—Two Kestrel's eggs in a hollow alder tree at Hempstead; from these, though exposed to the sky, the old bird must, owing to the depth of the hole, have had considerable difficulty in rising. This example is perhaps worthy of being added to Mr. W. G. Clarke's abnormal nesting sites (Zool. 1897, p. 449). The eggs were only lying on chips.

12th.—A small flock of Curlew Sandpipers, some in very ruddy dress (H. Slater).

15th.—A youth of eighteen paddling his canoe on the Yare was attacked by a Mute Swan which had a nest: the craft was upset, and the canoeist had a narrow escape from drowning.

19th.—Five young Ray's Wagtails thrown out of their nest by a Cuckoo at Sutton, and about this time some young Pied Wagtails at Keswick were similarly ejected, but no Cuckoo was seen.

21st.—One Reeve, seen at a former well-known breeding place on our principal broad, by Mr. Lee.

23rd.—Spoonbill on Breydon (Chambers).

25th.—Perhaps the chief event of the year was the discovery this day of a nest of the Common Sandpiper (*Totanus hypoleucus*) with its four unmistakable eggs. It was found by Mr. Oswin Lee under a gooseberry-bush in the garden of an inn by the side of one of our broads, where he was photographing. The bird was plainly identified. This is a discovery of more than local interest. Cf. J. E. Harting, 'The Field,' April 28th, 1877, though there can hardly be a doubt that the Sandpiper has nested in Lincolnshire (J. Cordeaux, Zool. 1893, p. 304); with this exception, these are the first authenticated eggs in the eastern counties south of the

Humber, and the particulars have been communicated to Mr. Howard Saunders. Mr. Lee was too familiar with this nest in Scotland to require the eggs, which he therefore left to the old bird, but we never learnt if they hatched off. Mr. Lee had also the chance of watching a pair of Montagu's Harriers which were breeding, and of seeing the grey male hover some seventy feet above the marsh where the female was sitting, and then drop prey—probably a mouse—which its mate quickly rising caught in the air. Another discovery was a Willow Warbler's nest at Cringleford, almost five feet from the ground; Mr. Mitchell, however, refers to nests in Lancashire at heights of sixteen and fourteen feet. Here I ought to mention the abundance of Nightingales, which were also recognized by my son in April in Morocco, being then on their way to England. Also the finding of a Pied Wag-tail's nest at Cringleford containing two young Cuckoos, and of a Spotted Flycatcher's nest at Braconash, also tenanted by two young Cuckoos, one of which ejected the other.

27th.—The Jackdaws have been uncommonly troublesome, taking fourteen young Pheasants from one coop; like Rooks, they are always worse in dry weather.

28th.—Dotterel, female, "telegraphed" at Holkam.

29th.—Spoonbill on Breydon (Patterson).

#### JUNE.

11th.—Hooded Crow seen by Mr. H. M. Wallis.

14th.—A pair of Tufted Ducks on Wroxham Broad (Wallis).

23rd.—A Green-backed *Porphyrio*, male, shot at Martham Broad, about two miles from the sea; taken to Mr. E. C. Saunders (*cf.* 'The Field,' 1897, July 3rd).

#### JULY.

2nd.—About one hundred Redshanks on a mud-flat near Duffell's Road, Breydon, considered by Mr. Patterson to be locally bred, the date being too early for migrants.

3rd.—Another Green-backed *Porphyrio*, male, shot at Martham Broad (Rev. M. Bird; *cf.* 'The Field,' 1897, Aug. 7th).

9th.—Five Shoveller Ducks on Breydon (Chambers).

12th.—Wind E. At eleven a.m. a Spoonbill appeared on Breydon, where at four o'clock it was to all appearance asleep,

with a guard of about a hundred large Gulls on the uncovered mud, head to wind, the Gulls sitting, the Spoonbill standing with beak snugly tucked away into its scapular feathers. It permitted an approach to within seventy yards, and then flew, stretching its legs out behind with its long neck extended in front. The watcher says it remained on Breydon Broad until the 31st, when for security he drove it away, but in a few days, apparently liking its old quarters, it returned with two companions. On the north or Norfolk side of the broad the close time ends on Aug. 1st, but on the Suffolk side it lasts till the end of the month, so there a Spoonbill is, or ought to be, safe for some time.

20th.—A young Short-eared Owl shot at Horning, which had not quite lost the down (T. Southwell)—perhaps from the nest which was reported in May at Hickling.

21st.—A Green-backed *Porphyrio*, female, shot at Barton Broad (T. E. Gunn).

31st.—Spoonbill seen on Breydon (Patterson).

#### AUGUST.

3rd.—Another *Porphyrio* at Barton, as I am informed by Mr. W. Lowne, who received it, and perceived signs of confinement, of which more presently.

13th.—A Great Skua seen at Cley by Mr. Pashley, who also reported some Manx Shearwaters, and two young Buffon's Skuas.

18th.—Spoonbill seen at Cley by Mr. Barclay, and about this time one at Kessingland (T. Southwell). Pectoral Sandpiper shot on Breydon (Zool. *ante*, p. 25).

27th.—An adult female Barred Warbler shot by the Rev. Henry Slater as it dodged out of a bush on one of the sandhills on our coast ('Ibis,' 1898, p. 148). There can be little doubt that this is a species which is moving westward, and will become commoner.

30th.—A Richardson's Skua with white carpal joints and edgings to the elbow of the wing, the chin and patch on the belly also white, brought to Mr. Pashley. Probably the first of this albinic variety which has been obtained in Norfolk—an interesting bird wherever killed.



## SEPTEMBER.

11th.—Another Green-backed *Porphyrio* shot at Barton Broad, as I learnt from Mr. Southwell while absent in Scotland. This is the fifth of these unfortunates in the same locality; but it is impossible to claim them as genuine migrants, for, though with one exception in perfect condition and plumage, they are probably some turned out by the Duke of Bedford at Woburn Abbey, in Bedfordshire. Mr. H. Saunders and I make it only 120 miles on the map in a straight line from Woburn to Barton Broad; the instinct which led so many to the same place, and that place so suitable to their requirements, is very remarkable. Whether they began their journey together, or not, it is morally certain that they did not all arrive at the Broad district at the same time, being far too noisy and conspicuous to remain long hidden. The first, on June 23rd, had probably just escaped, but in August Mr. E. Meade Waldo,—who, together with the Duchess, have kindly given every information,—informs me there were about sixty of these splendid "*Poules sultanes*" at large, full-winged, and already quite wild in Woburn Park. None were reported anywhere but in Norfolk, so far as I could learn, but a Purple *Porphyrio* was killed in Yorkshire (J. Cordeaux). If any more are turned out it would be a good plan to put dated aluminium rings on their legs, and we could then be sure of their owners and trace their wanderings. We can only promise them the same inhospitable reception they met with before, so long as the reed-mowers are allowed guns, for they, like all the rest of the tribe of Norfolk gunners, are incapable of leaving any bird alone, and the persecution of Montagu's Harriers and Barn Owls is especially regrettable. If these *Porphyrios* had been unmolested they might possibly have nested, as they did in a semi-wild state at Mr. Meade Waldo's place in Kent.

21st.—A Shag, caught alive at Grimston Road by the side of the railway, is the only item in my diary calling for notice, a strange contrast to the list of rarities recorded for September, 1896, and to many of the same months in previous years.

## OCTOBER.

7th. — Wind S.W. Grey Phalarope at Breydon Broad (B. Dye).

9th.—Wind N.W. A female Tawny Pipit in somewhat faded plumage was netted on Yarmouth denes, and exhibited at the next meeting of the Norf. and Nor. Nat. Soc. by Mr. Southwell, who took the opportunity of giving a *résumé* of the present status of Norfolk ornithology. It has been added to Mr. Connop's extensive collection, a catalogue of which Mr. Southwell has recently published (*Zool. ante*, p. 96).

12th.—An old Muscovy Drake attacked a Canada Goose with such ferocity that it completely disabled the latter, though three times its own size; the goose died from the wounds it had received.

19th.—Another of the chestnut Partridges—the variety named *Perdix montana*—shot by Mr. H. Galton at Sparham, about eight miles from where some were seen last year. The present specimen I am informed has the back and wings a uniform reddish brown colour without markings, breast bluish white, legs yellow, head normal. Two of those obtained by Col. Vivian last year had the whole of the breast and belly a rich dark chestnut, almost chocolate-colour, reminding me of a Grouse (*cf.* 'Field,' Jan. 15th, 1898). This is a more striking variety than the bluish or stone-grey variety, which is a pale bird with a cream-coloured chin, which also turned up this autumn in one or two places in Norfolk.

29th.—An Eider Duck watched on Breydon Broad by Mr. Patterson.

#### NOVEMBER.

Two Goosanders and four Mergansers are about the only things to be noted in this month; one Velvet Scoter, and an Eider Duck killed with a stone at Hemsby. Some hybrids between *Anas pæcilorhyncha* (the Indian Spot-billed Duck) and a Wild Duck on ponds at Keswick may be mentioned, though I do not think any of them are likely to escape and confuse county avifaunists.

#### DECEMBER.

10th.—A Coot on the river at Keswick (very unusual) and some Siskins on the alders, a bird of which there have been an unusual number at Yarmouth (Lowne). Two Magpies at Northrepps about this time, and a Waxwing catapulted at Wells (Col. Feilden).

31st.—A flock of about ten Shore Larks at a certain favourite corner by the sea sheltered from the north-west. This spot for years has been very seldom without these winter visitants, which have never numbered more than nine or ten. Here they stand by choice on the hardest mud, which the Sky Lark never seems to do. I have kept two or three Shore Larks for some time, and had one which developed a partiality for orange marmalade, being much annoyed by its stickiness, though liking its sweetness.

This month an adult Long-tailed Duck was shot at Wisbeach (Bland), and a crippled Pink-footed Goose was picked up.

## A HITHERTO OVERLOOKED BRITISH BIRD.

BY ERNST HARTERT.

IN a country so well explored and so well stocked with truth-seeking ornithologists as Great Britain, the addition of a bird "new to the British list" is always an event. Nevertheless several such additions have been made lately, but they were all stragglers from the far east or west; and it is, I believe, a long time ago that a resident breeding species has been added to the list. This, however, has occurred now with the discovery in England of *Parus salicarius*, Brehm.

It is well known that the Marsh Tits, to which this species belongs, consist of a number of local forms, partly recognized as species, partly as subspecies, by modern ornithologists. Thus over the greatest part of Central Europe we find a common Marsh Tit with a glossy, somewhat bluish-black head, generally called *Parus palustris*. To it belongs the common English Marsh Tit, which has been called *P. dresseri*, but which hardly differs in colour from West German and French specimens, but is a little smaller, and has a shorter bill. It is no species, but should be recognized as a subspecies by exact workers. From it the East German bird differs much more, especially in colour; but, strange to say, this fact has only recently been recognized. Different from these subspecifically allied forms are the Northern Marsh Tits, known as *P. borealis*, and replaced by a very closely allied form in the Alps. These Tits are always admitted to be different from the common Central European Marsh Tits. They differ at a glance by the colour of the crown, which looks less glossy and more of a brownish black. To this group also belongs *Parus salicarius*. This different colour is produced by a very different structure of these feathers. In the common Marsh Tits these feathers are deep black, rounded, and with strong glossy reflexes on the tips. In the Northern Marsh Tit and our *P. salicarius* they are brownish black, more

lengthened, without strong reflexes on the tips, less compact, and less strongly pigmented. The tail in the common Marsh Tits is almost straight, only the lateral pair being a little shorter. The tail in *P. salicarius* and allies is strongly graduated, at least the two lateral pairs being much shortened. There are also differences in colour, form, and size of bill, *et cet.*; but they are not so easy to see, and I will not dilate upon them at length. With regard to *P. salicarius*, it may be added that it differs from *P. borealis* considerably in size, form of bill, colour of flanks, colour of edges of wings, and of the entire upper side. It is, however, as *P. borealis* is not known to occur in Great Britain, more important for British ornithologists to distinguish it from the ordinary British Marsh Tit generally called *P. palustris dresseri*, and I may therefore repeat that it differs from the latter chiefly in the colour and structure of the feathers of the crown, the form of the tail, and the more rufous flanks and more brownish edges of the secondaries, *besides its call-note being very different.*

*P. salicarius*, although described as long ago as 1831, has been lost sight of for a long time, and only quite recently our young friends on the Continent, Kleinschmidt and Prazak, have rediscovered it. I myself came across it long ago in the willow thickets of the Lower Rhine near Wesel, and was at once struck by the colour of its crown, which, however, I thought erroneously to be due to its being a young summer bird. No credit therefore is due to my observation, which was lost through my travelling far away into Africa and India, which ended for a time my studies of German birds. The specimen in question, which somehow lost its original exact label, was later given by me to the British Museum in exchange, and is there now. *P. salicarius* evidently inhabits dark willow thickets and other swampy woods, so dense that the sun hardly ever reaches the ground in them. It is found on the Rhine between Worms and Bingen and near Wesel, and at Renthendorf in Saxony. When Mr. Kleinschmidt was in England last autumn he recognized two British skins, from Hampstead, in the British Museum, as *P. salicarius*, and as these birds were just then in fairly good plumage, I at once tried to procure some specimens, but only succeeded in getting three from Finchley.

Neither were we able to find them anywhere near Tring, doubtless from want of suitable localities; nor could we procure any more from our correspondents. There can, however, be no doubt that there are many suitable localities in England where this bird is found, and I hope ornithologists will look out for it, and procure some specimens in autumn, *as soon after the moult as possible*, for it is a pity to shoot any when they are in abraded dirty spring plumage, which in Tits is rather poor, as everybody knows.

More detailed accounts and figures of *P. salicarius* can be read in the 'Ornitholog. Jahrbuch,' vol. viii. Heft 2, and in the 'Journal für Ornithol.' 1897, no. 2 (April). These articles show that the forms of the Marsh Tits by no means form a chaos out of which it is too difficult to find a way, but that with some study they become a very clear group. The British specimens of *P. salicarius*, it may be added, differ a little from continental ones in being somewhat darker above, and having shorter wings; but more material will be necessary to decide about the constancy of these characters. In any case there is no doubt that another species, not a subspecies, must be added, as *P. salicarius*, Brehm, to the British list. As this species is a resident bird, and as all Marsh Tits are resident birds, there can be no doubt that the *Willow Tit*, as this bird may appropriately be called, will be found all the year round in suitable localities in Great Britain and perhaps in Ireland.

## NOTES ON BRITISH ANNELIDS.

BY REV. HILDERIC FRIEND.

## I. DISTRIBUTION OF TUBIFEX.

IN nearly all old lists in which records are found we meet the two entries, *Lumbricus terrestris* and *Tubifex rivulorum*. Under these two names were included respectively all the common species of Earthworm, and all the usual bloodworms of ponds, ditches, and streams. As the old *Lumbricus* group has been worked out, new genera and species have been differentiated, so that to-day it would be inadmissible to make an all-round entry under this heading; similarly with *Tubifex*. Much has been done of late years by a few English specialists, and more by continental workers, to extend our knowledge and analyse results. The term *Tubifex* is now used not only in a generic sense, but has been raised to the rank of a family, under which nearly twenty well-defined genera are grouped. The difficulty at present is to know to what genus or species the old records are to be assigned. Evidently the only way to settle the matter is by making an accurate entry every time any one or other of the *Tubificidæ* is found. Having examined a good many specimens from various parts of England and Ireland, I think it may be well to place on record here the localities and species about which no question can exist. I do not profess to give a complete list of all the species I have myself examined, nor do I include habitats recorded by Benham and others; but simply put down a few indisputable items as a nucleus around which further records may gather as research extends. I have undoubted records from the following places of—

1. *Tubifex rivulorum*, Lam.—Gasworks, Idle, near Bradford, and banks of Aire around Apperley, Yorks; dykes at Pevensey and ditches at Dallington, Sussex; banks of Derwent and muddy backwaters around Cockermonth, Cumberland; Ocker Hill, Tipton, Staffs.

2. *Limnodrilus udekemianus*, Clap.—Received from Ballintoy, Ireland, and reported in ‘Irish Naturalist,’ 1897.

3. *L. wordsworthianus*, Friend.—A species new to science found by myself in a pond at Old Carlisle, Wigton, Cumberland. It lives in mud at roots of plants, and when taken coils up as *Tubifex* does. When examined under the microscope the absence of capilliform setæ at once shows it is not *Tubifex*, while the fact that it has more than two setæ in each anterior bundle differentiates it from *Stylodrilus*, a worm which is moreover readily distinguished by its appendant penis. The worm is from two to three inches long, but owing to its habit of coiling up is very difficult to measure. Four to six forked setæ are found in each of the front bundles. The blackish chloragogen cells begin in segment v. These cells often become detached and float in the cœlomic fluid. They are globular, and when injured burst and dissolve into a thousand tiny specks. The first nephridium lies in segment vii. Dilated hearts in viii–ix. The tail, as in most Tubificids, lighter in colour than the rest of the body. A pair of trumpet-shaped penis-sheaths about four (or five) times as long as broad. In the living worm the brain appears almost circular, or like a square with the two hindmost angles rounded off. It changes in appearance, however, with every new movement of the worm. Eggs were found in as many as six segments or more. A remarkable feature is found in the delicate papillæ with which the peristomium and fore part of prostomium are covered. I have named it after the poet, because I had the honour to be President of the Wordsworth Institute (in his birth-place) when the worm was discovered.

4. *Hemitubifex benedii* (D’udekem).—Received from Malahide, Ireland.

5. *Branchiura sowerbii*, Beddard.—Since Mr. Beddard reported this beautiful worm from the tank in Regent’s Park, I have received specimens from Mr. Nicholson, taken in tanks from Kew Gardens, March, 1897.

I have also records for certain species of *Psammoryctes* and *Hyodrilus*, but as they are either new to science or still under investigation, the localities will for the present be held in reserve. As to habitats, it seems almost impossible to examine the wrong place if water and mud are present. The worms, however, have



a special liking for ooze, vegetable and animal remains in a state of decay, the fœtid banks of streams in manufacturing districts, and similar spots. I should be glad if correspondents would supply me with gleanings from such like situations for further record.

## II. BRITISH ENCHYTRÆIDS.

During a recent flying visit to Yorkshire I took occasion to visit a spot on the banks of the Aire at Apperley where I have often in former years found valuable material. The time of year was not favourable, as the worms had gone into winter quarters. I was fortunate, however, in finding along with a number of Tubificids one or two white worms, one of which is new to Great Britain. I have therefore to place on record *Fridericia striata* (Levinsen). The spot where the worm was found is connected with a mill, and more than one curious find has been made in the same locality in days gone by. This remark is made lest it should be supposed that a worm hitherto known only in Denmark and Germany would be unlikely to appear in Great Britain. Ude has indeed given it, since Mr. Beddard's monograph was published, as a native of Monte Video, whence it was brought by Dr. Michaelsen; so that there is no reason why it should not be found with us. It has from six to eight setæ in a bundle, but the peculiarity which struck me as most characteristic was the gizzard-like enlargement of the intestine in segment ix. My specimen has forty-five segments, the first five or six of which are striated, or marked by some irregular bands or vacuoles, usually three in each segment.

Since I reported the destructive *Enchytræus parvulus*, Friend, as an aster pest last year, I have found it by the score along with another species of *Enchytræus* and the pretty *Julus pulchellus* in my own garden, where between them they have almost entirely destroyed a row of celery originally containing about one hundred sticks. It is evident that there is still room for a good deal of research among our micro-annelid fauna.

## NOTES AND QUERIES.

## MAMMALIA.

## CARNIVORA.

**Stoats turning White in Winter.**—I should be very much obliged if any readers of 'The Zoologist' could kindly give me any information as to whether the Stoats (*Mustela erminea*) in their respective districts have or have not turned white, either wholly or partially, during the present mild winter. Specimens of Stoats in the process of turning white would be gratefully received by me at the Natural History Museum, Cromwell Road, South Kensington, London, S.W.—G. E. H. BARRETT-HAMILTON.

**Polecats in Suffolk.**—Since I received the Polecat (*Mustela putorius*), lately recorded (*ante*, p. 22), I have had the opportunity of examining two more Suffolk specimens in the flesh, by the courtesy of Mr. Travis, the taxidermist, at Bury St. Edmunds; the first obtained at Cavenham on Feb. 2nd, the second at Mildenhall on Feb. 16th. Both were splendid specimens.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

## RODENTIA.

**Black Water Vole in Suffolk.**—On Feb. 16th I received in the flesh a good specimen of the black variety of the Water Vole (*Microtus amphibius*), killed a few days previously in the stables of Hopton Rectory, which is about a mile from the Little Ouse, the Norfolk and Suffolk boundary. The correspondent who sent it to me for identification writes, "No one about here seems to know anything about it."—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

## AVES.

**Tree Pipit in January.**—On the 23rd of last January, a very mild and sunny day, my attention was attracted by a Pipit perched on a low tree on Headington Hill, near Oxford. I had a good look at it with a binocular at the distance of a few yards, and another still better one when it flew across the road and perched on another taller tree. I have no hesitation in saying that it was a Tree Pipit (*Anthus trivialis*). Both this species and the Meadow Pipit are of course very familiar to me. The latter is common in winter on our low-lying alluvial meadows, but rarely occurs on the higher ground, and is certainly not at home in trees, as was the bird I saw

on Headington Hill. I think it not impossible that the Tree Pipit may occasionally winter with us; it has been observed in November and also in February ('Yarrell,' ed. iii. vol. i. p. 570), and the extreme mildness of the past winter may well have helped to keep alive a stray individual who was hindered by some accident from joining his fellows in migration.—W. WARDE FOWLER (Lincoln College, Oxford).

Early nesting of the House Sparrow in the present mild Season.—In proof of the mildness of the season, I send you (Feb. 24th) a young *Passer domesticus*.\* It was sent to me by a friend near here. His boy saw four together in the garden, and he made a snow-ball and threw it at them, knocking this one over. It must, I think, have been hatched in January.—H. S. B. GOLDSMITH (Huntworth House, near Bridgwater).

The Brambling in Hants.—Very large flocks of this handsome Finch (*Fringilla montifringilla*) have visited the neighbourhood of the New Forest, and in smaller quantities the woods on the other side of the Avon. Some idea of the numbers frequenting certain spots in the forest may be gathered from the fact of a man killing *twenty-nine*, and wounding others, at a single shot. This reads very like "murder," and to a true lover of birds it is a sad record, yet the fact remains; and I find that the numbers above quoted have in some instances been exceeded in other localities where the species has previously appeared, as in the case cited in 'Yarrell' from the observations of the late Mr. Stevenson, who records that *forty-five* birds were killed at a single shot near Slough, indicating how vast must be the flocks which sometimes visit us. In previous winters I have noticed the occurrence of this particular species only in very severe weather, when the birds frequented rick-yards and like situations in company with Sparrows, Yellow Buntings, &c.; but I am told that this season there is an unusually large crop of beech-mast in the forest, and this, notwithstanding the hitherto mild winter, may be the great attraction, for it appears to be a food of which the birds are very fond. Those I saw were literally "crammed" with portions of the beech-nuts; some of them had the whole seed in their beaks, and the birds were very plump and fat. The man who shot them told me there was a conspicuously dark bird amongst the multitude he saw feeding on the ground beneath the trees, but it seemed to have fortunately escaped the fate of its fellows. Very little variation was observable in those I inspected, except that the tawny markings upon the breast and wing-coverts were redder, and the black bars in the wings more intense in some than in others, but not more than would be expected in birds of a different age. In some previous records of this winter visitor I notice that a preponderance of males has been seen, thus resembling the winter flocks of its

\* Duly received by the Editor.

relation the Chaffinch; but in the present instance the sexes seem to have been pretty evenly balanced, although perhaps the males were slightly in excess—of the twenty-nine birds I saw twelve were females. About the same time as the large flocks were in the forest, a flock of some fifty or sixty birds was seen in the fir-woods on the western side of the river, but so far as I know these escaped molestation, and, strange to say, at the present time (Feb. 2nd) they seem to have entirely disappeared from both localities, whether gone further south or west to seek “new pastures” and less persecution, or (deceived by the spring-like weather) back to their home in the far north, I cannot say. One thing is certain, they did not stay long enough to consume all the beech-mast.—G. B. CORBIN (Ringwood, Hants).

**Abundance of Crossbills in the Severn Valley.**—I have noticed more Crossbills (*Loxia curvirostra*) in the Severn Valley this winter than usual. I have several times counted as many as a dozen feeding at the same time on my lawn. It would be interesting to know whether observers in other parts of the country have noticed an abnormal increase.—R. H. RAMSBOTHAM (Monkmoor, Shrewsbury).

**Rooks and Buttercup Bulbs.**—While walking in a large meadow near Kingham last January, Mr. H. C. Playne and myself noticed that the Rooks had been turning up the bulbs of *Ranunculus bulbosus*, which lay scattered in every direction over the field. The same process had also been pursued in other fields in the neighbourhood. In every case the bulb had been partially eaten by a grub, and it was this of course that the birds were after. I have not been able to find the grub in the act so as to identify it. This performance of the Rooks is new to me, and also to Mr. O. V. Aplin, who has studied the habits of *Corvus frugilegus* in relation to agriculture. Were the birds in this case doing good or harm to the field? The grubs would seem to have been benefiting it by keeping down the growth of buttercups, which are acrid and unpalatable to cattle. On the other hand, the Rooks were finishing the work of the grubs by pulling the damaged bulb clean out of the ground.—W. WARDE FOWLER (Lincoln College, Oxford).

**Rough-legged Buzzard near Ringwood.**—In January, 1897, a specimen of *Buteo lagopus* was killed not far from the Avon in this neighbourhood, and its occurrence in this locality being, so far as I know, “few and far between,” I thought it worth noting—although rather a stale record—but illness prevented my doing so previously. The bird was a noble specimen, although badly shot, and to a person not familiar with the species its soft Owl-like plumage appeared peculiar, so unlike the comparatively stiff and close-set feathers of a Peregrine Falcon, or even the softer plumage of a Harrier. The specimen in question had been feeding upon

a rat, portions of which were in the "crop," whilst the tip of the long hairless tail of the rodent protruded from the beak of the bird. I had seen the species but twice before—first in 1884, again in 1894; but, if I recollect rightly, the present specimen had much more white about it than either of the former, and was, I imagine, an older bird.—G. B. CORBIN (Ringwood, Hants).

**Nesting of the Hobby in Hants.**—From a note on the above subject (*ante*, p. 24), it is gratifying to observe that this handsome little Falcon (*Falco subbuteo*) still holds its position as a breeding species in the county, certainly not the first occurrence of its kind. There was a time when the species regularly visited the New Forest, and nested in the woods, coming about the same date as the Honey Buzzard (*Pernis apivorus*), in May, and on one occasion (as mentioned by Wise, I believe) appropriating an old nest of the Buzzard in which to rear its brood. Only a few years ago I knew of a pair nesting within two or three miles of Ringwood, but the senseless persecution to which all this class of birds is exposed points directly to its growing scarcity and eventual annihilation as a breeding species. It was formerly so well known in the forest as to have the local name of "Van-winged Hawk" applied to it, and though I have never been fortunate enough to find a nest with eggs, yet in former years I have seen both old and young birds, and more than once watched their graceful evolutions as they chased the dragonflies over the forest pond in the daytime, or dashed after the dor-beetle (*Geotrupes vernalis*) as it disappeared in the increasing dusk.—G. B. CORBIN (Ringwood, Hants).

**Little Bustard in Norfolk.**—A Little Bustard (*Otis tetrax*) was shot by Mr. Goodwin at Feltwell, near Downham Market, Norfolk, on Jan. 25th last, and sent for preservation to Mr. Travis, Bury St. Edmunds, in whose shop I saw it in the flesh shortly after it arrived. It was in good condition and perfect plumage.—E. A. BUTLER (Brettenham Park, Ipswich).

**Varieties of the Red Grouse.**—Although I have examined a great number of European birds in abnormal plumage at home and abroad, I have never yet come across an albino of the Red Grouse (*Lagopus scoticus*). Numbers of this species come under my notice, and reports of so-called *white* Grouse reach me from time to time, but they always prove to be pale varieties, wearing, it is true, a bleached look, but far from possessing a really white garb. Such birds are usually females. Lord Lonsdale has one, shot on his estate near Haweswater by Major Parkin, of Ravencragg, in September, 1893. I examined two similar birds in 1894, procured near Girvan and in Avondale. A farmer named Forrester, of Saughtrees, near Bewcastle, shot another—an old hen—at the beginning of October, 1895. But a handsomer bird than any of the foregoing was shot last season on

Ellerside Moss, Lancashire, by Mr. R. Cavendish, M.P. The point about this bird—a male, which I examined in a fresh state—is, that while most of the upper and lower parts are either pure white or white faintly barred with pale cinnamon, the lores, sides of the head, and neck are rich chestnut-red, finely mottled with white. I forbear to supply a detailed description of this specimen because its owner, Mr. R. Cavendish, M.P., has generously consented to present his bird to the Carlisle Museum, in which it can be seen. The case in which it is mounted contains also two of the hybrid Red and Black Grouse mentioned in my paper on the interbreeding of those two species (Ann. Scot. Nat. Hist. 1897, pp. 15–17).—H. A. MACPHERSON (Allonby Vicarage, Carlisle).

Ornithological Notes from Mid-Hants: Autumn and Winter, 1897.—I forgot to mention in my last notes (Zool. 1897, p. 460) that two Hobbies came into Mr. Chalkley's hands, one from Basingstoke on July 20th, and another from the immediate neighbourhood of Winchester on July 30th. A gentleman living in south-east Hants informs me of the breeding of the Garganey in his neighbourhood this year (I may not give the more precise locality). He first saw the birds—two ducks and two drakes—in some marshy meadows on April 15th. After this he could only see one pair until May 11th, and after this only one male, which made a "jarring" noise when flushed. On July 7th he saw a hen bird with three young ones nearly as big as herself, and able to fly. They were not seen after Aug. 1st.

September was a very warm and rather rainy month toward the end. By the 23rd the water-meads some way down the river were swarming with Pied Wagtails, mature and immature, the latter preponderating. I saw the first Grey Wagtail on the 24th. Pied and Grey Wagtails came into the near water-meads on the 30th; and throughout the winter Grey Wagtails have been in great abundance. I saw the first inland flock of *Larus canus* on the 28th, some way down the river; and from this date the ploughed fields on the east of the valley have never been free from these birds. It was not until Oct. 14th, however, that the first flock paid a visit to the near water-meads; but from that date they have been more or less permanent there. On the 28th I saw a small flock of Peewits flying down the valley, as usual, in extended order; but I was surprised at the scarcity of these migratory flocks during this month. This autumn has been remarkable for the amount of Kingfishers in the neighbourhood. I myself have seen several in the water-meads, and Mr. Chalkley's death-roll of this bird is larger than ever.\* I may also mention here that Mr. Chalkley has received a great many Goldfinches during September and October; I have not noticed the same abundance in the immediate neighbourhood. On

\* A circumstance much to be deplored.—ED.

Sept. 24th I saw several on some tall thistles in the water-meads. Mr. S. Davies sends me the following notes from Langston Harbour:—"Sept. 1st, several Turnstones and two Greenshanks seen. 16th, a good many Grey Plovers, Bar-tailed Godwits, and Knots about. Shot five Grey Plovers and two Knots. I saw four Little Stints near the harbour." On the 7th a Wryneck was shot at Basingstoke. Mr. Kelsall reports an Osprey at Barton Cliff, on the coast, on the 10th of this month. Mr. Stares, from Porchester, reports a flock of Pochard in a marsh on the coast on the 20th, and that he flushed a Quail on the 21st, while out Partridge-shooting. He also tells me that Mr. Carclers (the Portsmouth taxidermist) received a Black-tailed Godwit from Langston Harbour, and a pair of Ring Ouzels from Portsea Island.

October was another warm month, with preponderating south wind. The beginning of this month was notable for the large flocks of mingled Gulls, Rooks, Peewits, and Starlings, in the ploughed fields on the east side of the Itchen valley. I have watched these flocks a great deal, and it has struck me that the Starlings are not good friends of the other birds, and usually end in being driven away. The similarity of the other three birds' cries when together has also struck me. By the end of the month these flocks were quite broken up. The Gulls (*Larus canus*) that came inland at the beginning of the month had the brown on the wings reduced to a minimum, but those that arrived at the beginning of November had the brown well developed. This species, though very shy of human beings, follows the plough with the greatest confidence. On the 14th I traced the Itchen north of the town. There were a great many Dabchicks on the river, but I did not see a single Pied or Grey Wagtail, or any Gulls, except a few passing over. I saw six Snipe (*Gallinago caelestis*) started from a bed of tall reeds on the river by some dogs, and two parties of Geese (sp. ?) flying high along the valley; also more flights of Peewits, going in an extended line. On the 15th I noticed the first influx of Chaffinches (male) into the water-meads. On the 18th I saw the last Swallows at Winchester, and on this date I saw a Sedge Warbler, on the river about seven miles south of Winchester. This is a late date, and Mr. Chalkley says that when fishing on the Itchen during the first week of this month, he saw a great many of these birds about. Mr. Kelsall reports the last Swallow at Milton, near the coast, on the 23rd; and Mr. S. Davies sends me the following notes from Langston Harbour:—"Oct. 2nd, shot two Knots. A flock of twenty Wigeon came in. One Grey Plover and a large bunch of Knots. Oct. 12th, last Swallow seen." Mr. Chalkley received the following interesting birds during the month:—Kite, adult female from Shoeburyness; on the 2nd, a fine female Peregrine from Micheldever; 4th, two Curlews from Longwood, two miles from the town; 13th, a Golden Plover from a flock passing over

Bishops Sutton; 14th, a Hawfinch from Basingstoke. With regard to the Kite, a species which Mr. Chalkley has not seen for twenty years, I certainly incline to his view that it is a *bonâ fide* wild bird. Although part of the tail-feathers are shot away, the remaining tail- and wing-feathers are not at all rubbed. Mr. Stares tells me he saw about ten Hooded Crows along the coast at Browdown, the first he has seen this autumn (Oct. 10th).

November was a very unsettled month, with a preponderating north-east wind. On the 3rd a good many Meadow Pipits came into the near water-meads, and I noticed a Carrion Crow among a great many Rooks, Jackaws, and Starlings. It moved off immediately. The Jackdaws are fond of perching on the Cows' backs. On the 4th Mr. Lane Claypon reported a Herring Gull among the others in the water-meads. On the 8th a party of Dabchicks paid a visit to the near water-meads, but left the same day. On the 10th Peewits were still on the move, a party of four flying south down the valley; I saw another party on the 15th. I watched a Kestrel on this date playing in the most systematic manner. It pretended to be hunting for food, hovering for several minutes over nothing at all, and then swooping away to repeat the same operation at a distance. I watched this going on for quite half an hour; then I went away, after having satisfied myself that there was no animal against which these manœuvres were directed. I left it still hovering. On the 22nd I noticed an increase in the number of Larks and Chaffinches in the near water-meads. On the 23rd I paid a visit to Fisher's Pond, and noticed that the Coots were still there. I also saw, in the wood bordering the pond, a great many Long-tailed and Blue Tits, and also a few Magpies. Mr. Stares sends me the following notes from Porchester:—"Nov. 3rd, saw a flock of Grey Plovers in Langston Harbour. 6th, shot a Quail on Portsdown Hill; it was a hen bird, and its crop contained plantain seeds. Whilst out waiting for Ducks at night on the mud-flats, I heard birds migrating over head, the calls of Fieldfares and Thrushes being especially distinct. 16th to 20th, good number of Wigeon about Portsmouth and Langston Harbours at night. 27th, very large flocks of Pigeons about the woods, mainly composed of Stock Doves and a few Ringed Doves among them." Mr. Stares was also informed of a Fire-crested Wren caught on board a steamer at Spithead, and a Spotted Crake killed by flying against telegraph wires in Portsmouth Dockyard.

December. The weather was cold and still for the first part of the month, but subsequently very wet. Mr. Lane Claypon tells me that Pied and Grey Wagtails remained numerous in the water-meads, while the Gulls were fairly constant, with occasional very large flocks (6th, 7th, 13th, 19th). On the 5th he reports an enormous flock of Starlings, on a ploughed field a mile south of the town; on the 9th a flock of Peewits going south, and a



Kingfisher and some Long-tailed Tits at St. Cross. On the 13th he writes:—"At about 5.15 p.m. a Pied Wagtail flew into a room where I was, no doubt attracted by the light. After flying about in a startled manner, it finally went out." On the 15th Mr. L. Claypon saw the first Reed Buntings in the near water-meads, and on the 16th a large flock of Peewits, fully a hundred, heading south. On the 19th he reports a flock of 500 Common Gulls near the town. Mr. Stares reports the following birds:—Dec. 2nd, saw a Great-crested, Red-necked, and several Little Grebes, on the Hants side of Chichester Harbour; also a pair of Tufted Ducks. 27th, a small flock of Siskins, feeding on the seeds of alder near the Hamble river. 31st, a male Blackcap, feeding on some rotten apples that had been thrown out for the Blackbirds; it has been here (Porchester) for quite a fortnight, and comes and feeds daily within two yards of the windows. It is still here (Jan. 4th). I may mention that I saw two Blackcaps near Winchester, on Oct. 18th.

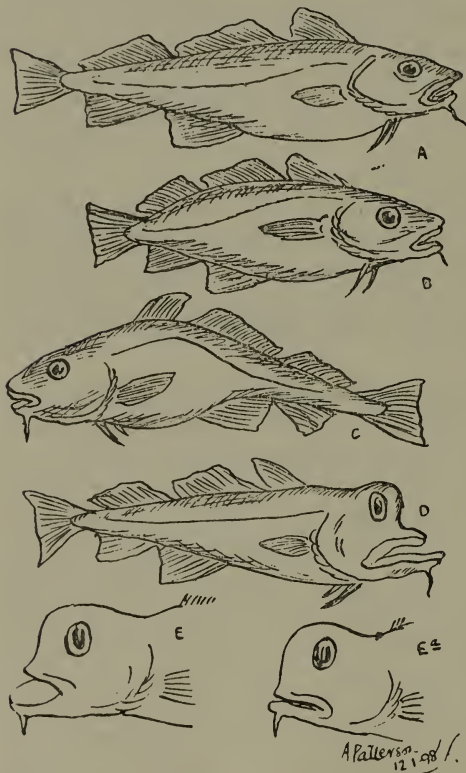
During the last two months Mr. Chalkley has received the following birds:—Nov. 13th, Great Spotted Woodpecker, from the near neighbourhood; 15th, Pin-tailed Duck, from Avington; 18th, Hen Harrier, male, from Andover; 23rd, Long-eared Owl, from Avington, and one on the 27th, from the neighbourhood; 24th, Saddle-back Crow, from Avington. Dec. 16th, Golden Oriole, from Avington.

The following are some of Mr. Stare's notes for the earlier part of the year, which I was not able to insert in my own notes then:—"April 1st, a Tawny Owl, with eggs, sitting; 6th, a punt-gunner told me he had seen to-day, in Langston Harbour, a flock of about two dozen Red-breasted Mergansers (he called them "Spear-wigeon"); 19th, large flocks of Swallows pitching in the reed beds, and numbers of Nightingales and Warblers about the hedges and fields; 24th, Redshank with egg, sitting. Saw several Swifts. Small flocks of Whimbrel (*Numenius phaeopus*) about Langston and Portsmouth Harbours, and several Bar-tailed Godwits just beginning to get the red plumage. Flocks of Yellow Wagtails about the marshes. April 26th, Ringed Plover with young. 27th, on a piece of water not far from here (Porchester) I saw three White-winged Black Terns (*Hydrochelidon leucoptera*), one of the Marsh Terns. They only remained there one day. They are very elegant birds, flying about over the reed-beds and open water hawking after insects. Sometimes they would come and settle on some old posts that were standing in the water. May 19th, saw a Hoopoe (*Upupa epops*). I am told it had been about the spot where I saw it for more than a fortnight. 25th, Wood Wren with eggs. July 2nd, large flocks of Gulls in Langston Harbour, composed of Herring, Lesser Black-backed, and Kittiwake Gulls, one Great Black-backed Gull amongst them. 10th, saw a Hobby in the woods near Titchfield. 19th, pair of Pigmy

Curlew in Langston Harbour, among a flock of Dunlins. Aug. 2nd, saw a few Greenshanks in Portsmouth Harbour."—G. W. SMITH (College, Winchester).

## PISCES.

**Malformed Codfish.**—In the course of my observations on the fishes of this district, variations in the forms, or deviations from the normal shape in certain species, have come from time to time under my notice. The tendency to abnormality appears to be greater in the Cod (*Gadus morrhua*) than in any other species. Occasionally a Haddock or a Gurnard has presented itself as an example of the grotesque, but it is the Cod, whose numbers are certainly not in excess of any other common "round" fish, which leads the way. The specimens in the illustration are amongst the number that have come under my notice, and are as follows:—



A.—The normal shape.

B.—A 15½-inch Codling netted off Gorleston beach, Jan. 11th, 1898. The tip-end of the pectoral fins was exactly midway between the extreme ends of the tail and snout. The fish was only three-fourths the length it should have been for the size of the "head and shoulders."

C.—A deformed example, seen on a fish-stall of this

town, Jan. 20th, 1890. It looked a veritable *Æsop*. Length guessed as about 20 in.

D.—An example of the "Bull-dog" variety, taken May 1st, 1894. Length, 16 in.

E.—On Jan. 17th this strange-looking specimen was hooked by a sea-angler fishing from the jetty. Length, 16 in. It is a curious fact that most of the *Gadus* varieties I have examined measured this length. E a shows the mouth closed.—A. PATTERSON (Ibis House, Great Yarmouth).

## CRUSTACEA.

The Struggle for Existence among Hermit Crabs.—It is well known that the Hermit Crabs (*Paguridæ*) have occasionally royal battles for the possession of some old empty shell which serves them for a temporary lodging, and the following account is of a proceeding which I one day witnessed on the Hastings beach. I had been hunting for Hydroids at low-tide, and just as I was leaving I noticed a mob of Hermit Crabs. In warm weather these are usually plentiful enough, but it struck me that on this occasion they were collected together for some purpose. In fact, so preoccupied were they, that they did not pay any attention to me, though I was stooping over them. The Crabs were of different sizes and in various shells—*Purpura*, *Natica*, Whelk, &c. One which occupied a *Purpura* was rather a little fellow, and ensconced behind the thickened mouth of the shell he looked very snug and secure. He was evidently the central figure of the group, and was endeavouring to edge away from those around him. At length up stalked a big burly fellow, and seized him by the front leg at the joint. Then commenced a series of smart tugs, perhaps half a dozen, and then a slight pause, after which the tugging commenced again. This kind of thing continued I suppose for ten minutes, and if only fair means had been used no doubt the assailant would have had to desist, but it seemed to strike the intelligence of one of the bystanders that in rendering assistance he might also serve his own ends; so, coming forward and going behind the *Purpura* shell, he seized hold of it. Then began again the tugging by the original offender. This continued for some time, but even with this assistance no impression seemed to have been made upon the little fellow in the deadly grip of his antagonist, for he remained almost out of sight, and firm as a rock. Then another volunteer stepped out of his own accord and seized hold of the shell of No. 1 assistant. There were thus two Hermit Crabs resisting the pull of the original assailant. No sooner had the second assailant lent a hand than the victim was instantly “whipped out” of his shell like a cork from a bottle! and directly the little fellow had been extracted from his shell No. 1 assistant slipped quickly out of his domicile and scrambled into the empty *Purpura*, thus ousting entirely the original aggressor, and made off with his ill-gotten property.

It would appear, on considering the above, that the Hermit Crabs must have very decided preference for certain shells; for, considering that all the other parties concerned were properly domiciled, why should they have so coveted this particular shell? In this case, if I remember rightly, the shells of the aggressors were *Naticas*, that is to say, shells with wide open mouths, and not likely to afford anything like the protection that a *Purpura* would offer with its greatly thickened and dentated lip, and a stout shell into the bargain.—P. RUFFORD (The Croft, Hastings).

## NOTICES OF NEW BOOKS.

*A Text-Book of Zoology.* By T. JEFFERY PARKER, D.Sc., F.R.S.; and WILLIAM A. HASWELL, M.A., D.Sc., F.R.S. Macmillan & Co., Limited. Two vols.

THIS notable publication appears under sad and unique circumstances. The death of Prof. Parker, which occurred just after the last sheets were passed for press, has been widely deplored. The two authors were respectively Professors of Biology at Otago and Sydney, were separated from each other during the greater part of their collaboration "by a distance of 1200 miles, and the manuscript, proofs, and drawings have had to traverse half the circumference of the globe on their journeys between the authors on the one hand, and the publishers, printers, artist, and engravers on the other."

When we call to mind our school-day text-book, which was that of T. Rymer Jones, we can well appreciate the difference of the zoology of to-day and then, by an even cursory examination of these two portly volumes; and although 'The Zoologist' is largely representative of what is generally understood as Ethology or Bionomics, our readers must still frequently require a handy authority for the solution of many zoological problems which depend on a knowledge of Morphology, Embryology, Organic Evolution, Palæontology, Distribution, and Physiology. This text-book is certainly for the student. "In spite of its bulk, the present work is strictly adapted to the needs of the beginner"; but besides this purpose—and we all have not the youth and time to go through a new course—its value is to be estimated as a work of reference.

Our authors divide the animal kingdom into twelve "phyla" or primary subdivisions:—Protozoa, Porifera, Cœlenterata, Platyhelminthes, Nemathelminthes, Trochelminthes, Molluscoïda, Echinodermata, Annulata, Arthropoda, Mollusca, and Chordata. Each phylum where necessary is again reduced to classes. As

an illustration the Arthropoda are subdivided into (1) Crustacea, (2) Onychophora—*Peripatus* only, (3) Myriapoda, (4) Insecta, (5) Arachnida. Each group is represented by an individual, of which a complete and exhaustive examination is made, so that a series of analytical types afford a clear insight into the real inwardness of the classification. Thus *Brachionus rubens* is made a representative of the Rotifera, and a Cockroach (*Periplaneta americana*) is used to focus the structure of the Insecta; and in this way if the student is unable to obtain the identical species for examination, an allied form will easily be procurable, and will serve a similar purpose. In Aves, which form Class V.\* of the phylum Chordata, the Common Pigeon (*Columba livia* var. *domesticata*), is chosen as the subject for demonstration. The whole class is divided into two subclasses—ARCHÆORNITHES (Mesozoic birds) and NEORNITHES. The last form two divisions: Ratitæ—flightless Neornithes, including Emus, Cassowaries, Rheas, Ostriches, &c.—and Carinatae, in which, “with the exception of some flightless species, the sternum has a keel,” &c. The classification thus runs from the Emus, Cassowaries, Moas, Ostriches, and allied forms now extinct and in the domain of palæontology, through the Divers, Petrels, Herons, Ducks, and Geese, when we reach the Accipitres. Then follow Gallinæ, Grallæ, Gaviæ, Limicolæ, Pterocletes, Columbæ, Psittaci, and we arrive at the Owls (Striges). After these Picariæ, when the system ends with the Passeres. Whatever may be the opinion of ornithologists as to this arrangement, they will doubtless agree with the authors that—“In respect of range of structural variations, the entire class of Birds is hardly the equivalent of a single order of Reptiles. Among existing Birds the Emu and the Raven, which may be said to stand at opposite ends of the series, present nothing like the anatomical differences to be found between a common Lizard and a Chameleon, or between a Turtle and a Tortoise.”

The chapters at the close of the second volume are devoted to those topics which interest all zoologists, and prove a charm to most readers. On the subject of “Distribution” excellent point is made by the comparison of the faunas of Great Britain and New Zealand. These two insular areas are not widely different in size, have each a temperate climate, a physiography of considerable

\* In error styled Class VI. in text, vol. ii. p. 350.

resemblance, a humidity well marked, and yet possess totally dissimilar faunas. Moreover, Great Britain has a fauna almost common to the adjacent European continent; whilst that of New Zealand differs from the neighbouring Australian to a greater extent than obtains in the faunistic relationship of England and Japan. This may be trite information, but it cannot be too sufficiently emphasized.

The "Philosophy of Zoology" is treated in a temperate and judicial manner; whilst the true principles of Evolution and its methods as expressed by "Natural Selection" with its handmaid Mimicry, &c., are clearly acknowledged. But it is well observed: "The generalisations forming the subject-matter of the philosophy of zoology may, in some instances, be so clearly and directly deducible from the data concerned, that it is scarcely possible for anyone conversant with the facts to refuse credence to the generalisation. But in other cases the conclusion is a matter of probability only, and one conclusion or another may be regarded as the more probable, according to the estimate formed of the relative importance to be attached to different sets of the facts or to different aspects of the facts."

The "History of Zoology" is necessarily a compressed digest, but we are glad to see that our countryman John Ray is recognised as the first to grasp the specific generalisation, though his imperfect efforts were afterwards developed and perfected by Linnæus.

We will conclude this notice with the last words of our authors. "Nothing is more certain than if the new 'Natural History'" (the study of living animals under natural conditions) "is to be superior to the old—more scientific, more concerned with the solution of general problems—it can only be by utilising to the full all that has been learnt in the laboratory in the departments of anatomy, physiology, and embryology."

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*A History of Fowling: being an account of the many curious devices by which Wild Birds are or have been captured in different parts of the World.* By the Rev. H. A. MACPHERSON, M.A. Edinburgh: David Douglas.

THERE are certain subjects about which everyone knows a little, which possess local specialists, but which have never been treated in an universal manner. Historians are familiar

with this phase of undigested information, and with this want of monographic treatment. Anthropology is a science which affords a special instance of how the accumulation, selection, and arrangement of facts can by competent and judicious authorities be made original contributions to the knowledge of our own species. The history of Fowling was a subject that could only be treated properly by an ornithologist, but was one that few ornithologists would consider came within their vocation. It was an opportunity for a "book" in its real sense; and we are glad that Mr. Macpherson essayed the task, and not a light one. This collection of facts, with their orderly arrangement and subordination to the aim of the work, is more than equal to the collection of species and their subsequent taxonomic treatment; and our author informs us that his "plan has been to read through every ornithological work that I could find in the five or six languages which are all that I can possibly translate." Besides these, books of travel must and have been consulted, and we now possess a standard work which the reader can from time to time annotate himself with those stray records which do not come to all alike; for which purpose we are thankful for wide margins, good paper, and a book that will *almost* open flat—though perhaps this is too much to expect in modern binding.

The introduction contains, under the title of "The Literature of Fowling," references to little-known works in English, German, French, Greek, Spanish, Italian, Norwegian, Russian, and Japanese literature; and also a dissertation on the principal implements used in the art of fowling. The systematic arrangement of the birds "is partly based upon that which my colleagues and I adopted in writing the *Avian* portion of the 'Royal Natural History,' " commencing with the family Corvidæ.

There seems a natural inclination on the part of most races of mankind to practise the snare of the fowler as a sport; and when commerce steps in and bribes the baser passions, the pursuit assumes a form of slaughter. Even in India the White-breasted Kingfisher (*Halcyon smyrnensis*) is easily caught by the natives; at Vancouver Island the Indians successfully capture Brent Geese; in Australia the Black Swan (*Cygnus atratus*), when in moult, can be rowed down in a boat; the Japanese are expert decoyers; Pheasants are snared all through-

out the East; while Willoughby writes that the Icelanders of his day were in the habit of snaring the Great Northern Diver. It may thus be seen that a history of fowling must embrace a wide area of observation, and might be treated ethnologically as well as ornithologically; in fact, should Mr. Macpherson issue a supplement to this very interesting work, or bring out a new edition of the same, he might with advantage peruse some ethnological literature, from which he would doubtless glean fresh facts.

This publication is a standard one, and is of more than ornithological interest; it will be consulted and quoted by the ever-increasing number of anthropologists who study the evolution of human crafts and customs.

NOTE.—We have received the following communication from the author:—

*The History of Fowling.*—I should be glad if you would kindly allow me to correct, through 'The Zoologist,' a slight misconception which is embodied in the above work. The description of taking the Bush Warbler (*Cettia cantans*) in Japan, supplied at page 129, should refer to the Chinese Great Reed Warbler (*Acrocephalus orientalis*) instead of to the former species. Both are favourite cage-birds in Japan.—H. A. MACPHERSON.

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*Elephant-Hunting in East Equatorial Africa.* By ARTHUR H. NEUMANN. Rowland Ward, Limited.

ALTHOUGH the principal details of this book are of an Elephant- or ivory-hunting description, its perusal will provide the zoologist with some facts and observations not only relating to the huge Proboscideans who were the principal aim of the expedition, but also as regards other animals with which the writer came in contact. There are also various conclusions scattered in its pages as to the restricted areas of Antelopes, &c., which will serve as material towards discussing some of the problems of specific separation.

Mr. Neumann started from Mombasa, and his two expeditions were confined to Eastern Equatorial Africa, a region still teeming with big game. He gives a verbal picture of the profuse animal life he met with on one of his excursions from El Bogoi. A large patch of thorn forest, fairly open, was "simply filled with Elephants standing, mostly in clumps, here and there all through it." "Such a sight I never beheld. It reminded me of pictures in



ancient books on South African hunting. In the foreground were some Grant's Gazelles and a large Grevy's Zebra; the bush seemed full of vulturine Guinea-fowls and Francolins; 'paa' (*kirkii*) were everywhere, and here and there one caught sight of a *walleri* or two making off, while small birds were in clouds. All the teeming life in this oasis was due to the life-giving moisture from the little stream." It is to be hoped that this fauna may not as rapidly share the fate of that of the more southern region.

The author considers that the neighbourhood of the small lake, called by the natives "Kisima" and situated south of Lake Rudolph, is the extreme northern limit of *Gazella thomsoni* and *Bubalis jacksoni*, and that the Lorogi Mountains "here form a distinct line of demarcation in the geographical distribution of certain species."

Among the birds common to the shores of Lake Rudolph is the Large Crested Pauw (*Eupodotis kori*), in connection with which Mr. Neumann records an interesting observation. The Rosy Bee-eater (*Merops nubicus*) has the habit of riding on the back of the Pauw. "It sits far back, on the rump of its mount, as a boy rides a donkey. The Pauw does not seem to resent this liberty, but stalks majestically along, while its brilliantly-clad little jockey keeps a look-out, sitting sideways, and now and again flies up after an insect it has espied, returning again after the chase to 'its camel'—as Juma not inaptly called it." This Bee-eater was also seen sitting on the backs of Goats, Sheep, and Antelopes, but the Pauw seemed "its favourite steed."

There are of course many habits of the Elephant to be found scattered in the details of its destruction, but one becomes satiated by the recital which in the excitement of the field is "sport," but in the pages of a book reads "slaughter." A few more excursions in this region of sportsmen with the skill and pluck of Mr. Neumann, and the Elephant must either "move on" or be practically exterminated. The author is of opinion that, in the region he hunted, the Elephant "attains his greatest dimensions both as to bodily bulk and weight of ivory," and this estimate is largely based on the records made by Selous in South Africa.

Lepidopterists will find in an appendix a list of the Rhoplocera collected during the expeditions. This has been compiled by Miss Sharpe, who describes three new species, which are amply illustrated in a coloured plate.

## EDITORIAL GLEANINGS.

At the meeting of the Zoological Society held on Feb. 15th, Mr. W. P. Pycraft read the first of a series of contributions to the Osteology of Birds. The present part (of which the following is an abstract) related to the *Steganopodes* :—

“The fact that in the Tropic-birds, Cormorants, Gannets, and Frigate-birds all the toes are united by a common web, has led to the belief that these forms are closely related; they form the suborder *Steganopodes* or *Totipalmatæ* of authors. A comparison of the osteology of the group confirms this opinion. *Phalacrocorax* may be taken as the type of the suborder, which may be divided into three sections according to the form of the basitemporal plate. In *Phalacrocorax* and *Plotus* this is seen in its most generalised form, and agrees with that of the *Ciconiæ*. *Sula* is the nearest ally of the Cormorants, as is shown by the close resemblance in the form of the fused palatines, and of the pectoral and pelvic girdles and limbs. *Sula*, it is evident by the form of the basitemporal plate, leads to *Fregata*. The Pelicans resemble the Cormorants and Gannets in the form of the palatines—which are, however, more highly modified than in these families—as also of the sternum, lachrymal, and nasal hinge. *Phaëthon* is the most aberrant of the group, but agrees most nearly with the Pelicans in the form of the basitemporal plate, which differs from that of the preceding families. Its sternum, though distinctly Steganopodous, differs in that the free end of the clavicle does not articulate with the coracoid by a flattened facet. *Phalacrocorax*, it is contended, must be regarded as the typical Steganopod. *Sula* and *Fregata* fall into places on the one side, *Pelecanus* and *Phaëthon* on the other side of this family. *Phaëthon* and *Fregata* represent the two extremes of the suborder; they alone retain the vomer, and in them the modification of the palatines and of the maxillo-palatine processes is comparatively slight.”

THE Annual Report, 1896-7, of the Director of the Field Columbian Museum, Chicago, has reached this country. We read that very much work—essential to a museum—has been done in identification, inventoring, cataloguing, and labelling; work that, as the Director remarks, “is uninteresting, plodding, and tiresome, with nothing that appeals to the

student and expert, or stimulates him to effort." With reference to the recent expedition to Somali-land, under Mr. Elliot:—"The collection obtained is very valuable, probably the most important, certainly so as regards quadrupeds, ever brought out of any country by one expedition, and consists of about two hundred mammal skins, three hundred of birds, numerous reptiles, and about half a barrel of fish, obtained on the coast and at Aden. Skeletons of every species, in certain cases two or three of the same species, were preserved, and casts of heads and parts of bodies showing the muscles of the large animals were made. These will be beyond price when it is desired to mount the species, exhibiting as they will every muscle, artery, and, in the case of heads, the proper lay of the hair and contour of the face. Besides these we have over three hundred negatives of the people we met, the scenery of the country through which we passed, and the animals, living and dead, which we had obtained. These last will be of as great value to the taxidermists in their work as the casts, and they are both unique assistants, such materials never before having been secured." We also learn that in the museum "the spirit formaline in which the specimens of fishes were preserved failed under the extreme low temperature which the exhibition halls reached at night during the winter, and alcohol has been or is to be substituted in all instances, and the specimens placed upon upright plaster slabs within the jars, thus showing them to better advantage."

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"THE final plans for the location of the buildings, ranges, dens, aviaries, and other enclosures for animals, and the ponds, walks, roadways, entrances, &c., for the Zoological Park in South Bronx Park, New York City, were lately submitted by the New York Zoological Society to the Department of Parks, and approved and adopted by the Park authorities. The Society has raised 65,000 dols. towards the 100,000 dols. necessary to receive from the city an appropriation of 125,000 dols. for laying out the grounds and providing drainage and water supply. The funds provided by the Society—namely, 250,000 dols. to be raised during the three years' limit—are to be applied to the erection of buildings and the purchase of collections. It is a work that may well interest people residing beyond the limits of New York City. The area allotted to the Zoological Park is four times larger than that of the largest zoological garden in Europe, and with the care that has been bestowed upon the plans, in order to secure the best results attainable, there is no reason why this country should not in due time be in possession of the best zoological garden in the world" (The 'Auk').

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IN last year's volume (1897, p. 44) we drew attention to an enumeration of "The Snakes found within fifty miles of New York City." We have

now received from the same source—the ‘Proceedings’ of the Linnean Society of New York—a paper on “The Fishes of the Fresh and Brackish Waters in the Vicinity of New York City,” written by Mr. Eugene Smith. The area included “embraces most of the territory immediately tributary to New York Harbour taken in its largest sense.” The summary is as follows:—“Native fresh-water species known, 24; introduced species, 11; brackish water and anadromous species, 26. Total, 61. Adding thereto the probably occurring native species (12) gives a total of about 73, belonging to 54 genera and 24 families. This shows that while the number of species is not large, the families are well represented.” Of introduced species, the Carp (*Cyprinus carpio*), Gold-fish (*Carassius auratus*), and the Brown Trout (*Salmo fario*) are of Eurasian origin. The Quinnat Salmon (*Oncorhynchus tshawytscha*), from the Pacific coast, seems not to have become established.

IN the official ‘Wealth and Progress of New South Wales,’ recently issued by the Agent-General, some interesting facts are available concerning the treatment of noxious animals in that colony. For the destruction of these, other than Rabbits, the amount paid by stock-owners in 1896 was £35,934. The numbers and animals for the year were:—

Kangaroos .....	80,639	Native Dogs .....	13,138
Wallabies .....	655,309	Opossums .....	7,142
Kangaroo Rats .....	160,808	Eagle Hawks .....	8,810
Wombats .....	112	Crows .....	48,308
Bandicoots .....	1,879	Emus .....	4,050
Pademelons .....	21,791	Foxes .....	66
Wild Pigs .....	23,000	Flying Foxes .....	3,591
Hares .....	551,548		

The loss of stock from native Dogs is reported to have been 195,455 Sheep, valued at £35,670; while the loss from tame Dogs is returned as 62,135 Sheep, valued at £12,196.

THE Scarborough Field Naturalists’ Society have issued ‘Natural History Records of the Scarborough District. Part I. Vertebrata (not including the Fishes).’ This catalogue enumerates the Mammals, Birds, Reptiles, and Amphibians. The preface is by the members of the Vertebrate Sub-Committee, who state that “every care has been taken to make the list as complete as possible from the data available, whilst equal care has been exercised to exclude doubtful records. Many species have been omitted, the evidence of their occurrence not being considered sufficiently trustworthy.”

The area defined is as follows:—“The extreme coast limits are Scarborough Head and Whitby (south of the Esk). The inland boundary

follows the valleys occupied by the railway from Whitby to Pickering. Thence, in the absence of a natural boundary to the south of this point, an arbitrary straight line has been drawn to Weaverthorpe village, and thence to Flamborough Head.”

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AN excellent example of comparing the faunistic records of old authors with the existing fauna of the present day has been set by Mr. J. W. Carr in ‘The Naturalist.’ He has written an article on “Fishes of the Nottinghamshire Trent in 1622, recorded by Michael Drayton in the ‘Poly-Olbion’; with notes on their present occurrence.” “In spite of the enormous growth of the city since Drayton wrote, and the pouring into the river of great volumes of foul water from the numerous dyeing, bleaching, tanning, and other works, as well as the effluent from the sewage farm, the fish-fauna seems to have undergone comparatively little change during the interval of 275 years since the publication of the ‘Poly-Olbion.’”

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IN this month’s ‘Windsor Magazine,’ Mr. C. J. Cornish gives some interesting particulars as to “How Animals come to the Zoo.” We can only give the following extract:—“The readiest source from which to fill up *lacunæ* in the ‘Zoo’ is the stock-in-hand of the wild beast dealers, such as the Jamrachs, Cross of Liverpool, or the surplus stock of foreign menageries, or of men like Mr. Hagenbeck, of Hamburg, who both own menageries and import wild animals obtained by their collectors abroad. The animals at the English dealers, are recorded weekly in the ‘Field’; but the prices paid for really rare animals do not as a rule transpire. The first expensive purchase made for the ‘Zoo’ was an Indian Rhinoceros, bought in 1834. The price was merely alluded to as ‘heavy’; but, as for that year the cost of purchasing animals was £1200, while in the previous year only £160 was spent, the animal probably cost not much less than £1000. The Society had extraordinary luck in their Rhinoceros collecting, whether by purchase or otherwise, though the animals cost a small fortune. In 1875 they bought of Mr. Jamrach a Rhinoceros, never before seen in Europe, for the great price of £1250. This was believed to be a Sumatran Rhinoceros, though it came from Chittagong. A few months later some undoubted Sumatran Rhinoceroses were shipped to England, and one was purchased, also of Mr. Jamrach, for £600. This was found to differ from the first, which was not only a new species, but at that time the only specimen known to exist! It was named the ‘Hairy-eared Rhinoceros,’ and several have since been obtained. Another Rhinoceros, from the Straits of Sunda, was then bought for £800, so that at a cost of £3850 the Zoological Gardens were able to exhibit all the species of Rhinoceros found in

Asia. Other high prices paid are £100 for the first Chimpanzee, £800 for a young Hippopotamus, and £600 for a Giraffe."

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"IN all zoological collections there arises, from time to time, the need for some rough-and-ready surgery. A good example of work of this kind took place yesterday morning (Feb. 24th) in the Elephant-house at the Zoological Gardens, when the front horn of the female Hairy-eared Rhinoceros (*Rhinoceros lasiotis*) was removed. This operation was a repetition of one performed some ten years ago, when, as now, the front horn had become bent backward, and not only interfered with the growth of the posterior horn, but actually penetrated the skin, as would probably have been the case in a short time had the present horn not been removed. The operation was carried out by Mr. Bartlett, the Superintendent, and Mr. Thomson, the head keeper, who had for assistance the staff of the Elephant-house and a number of other keepers. A rope was passed under the body of the animal, which was thus securely girthed, and so drawn up to the stout wooden railings. When she was on her side, her feet were secured with straps, and so she was prevented from struggling. This, of course, was the longest part of the business, for she resisted violently and noisily, and, as may be imagined, a Rhinoceros is not an easy animal to handle. But when once the beast was in position, the removal of the horn was not a long operation, and was certainly unattended with pain. On being cast loose, the Rhinoceros, though at first enraged, soon became calm, and the chief signs of temper were the quick, fierce expirations from the nostrils, which scattered the loose straw on the bottom of the den. The malformation which rendered this operation necessary is of interest, since it throws light on the way in which some forms have been described as distinct species, owing to abnormalities in the horns, due to injury, disease, or excessive growth. It will be remembered that a few years ago the head of an African Rhinoceros showing a third horn was exhibited at a meeting of the Zoological Society; and last year Captain Harrison shot a Black Rhinoceros with five horns, of which the third and fourth were outgrowths from the second, while the fifth seems to have been distinct."—*Standard*.

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In 'L'Intermédiaire des Biologistes' for January (No. 5) is a reply to a query which is of interest to British zoologists. It is written by Prof. W. A. Herdman, of Liverpool, and refers to the Common Spiny Lobster:—"I think I can state that the northern limit of distribution of *Palinurus vulgaris* is that part of the Irish Sea which lies between Liverpool and the Isle of Man. It is commoner to the south. I have not

heard of it further north, and it has only been occasionally found in our area,—the region which the naturalists here have called the L.M.B.C. district. I have two specimens which have been brought into Liverpool, and the fishermen at Port Erin, at the south end of the Isle of Man, occasionally catch the species. It is recorded in the 'Fauna of Liverpool Bay,' vol. iii. p. 53 (1892)."

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THE 'Times of Swazieland' lately received from Mr. John A. Major, of the Umhlaba Bomvu, Lubombo, an interesting communication on the subject of rinderpest amongst the game which at one time abounded on his farm and in its vicinity. Mr. Major writes:—"All the game of any consequence has pretty well died from rinderpest. I believe every Koodoo on the eastern range is dead, together with most of the Rooi-rheibuck; the mortality seems to have been greater amongst these two kinds of Buck than amongst others. From Mr. Whittaker and the natives I hear all the Inyala about the top end of the Tembi have died. Hearing of a Buffalo down near Wests' place in Portuguese territory, I went out with my boys to try and get a shot at same. We found the spoor well in Portuguese territory, as also a great number of dead game. I picked up and carried home no fewer than six pair of Koodoo horns, from a very old bull downwards. This does not include what the Kaffirs picked up. The game appear to die by the banks of the rivers; where the Palata runs through the mountain is a perfect charnel-house. From my own observation here the game seem to die, and the disease spread, in much the same manner as it has done with cattle, but sooner or later to become contaminated. The place where the disease appears to be absent is at the top end of the Umnyama River. Buffalo, Waterbuck, and Blue Wilderbeeste, appear to be the only game not affected with the disease; all other game are totally disappearing. Wild Pigs are particularly subject to the disease, and seven Pigs belonging to Karl Groening, which were herded with his cattle, died of the pest."

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THE Johannesburg 'Star' has received from King William's Town the following communication:—"Mr. J. D. Ellis, Honorary Secretary of the Society for the Acclimatization of British Fish in the Cape Colony, yesterday received from Messrs. Halse's farm at Carnarvon a magnificent Loch Leven Trout, weighing 9 lb., 25 inches long and 16 in girth, which escaped from the reservoir and was accidentally killed. It was one of a number of fry liberated in Messrs. Halse's dam only three and a half years ago, and is a great credit to the Pirie Hatchery, from which it was taken in the first instance."

FROM the last Annual Report of the Limerick Field Club we learn that "the capture of a fine specimen of the Royal Sturgeon (*Acipenser sturio*) was made on July 8th last, by fishermen, near the mouth of the Maigue River, its length being about 10 feet, and its estimated weight between four and five hundredweight.

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IN "Social Hours with Celebrities," being the third and fourth volumes of 'Gossip of the Century,' by the late Mrs. W. Pitt Byrne, edited by her sister, Miss R. H. Busk, are some interesting reminiscences of Charles Waterton. His 'Wanderings,' a book which had a large circulation, and was in every way successful, never brought its author a penny. The writer of "Social Hours with Celebrities" tells of going to his publishers with Waterton and inspecting the books and finding that the balance was against the naturalist. In his own grounds we read that "the Peacocks on the lawn, however depressing the weather, seemed to vie with each other the moment they saw him approach, in strolling eagerly forward, and spreading out the glory of their fantails for his delectation. Most remarkable of all, however, was it in the woods, where it was impossible not to believe the birds recognized their benefactor when one saw them come out to meet him, flying about him as he walked, settling on his shoulder, and even on his hand when he held it out to them, while a call from his voice would bring them from any distance." It is said that when his body was being conveyed in a boat across the lake for burial in a sequestered nook of the park, which he had himself selected, "a flight of birds suddenly appeared, gathering as it went, and followed the boat to its destination."

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DR. NICOLAUS KLEINENBERG, Professor of Zoology and Comparative Anatomy at the Royal University of Palermo, died on Nov. 5th last, at Naples, in his fifty-fourth year. He was born in the Baltic Provinces, whence he came to live in Italy about twenty years ago. His fame as an embryologist obtained his appointment at the University of Messina in 1882, from which he was transferred to Palermo. In 1888 he was appointed a member of the "Commissione consultiva per la pesca," to which, in addition to his scientific knowledge, he brought a large amount of practical information acquired by continual intercourse with fishermen. As a supporter of "experimental zones," he was appointed by the Minister of Agriculture to formulate the plan of studies to be pursued at the establishments in the Gulf of Castellamare and of Termini Imerse. The above particulars are taken from 'Giornale Italiano di Pesca e Acquicoltura.'





# THE ZOOLOGIST

No. 682.—April, 1898.

## THE WRETHAM MERES.

BY W. G. CLARKE.

NORTH of Thetford, on part of the belt of barren heathland that surrounds the town, are several sheets of water known as meres, which are almost unique in their formation and situation. Of similar origin, but with very different surroundings, are other meres, a little further northward, in Wretham Park. It is of the heathland meres—Ringmere, Langmere, Fowlmere, and the Devil's Punch Bowl—that I shall more particularly write; although the bird-life of the meres must necessarily include the whole series—Mickle Mere, Great Mere, and West Mere, in addition to those previously mentioned.

Ringmere lies close to the main road, between Thetford and Wretham Station. A triangular plantation shelters it on the south—a plantation of fir, larch, birch, and beech trees. It is most impressive at night: then the trunks of the silver birch stand out ghostly in the gloom of the fir trees; and the sighing of the aspen and the sougling of the fir trees, with the crisp rustle of the brown bracken, have a singular harmony as we wander along the woodmen's paths or through the woodland glades. Mayhap we hear the uncanny "Hoo-oo-oo-tu-vit" of a Long-eared Owl, or the flapping of some startled Pigeon in the treetops. But of the mere itself—a pool in the midst of a wild heath. With the Raven, immortalised of Poe, one is at first tempted to say, "Only that, and nothing more." Thoreau

likened Walden Pond to an eye of the earth. And this is another. On the south the plantation forms a bushy eyebrow, whilst the belt of rush and sedge bordering the water's edge forms the eyelashes, reflected likewise in the liquid depths.

Ringmere is a circular, crater-shaped hollow, and is the smallest save one of the meres on the heath, the Punch Bowl being more diminutive. The word mere is Anglo-Saxon, signifying a piece of water, a lake, a pool. Lakes, however, are generally long and narrow; meres are round or oval. Ringmere is in the form of an amphitheatre. Blomefield says of it: "It is a very old mere or large water, as the Saxon name which it still bears tells, Ringmere being no other than the Round Mere or Water." All the meres are situated on the upper boulder clays, and occupy higher levels than the broads. They were probably formed by glacial action wearing away the beds above the chalk. Tradition says, with every degree of probability, that a battle was fought on the surrounding heathland. John Brame, a monk of Thetford, assigned it to a semi-mythical Arthurian period; but history records it as being fought in the middle of May, 1010. In King Olaf's Saga, the 'Heimskringla,' mention is made of this great fight in the following passage:—

“ From Hringmar field	The living fly,
The chine of war,	The dead piled high,
Sword striking shield,	The moor enrich,
Rings from afar.	Red runs the ditch! ”

And in mentioning many of high degree who here met their doom, the Saga goes on to say—

“ Hringmare Heath  
 Was a bed of death;  
 Harfager's heir  
 Dealt slaughter there.”

It was likewise held by the late Mr. Mark Knights, in his 'Peeps at the Past,' that a Ketel's Bridge at Wretham (? where) was a surviving relic of the name of the East Anglian ealdorman, Ulfketel, who led the Saxon forces in this battle against the Danes. It is not so very many years ago that pilgrimages were paid to Ringmere at harvest time. If it was full of water, the

price of wheat would go up; but would fall with the fall of water in the pool. This was a chance for some symbolic interpretation, which was ignored by the author of 'Peeps at the Past,'—a matter for wonderment. The mere was quite dry in 1859; at other times its waters have overflowed the road; and in the swampy tract on the far side of the highway belated travellers have seen the fitful flickering of the will-o'-the-wisp. Seven parishes have the right of watering their sheep at this mere for so many hours a day, on so many days a week, the parishes differing in this respect to avoid any friction between the rival shepherds. Kilverstone, Croxton, East and West Wretham, Bridgham, Roudham, and Brettenham are the villages so privileged.

We have walked or cycled the four miles that lie between Ringmere and the town of Thetford by night and by day at all seasons of the year, and have learned to love its changing moods. Being fed by springs arising from the chalk, the height of water seems to have no connection with the meteorological conditions prevalent for some time previous. Thus in the middle of a dry season the meres are often full, and almost devoid of water after a long spell of rainy weather; when one mere is high, another may be low; and it would probably take a long series of observations ere the reasons for this could be assigned with any degree of accuracy. At certain periods of the year the water's edge is lined with thousands upon thousands of the empty shells of the freshwater Whelk (*Limnæa stagnalis*), which crackle and crunch beneath the feet of the visitor as he walks round the mere. The people of Norfolk, with a contempt bred of familiarity, speak of these meres as "pits," referring to "Ringmer Pit," "Langmer Pit," and so on. On a day in late September of last year, on a visit to Ringmere, I counted the bald patches of fifty-eight Coots; and one flock containing twenty-five Mallard flew off to Langmere. Otherwise there was never a sign of life to be seen. The sun peered down between the lichen-covered trunks into the plantation glades with flickering shafts of light, that seemed fearful of disturbing something. Rushes and sedge swayed in the slight breeze; whilst on the lone hawthorn bush on the verge of the crater mouth a Chaffinch uttered its melancholy "spink, spink, spink." For had not his wife gone south for the winter, like other fashionable folk, and a state of "single blessedness" did not suit

his temperament. For a few yards from the shore the waters were placid, lying as they did beneath the lee of the high banks. Farther away they rippled with the motion of the Coots, which swam round and round as near to the centre of the mere as they could get. The water looked dark and mysterious, as if fabled monsters lurked in the unknown depths. An old gentleman who remembered it becoming totally dry said that there was quite a deep hole in the centre of the mere, and that in its dry bed sprung up nettles of gigantic height, which proved an almost impenetrable phalanx. On this particular afternoon the tree shadows in the water looked blurred and indistinct; whilst from the distant woods came the lingering murmur of the wind, departing with the set of sun. From the rim of the crater acres and acres of seared bracken could be seen, rarely broken by a hawthorn bush, or a clump of furze, whilst the glory of the heather had departed. In different directions could be seen boundary banks, whose significance has long been lost, only useful in case of parish disputes; although one would think that hereabouts there is little worthy of disputation.

On the great heathland surrounding the various meres, Moles are extremely common. Stoats and Weasels are frequently caught; and at the end of April, 1895, a Badger, suckling two young ones, was trapped at West Wretham. The mother was stuffed, and is preserved at the hall. An attempt was made to rear the two cubs at the Home Farm, but did not succeed. The gamekeeper saw the footprints of this animal in the snow, and thought they belonged to a barefooted man; but being apprised of their real nature he set a trap, and caught the Badger. Rabbits are very plentiful; and the ungainly gallop of a Hare is also by no means an uncommon sight. Vipers and Ringed Snakes are also not infrequently seen; while the borders of the meres form happy hunting-grounds for Frogs and Toads. The birds of the heathland are many. Wheatears and Stockdoves nest in disused rabbit-holes; Whinchats, Stonechats, Linnets, various species of Finches, Thrushes, Blackbirds, and Hedge Sparrows nest in the furze; and in the neighbouring plantations Long-eared Owls and numerous other birds of the woodland find a home. But Mother Earth is the place upon which most of the characteristic birds of the locality deposit the eggs which con-

tain their hopes of future progeny. Besides the Sky Lark and Corn Bunting, Pheasants, Partridges, and Red-legged Partridges nest beneath the furze. This likewise is a favourite haunt of the Nightjar, whose "reel" is such an interesting addition to the harmony of a summer's eve, as he sits on the bare branch of a pine tree on the northern shore of Langmere. The Lapwing prefers the open country; associating with the Stone Curlew and Ringed Plover, the shrill whistle of the former and the mellow note of the latter making weird harmony with the mournful plaint of the Lapwing. The marshy spots and "pitsteads" around the meres are tenanted for breeding purposes by the Snipe.

The Black-headed Gull, or "Scoulton Peewit," breeds sporadically by a little pond in an enclosed part of the heathland between Ringmere and Langmere. In 1883 there were about fifty nests, which on the 8th of June contained from one to three eggs each. Then for several years the nests were very few; and they have never reached the numbers of 1883 again. Possibly this may be because of the loss of eggs through the depredations of the local shepherds and gamekeepers. Last year there were but five nests; one of these was built in a very peculiar manner. On a certain Sunday a Coot's nest was noted a few yards from the shore. On the next Sunday a log had been thrown across this nest, and on the log was the nest of a Black-headed Gull containing one egg. It is a matter for regret that these Gulls cannot be induced to stop in larger numbers, as their snowy, graceful forms on the newly-ploughed land is one of the prettiest imaginable sights in the district around the large mere at Scoulton—one of the best-known "Gulleries" of this species.

Langmere should perhaps be more correctly Long Mere, as it is a long, narrow sheet of water, divided by a promontory, on which are some gaunt fir trees. Tradition says that these were not planted by the hand of man. At very long intervals this promontory becomes an island, and Langmere then is a sight to be remembered. Lying in the midst of a wild, scrubby heath, with never a sound but the wail of the Peewit or scream of a Gull, it is by far the most impressive of the meres. A dried-up, starved, stalky growth of thistles forms the sole vegetation in the immediate neighbourhood of the mere. There is an eeriness, a

weirdness, a loneliness around this mere, which is uncanny in the extreme. It is, nevertheless, beloved of Wildfowl. On November 6th, 1896, I counted over two hundred Wild Ducks on this mere. They were of several different species (chiefly Mallard, however), and I managed to get a splendid view of them by crawling over twenty yards to the top of the bluff which forms the promontory, and then peering from behind the trunk of one of the huge pines. When disturbed the birds fly up with much spluttering, wheel round and round several times—the whistling of their wings sounding strange indeed at night-time—and then fly off to one of the other meres, where they wait until again disturbed. The “Drove” is an ancient grass-grown trackway, which runs between Ringmere and Langmere, and between Fowlmere and the Punch Bowl. It starts near East Harling and goes by Roudham and the meres, over Bromhill, and through Weeting to Hockwold on the border of the fenland. In the days preceding railway communication this was the great road for sending sheep and cattle to and from the fenland. By so doing there was no interference with the ordinary highway traffic. In some parts this track is overgrown and disused; but a walk along its entire length leads one through scenes of picturesque beauty which can hardly be surpassed in south-west Norfolk. On September 27th, 1894, Langmere was quite dried up, its bed being one huge expanse of mud, divided by cracks as it hardened in the sun, and looking as if effected by some miniature earthquake.

Between Langmere and Fowlmere the “Drove” is carpeted with velvety turf. On the heathland, to right and left, the flint implements and weapons of Neolithic man are occasionally found. Pine “belts” stretch away into the dim distance; bracken flourishes everywhere. Truly an out-of-the-world spot. Fowlmere is by far the largest of the four heathland meres; it is indeed a respectable-sized sheet of water, forming the much-cherished haunt of numbers of Wildfowl. At one end—although some distance away—is a farmhouse; at the other, runs the “drove.” A projecting fir-crowned bluff frowns to the eastward; whilst the western shore is now clothed with thick undergrowth, in which many species of Ducks and water-birds delight to shelter. Tradition says that Fowlmere was once sown with oats, and the crop lost by the sudden influx of the waters. As

this was in my pre-natal days I can give no authoritative opinion. The northern is undoubtedly the deeper end of the mere, as on December 3rd, 1893, the southern half was covered with ice, while the northern was quite open. I have, however, enjoyed some delightful skating on this mere when every part of it was absolutely safe, and the rhythmic clanging of the skates on the frozen surface reverberated in musical cadence from the wooded shores. This mere is also noted for its fish. One day last year an angler caught over one hundredweight in its waters. It must not, however, be forgotten that, with the exception of certain immemorial rights and privileges, these meres are private property, and that the expectant angler must therefore beware. Perch and Pike have been obtained in some numbers; but the mere is chiefly noted for its Tench, which here attain a great size. The dog of a neighbouring shepherd will enter the water, catch these fish with great dexterity, and bring them to land.

The Devil's Punch Bowl Mere is on the other side of the "Drove," barely a hundred yards distant. This is the smallest and likewise the best example of the crater-shaped mere. It is circular in form, and the water varies much in depth. It is surrounded by a ring of fir trees, a ring of bracken extending from them about two-thirds of the way down the slope, then close slippery turf within a short distance of the water. Between turf and mere is a small strip of gravelly beach, which widens or narrows with the fall of the water. On the southern edge of the crater is perched a shepherd's cottage. It sometimes happens that a circle of white mist overhangs the mere at night-time. This is known as the "Devil's Nightcap," and originated an expression appertaining to local weather lore: "The Devil's got his nightcap on." At the end of September, 1894, this mere was practically dried up, a pool on the southern side, about twenty feet by twelve and about one foot deep, alone remaining. Although Ringmere and Fowlmere were not at all low at the same time, Langmere was then completely dried up.

The park meres of Wretham are far more strictly preserved than the foregoing. On Mickle Mere there is an active decoy. Two of these meres have preserved notable memories of pre-historic man. When Wretham West Mere was drained of its waters in 1851, underneath eight feet of mud were found bones

of the Red Deer and of the now extinct Long-faced Ox. Near the centre was a circular bank of fine white earth, twenty or thirty feet across and about four feet in height. Not far from its inner circumference was a hole deeper than the rest of the mere, piled and evidently once wattled. Here, with the remains of a wall built of flints packed together with marl, were found bones and portions of a rudely-constructed ladder. In short, here were contained the remains of a lake-dwelling. Part of another lake-dwelling with posts of oak wood shaped and pointed by man was found in the mud of Wretham Great Mere in the year 1856. These discoveries have been scientifically described by Professor A. Newton and Sir C. Bunbury.

These singular meres of Wretham are, however, chiefly memorable at the present day from the fact that here breed no fewer than seven species of Wild Duck, several of them extremely rare as nesting birds in the British Isles. Many other rare birds have likewise been procured here at various times. Thirteen Short-eared Owls were flushed from one pine tree at Wretham about twelve years ago. Ten of them were shot. This was likewise the fate of a beautiful White-tailed Eagle shot on the decoy in 1892, and now preserved at Wretham Hall. Specimens have likewise been procured here of the Osprey, Cormorant, White Stork, and Crane. The last-named was shot in September, 1873, and is now in the Norwich Museum. The Bean Goose and the Pink-footed Bean Goose frequent the open country about Wretham. Mr. A. W. Partridge saw a flock of two hundred to two hundred and fifty of the latter on a field of young rye. A Grey Phalarope (one of four) was shot on a pond near Fowlmere in 1846. Pintail and Wigeon are winter visitors to the meres, the latter in fairly large numbers. The list of rarities that have here met their doom likewise includes specimens of the Scaup Duck, Goldeneye, Smew, and Goosander. Moorhens are not uncommon, and Coots abound, their bald patches being noticeable in any "bunch" of wildfowl. The Great Crested Grebe and the Little Grebe here find a congenial home; the sprightly form of the irrepressible "Dabchick" would be particularly missed. How often have I found his oddly-constructed nest a few yards from the shore with the dirty oval eggs covered over with the weeds of which the nest is composed.



But it is the species of Duck breeding on the meres in ever-increasing numbers that give the locality such an interest for British ornithologists. Besides the Mallard and Teal, which are not uncommon in other localities, the Gadwall, Shoveler, Garganey, Pochard, and Tufted Duck here nest in the solitude and peace of the "breck" district. Eight drake Shovelers have been flushed on Langmere at one time in the breeding season. And in the stillness of the summer night the music of the meres is weird and strange to unaccustomed ears. The low contented quacking of the Mallard and Gadwall, the "knack" of the Garganey, the "kree-ah" of the Black-headed Gull, the low whistle of the Pochard, the "crek-rek-rek" of the Moorhen, the "currugh-currugh" of the Tufted Duck as he shifts his quarters, the clear ringing, oft-repeated "koo" of the Coot, the "whit-whit" of the Dabchick, and the harsh "kek" of the Loon, added to the wailing and whistling of the heathland birds, the lapping of the waters, and the souging in the pine trees,—who could not wish for such nights o'er again. May memories of the meres never be less pleasing than now!

## A CHAT ABOUT INDIAN WILD BEASTS.

BY COLONEL F. T. POLLOK.

THE TIGER (*Felis tigris*).

FOREIGNERS say that wherever Englishmen travel the cry is "Let us go and kill something." This alludes, of course, to our love of sport, and they rather laugh at our enthusiasm for slaying the *feræ naturæ*; but I attribute two-thirds of our acquired possessions to the innate love of sport implanted in the breasts of our islanders. Our pioneers have generally been men in search of game. To be a successful sportsman a man must study the habits, manners, and customs of the beasts he intends to hunt. I propose to relate here certain facts which can well be impressed upon the minds of naturalists as well as others.

India is our great nursery, and in it game is still plentiful. Hog hunting is pre-eminently the grandest sport. After it comes Tiger-shooting off Elephants and out of howdahs. Tigers can be shot on foot only in Central India. Where Tigers abound, the grass is too high and too thick for a man on foot to have a fair chance. But mounted on a fairly staunch Elephant, the pursuit is most enjoyable.

It has been a disputed point how a Tiger strikes down his prey. A noted sportsman wrote as follows:—"Some years back, at Pykara, not far from the bungalow, a Tiger took a fancy to a Todah (a hill man) in preference to the Buffaloes he was tending. Two other Todahs were witnesses of the affair, and they described how the Tiger behaved. Having caught the man, he amused himself for some time by letting him go, and then dodging him as the poor victim tried to escape, before killing him outright, notwithstanding the shouts and yells of the two spectators."

There are divers opinions as to the exact mode by which a Tiger takes its prey. Popularly he is supposed to lie in ambush, and spring on his victim as it passes his lair; or, by watching at a pool, awaits the arrival of animals in quest of water. These

would offer but precarious chances even to so cunning and stealthy a foe as the Tiger, as all wild animals are so wonderfully cautious in their approaches to such resorts. The Tiger too would betray his presence to them by that peculiar smell attaching to him, so that the odds are greatly against our striped friend's success, though of course he occasionally is rewarded by catching some unwary over-thirsty animal that rushes to the pool heedless of the consequences. But this will not apply to the Tiger on the hills, where no paucity of water ever occurs to such an extent as to drive the game to any one spot to drink. That the Tiger's principal food in certain localities is game there can be little question, but how he takes it is not well known, and perhaps may never have been witnessed by anyone.

I have a theory of my own on this point; let us ventilate it. In the first place, the Tiger must have room to spring on his victim in the sholas,\*—many are sufficiently clear to allow this,—and no doubt he takes advantage of such spots when a chance offers in them; but in general the woods are dense with undergrowth interspersed with trees so close together that the spring of the Tiger and the force of the blow must—I should say—be greatly interfered with. Then, again, his presence, as before said, is so liable to detection by the Deer that his chances of capture are remote; but at night the Deer are out in the open, and then perhaps, the wind being by chance in his favour, he may succeed; and I am disposed to believe that this is the most likely time for him to do so, though he is in no way restricted as to time or place, for he slays tame Indian Buffaloes oftener during the day than during the night, and at times close to their habitations. All Deer possess an acute sense of smell, and against it a Tiger has to contend before he can provide his larder with game; but how does he manage it? We cannot give him the credit of the intellect of man, who, in pursuit of game, is well aware nothing can be done down wind. Were it so, not a Sambur or Deer would be left alive. The Tiger would bag them all just as he pleased,—in fact, he would then be able to kill any Deer when he wanted it. We have so far considered the acuteness on the part of the game to ensure them against total destruction, and I have only one further observation to record, and that is

\* Wooded ravines.

how often the presence of a Tiger is indicated by the actions of the Sambur and other Deer and also by various Monkeys. If disturbed by him in a sholah during the day, the Deer immediately resort to the open, watching with eagerness the wood they have quitted, and generally warning the neighbourhood with loud consecutive bells; whilst Monkeys will perch on a branch above the feline, and keep up a constant chatter, and in their language swear at him until they acquaint the whole forest with his presence. That a Tiger is stealthy and quiet in his movements we all know; that velvet paw of his, so soft and yet so formidable, enables him to tread the woods and forest so noiselessly that the sharp-eared Deer may often be taken by surprise, and fall a victim to its blow; and but for the tell-tale scent emanating from his striped hide, numbers would be destroyed. That he, when hungry and sharp-set, is always on the prowl there can be no question, and it is on these occasions that he is supposed to adopt a very wily plan to secure his food.

On a late occasion when a well-known sportsman killed a fine Tiger, he was attracted to the spot by the belling of Sambur and the call of the Spotted Deer. On quietly approaching, he perceived the Tiger lying down under some bamboos watching or listening to the Deer, who kept calling. Before any result could be observed, a well-planted ball slew the feline on his couch. It then occurred to the sportsman that it was not at all improbable that this act of the Tiger lying down calmly in sight or hearing of his prey might be one of his devices to allure the game within reach. We know how proverbial is the curiosity of Deer, and how, when uncertain of the object before them, they will at times advance towards it. In the Sambur this is more particularly the case, and may it not be that the Tiger is aware of this propensity, and so—like Jacko and the Crow—feigns sleep or death to attract the unwary and inquisitive victims? That he also tries his speed at times, the following instance is good proof.

One afternoon, on reaching the summit of a high hill commanding a well-known valley for game, my friend espied three or four Sambur in a swamp below; he noticed that they were on the *qui vive*, and could not divine the cause, especially as what appeared to be a stag was lying down in the swamp, but very far from the other Deer. On turning his binoculars on this object,

to his surprise he saw it was a grand Tiger; and while in the very act of looking at him, he saw him gather himself up, and with three magnificent bounds fly through the air in the direction of the Deer. The latter, however, were too quick for their foe, and, scampering off, all got away; the Tiger then crouched sulkily, and on seeing the hunter approaching, he too was off like a shot. Now this I consider as very probably the manner in which a Tiger takes his prey at night, and one can imagine it to be most destructive.

Tigers are not particular as to the state of their food being fresh or otherwise. It was observed on the Anamallies that these animals seldom, indeed never, were found to resort to the carcasses of Gaur that had been shot until the effluvia from them was exceedingly strong,—indeed, it may be said when in the highest state of putrefaction; and on one occasion, when the feline had dragged the putrid carcass some distance, the sportsman was able to follow it up to the spot by the scent, and found the Tiger quietly reposing near to the offensive remnants of the defunct. In many cases it has been noticed that he makes his lair conveniently close at hand to prevent the intrusion of any assistance in the demolition of the carcass.

On one occasion, I was present when the noise of the descent of a large number of Vultures on a dead Buffalo, lying just outside a sholah, caused the Tiger who had killed it, to put in an appearance at noonday to protect his rights to the beef from the feathered tribe, and not one of the obscene birds would go near the body as long as Mr. Stripes was in sight. It is evident from a Tiger's droppings that he usually consumes the whole of the animal he slays, even to the very skin, as he voids large quantities of hair.

I may here record another instance of craftiness on the part of the Tiger in approaching his game, and which the natives firmly believe in, and that is that the Tiger is often heard to reply to the bell of a Sambur or the call of a Deer, and that he does so with a low muttering growl, or sometimes with a short impatient grunt, at the same time stealing on quietly towards the sound of the Deer's call. This answer of his seems to elicit a reply from the Deer, and the Tiger, ascertaining with tolerable precision the position of his prey, is guided accordingly, stops

his growling, and perchance secures a victim. Tigers, it is well known, prey at times on their own tribe, as the following instances will show.

A Leopard was half eaten by a Tiger by the side of a "kill," and there were evident traces of a struggle having taken place. Whether the Tiger ate his enemy out of revenge, or found him fresher and more tasty than the body over which they had fought, I will not hazard an opinion; but, though strange, it is not uncommon either with the hairy or the feathered tribe,—birds of prey doing the same, for I shot a Falcon in the act of feeding on a Kestrel it had struck down. Another instance is known of a Tiger having killed a young Tiger over a dead bullock, and partly eaten him. I have known several instances, when two Tigers have fought in Assam, of the survivor demolishing the defeated.

There is a peculiar and singular distinction in regard to the mode of breaking up their prey between the Tiger and the Panther; the former invariably commencing on the hind quarter of the animal slain, and the latter at the fore quarter or chest. There is no reason shown for this strange difference, but it is a well-established fact, and one perfectly recognized by native shikaries, who will, without hesitation, pronounce which animal is the culprit by observing these particulars.

We now come to an instance where some sportsmen did see a Tiger strike down a cow. "We had been tempted off our proposed line of march on the 11th by the receipt of news of a Tiger having killed two cows in the bed of the river near the village of Pipulkulti; and, encamping at Watoli, had sent our shikaries to tie up Buffaloes near Pipulkulti, and also near Amba, a village in the opposite direction, near which there had been a 'kill' about a week previous. The news came in early from both directions: 'Nothing from Amba, and "no kill" from Pipulkulti'; but Shaikh Boden, our head shikarie, who had inspected the latter place, had found fresh tracks, so we determined to try our luck, and started after breakfast with about twenty coolies for a beat. One mile below Pipulkulti the Pen Gunga river averages in breadth from four to five hundred yards, when a large nullah runs into it from the Berar side. In the bed of the river there are a number of small flat islands covered with a description of Cypress grass, affording sufficient cover for

a Tiger to take refuge in. Shaikh Boden proposed beating diagonally up the bed of the river, and that we should post ourselves half-way down the bank, behind some bushes on the upper extremity of the cover,—the disposition of the islands (on which was the only cover) being such that the chances were greatly in favour of the Tiger being forced within easy range. This plan we agreed to pursue, and were walking along the northern bank on our way to our posts, when we were stopped by the cry, 'Bagh hai,' and on looking down to the bed of the river, saw what apparently was a very large Tiger stalking a herd of cattle that had come down to water. We crouched down, and had the luck to see the whole business. The Tigress, as she proved to be, when first seen, was stealthily stalking a white cow, which was some little way off from the main body of the herd, and, taking advantage of the slightly undulating bed of the river, had probably approached across an open space of perhaps five hundred yards before this cow had seen her; the rest of the herd were behind one of the islands, and could not yet see the enemy. The white cow allowed the Tigress to approach to within about eighty yards before she appeared to notice her danger, and at first seemed to be fascinated by the appearance of the brute creeping towards her, and it was only when the Tigress commenced to increase her pace to a trot that the cow made off. The trot increased immediately to a lumbering gallop, as the Tigress had now got on to the firmer ground that surrounded the islands, and in a very short time she skirted over a small ridge into close proximity of the herd, which was then commencing to scatter on the news received from the white cow. The gallop turned into a charge, and in a few seconds the Tigress had picked out a fine young cow, on whose back she sprang, and they both rolled over together in a heap. When the two animals were still again, we could distinctly see the cow standing up with her neck embraced by the Tigress, who was evidently sucking her jugular; the poor cow made a few feeble efforts to release herself, which the Tigress resented by breaking her neck."

What induces a Tiger to prey on human beings? Some affirm that it is only when age overtakes the animal and he finds himself unable to cope with his ordinary victims, Deer or cattle, that he falls upon man; and it is stated in support of these views

that man-eaters are mangy and decrepit beasts, sans teeth, sans hair, and sans anything and everything that makes a Tiger the formidable creature he is in his prime. This is occasionally true, but man-slayers have also constantly been found to be sleek, lusty, and in their full strength and vigour. It is not, therefore, entirely dependent on age and its concomitant weakness that the Tiger takes to this habit. I think the argument advanced by many observers and naturalists that the animal, either accidentally or by press of hunger, having once seized a man and found out what an easy captive he had made, and in addition that the flesh is palatable, takes advantage of this acquired knowledge, and thenceforth becomes that dreaded being,—a man-eater,—is equally reasonable with the former, and may be accepted perhaps as the more probable of the two.

#### LEOPARD (*Felis pardus*).

Although there is but one species, there are two varieties of this beast. The larger is styled by sportsmen the "Panther"; the Snow Leopard is only found in the Himalaya range in altitudes ranging from 8000 to 10,000 ft. The Panthers grow up to nearly eight feet in length, and are more savage, active, and determined than many a Tiger. The colouration is orange yellow, passing into white below. It is spotted with deep or brownish black, sometimes distinct, sometimes composed of two, three, or even four points disposed in a circle and surrounding a space, always somewhat darker than the ground colour, and shading into it below. Along the spine, on either side, the spots are arranged in parallel bands. On the head and legs the circular spots pass by degrees into mere points; the tail is ringed with annular spots. On the hinder part of the ears is a clear spot. In the true Panthers the rings are more regular than in the Leopards; but no two skins are exactly alike in marking. Panthers live more on cattle; Leopards principally on Dogs and any small game they can find,—consequently one is an inhabitant of the plains, and the other of hilly ground. Leopards are very plentiful in the Cossyah and Jynteah Hills, and when Shillong was first occupied, any Dog that ventured out of the house after dark was sure to be seized and carried away. Notably two large towns, Burpeltah and Hazoo, in Assam, were infested with



Panthers ; there were cane-brakes in their midst,—they were of course straggling places,—and out of these almost impenetrable lairs Messrs. Mackenzie and Campbell shot several Panthers. I killed a couple in Hazoo. A Leopard is more difficult to circumvent than a Tiger, as it approaches its kill in the most wary and cautious manner, examining every yard of the ground, and, being arboreal in its habits, it scans the surrounding trees, which a Tiger only does after it has been shot at once or twice from a coign of vantage. They prowl about after sunset till dawn in search of prey.

Another peculiarity of the Leopard tribe is that when an animal has been killed by one, it commences to feed upon the fore quarter and viscera, whilst the Tiger attacks the hind. A man-eating Tiger is bad enough, but when Panthers take to preying on the human kind they are ten thousand times worse, as they force their way into the frail huts of the natives and devour the people. In some places in the Nizam's dominions, on the borders of the Nirmal Jungle, the average of deaths from Panthers was one man a day ; whilst in others it rose to two ! I have known whole districts deserted on account of these scourges, and it is almost impossible to exterminate a family, as the caves they generally inhabit have underground passages, and to smoke them out is impossible ; there are, too, so many entrances, that where to sit up is also an uncertainty. Yet native shikaries, by means of crossbows and poisoned arrows, kill a great many Leopards and Panthers a year for the sake of the reward offered by Government.

Whilst a "griff" at Secunderabad, three of us lived together. We had a Panther, then more than half grown, which had been captured when a baby and carefully brought up. We used to go up on to the flat-terraced roof and take the Panther with us. One of us would sit down at the further end with his back towards the beast, who was then let loose ; in fact, in those days he was seldom confined. Directly the beast thought he could do so unperceived, he would stalk the sitter, who took care to stand up and face the brute before it got within springing distance, and it was amusing to see the innocent look it would put on, and gaze in any direction rather than to where the ottoman was placed ; he would then be removed further off and

again released, the sifter resuming his seat, and he would at once commence to restalk. At last he got too big and too dangerous, and we had to chain him at the foot of a tree, in which he spent the greater part of his time. I had bought two English Greyhounds of some considerable value. They got loose one night and attacked the Panther, who, chained as he was, soon put both *hors de combat*, and they were so mauled that, though by timely interference we saved their lives, they were ever afterwards useless for coursing. We had a large Sambur, fully three years old. In passing under a branch of the tree, where the Panther was crouching, the beast sprang down upon it, and would have killed it, had not our servants been at hand to rescue the Deer. We eventually turned him and a Bear we had, loose on Mole Alley Race-course, and speared them.

Shikaries sitting upon trees and machans have been carried off by them; and two Karens travelling through a forest in the Tenasserim District got benighted, and erected bamboo platforms on the branches of a large tree. During the night, the lower man was awakened by a Leopard climbing up the tree; he called out to his comrade, who was too sleepy to pay any attention, and was seized and carried off.

It is uncertain the number of cubs a Leopardess brings forth at a birth; but a chum of mine killed one with no fewer than seven young ones. Black Leopards are but a *lusus naturæ*. They are more abundant in moist clines overrun with sombre forests than in more open country, though they are occasionally found here and there in open as well as wooded lands. In the dense forests of Malaya and Lower Burma Leopards exist principally on the Gibbon Apes, as other game is scarce. Nature therefore adapts their colouration to their surroundings. An ordinarily marked Leopard would be too conspicuous, and would die of starvation. The fittest—the black—survive, as they are not so easily seen. A black Pantheress who mated with an ordinary Leopard had two or three litters which showed no signs of being melanoid. In Africa the ordinary Leopard, as distinguished from the Panther, is most plentiful, and great numbers are killed every year by the natives with poisoned arrows. Numbers are caught in traps, and Colonel Montagu, of the Commissariat, caught twelve Leopards and one small Tiger in a trap in his compound at Shillong.

THE HUNTING CHITAH (*Cynœlurus jubatus*).

This is found here and there in India, but is unknown in Ceylon. It is most common in Eastern Africa, more so than in India. They are more plentiful in Oude and Upper India than in Southern India; and I never saw but one, and that I was lucky enough to shoot, in the wild state. It is not found in Assam or Burma. I have seen many in captivity. We had a couple when I was a child. They are largely used by native rajahs and other personages to pull down wild Antelope, but it is not an exciting sport. When slipped from the cart, in which he is carried as near to a herd of Antelope as possible without frightening them off, he first cautiously walks towards his quarry, and with bristles erect. When the Antelopes perceive him, and he is within one hundred or even one hundred and fifty yards of them, he rushes at them with incredible speed, and if he overtakes one, as he generally does, within that distance, he fastens on its throat. If he fails to reach within that space, his wind being exhausted, he desists, and walks about in a towering rage, but soon allows his attendants to blindfold him, and to put him back on the cart. If he kills, the shikarie fills a saucer full of blood, and whilst the Leopard is lapping it up, he is hooded and led back. His call is a bleat-like mew. If taken as cubs, the natives assert they are useless for the chase. Only the adult ones who have been trained by their parents to hunt are of any use in a domesticated state. I never heard of their breeding in confinement in India; but I believe an instance or two has occurred in the large zoological establishments on the continent. None have bred in our "Zoo." The young, when born, are covered with soft brown hair, without spots, which is curious, as even the young of the Lion and Puma are distinctly marked with spots, which disappear in time. It is capable of domestication; Dr. Jerdon, the naturalist, had one that followed him about like a Dog, and was always sportive and frolicsome. Chitahs in a wild state, if wounded, will turn to bay and fight to the death.

BEARS (*Ursus tibetanus* and *U. labiatus*).

Of the Bears of India, the Isabelline, or Brown Bear, of the Himalayas (*Ursus tibetanus*), which is allied to the Syrian Bears, is found in the Terai along the foot of the Bhootan

range of mountains and in Assam. The *Ursus labiatus* is confined to the peninsula of India and Ceylon, although I did shoot one in Assam. How it got there was a puzzle to Jerdon, the naturalist, as he declared it was not to be found in that part of the country at all; but as I had the almost fresh skin with skull attached, seeing was believing. But I must own that out of a good many shot by myself and others in that and the adjacent countries it alone was *labiatus*, all the others were *tibetanus*. Why this latter Bear should be so styled has been a puzzle, for it is not found in Thibet at all. The two Sun Bears are found in Burma and downwards in Malaya. The Sloth Bear is an ungainly-looking beast. It has long shaggy hair, a prolonged and very flexible snout and lower lip. The fur is black, and the muzzle and the tips of the feet being of a dirty white or yellowish colour. Its breast is ornamented with a whitish V-shape; a ball placed therein being certain death to the beast. This Bear feeds on White Ants, fruit, and honey; but although such a great authority as Sir Samuel Baker asserts it is not carnivorous, yet I have come upon both the *labiatus* and the *tibetanus* devouring the remains of dead animals which we had shot a day or two previously.

There is just sufficient danger in Bear shooting to make it an exciting sport. Bear spearing off horseback is undoubtedly a grand sport, but the *Ursæ* are seldom met with on ridable ground; but the late Geoffrey Nightingale must have speared several hundreds of them. If a Bear is wounded when in company with another, he invariably goes for his comrade under the idea, I suppose, that he has been the aggressor. They charge in a most determined manner; but when close by, they generally rise on their hind legs and claw at the sportsman's face. I have seen some terrible wounds inflicted by them, principally on unoffending woodcutters. It is useful to carry a stout spear with a crossbar when following up a wounded Bear. My shikarie, Mogul Beg, was charged by an old he-Bear; he thrust the broad blade a little way into the chest, but, stumbling, failed to drive the weapon home. The Bear seized the crossbar by the fore feet, and fairly drove the blade through his own body!

They all have very long powerful claws, by means of which

they climb up trees without a branch to the height of sixty or seventy feet by simply digging their claws into the soft bark. The Karens, following their example, fill a haversack with bamboo pegs, and driving in one and standing on it, they insert others into the bark the whole way up; and I have seen them thus ascend the bole of a forest monster fully twenty-five feet in circumference, and without a branch for one hundred feet, after the huge honey-combs pendant on the lower lateral branches.

A large Bear will be about six feet in length, and weigh close on eight hundred pounds; not that I ever weighed one myself, but I have been told so by those who had. They seldom have more than a couple or, at the most, three cubs at a birth, and the little ones often ride on their mother's back. More people are killed annually in Assam by Bears than by Tigers. They are fond of rocky ground, and have their dens formed naturally by slabs of stone lying one on the top of the other; but in parts of Assam and Burma they lie on the open prairies in a dense patch of either long grass or in a thicket. Although Bears are very numerous in both countries, they seldom fall a prey to the sportsmen excepting in the hilly districts. When hunted on Elephants, they manage to evade the line, the noise made in forcing a way through the long grass gives them warning that their enemy man is nearing their lair, and they quietly shamle away. Why Bears should be so subject to cataract of the eyes I do not know, but it is a common disease amongst them. Elephants dislike Bears, and fear them more than they do Tigers.

The Burmese Bear, *Ursus malayanus*, has a glossy skin, with shortish hair, muzzle blackish, but face, mouth, and lower jaw a dirty white, throat black, dividing the white part just mentioned from a large heart-shaped white mark covering nearly the whole breast, with a large black spot in the centre, and a few minute black dots over the remaining portion; the lower part of this heart is continued by a white line between the fore legs, and widened out again on the belly into a large irregularly-shaped spot. The head is flattened and very short, with far more of a canine than an ursine expression. Ears very small, smooth, and round. It seldom exceeds four and a half feet in length. It is

probably more intelligent and lively than the Indian variety. The *Ursus euryspilus* is again smaller, and the horseshoe on its chest is orange or rufous-coloured; and in both varieties the claws are exceedingly long. Nothing a Bear relishes more than the larvæ of the White Ants, and to get at them he will demolish nest after nest, a work of great labour and of considerable time. Whilst sucking out the nests, which are at the very bottom of the Ant-hills, the forcible inhalations can be heard a long way off; and I have, on three or four occasions, guessed at their whereabouts by this noise, and slain them. They are great adepts at climbing. I had two Bears, both blind; they were quite harmless and almost tame, but if frightened and they struck a tree they were up it in a second. One of them used to get into the coolest corner he could find. Major Edgar of the 69th was living with me, and the Bear one night got into his bathroom, and rolled himself up amongst the watering-pots (earthenware chatties). The major, as usual, came home very late from mess, and in the dark went into the lavatory and stepped upon Bruin, who immediately stood up and clasped the field officer,—who had little clothes on, and was as hairy almost as the Bear,—round the chest! I was in the next room, and for a second or two I could not move for laughing, whilst he shouted to me to extricate him. This I at last effected without any damage having been done; but Edgar was so irate that I had to give Bruin away.

#### THE ELEPHANT (*Elephas indicus*).

This most useful and generally docile animal when domesticated is employed in many ways. It is essential for Tiger hunting in the vast prairies covered with long grass in Bengal, Assam, and Burma.

There are two varieties in the East: one, the Goondas, have large tusks; and the other, the Muchnas, which have none, or only rudimentary ones. Some naturalists assert that having tusks, or the contrary, is a freak of nature, like whiskers in a man; but the peculiarities which distinguish one male from the other also extend to the females. The Goondas have a broader expanse across the forehead, the bump between the eyes and the root of the trunk is more prominent, but the hollow between the

eye and ear—commonly called the temple—is less marked. The countenance is more pleasing, the eye brighter and kinder looking.

The Muchnas—called by the Burmese “Hines”—has the head much longer and narrower, the temple very much depressed. The trunk is longer and very ponderous, possessing immense strength, as if to compensate the animals for the want of the formidable tusks possessed by the Goondas.

If nature has not given intellect to these animals, it has given them an instinct next thing to it. One has only to hunt them in their wilds to learn how wonderfully Providence has taught them to choose the most favourable ground, whether for feeding or encamping, and to resort to jungles where their ponderous bodies so resemble rocks or the dark foliage that it is most difficult for the sportsman to distinguish them from surrounding objects; whilst their feet are so made that not only can they tramp over any kind of ground, hard or soft, thorny or smooth, but without emitting a sound. The Indian Elephants prefer forests by day and open ground by night, and feed on bamboos, wild cardamoms, plantains, null, branches (leaves) of trees, especially of the *Ficus* tribe, or long grass, which is abundant on all the plains. They are very fond of hiding in a wood in the vicinity of cultivation during the day, and sallying forth to plunder at night. They do a great deal of damage, not only in what they eat, but more in what they trample down and destroy. Elephants are at all times a wandering race; they consume so much and waste so much more, that no single forest could long support them, hence their roving propensities.

Whilst the European sportsman in India fires only for the brain of an Elephant, natives often kill them by firing at the point of the shoulder. Elephants have a very keen sense of smell and of hearing, and they must be approached up wind. In the dry season there are so many fallen twigs and dry leaves that it is almost impossible to come close enough to a herd to kill one; the slightest noise, and off they go! But after the jungles have been burnt and rain has fallen, especially when they are feeding on bamboos, they are easier to get at. Colonel McMaster, an excellent sportsman and naturalist, says of Elephants:—

“Those who only think of Elephants as they have seen these

domestic giants working at any of the innumerable tasks on which these almost reasoning slaves may be employed, can hardly imagine how puzzling a matter it is to distinguish them amongst the dark shadows and irregular outlines that fill up any portion of a landscape in their forest haunts. I was for some moments—it seemed to me hours—waiting in long grass and reeds within a few *feet*—not yards—of the head of a fine tusker without being able to get a satisfactory shot at him, or even to see more than an indistinct dusky outline of form, or a dark shadow as his trunk was raised aloft when the mighty beast suspected that he scented mischief. Having at length made sure that there was something uncanny near him, he uttered a shrill cry and wheeled round on the very spot on which he stood, without exposing any more vulnerable target than his enormous hind quarters, at which it would have been wicked and wanton cruelty to fire, rushed down the hill, followed by his family (eight or ten unwieldy wives and sturdy children), whose progress, as they crashed through the dense underwood and undergrowth of long grass, caused a noise sufficient to startle anyone whose nerves were not tightly braced, and which my pen is certainly too weak to describe.”

General Hamilton—“Hawkeye”—wrote :—

“On another occasion I was blown at by a wild Elephant, who threw her trunk out from behind the jungle lining the narrow path along which we were running to intercept the herd, and blew her nose so suddenly in the chest and face of the leading man, that he fell back right upon me. We had cut this Elephant off from its companions, and having a young calf to take care of, she had loitered behind the herd. In this case we noticed the wonderful and extraordinarily quiet manner in which these gigantic animals noiselessly move through the forest when trying to avoid observation or danger.”

Thick as is the skin of an Elephant, no beast is more tormented by Mosquitoes, Gadflies, and Leeches than he is. Hence his habit of covering his body over with earth, and squirting saliva about to drive off these pests.

I have never known an Elephant that could be invariably depended upon for dangerous shooting. Elephants that would one trip be as staunch as possible, would, the very next, run



from a Hare or small Deer ; and a Pea-fowl or Partridge getting up with a whirr under their trunks would set them quaking with fear.

Although in the wild state Elephants feed not far from Rhinoceroses, and there is no antagonism between them, yet when caught and trained, the very noise made by a Rhinoceros will send them to the rightabout.

Tame Elephants are very subject to epidemics. It is to them what the rinderpest is to cattle,—they die off like rotten Sheep. The only hope of saving the stud is to scatter the animals as far apart as possible, and to let them loose to feed on aquatic plants, which grow in most of the large bheels of India. Elephants, like other animals, must die ; yet during thirty years' wanderings in India, and of over three in Africa, I never came across the remains of an Elephant that had joined the majority through natural causes. What then becomes of their ponderous skeletons ? Some say that the bones are consumed in the periodical fires ; but what becomes of the massive skulls and tusks ? I have seen every other wild animal of India dead, or rather have come across their remains ; but though I had to wander over jungles in Burma and Assam for over twenty-one years, which were swarming with these pachyderms, I never came across the remains of a single one. Can the tales we read of in the 'Arabian Nights' be true, that when an Elephant feels his last hours or days near at hand he retires to their Golgotha, and there dies ? Even if that were the case, how is it no such treasure trove has ever been found ? I never met anybody—European or native—who had ever seen the remains of a dead Elephant unless it had previously been killed by human agency.

Elephants utter peculiar sounds to denote peculiar meanings. A whistling noise produced by the trunk indicates satisfaction ; when they trumpet or utter a hoarse sharp scream, it is a sign of rage ; a noise made by the mouth like "pr-rut-pr-rut" is a sign of alarm ; so is the striking of the trunk on the ground accompanied by a pitiful cry ; whilst a noise like "urmp-urmp" denotes impatience or dissatisfaction.

Elephants are caught in Keddahs, in pitfalls, and noosed off other Elephants specially trained for that purpose.

They snore a good deal when asleep, and I have seen them

use a foot for a pillow on which to rest their heads. They are very human-like in many of their ways. They get a piece of wood and use it as a toothpick; they will plug a wound with clay; they scratch themselves with the tip of their trunk, or if they cannot reach the part they take up a small branch and use that.

When thoroughly alarmed and seized with a panic,—by no means a rare occurrence,—scarcely anything will stop an Elephant. A sportsman incautiously took his steed up to a dead Bear, as he thought; but in putting her hind foot on Bruin, from whom no more sport was expected, she began to jump and trumpet, and set off at a fearful pace:—“On looking round I saw that the Bear had hold with his teeth of the right side of the Elephant’s buttock. I instantly fired, and Bruin this time really fell dead; but the Elephant continued her mad career,—the howdah was broken amongst the sal trees, and it was only on arriving at a river where another Elephant was tethered that she pulled up.”

There has been much controversy regarding the age to which an Elephant is supposed to live. The late Mr. Sanderson wrote a charming book, ‘Thirteen Years Among the Wild Beasts of India.’ In it he stated he believed that these animals lived up to one hundred and fifty years; that is, that the ordinary duration of Behemoth’s life was one hundred and fifty compared to that of a man’s seventy. In this I think he was altogether mistaken. The same sources of information—*viz.* the mahouts—were equally open to me. I had Elephants under me for over twenty-one years. My jemadar was a Keddah Havildar. I knew Mr. Nuttal, superintendent of Keddahs, for over thirty years, and they ridiculed the idea of general longevity in these animals. Mr. H. D. Nuttal says:—

“I have had an Elephant trained in a fortnight, but it generally takes two months and often longer. I have had Elephants out Tiger shooting two and a half months after capture; and five months after capture I have had them out chasing wild Elephants in the jungles, and even lassoed others off their backs.”

As to their duration of life, he makes the following remarks, and the reader must remember that this gentleman was a Keddah officer of very many years’ standing:—

“When the British captured Ceylon, a memorandum was found, left by Colonel Robertson, who was in command of the island in 1799, which stated that an Elephant attached to the establishment at Matura had served under the Dutch for upwards of one hundred and forty years—during the entire period of the occupation from the expulsion of the Portuguese in 1656, and found by them in the stables when they took possession of the island. The stories of Elephants living to an immense age in India I put no trust in, because with any favourite Elephants in former days (when the Jemadar had the naming of them) they had special names; and as their vocabulary of names was but limited, they used to give three or four Elephants the same name, as, for instance, ‘Pobun Peary No. I., Pobun Peary II., Pobun Peary III.’ Pobun means the wind, and an Elephant in the depôt possessing swift and easy paces would go by the name of Pobun, and when Pobun I. died Pobun II. became No. I., and so on, and a new one christened No. III. These appeared in the office books, while the casualty rolls were kept merely on fly-sheets, and were after a while disposed of as waste paper, and therefore no check was possible to the true identification of an Elephant; and as no trace could be found except in the office books, which simply showed the same names of Elephants running on continuously year after year, it appeared as if they (the Elephants) reached an extraordinary age. But all this has now been altered, and better books kept. I consider an Elephant to be at its prime about thirty-five or forty, and capable of working up to seventy or eighty years of age. An Elephant’s life may extend rather longer than a human being’s, but not by much; but I do not believe in animals (except a very occasional one) living up to 150 years. There are mahouts whose fathers, grandfathers, and great-great-grandfathers were all mahouts, and my opinion is founded on theirs, supplemented by my own observations of the past thirty years.”

#### RHINOCEROS (*Rhinoceros unicornis*).

There are three well-known varieties of Rhinoceros found in India, and perhaps there are two other varieties. *R. indicus* is the largest, the dimensions of one I killed being—extreme length

12½ ft., tail 2 ft., height 6 ft. 2 in., horn 14 in. As a rule all Rhinoceroses are inoffensive; they inhabit such remote localities that they can seldom do damage to cultivation; yet if some ryot cultivates a patch of ground, and the pachyderms get scent of it, they will soon devour it. They are nocturnal by habit, and retire to dense thickets in the midst of a swamp soon after sunrise. It is naturally a timid animal, more anxious to escape than fight, and, notwithstanding their thick hides, far easier to kill than a Buffalo. It is an exploded idea that their skins are impenetrable. The outer cuticle offers no great resistance whilst on the living animal, but when removed and dried in the sun it will turn aside an ordinary bullet fired with a moderate charge of powder; yet heavy rifles with large bores and immense driving power behind are absolutely requisite, for the vital spots have between them and the skin such a mass of blubber, muscle, and bone that only a hardened ball driven as above described can reach them. If shot behind the ear an ordinary smooth-bore will account for them. I have seen a shikar knife driven in to the hilt behind the shoulder of one just killed by an ordinary man. The best material to mix with lead to harden the bullets is quicksilver. It should not be allowed to remain long in the crucible, as it will then evaporate; one-twelfth of quicksilver is sufficient. If too much is used the bullet gets brittle and flies to pieces on impact.

The *R. indicus* has only one horn, seldom 18 in. long, generally a good deal less; this is liable to fall off through injury or disease, but another will grow in its place. It is formed by a coagulation of hair, and the Indian variety only uses it to dig up roots, and never as a weapon of attack, like the African pachyderms. It has two formidable tusks in the lower jaw, and with one of them he can cut an Elephant's leg to the bone; and in season they fight a good deal amongst themselves, for I have seen not only the males but the cows scored all over. The skin is exceedingly thick, with a deep fold at the setting-on of the head, another behind the shoulder, and another in front of the thighs; two large incisors in each jaw, with two smaller intermediate ones below, and two still smaller outside the upper incisors, not always present. General colour dusky black. They are very plentiful along the Terai, and in the Durrung, Nowgong, and Goalpara

districts of Assam; and I believe are found also in the Yonza-  
leen, Arrakan, and Yomah ranges in Burma.

In the primæval forests there does not seem to be any hostility between the Elephant, Rhinoceros, and Buffalo. I have seen all three feeding within a few yards of one another, and I have also seen Rhinoceros and Buffaloes lying down together in the same mud-hole. But the domesticated Elephants dread these beasts far more than they do any other, why has always been to me a puzzle. When disturbed a Rhinoceros makes a peculiarly squeaking noise; directly an Elephant hears this ninety-nine times out of a hundred he seeks safety in flight. If the beast is quiet your steed will go up pretty close, but not if it utters its cry. If the ball is placed in the centre of the shield, rather low down over the shoulder, it penetrates the heart; if behind the shoulder the lungs are perforated. The beast makes off full pelt, uttering its squeak, but in a few minutes it falls down, and in its dying moments makes a noise which once heard can never be forgotten, and is a sure sign of approaching dissolution. A peculiarity of this beast is, that whilst it remains in a locality it will deposit its ordure only on one spot, and visits it for that purpose once when it commences feeding at night, and again before leaving off soon after daybreak. Considering the great value put on the flesh, hide, and horn of the animal, I am astonished that any are left alive. All a native shikarie has to do, is to dig a pit near this mound, and lie in wait until its usual visit, and then to pot it.

The Assamese do not waste a morsel of the flesh. The shields over the shoulders are dried in the sun; the rest of the hide is cut into strips, roasted over a charcoal fire, and devoured by them much as is the crackling of a pig by most Europeans. The horn, useless as a trophy to British sportsmen, is greatly prized by them, and has a purely fictitious value; they will pay as much as forty-five rupees a seer (2 lb.) for them. They invert them, store them in their namrghurs, place water in the cone at their base, and believe that it is an antidote to poison if partaken inwardly. Even the Maiwaries, strict vegetarians, have asked me to bring them the dried tongues; they pulverise them, and partake of a little when they are ill, and believe that it is a sovereign remedy against all diseases.

Although timid and anything but pugnacious, if driven to a corner and sore from wounds they will charge savagely. I never had one close with an Elephant of mine, though I have had them several times within a foot or two, but always managed to drop them before they did any harm; but I had an Elephant which I bought from Tye of Koliabar, a good and successful tea-planter, who had been mauled by one, and she was as good on Rhinoceros as an English pointer is on partridges. If there was one within two hundred yards of her, and she scented him, off she would go, and nothing in the world would stop her. At times they are gregarious, and Jackson, Adjutant of the 43rd Assam Light Infantry, and I came across fully twenty, if not more, in a (comparatively speaking) small patch of long grass and reeds, and dropped four and lost several others severely wounded; but there was an impenetrable jungle close at hand, into which they took refuge, and there was no following them up there.

#### THE LESSER RHINOCEROS (*Rhinoceros sondaicus*).

These are distinguished by their size, by their shields being less prominent, and their skins covered with square angular tubercles. They grow up to  $4\frac{1}{2}$  ft. high—a monster may be 5 ft. These Rhinos are found in the Sonderbunds, in the delta of the Ganges, and extend throughout Assam, Sylhet, the Garrow Hills, Tipperah, Chittagong into Arrakan, and Burma, probably extending into the western provinces of China. The Burmese dread them very much, and declare that if they see a camp-fire they rush at and devour it! They live in swamps, almost quagmires and quicksands, between the lower ranges of the mountains in Burma, where it is impossible for a sportsman to get at them, though I shot a two-horned variety once near Cape Negrais by sitting up at night for one; but the sport is not worth the candle. The tortures we underwent that night from mosquitoes and sand-flies I shall never forget.

The ordinary *R. sumatrensis* is the best known two-horned variety. It is common in Burma and Malaya. Its body is covered with bristles, and the folds of the skin are deep, especially that behind the shoulder; the folds on the neck are not very distinct. The horns are generally mere knobs, but the one I shot

had a very fair front horn measuring fully nine inches, whilst that behind was little more than an inch or two.

In 1868 Captain Hood, Superintendent of Keddahs, and Mr. H. W. Wiches captured a new variety in Chittagong, and it has been named the Hairy-eared Rhinoceros (*R. lasiotis*). It has long hairy fringe to the ears, and long reddish hair on the body, the skin fine and granulated, the tail shorter. The only known specimen is, or was a short time ago, in our "Zoo," having been purchased for £1250.\*

All Rhinoceroses, if caught young, are easily tamed. A dhoobey (washerman) had one for some time in Gowhatty, and it did not mind carrying burdens or letting people ride it. It is rather profitable to catch the little ones. If a cow with a calf is killed, the little one remains near the carcass. All Assamese villages have nets for catching various beasts, from Deer to Buffaloes, and it is easy to surround and capture the little one. One I captured was more savage than a Tiger; it was tethered by all four legs, and with a rope over its neck. It rushed open-mouthed at anyone it saw the first day, but soon quieted down. My two shikaries, Sookur (mahout) and Seetaram, his uncle, knew how to manage these animals. After grilling in the sun many hours Sookur poured a little milk over its head, and as it trickled down the little one curled up its lips; a little of the nourishment got into its mouth, which it greatly appreciated, and it readily took all that was given it. The next morning plantains mashed in milk were given to it. After three days it would follow Sookur about anywhere, and in a week or ten days it was quite tame. I had two of them, and sold them to Jamrach's agent, an Afghan, for 1200 rupees, delivered in Gowhatty; but I believe I ought to have got double the amount. The milk of a cow Rhinoceros is thin and sweet, very like a woman's in the earlier stages of nursing. One I shot was milked by my seik overseer, and he got more than two quarts from it. I tasted it just to see what it was like.

All Rhinoceroses live on herbage, long grass, null, wild cardamom, and branches of trees. The upper lip protrudes beyond the lower, and is very pliable. They delight to lie in mud-holes, and I have even shot them lying in a clear rippling stream. I have shot them right and left with one ball each, on an occasion; but frequently I have killed them with but one ball each. Though

\* Vide *ante*, p. 142.—Ed.

the would-be critic of 'Land and Water' said "that was more than he could believe," I wonder what he would say to two having been killed by the same ball? I was not present, but knew all the sportsmen who were—when it was believed that, although Colonel Campbell fired two shots, they were at animals some way apart; whereas, when they went to examine the one that had fallen dead, they found another freshly killed lying alongside. It was an extraordinary fluke, of course, but I believe it occurred.\*

#### THE TAPIR (*Tapirus indicus*).

It is odd that this pachyderm should be found only in Malaya and the Tenasserim Provinces in Asia, and again in South America. There is very little difference in the two, the Asiatic being somewhat the larger. They inhabit the inmost recesses of the densest forests, and are nocturnal in their habits. They possess short and movable trunks, by which they convey their food into their mouths. They have no mane, and the general colour of the hair is black. There is a white patch on the back and rump, and the sides of the belly are also white. They are easily tamed, and become as familiar as a dog. They possess immense strength, and although they can force their way through any forest, they yet have regular tracks which they follow, and which lead to a considerable number of them being shot, as skikaries lie in wait for them. The hides are valuable, and the natives like the flesh. They, like Rhinoceroses, must have marshy land handy to retire to; they swim and dive well, and are harmless, unless wounded and cornered, when they show fight. At times the people imitate their cry, and as they approach kill them.

#### THE PIGMY HOG (*Sus salvanius*).

In the vast dooars lying at the foot of the Bhootan range I have often put up small sounders of what I took to be young porkers deprived of their parents, and having to shift for themselves; so I never molested them. But on one occasion I had to go into Bagh dooar, at the embouchure of the Manass River, late

\* Mr. Chanler, in his 'Through Jungle and Desert,' records that his comrade Von Hohnel shot two Rhinoceroses dead with one ball from a Männlicher 25-bore rifle!



in the season ; the freshets had already commenced, and I had great difficulty in crossing the river. All the islands were not submerged, and as Deer abounded, and I wanted meat for my numerous followers, I set to work to slay them. Seeing some of these small Pigs, and noticing that one about the size of a large Hare was inclined to be pugnacious, I thought I would like a sucking pig for myself, and shot it. My delight may be imagined when I found it to be a Pigmy Boar. I tried to obtain others, but failed. When young these animals are striped like the young of the Wild Pig. The males continue with the sounders, and are their resolute defenders.

## SOME NOTES ON THE STALK-EYED CRUSTACEA OF GREAT YARMOUTH.

BY ARTHUR PATTERSON.

THE same remarks which have in a previous contribution been applied to the Fishes\* hold good in relation to the Crustacea, as far as unsuitability of the tides, &c., to their habits are concerned—"the seaboard in the more immediate neighbourhood of Great Yarmouth is not, in my estimation, favourable, . . . the flat, sandy, shifting nature of the bottom affording but little shelter, although in the finer months it abounds in (*certain*) Crustacea and Entomostraca." With the exception of these common species which, in individual numbers, may be termed "legion," the search for rare and curious forms proves a very unsatisfactory one, an almost entire absence of seaweeds, and no rocky bottom at all, denying harbour (or shelter), while other conditions that appear to be necessary to the welfare of the family are also absent. Such a comparatively barren field has found few, if any, local workers interested in this particular branch of zoological research. The Pagets referred to this when cursorily noticing the Mollusca and Crustacea †—"Excellent opportunities would be found for pursuing the study of a portion of a most extensive class hitherto entirely neglected here, and which do not seem to have received nearly the attention which they deserve in any part of the kingdom: these are the *Mollusca*, or shells, and the *Crustacea* of our coasts, in which there is a most wide and unbeaten field of interest."

It was in 1889 that I first commenced recording such Stalk-eyed Crustaceans as came to hand, and till then not a list had been made. It was to the shrimpers my thoughts naturally turned, for no better allies could be found, if they could only be

\* "The Marine and Fresh-water Fishes of Great Yarmouth and its neighbouring Coasts, Rivers, and Broads," 'The Zoologist,' 1897, pp. 539-567.

† 'Sketch of the Natural History of Yarmouth and its Neighbourhood,' by C. J. & James Paget, 1834; introduction, p. xvi.

sufficiently interested in the subject as they had been in the matter of fishes; although without a doubt it was the chances of earning a little spending money that induced them rather than any other. Certain circumstances (chiefly in connection with the vulgar "struggle for existence") drew me away from the pursuit of the Crustaceans after 1892, or the list might have been more extensive. I am hoping in 1898 to again pursue the subject in conjunction with the *Sessile-eyed* Crustaceans. Remarkably few specimens, alive or dead, have turned up at the high-water mark, or had they, the Sandhoppers (*Talitrus locusta*), which abound in the tidal refuse, had made short work of them. The eighty shrimp-boats, each carrying twelve-foot-beamed dredges, covering when in action and working several hours daily a net-frontage of nearly 700 yards, are responsible for the majority of the "finds" here recorded. And it will be a matter for surprise that the list is such a small one, seeing that the myriads of sizeable Shrimps and Æsop's Prawns have each to pass through the shrimpers' fingers; the smaller are, however, riddled back into the water before sorting.

The numbers of the commoner species frequenting the roadstead must be prodigious. Shrimping begins with the first open days of spring, and ends in September or early in October, when some of the men find employment in malshouses or on the Fish-wharf. Day after day good catches generally are made. In March, half a peck is thought an average catch. These are "Brown" Shrimps (*Crangon vulgaris*). I have counted at that season 400 Shrimps to the pint. They run larger in the finer months, and a dozen pecks is a frequent "take." In summer the "Pink" Shrimps or Æsop's Prawns (*Pandalus annulicornis*) come into the shallows and are more eagerly sought. On certain bottoms, known as the "rough grounds," also as "pink grounds," the shrimpers meet more abundantly with the species; this rough bottom appears to be hard chalky ground, with Fuci and colonies of *Sabella* and allied forms, which latter, the shrimpers affirm, are a favourite food of the "pinks."

Fishes of all kinds devour myriads of Shrimps: Pogges, Bullheads, Weevers, and many others, being often surcharged with them; even the Gobies are sometimes found quite obese, having swallowed Shrimps apparently half as big as themselves.

The above remarks apply more particularly to the smaller MACRURA.

The BRACHYURA and ANOMURA are represented chiefly by a few small resident but interesting species; *Cancer pagurus* and one or two others are simply wanderers, drifted hither involuntarily by the action of the tides, although Cromer, not more than forty miles northward, is noted for the abundance of the Edible Crab. That it occurs occasionally and unwillingly is not to be wondered at, when, during severe north-westerly winds, weighted crab-pots have been found washed up on our beach.

The only local nets used in the capture of Crustacea are the dredge or drag-net, and the small trawl. The former has a half-oval mouth, a long thin willow pole being bent over a heavily lead- or iron-weighted beam. The net, which has a small mesh, is cone-shaped, ending in an acute angle. The trawl has a fourteen or fifteen feet beam, with all the usual fittings incidental to the ordinary smack's trawl, the mesh being, of course, sufficiently fine to keep within it Shrimps of edible size. In this a few Soles, small *Rays*, and other fish are sometimes taken. The drag-net is responsible for very little damage, if any, to the edible species; a few immature fish are occasionally taken, although Gobies, Pogges, and other—even for bait—useless species are abundantly netted. It is to be hoped that no harassing legislation will ever be made to hamper a very hard-working body of men who do surprisingly little damage, indeed, if any at all, to the undoubtedly diminishing edible fishes of the North Sea. The "shove-net" has become obsolete.

I have had some difficulty in identifying the various species, there being no very modern popular work on the subject, nor indeed any reference book on the subject in the local libraries, which goes for saying there has been no "call" for one. My best thanks are due to Mr. H. D. Geldart, of Norwich, for help rendered in naming difficult "finds" forwarded to him from time to time; and also to Mr. Liffen, an intelligent local shrimper, who has been particularly helpful in the procurement of specimens both of Crustacea and Fish.

The following abbreviations will denote the position each species holds in the locality:—R. Rare. F. Frequent. C. Common. A. Abundant.

*Stenorhynchus rostratus*. Beaked Spider Crab. C.—Taken in shrimp-nets.

*S. tenuirostris*. Slender-beaked Spider Crab. C.—A common take in the shrimpers' nets all the summer.

*Lithodes maia*. Thornback Crab. R.—Known to fishermen as "Camperdown Pilots." Most of those seen in fish-shops are brought from the west coast, or from the other side of the German Ocean. Trawlers only bring it in as a kind of curiosity. The dried shell is frequently seen in local fish-shops as a window attraction. Is never eaten here. It has been dredged up in the neighbourhood.

*Hyas araneus*. Harper Crab. C.—Frequent on the beach in winter time; numbers sometimes washed ashore in frosty weather, when it is seen feebly struggling, not uncommonly on its back, and often heavily berried. Is not at all common in the warmer months. I have frequently found freshly-moulted examples on the sands.

*H. coarctatus*. F.—Occasionally washed up on the beach.

*Eurynome aspera*. R.—The only record I have of this species is one taken out of what I am assured was a locally-taken cod-fish, Oct. 7th, 1889. It was in company with *Portumnus variegatus*.

*Pirimela denticulata*. Toothed Crab. F.—This pretty little Crab appears to be fairly common, its small size, grey hues, and retiring habits shielding it from casual observation. I first met the species Oct. 9th, 1889. Several times since found on the piles, and amongst seaweed.

*Pilumnus hirtellus*. Hairy Crab. R.—As a rule this species, I think, merits the title of a rarity. It is seldom found in perfect condition. On Nov. 25th, 1892, I picked up half a dozen on the north beach within the space of a few yards. They had evidently been brought hither from the rough ground at Cromer by strong tides.

*Cancer pagurus*. Edible Crab. F.—There is no harbour within my "ten mile limit" for this species. Those found occasionally are undoubtedly driven hither by the strong sea currents following north-westerly gales. Have occasionally found small specimens amongst the drift at the high-water mark. By chance a fine example is taken in the shrimp-nets; on one

occasion I saw a huge fellow entangled in a draw-net. It had killed a large Sole, and was still holding it with vicious grip. Cromer, forty miles northward, with its stony bottom, is a favourite rendezvous of this species. An example weighing  $2\frac{1}{2}$  lb. was taken on a line off Britannia Pier. An illustration of an abnormal development in the pincer-claw of one of the Crabs was given in 'The Zoologist' of last year (p. 340).

*Portumnus depurator*. Swimming Crab. C.—In the warmer months this voracious species is found most abundantly off this coast. It is a most troublesome take both in the draw and shrimp-nets. In the former it becomes woefully entangled; in the takes of the latter it is a most unwelcome intruder, being eager and alert to nip the fingers deftly sorting over the catches of more valuable crustaceans. I have on occasions observed this species swimming near the surface upon the flood-tide up the Bure.

*P. variegatus*. Pennant's Swimming Crab. R.—I have met with but very few specimens of this Crab; have taken it from a Cod's maw, and on one or two occasions found examples at the tide-mark.

*Carcinus mænas*. Shore Crab. A.—Locally known as "Sea-Sammy." This species is most abundant, even extending its travels to the fresher waters up-river. On one occasion I knew one solitary fellow who lived fairly comfortably in a marsh-ditch not far from the Bure. He was an exceedingly interesting little fellow to watch in his strange quarters. Every Yarmouth boy knows and delights in hunting this species, using any vile animal substance as a bait that may be picked up in the gutter on the way to the river. Not a few children's lives have been sacrificed to their love of the sport. As the "green" Shore Crab the name is ambiguous, for highly coloured red examples are as common as those with green-tinted carapaces. No use is locally made of *Carcinus*, who, however, is a most useful little creature at home, making sepulchre for the many carcasses of animals and birds, e.g. cats, pigeons, fish refuse, &c., that would otherwise in the neighbourhood become a decided nuisance. In turn this Crab is provokingly fond of the tempting morsels used by salt-water anglers, on Breydon especially. Myriads of small ones are devoured yearly by Gulls, Herons, and other birds; and Codlings

taken on Breydon and in the river are often found packed with them. Eels and Flounders are partial to them also. Mr. Geldart informs me that at Cromer there are sometimes very highly coloured specimens with blue and yellow tints. He has also seen them there measuring as much as six or seven inches across the larger diameter of the shell.

*Pinnotheres veterum*. Pea Crab. C.—Found in locally-taken Mussels, and in Oysters. I discovered a very large one in an American Oyster; it had a narrow escape. Have found this species in the Sole.

*Corystes cassivelaunus*. Masked Crab. R.—The first specimen I met with was from the maw of a Haddock caught off the Norfolk coast. It was a female. Found a fine male example in a freshly-taken Cod on Oct. 25th, 1889. Two or three on the shore since that date, both male and female.

*Pagurus Bernhardus*. Soldier Crab. C.—A very frequent take both in shrimp and draw-nets in the summer months. I have seen *Pagurus* frequenting all kinds of shells, but have never yet been able to determine any other of the seven reputed British species. Cods taken off the coast are frequently full of shell-less Soldier Crabs. I am of opinion the shell is thrown up again as soon as the tenant is dead and unattached. I never yet found Whelk-shells in a Cod-fish, which appears to me to be rather strange. Have met with many of this species stranded on the beach, but never saw one make any attempt to reach the water again, if only a few feet separated them.

*Galathea squamifera*. Montagu's Plated Lobster. F.—Known locally as "Philadelphias," this species is occasionally taken with Shrimps. Becomes more abundant further northward of the county.

*Porcellana longicornis*. Porcelain Crab. R.—Somewhat rare, although common at Cromer. Have met with examples occasionally washed up on the north beach.

[*Palinuris vulgaris*. Spiny Lobster. (?).—Have occasionally seen examples of this crustacean both at Yarmouth and Lowestoft. Have not known it actually taken locally, although brought in by local smacks. Those exhibited were probably from the west coast of England.]

*Homarus vulgaris*. Lobster. R.—In the immediate locality

the Lobster is by no means common, although some miles northward, and again in the vicinity of Lowestoft, it is a not uncommon take. Have occasionally seen fair-sized specimens brought in by shrimpers. Two, one a very fine one, captured in the Roads in one net, June 15th, 1897. Enormous specimens are occasionally landed from fishing smacks, covered with barnacles and zoophytes. A specimen weighing  $10\frac{1}{2}$  lb. is preserved in the town. Boxes of Lobsters, covered with *Fucus serratus*, sent by rail from Cromer are sold on the fish-wharf.

*Nephrops norvegicus*. Norway Lobster. A.—I am inclined to give this species a *locus standi*, having met with examples “almost alive” in the stomachs of locally-taken Cods. The digestion of Crustacea takes place most rapidly in the Cod’s maw, the extremities becoming dissolved and gelatinous in a marvelously short space of time. The finding of perfect untouched examples is pretty fair proof of the recent capture of both devourer and victim. Very rarely does this species appear on our fishmongers’ slabs, so that as an article of food it is not generally known. It becomes frequent “nor’ard of the Dogger.” I have not yet secured a specimen from the shrimpers.

*Crangon vulgaris*. Sand Shrimp. A. — Literally teems on the coast; most abundant in summer time. Very large specimens appear to frequent the shallow waters, as may be seen in



the one or two solitary shove-nets now rarely used from the shore. With *Pandalus annulicornis* it gives a living to a large number of “catchers” and their families, and provides food for multitudes of shore-loving fishes. Is found near shore, even in winter, although it is a rare thing for a “catcher” to go out



winter. Locally known as "Brown" Shrimp. I met with a curious example on Sept. 9th, 1891. The carapace was brown, the "body" or tail portion being milk-white;\* and I previously saw one, after boiling, which was an ivory-white all over.

*C. fasciatus*. Banded Shrimp. R.—Have had a few brought me occasionally in April and May. It may not be so rare as supposed, owing to the ease with which it may be riddled through the sieve back again into the water.

*C. trispinosus*. Three-spined Shrimp. F.—Occurs in some numbers, but not often in sufficient abundance to make its sorting out remunerative. Hence it is generally mixed in with the "brown" Shrimps. It is superior in flavour to the "pink" or "brown" Shrimps. Commonest in August. Local, "Yellow" Shrimp.

*Nika edulis*. R.—Rarely noticed by the shrimpers, of whom I have had a few examples from time to time. They know it as the "green" Shrimp, owing to the green patch usually seen under the semi-transparent carapace. Several turned up in May, 1889.

*N. Couchii*. R.—I have but once met with this species.

*Hippolyte varians*. R.—This small Prawn is known to the shrimpers by the title of "Little Shrimp."

*H. Cranchii*. R.—Met with but once, viz. on May 29th, 1891.

*Pandalus annulicornis*. Æsop's Prawn. A.—Local, "Pink Shrimp" (*vide* remarks in introduction). Is a very vile feeder, but of delicate flavour itself. Dies almost immediately it is taken out of the water. When freshly taken its hues are decidedly pinkish, the colour deepening by the process of boiling. Sometimes exceedingly highly-coloured specimens are taken. Larger catches of this species than of *Crangon vulgaris* constitute the takes of local shrimpers during the summer months. A good and profitable average catch is from eight to ten pecks. Twenty pecks have been taken in a tide, but a glut always proves anything but welcome from a financial point of view. I have frequently found this species with a parasite attached to the abdomen under the first ring. Mr. Geldart refers it to *Phryxus*

\* The figure is from a rough drawing made by Mr. Patterson, designed only to show varietal coloration, and not to be commended for structural accuracy. The drawing has been photographed as received.—ED.

*abdominalis*. The female is most commonly found, and has much resemblance to a minute octopod.

*Palæmon serratus*. Prawn. R.—Locally is extremely rare; the news of the capture of one by a shrimper becomes quite an item of conversation amongst the fraternity. Only comparatively small examples are taken.

*P. squilla*. White Prawn. F.—This fine sturdy species is not an infrequent take in the trawls occasionally used on Breydon.\* This Prawn appears to prefer a muddy habitat. It is seldom taken offshore. Local, "Breydon Shrimp."

*P. varians*. Ditch Prawn. A.—Known locally as the "Fresh-water Shrimp," which is erroneous, *Gammarus pulex* being a sessile-eyed crustacean, equally abundant. Abounds in all the ditches which traverse the marshes abutting on the valleys of the Waveney and Bure. This species is exceedingly interesting to watch both in its native haunts and in captivity. It is impossible to secure one by hand, even when a number are "skirring" over the fingers held under water. I have been much amused watching Sticklebacks endeavouring to dislodge these Prawns from favourite corners in an aquarium. This species makes a killing perch-bait.

*Mysis chamæleon*. Opossum Shrimp. A.—The salt water in the warmer months teems with myriads of this species. The margins of the rivers, if examined very closely, will be seen to be simply full of them. They are the favourite food of many round fishes; I have examined young Herrings running from three to six inches in length, finding them well filled with *Mysis*. On one occasion I dissected a stranded six-inch Herring, whose maw contained 143 Opossum Shrimps. It is amusing to observe Flounders gliding along the shallows into the midst of a shoal of these, and to see the latter spring out from the water at their pursuers' rushes, like a swarm of Lilliputian flying fishes. Around piles these Shrimps may be seen swimming and darting in a perpendicular attitude.

*M. vulgaris*. "Opossum Shrimp." A.—This also occurs.

\* Only two or three worn-out shrimp-boats are used for this purpose; eel-pouts are sought for to be sent away to the crabbers for bait. Flounders and other fish are occasionally taken, and also some numbers of this species of Crustacea.

## NOTES AND QUERIES.

## MAMMALIA.

## CARNIVORA.

Stoats (*Mustela erminea*) turning White in Winter.—A few days before reading Mr. Barrett-Hamilton's note on this subject (*ante*, p. 122), my keeper told me that he had seen a white Stoat two or three times lately—that is, between the middle of February and the second week in March—in one of my coverts, but had not succeeded in procuring it. Yesterday (March 22nd) I saw several others, lately killed, some of which were almost all white, and some brown and white, in the shop of Mr. Travis, Bury St. Edmunds, who informed me that, notwithstanding the exceptionally mild winter, he had received more white Stoats this season for preservation than usual. There has been no snow worth mentioning in this neighbourhood the whole winter, and it is evident therefore that they turn white in mild as well as in severe winters, a fact I was not aware of before. It seems curious also that such a small percentage of them turn white. One would imagine that if some changed colour all would do so, but that certainly is not the case, as most of the Stoats observed in the eastern and southern counties of England, so far as my experience goes, do not undergo this change; and, although many are killed here all through the winter, it is seldom we get a white or even partially white one. If I do get one I will certainly forward it to the Natural History Museum, South Kensington, as requested.—E. A. BUTLER (Brettenham Park, Ipswich).

Stoats turning White in Winter.—In reply to Mr. Barrett-Hamilton's query *re* Stoats turning white during the recent mild winter, I may state that I had one brought to me on Dec. 17th last, which was a very good white colour all over, excepting the top of the head, which was of the normal hue. The tip of the tail was, as usual, black. I noticed that the white hairs were longer and thicker than the brown ones, a peculiarity which I have noticed before in other specimens.—W. G. CLARKE (44, Huntriss Row, Scarborough).

## AVES.

Water Pipit in Carnarvonshire.—On Dec. 3rd, 1897, I observed two Pipits feeding on a piece of mud on the Carnarvonshire side of the river Glaslyn. While examining them with my glass they both rose, one flying out of sight, the other alighting on an alder bush close by, from which I

shot it. It proved to be an immature example of the Water Pipit (*Anthus spipoletta*), and was exhibited by Mr. Howard Saunders at a meeting of the British Ornithologists' Club on Jan. 19th last.—G. H. CATON HAIGH (Penrhyndeudraeth, Merionethshire, North Wales).

“Horse-match,” a name for the Red-backed Shrike.—One of the least-known local English names of the Red-backed Shrike (*Lanius collurio*) is “Horse-match.” The “match” is clearly closely connected with one of the names of the Wheatear, although possibly it may not be cognate with it. A German name for the Wheatear is “Steinschmatzer,” and we have the same name in use among early English authors, *viz.* “Fallow Smich”; Merrett (1667) indeed goes closer still to it with “Smatch.” “Steinschmatzer” is of course rendered by the English name “Stone Chacker.” The Shrike may have been called a “match” from its resemblance to the Wheatear in the matter of a conspicuous tail and tail movement; or it may have been so called because it also has a loud chacking note. The prefix “Horse,” I believe, often merely signifies a larger or a coarser sort of a particular thing. In this case it might allude to the fact that the Shrike appears considerably larger than the ordinary “Smatch,” although there is actually only about an inch difference in the length of the two birds. It would be interesting to know in what parts of England this curious name is in use. Personally, I have only met with it on the borders of Oxfordshire and South Northamptonshire; but a correspondent informed me that it is used in South Warwickshire, which is, however, practically the same district.—O. V. APLIN (Bloxham, Oxon).

Hawfinch near Reigate Railway Station.—I observed a Hawfinch (*Coccothraustes coccothraustes*) to-day (March 1st, 1898) in the kitchen garden of a villa not three hundred yards away from Reigate Station, South Eastern Railway. If one escaped from confinement it at least appeared to have full use of its wings, &c. It is generally considered a shy bird, although bold enough in its attacks on green peas.—ALFRED T. COMBER (2, Worcester Terrace, Reigate, Surrey).

Hybrid Finches at the Crystal Palace Show.—There was a remarkable exhibition of hybrid British Finches at the show held last February at the Crystal Palace, no fewer than thirty birds being figured in the catalogue. The exhibits included such rare hybrids as the Siskin and Greenfinch and the Linnet and Redpoll, and also a most beautiful series of crosses between the Goldfinch and Bullfinch. This cross has never, I believe, occurred in a wild state, but is the most popular of all with breeders for exhibition. Descriptions in catalogues are often very loose, and there is no doubt that exhibitors sometimes erroneously describe hybrids of which the male parent is a Goldfinch as crosses between the “Bullfinch and Goldfinch.” Some

birds were so described in the show in question, but the male parent in each case was probably the Goldfinch. A correspondent, who has had long experience as a breeder, judge, and exhibitor, assures me that he has never known an authentic case of any cross bred from a cock Bullfinch. I have seen a large number of hybrid Finches, and have on many occasions examined birds described as crosses between "Bullfinch and Goldfinch," "Bullfinch and Linnet," and (occasionally) "Bullfinch and Redpoll" and "Bullfinch and Greenfinch"; but it is just possible that in each of these cases the order in which the parents' names were given should have been reversed. If it be the fact that no hybrids have been raised from the cock Bullfinch, it is very curious. Further information would be interesting.—A. HOLTE MACPHERSON (51, Gloucester Terrace, Hyde Park).

Chickens reared by Partridges. — On a farm in this parish two chickens were last summer hatched by Partridges, a hen from the farmyard having no doubt laid in their nest. The chickens, which were both pullets, throve well, and were reared to maturity, growing into big lusty birds; but, as might be expected, were as wild as the Partridges with which they lived. This interesting family were in the habit of frequenting some low-lying meadows adjoining a piece of barley. On the first occasion of my meeting with them I was much puzzled by seeing out in the middle of the meadow, which was at some distance from the house, two big dark-looking birds, which from their actions were evidently neither Rooks nor Waterhens. From the length of the grass little else could be seen of them but their heads and necks, and their little foster-parents were at first entirely concealed. On seeing me, however, the two big black pullets at once started off running, accompanied by one of the Partridges, which soon outran them, got up, and flew off, the other Partridge having squatted in the grass. The fowls ran at full speed towards a broad ditch full of water, but choked with sedge and other plants, where I lost sight of them. On arriving at the place where they had disappeared, I distinctly heard them in the ditch, apparently about the middle, but could do nothing towards rescuing them. The broken-down sedges, however, afforded them, no doubt, sufficient support to prevent their drowning. Usually, when disturbed on the open meadows, the whole family would get up and fly into the middle of the barley. These wild-reared pullets seemed to be decidedly stronger on the wing, and able to take longer flights than would have been the case if reared in the ordinary way.—G. T. ROPE (Blaxhall, Suffolk).

Birds which nest in London.—With reference to the article in the January number of the 'Edinburgh Review,' mentioned in 'The Zoologist' (*ante*, p. 91), I observe the writer divides London birds into three classes: (1) casual stragglers, (2) regular birds of passage, (3) birds nesting in

London, which is defined as being within four miles of Charing Cross. As to the first two classes, I have nothing to say, and it would be difficult to add to Dr. Hamilton's list (Zool. 1879, p. 273). The third class includes the names of twenty-six species, and I am curious to know whether readers of 'The Zoologist' can confirm these or add to them. The list is most interesting:—

Thrush (*Turdus musicus*); Blackbird (*T. merula*); Redbreast (*Erithacus rubecula*); Hedgesparrow (*Accentor modularis*). These four species nest in all the parks.

Whitethroat (*Sylvia cinerea*). Said to have nested for some years in Battersea Park.

Sedge Warbler (*Acrocephalus phragmitis*). Said to have "recently" nested by the Serpentine. I cannot help wondering how long ago this was.

Reed Warbler (*A. streperus*). Said to have nested in the Botanic Gardens. I should be curious to know the last occasion it did so.

Great Tit (*Parus major*); Coal Tit (*P. ater*); Blue Tit (*P. cæruleus*); Wren (*Troglodytes parvulus*); Starling (*Sturnus vulgaris*); Jackdaw (*Corvus monedula*).

Crow (*C. corone*). I fear this species runs some risk of being destroyed by the park authorities, which surely should be prevented.

Rook (*C. frugilegus*). The writer of the article is wrong in saying there are only three nests left in Gray's Inn. There are many more, but I have not counted them exactly. This is the last London rookery, and I think only continues because the Rooks are regularly fed. When did the Rooks desert Holland House?

Flycatcher (*Muscicapa grisola*).

Swallow (*Hirundo rustica*). Nests in Battersea Park, but there must be other places within four miles of Charing Cross.

Martin (*Chelidon urbica*). I never saw a nest in London that I can remember.

Greenfinch (*Ligurinus chloris*). Said still to nest in Battersea Park.

Sparrow (*Passer domesticus*); Chaffinch (*Fringilla cælebs*),

Cuckoo (*Cuculus canorus*). I heard a Cuckoo in the Temple Gardens about 8 a.m. last April. It is said a Cuckoo deposited her egg in the Whitethroat's nest at Battersea a year or two ago.

Wild Duck (*Anas boscas*). I question whether there are any genuinely wild specimens on the London waters.

Wood Pigeon (*Columba palumbus*). One has been sitting since the last week of February on a nest in a plane tree in Fountain Court, Temple. No explanation seems ever to have been given to account for the strange increase of Wood Pigeons in London.

Moorhen (*Gallinula chloropus*).

Dabchick (*Podiceps fluviatilis*). St. James's Park.—C. MEADE KING (3, Harcourt Buildings, Temple).

## PISCES.

Yarrell's Blenny and the Two-spotted Goby at Scarborough.—While poking about in the rock-pools in the South Bay, Scarborough, last July, I captured two small fishes, with which I was unacquainted, I sent them to Dr. Günther, who kindly named them for me as Yarrell's Blenny (*Carelophus ascanii*), and the Two-spotted Goby (*Gobius ruthensparri*). Both species, he says, are not very common, and are somewhat local. Since then I have seen two other specimens of the former, but have not succeeded in finding any more of the latter.—W. G. CLARKE (44, Huntriss Row, Scarborough).

## MOLLUSCA.

Abnormal Scalariformity in Shells.—In August, 1893, whilst examining the dykes at Pevensey, I came to a spot where the weeds were particularly dense, and here met with an irregularly scalariform shell (immature) of *Planorbis complanatus*, and another regularly scalariform specimen of *P. vortex* var. *compressa* (Mich.), both being dead shells. Having examined these closely, and mentally ruminated as to the probable cause of this kind of deformity, I drew a decided conclusion that the animal from some cause or other—possibly a deformity or a wart at the back of the head—was induced to direct the head downwards, in which case the shell-whorls would be formed at an angle. Being impressed with this idea, and hoping to obtain a living specimen, I went again to the same place, and obtained another similar specimen of *P. complanatus*, alive. On examining it with a one-inch objective (which I always use as a pocket-lens), I saw distinctly several minute white worms attached exactly where I had expected to find the *causa mali*, that is to say, on the head between and around the tentacles. They attached themselves by the hinder portion of their bodies, the front part being free and waving about, as if on the look-out for anything in the shape of food. The action was exactly similar to that of a caterpillar, and they looped their bodies similarly also. The lip of the shell evidently formed a capital shelter, from under which they could protrude or withdraw their bodies. On examining one of the worms under the microscope—for they were rather minute, perhaps a line or so in length—I found that the setæ were placed more on the ventral surface than usual, and that they occupied only the posterior half of the animal, with the exception of a pair of oral tufts, which were directed forward. There were some seven pairs of bristle-tufts in the hind portion of the body, and an average of ten bristles in each tuft, making 140 bristles in all. With a quarter-inch objective it could be seen that each bristle was terminated by a double hook

or grappling-iron, and when in the act of gripping the tufts expanded like a hand. It was evident therefore that these worms were specially adapted for clinging firmly to their host, and I found it rather difficult to detach them; but with the assistance of a friend, who is rather clever in manipulating for the microscope, I managed to get one mounted. The head of the worm, I noticed, was ciliated, and there were from four to six worms on this specimen, if I remember correctly. I omitted to make a note of it, although on others I found fully six worms.

The conclusion one would naturally draw from the above facts is, I think, that the irritation produced by several of such worms, or possibly the desire of the mollusc to accommodate them, is sufficient to account for the depression of the head and the consequent distortion of the shell. On examining two normally formed specimens of *Planorbis complanatus*, I found that one carried worms and that the other did not. It does not, however, follow that because one animal carried worms and had a normal shell, that therefore my theory will not hold good, since the worms might have only recently attached themselves, and the amount of irritation would naturally be proportionate to the number of worms. I may here mention that the *Planorbis* was only half-grown, and that the head and tentacles were strongly ciliated. It may be that the worms derived some advantage from this circumstance, since in very stagnant water the currents set up would bring both food and oxygen. But I imagine that the main benefit derived would be from the fact of being transported about, and that from a position of great security. Under irritation the worms evinced an uncontrollable desire to divide. This operation was performed once, and almost a second time. A constriction took place at a certain point in the body, and gradually became more and more pronounced. Then the body from time to time gave some spasmodic twitches and bent upon itself at the constricted point. A few more spasmodic twitches followed, and the trick was done.

From the facts here stated I think a fairly good *prima facie* case is made out, and if other observers who happen to meet with scalariform Helices, &c., would examine the head closely, they would most likely find some irritating parasite to account for the abnormality.

On mentioning the above circumstances to a gentleman at South Kensington Museum, he cited the case of a scalariform *Turritella*, which when found had on its head a parasitic crustacean. The name of the worm above alluded to is *Chatogaster limnæi*, Von Baer. — P. RUFFORD (The Croft, Hastings).





# THE ZOOLOGIST

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## STOATS TURNING WHITE IN WINTER.

BY O. V. APLIN, F.L.S., M.B.O.U.

ON February 3rd, 1898, I examined a female Stoat in the flesh, which had been killed in this neighbourhood\* the day before, and was nearly white. That is to say, it was white, with the exception of the crown of the head, a space round the eyes, and a stripe down the back of the neck—the black part of the tail of course excepted. It closely resembled one figured in 'The Field,' February 20th, 1897. As long ago as 1884 I called attention in 'The Zoologist' to the fact that Stoats turned white in mild winters, with reference to that of 1883-4 (*Zool.* 1884, p. 112). I then mentioned an example killed on January 19th, 1884, which was white, with the exception of a (chance) narrow light brown mark on the near fore leg. Also another, white, save for a dark patch on the crown of the head. The change is not universal in all the individual Stoats in a given locality. For on the day I handled the above-mentioned white one (four days after it was captured) I saw a specimen in the flesh which did not show a sign of white on the upper parts. In the winter of 1895-6 I received information of two partly white Stoats, one pied, the other white, with the exception of the head. In the mild winter of 1881-2 I observed that the change took place in some examples. But white, or partly white, Stoats are naturally far more common in severe winters. After the hard winter of 1890-1, I saw and

\* Bloxham, Oxon.

heard of a great many. Few reach the birdstuffers until *after* the severe weather, for Ermine Stoats escape notice until after the snow is gone, when they become very conspicuous.

An interesting question is—Would a Stoat turn white in a winter in which absolutely no cold weather (say, nothing below 30°) occurred? It is worth remembering that during this mild season of 1897-8 we had a few days of sharp frost in the latter end of December, with a good deal of white rimy frost. On two nights I registered 22° at four feet from the ground on a north wall, and on four days it froze all day on the ground in the shade.

The change to ermine dress is produced by the white of the belly extending up the sides of the body and over the limbs, until only the top of the head and a band down the middle of the back remain brown. The white then spreads across the lower part of the back (leaving for a time, in some cases, a detached portion of brown near the root of the tail); the spinal line becomes gradually shorter and narrower, and at last disappears. Meanwhile the white on the head has increased, the ears and the region about them have become white, and a space round the eyes and a patch on the top of the head alone remain brown. The latter disappears, and the patches about the eyes decrease, until only a narrow ring of brown round each eye is left. This is actually the last part to turn white. Stoats in this condition have a "spectacled" appearance; I have handled several. One was caught at the end of February or beginning of March, 1891, and another on March 5th, 1894.

In 'The Zoologist' for 1888, p. 140, I published some observations which pointed to the fact that the change from white to brown was effected by a change of colour in the fur, and not by a change or moult of the hairs; and that the change began at the tip and not at the base of the hairs. I believe that the change from brown to white is also effected by a change in colour of the hairs, and not by a change in the coat. A change of coat in severe weather would be inconvenient for the animal.

## NOTES ON THE BREEDING OF THE CHAFFINCH.

BY CHARLES A. WITCHELL.

SOME years ago, a friend who had bred many hybrid Finches of different kinds told me that hybrids could not be obtained from the Chaffinch, because that bird would not breed in confinement, a flight being necessary for the union of the sexes. This information, and the frequent exhibition of a swooping flight by a pair of Chaffinches, led me to conclude that the swooping flight might be really necessary to the breeding of the Chaffinch; and it may be mentioned that Mr. W. H. Vale, in his 'Handbook of Hybrid Birds' (1896), records that he has not been able to find an authentic instance of a Chaffinch mule.

My present purpose is to offer some remarks on the question whether a love-flight is necessary to the Chaffinch. By "love-flight" I do not mean the common straight Cuckoo-like flight of the male when he is leading a female from tree to tree, and flying with a constant and even succession of wing-beats; but I mean the swooping flight performed by both birds together, in which they are very near each other, if not actually in contact.

During this swooping, the birds always utter the call-note which they particularly address to each other and to their young. It is a little soft sound, something like "chirri" pronounced very rapidly. In April and May this note may be constantly heard. But during the love-flight another sound is sometimes uttered, and this deserves very close attention. Perhaps the simplest mode of describing it will be to give a few instances of its occurrence.

On April 5th, 1896, a pair of Chaffinches near each other in an Austrian pine in a garden at Stroud, in which tree the species nests nearly every season, were uttering the love-call, "chirri." They suddenly darted forth and swooped and swerved close together, both of them uttering the call many times; and during the flight the whole song was given by one of the birds (doubtless the male), but in a hurried manner, ending in a very full low rattle, seemingly lower in pitch than the usual termination of the

song. At that moment the birds had descended to within a foot or so of the ground, and were so close together that they seemed almost as one. They did not separate until, after swerving upward, they had again descended and actually entered a thick pink-may bush. Throughout the incident they were never more than twenty yards distant from me.

On April 19th, near New Eltham (Kent), a male and female Chaffinch were uttering their call-note nearly overhead in an oak. They quitted the tree at the same time and swooped close together, passing within two yards of my head, and swerved up again into another tree. They were squeaking their call all the time, and during the flight, but at a moment when the birds were behind me one of them uttered a brief repetition of a full low note, precisely like the low gurgling rattle which was uttered on a similar occasion by the above-mentioned Chaffinch at Stroud.

On April 20th, at a spot a quarter of a mile from the site of what occurred on the 19th (above described), two Chaffinches were calling in an elm tree. The female was shivering her wings and repeating the love-call very rapidly. A few yards distant from her a male was hopping from twig to twig, exclaiming in the same manner. Both birds swooped, and during the flight the low rattling cry was uttered exactly as it was yesterday. The low rattle is not always heard.

On May 11th two Chaffinches swooped downwards together when passing from tree to tree, and during some portion of the descent they were very close together, breast to breast. They were all the time uttering the "chirri" very rapidly. One was certainly a female, and the other seemed to be a male. The foliage interfered with the view.

On May 12th a pair of Chaffinches descended together from the top of an oak, swerved up again nearly to the full height of the tree (forty feet) and descended as before, uttering the call-note all the while.

I have sometimes seen Chaffinches treading in a tree. The male then alights several times in succession on the female, meanwhile uttering the "chirri"; and at the last attempt, when about to quit the female, he utters the low full rattling note above mentioned, and immediately quits her and makes no further attempt for some time. It appears therefore that this full

cry accompanies the act of coition, and, if so, it is important if the note is sometimes heard when the two sexes are swooping together. It seems to imply that coition may actually occur in the air.

The full rattle is also deserving of observation in relation to the song of the bird, for the greater part of the song is of much the same character as this exclamation; and it is probable that if this full sound had been originally employed during coition, it might have been afterwards employed for the purposes of suggestion, and in course of time might have been elaborated into a comparatively long strain. I venture to think that ornithologists will allow that I have elsewhere ('*Evolution of Bird-Song*') adduced some reasons for the theory of the development of certain songs (as well as certain alarms) from a repetition of short cries, and the song of the Chaffinch is not without indications of a similar history.

Dr. Butler tells me that the song of the Chaffinch is popularly rendered—

“In another month will come a Wheatear.”

The first few notes never show much variation, and in early spring they may sometimes be heard in the form of mere repetitions of the “chirri.” The middle of the song consists of a rattling repetition of the same character as the full rattle I have just described. The last syllables, “wheatear,” have always seemed to me to be very interesting, as relating the song of the Chaffinch to those of the Greenfinch and Lesser Redpoll. The “wheat” is greatly varied in loudness, and is very often wholly absent, or its place is occupied by a sound like “tissi.”

Near Eltham, in April and May, some of the male Chaffinches have a loud single alarm-cry, “zee,” which can be heard through all the chorus of birds. This note is sometimes given in the song, but only at one particular part. It then takes the place of the hard penultimate note, “wheat,” and whenever given it ends the strain. I called the attention of Mr. A. Holte Macpherson to this note, and he, like myself, had never heard it elsewhere. It seems to me to be a survival from an earlier period. The Chaffinch seems to be losing all trace of this danger-cry, and to be developing instead the full love-rattle. The “chirri,” and the “love-rattle,” and the “zee,” uttered in succession, would constitute an excellent “skeleton” of the Chaffinch’s song, and especially so if the first two cries were each repeated a few times.

## ORNITHOLOGICAL NOTES FROM MID-WALES.

BY J. H. SALTER.

THOUGH rather late to record the fact, it may be worth noting that an unusually large flock of Bar-tailed Godwits visited the estuary of the Dovey about the first week in September, 1895. Mr. F. T. Feilden tells me that on the day of their arrival he walked to within forty yards of them, and that the flock could not have numbered less than two hundred. Later in the day he got a shot at part of them with a four-bore gun, and bagged eleven, and one Curlew Sandpiper; and a few days later a second shot bagged nine, and one Knot. On Dec. 9th of the same year, at Penglais House, I found, amongst various stuffed birds obtained by the late Captain Richards, a local specimen of the Waxwing, and also the only Cardiganshire Dotterel of which I have any knowledge.

Owing to absence from home I have no notes for the spring and summer of 1896. As already recorded, the late September gales of that year brought an unusual visitation of Sabine's Gull. As far as I can learn, eight were obtained in the course of the three days (Sept. 24th-26th). Another was seen on Sunday morning (27th), and the last one was obtained on the morning of Oct. 8th—which will be long remembered here for its gale and high tide—making in all nine taken, ten seen. A young Black Tern and Grey Phalaropes were obtained at the same time.

On Oct. 22nd, 1896, a Chaffinch was singing its imperfect autumn song, which I have very rarely heard, though Mr. O. V. Aplin (*Zool.* 1894, p. 412) states that he hears it every year. On Oct. 30th I listened to the Missel Thrush's autumn song, which I only recollect to have heard upon one previous occasion. Common Buntings and a Cirl Bunting were singing freely upon Christmas Day. The latter, an increasing species here, has sung at intervals all through the past autumn and mild winter.

The remainder of my notes refer to the past year.

On Feb. 16th a Stonechat was coming into song, and on March 13th I heard the Wood Lark. A Dipper was sitting on five eggs, which on March 31st appeared to be within a day or two of hatching, under the archway of a stream between Cemmes Road and Llanbryn-mair. At the same place a Chiffchaff was silently making its way down the valley from willow to willow, confirming my view that many of the migrants reach Cardiganshire by this route—that followed by the Cambrian Railway. In early April I found Buzzards numerous at Dinas Mawddwy. The snow had driven them down to the woods in the vicinity of the hotel. Only one pair of Ravens was seen; they were making over towards Lake Vyrnwy, the Liverpool reservoir, where they were reported to be nesting on the rocks above the lake. Both pairs of Ravens occupied their usual nesting sites upon the coast near Aberystwyth, and on April 28th I found a pair breeding at Craig y Pistyll; young ones could be heard in the nest. A pair of Choughs occupied their usual sea-cave near the Ravens.

On May 12th, a bitterly cold day, I found Curlews sitting upon three and four eggs respectively. On the 14th I noted a pair of Ravens breeding at the lower end of the Nant Berwyn, near Tregaron. They sailed out from the hill-side, coughing and growling till the rocks rang again. On the same day, at Nant y Stalwen, I saw five stalwart young Ravens, fully fledged, strung up against a barbed-wire fence, and on the following day I was offered two young ones which had been taken that morning from the nest at Pwll Uffern. On the 15th I saw a Kite go down the valley; it was sailing almost in Buzzard style, without much flapping. The birds had attempted to nest once more in their favourite tree, and fresh marks of climbing irons indicated that the eggs had been taken, making the fifth year in succession in which they have been obtained from this nest. A dealer visits the district regularly in quest of Kites' eggs, and the extinction of the birds can only be a matter of a year or two. A Tree Creeper's nest close by was lined with Kites' feathers. A Buzzard's nest contained two newly-hatched young, and an egg from which a third one had failed to extricate itself. By way of provision, the nest contained a half-eaten mole. I was told that in every brood of young Buzzards the strongest individual kills

its nest fellows, and in all cases where I have seen young Buzzards in the nest one precocious chick has bullied the other one, or sometimes two, unmercifully. The next day a second Buzzard's nest contained two eggs which were chipping to hatch.

Pied Flycatchers were singing on every hand, and were already building, though, owing to the backward spring, the oak woods were as bare as at mid-winter. I noticed, as on previous occasions, that the Flycatchers were very fond of tenanting a hole which has been previously occupied by the Greater Spotted Woodpecker.

As usual in this hill-district, I found the Wood Warbler very numerous, almost to the exclusion of the Chiffchaff and Willow Warbler. In the Nant Berwyn its note drew my attention to a Lesser Redpoll, a bird which I have long been on the look-out for, but have never previously seen in this county. It must have been breeding.

On May 19th a Buzzard's nest in the neighbourhood of Pont Erwyd contained one egg which looked incubated. On the night of the 20th, which was still and warm, I heard the Manx Shearwater's note about 11 p.m. In Cwm Woods, on the 23rd, I listened to the Golden Oriole's call coming from the tops of the oaks, followed by its harsh note. Both were familiar, as I had heard them daily on the Rhine. The bird was on migration, and must have passed on at once, as I failed to hear it subsequently. I believe this is the first reliable record for the county.

On May 26th I visited the colony of Lesser Black-backed Gulls upon the Teifi Bog, about twelve miles from the sea. Four nests which were found contained three eggs apiece. About thirty of the birds were on the wing. Five Whimbrel were still upon the strand on May 30th; they continue to pass all through the month.

On June 2nd I saw a Buzzard about the rocks at Pistyll y Llyn. I found a few pairs of Redshanks breeding on June 6th at Mochras Island, south of Harlech. A Nightjar was sitting upon two eggs which were laid upon bits of cork and cinder, the flotsam of an unusually high tide in the lagoon. On the following day I noted a family of Ravens about the rocks at Cwm Bychan lake. A Turtle Dove's nest at Llangorwen contained two eggs which were hatching on June 22nd, and I subsequently heard the



note of this bird at Love's Grove; but so scarce is it as a breeding species in Western Wales that, though always on the look-out for the past six years, I had never met with it previously. The Wood Lark sang on Sept. 30th.

On Oct. 2nd I called to see a Kite in the hands of the local birdstuffer. It was said to be an old male, and was, I am afraid, a member of the small and dwindling colony above mentioned. A Kestrel got up hurriedly from the cliff on Oct. 22nd, dropping a half-eaten Thrush as it rose. I have long thought that the Kestrel's misdeeds in this direction are more numerous than is generally supposed. A pair of Choughs, long absent from this immediate neighbourhood, frequented the hill at the northern end of Aberystwyth all through the autumn, apparently for the sake of hunting for beetles amongst the slates and *débris* due to the making of a tramway.

NOTES ON THE HABITS OF SOME OF THE AUSTRALIAN  
MALACOSTRACOUS CRUSTACEA.

BY DAVID G. STEAD.

OF the habits of these animals hitherto very little has been known. In descriptions of *any* animals it always seems to me that an insight into their habits and mode of living is quite, or very nearly, as valuable as the scientific diagnosis; but this is the part that is almost invariably neglected. Indeed, many species have been named from old and faded specimens whose proper habitat was not known. Though this is not intended as a "descriptive" paper, I have thought it advisable to place the species in systematic order. Of course, the species enumerated form but a very small portion of those known, there being about 550 recorded species of the Malacostraca in Australia.

## Order PODOPHTHALMATA.

## Sub-order BRACHYURA.

## Tribe OXYRHYNCHA.

1. *Halimus tumidus* (Dana).—This species lives at a depth of from one to three feet below low-tide mark, where it is to be found on or under stones that are covered with seaweed. It is hardly possible to distinguish it unless it is in motion, as the carapace and ambulatory limbs are covered with seaweed of the same kind as that which surrounds it. The seaweed is held on to the Crab by means of the hooked hairs which cover it. Rather common in Port Jackson.

## Tribe CYCLOMETOPA.

2. *Ozius truncatus* (M.-Edw.).—This is a species which, as will be at once observed by its conformation, is adapted to living amongst loose stones in rocky situations. There are three well-marked varieties; one, the commonest, being an uniform deep red, with black fingers; another a bluish-grey mottled variety; and the other white, which is only found of a small size.

3. *Pseudocarcinus gigas* (M.-Edw.). "The Giant Crab."—As its specific name implies, this is a giant amongst crustaceans, the carapace sometimes reaching a breadth of two feet. On account of the enormous size of the chelæ, it can give a tremendous crush—we cannot call it a "nip"—with those weapons. Its habitat is Bass's Strait, between Tasmania and Victoria, where it lives amongst stones, for which it is well adapted, as, if it kept perfectly still, there would be some difficulty in discriminating between the stones and the Crab. The colour varies from red to yellow, with black fingers.

4. *Pilumnus fissifrons* (Stimps.).—This small species frequents stones, &c. (just below low-tide mark), which are covered with mud and algæ, and is common around the shores of Port Jackson. The carapace being very setose, catches and holds sediment, thus giving the Crab the appearance of a small round protuberance on the stone which it frequents.

5. *Pilumnopeus serratifrons* (Kin.).—Common on rocky shores of Port Jackson and other inlets along the coast of New South Wales, especially in those parts that are covered with small stones, under which they seek concealment. They are subject to a good deal of variation in colour. Length of carapace,  $\frac{3}{4}$  in.; breadth, 1 in. Found along the east coast of Australia, and in New Zealand.

6. *Leptodius exaratus* (M.-Edw.).—May be procured in similar situations to the preceding, but is not very common. The carapace is very flat, and the last pair of ambulatory legs is twisted upwards to enable it to grasp the under surface of stones, under which it has sought refuge. In coloration it varies according to situation, some being white, others mottled, and others quite black.

7. *Neptunus pelagicus* (M.-Edw.).—A species which is very widely diffused, undergoes a good deal of variation, and is very abundant. It is the common Edible Crab of the Sydney fish-market. One peculiarity which I have noticed is that the sexes for the most part of the year live strictly apart. I have seen at one time scores of females with not one male among them, and *vice versâ*. To be quite sure, I enquired of the fishermen whether they put them in separate heaps, but they assured me that they did not. This form is very nearly allied to the *Lupa bellicosa* of America.

8. *Neptunus sanguinolentus* (M.-Edw.).—This species is rather common, and specimens of a small size are extremely abundant. But few of them arrive at a large size. This falling-off, I think, is mainly due to the attacks of its congener the quarrelsome and almost ubiquitous *N. pelagicus*, which species is a great check on the diffusion and growth of very many of the pelagic Crustacea. Not being so good—from an epicurean point of view—as *N. pelagicus*, it is but little sought after. It has an extremely beautiful appearance, the carapace showing iridescent colours, and having on it three spots like drops of blood, surrounded by bluish white rings, one on either side on the epibranchial regions and one almost on the posterior border of the carapace, over the intestinal region. It leads a pelagic life, and is widely disseminated.

9. *Charybdis cruciatus* (Herbst.).—This is, in my opinion, the most beautiful of our Crustacea. When fresh, its rich tints cannot be surpassed by anything in Nature. It may be seen occasionally in company with *N. pelagicus* at the fish-market, but is very uncommon. I have never found it in its young state.

10. *Scylla serrata* (De Haan).—This is the largest Crab to be seen in the Sydney fish-market. Like *N. pelagicus*, it is pelagic, but is not nearly so common. The carapace is generally of a dark green colour. It has a wide distribution, reaching from Japan to Australia. Around the anterior border of the carapace there is a row of sharp conical spines. Any refractory prisoner is quickly put an end to by being pressed against these.

11. *Thalamita sima* (M.-Edw.).—Does not attain a large size, and is essentially pelagic. It is rather common in our bays and harbours. Carapace and chelæ shortly setose, and of a greenish hue.

12. *Thalamita admete* (Herbst.).—This is a very small pelagic Crab. I have observed it in tiny pools in rocky situations at Port Jackson.

13. *Nectocarcinus integrifrons* (M.-Edw.).—Though adapted for a free-swimming existence, this species lives to a great extent on the bottom in shallow water, amongst seaweed. It is not of uncommon occurrence for green *Fucus* to be found growing on its legs and carapace, which are very setose. East coast of Australia and New Zealand.

14. *Platyonychus bipustulatus* (M.-Edw.).—This pelagic spe-

cies is very common in its young state, but a great many must fall a prey to their many enemies, amongst the chief of which may be reckoned *Neptunus pelagicus*, as large ones are of rare occurrence. One that I have procured measures 10 centimetres across the carapace, but specimens of this size are seldom found. It has a wide distribution: East coast of Australia, New Zealand, Japan, and China.

Tribe CATAMETOPIA OR GRAPSOIDEA.

15. *Macrophthalmus setosus* (M.-Edw.). — This species is essentially a burrowing one, frequenting mud-flats. Its burrows may be found here and there among those of *Helæcius cordiformis* (q. v.), but cannot be mistaken for the latter on account of the acute angle it makes with the surface, whereas the burrows of *H. cordiformis* are vertical and smaller. Colour yellowish brown, covered with setæ. Port Jackson, New South Wales. Common.

16. *Helæcius cordiformis* (Dana).—Found in similar situations to the preceding, but is much more common. The mud-flats, where these animals dwell, possess a most animated appearance, and remind the observer very forcibly of a busy city, of which the soldiers are *Mycteris longicarpus* (q. v.) and the civilians *H. cordiformis* (of which there are myriads), and all their little legs moving in concert make quite a great clatter. They are extremely amusing. On anyone approaching they show fight at once, holding up their comparatively large “nippers” as high as they can, so that as they retreat—which they do with their “faces to the foe”—they very often roll over backwards, so eager are they to show their weapons. The very rotund body is of a deep reddish brown colour. New South Wales, Tasmania.

17. *Ocypoda cordimana* (Desm.). — The Crabs of this genus are noted for their extreme swiftness of foot; indeed, they run so fast, and their colour assimilates so well with the sand, that they appear like pieces of cotton-wool or feathers being blown along by the wind. They are found wherever there is a good stretch of sandy beach, in which they make their burrows. These burrows average about 2 ft. in depth. East coast of Australia.

18. *Grapsus variegatus* (Latr.). — This is, without doubt, the dominant species of Crustacea in Australian waters, is distributed over a wide area, and presents great variation. They are found in great numbers all along the rocks at low tide, but scurry off

into the crevices with great rapidity when disturbed. Though not pelagic, their flattened legs enable them to swim very well. They vary in colour from a deep green with faint yellow streaks to a bright yellow and red. Coast of Australia, New Zealand, Norfolk Island, California, and Chili.

19. *Pachygrapsus transversus* (Gibb.). — Inhabits short seaweed about midway between high- and low-tide marks. It is also obtained in crevices of rocks amongst small stones, and amongst sessile ascidians. In appearance it is something like a small specimen of *G. variegatus*, but may be at once distinguished by the bristles which clothe the legs. Port Jackson.

20. *Cyclograpsus Lavauxi* (M. Edw.). — Common round Port Jackson in situations where the shore is covered with clean stones—*i. e.* stones free from algæ and mud—nearly at the limit of high tide. They are very interesting, especially in the operation of disengaging them from your fingers, which is no easy matter if they once get a good grip. The colour is a beautiful red dorsally, with white on the ventral side. Port Jackson.

21. *Chasmagnathus levis* (Dana).—Found as a rule in muddy situations wherever there are stones, under which it burrows. It also avails itself of the burrows made by *Macrophthalmus setosus*. Colour deep brown, dotted on the carapace with yellow. Port Jackson.

22. *Sesarma erythroductyla* (Hess.).—The observer will be at once struck with the great disparity in coloration between the male and female. The female is always a dull brownish colour, while the male exhibits great variation, the carapace being sometimes a brilliant green. The chelæ in both sexes are tipped with red. Common on mud-flats under stones. Port Jackson.

23. *Plagusia chabrui* (Miers). — This species inhabits the short red seaweed which clothes the rocks just below low-tide mark. It is very seldom seen to leave the water of its own accord, but, if it does so, returns almost immediately. It subsists chiefly on vegetable matter (*Fucus* and algæ), but consumes animal matter whenever it is available. The outstretched limbs cover an expanse of about 10 in. The carapace and dorsal aspect of ambulatory limbs are covered with a short dense red pubescence. Widely distributed: Port Jackson, New South Wales; Tasmania, New Zealand, Cape of Good Hope, and Chili.

24. *Plagusia glabra* (Dana).—Rather common along the coast of New South Wales, where it is found in small rock-pools and crevices at low tide. It does not often leave the water, and is essentially a vegetarian. Legs and body are far more rotund than the preceding, and not at all setose. I am without doubt that Milne-Edwards' description of *Heterograpsus octodentatus* has been drawn from the young of this species. There is a great difference between the colour of old and young specimens. Young ones are chiefly of a yellowish tinge, with black spots; while old ones are of a very dark colour, with traces of yellow on the metabranchial regions. They form most handsome objects in the water when the sun is shining on them, showing up their beautiful tints. Port Jackson, New South Wales.

25. *Mycteris longicarpus* (Latr.).—Commonly designated the "Soldier Crab." It is at once a marvellous and strange sight to see thousands of these crustaceans on the low mud-sand-flats, marching about in regular battalions after the tide has ebbed. Scarcely ever is one to be seen singly but it is scurrying off to meet a company; and here and there will be seen an extra large one, acting no doubt as an officer. Their military appearance is considerably heightened by the colours, which are as follows:—branchiostegites dark blue (these being very prominent); remainder of carapace pale blue; legs yellow, with a red band at each joint. Third pair of maxillipedes very large. Port Jackson; Victoria.

26. *Mycteris platycheles* (M.-Edw.).—This species is found in very similar situations to the preceding, but has not so great a propensity for travelling in companies. Port Jackson.

27. *Hymenosoma varium* (Hasw.).—This minute species undergoes a good deal of variation, and inhabits many different situations. Most frequently it is found in short seaweed just below low water, though I have procured it from amongst minute pebbles and from mud. Some specimens are beautifully marked. East coast of Australia, Tasmania, and New Zealand.

#### Sub-order MACRURA.

##### Tribe ANOMALA.

28. *Eupagurus sinuatus* (Stimpson).—This is one of the commonest and most beautiful of our Hermit Crabs, frequenting

rock-pools. In choosing its domicile it seems to have a decided partiality for the shell of *Purpura succincta*. It may often be found in the act of house-hunting, though in general choosing a shell a few sizes too large, so that there is no need to make a change until several ecdyses, or moults, have taken place. Port Jackson, Bondi, New South Wales.

29. *Paguristes barbatus* (Hell.).—Another of the "Hermits"; not so common nor so large as the preceding. I have found it inhabiting the shells of *Purpura succincta*, *Monodon zebra*, and *Neritina punctata*. Port Jackson.

30. *Porcellana dispar* (Stimp.).—This species frequents stones covered with mud and algæ that are found just below low-tide mark. If one of the stones be picked up out of the water these crustaceans will not, at first, be observed, as they appear precisely similar to dirty little pieces of seaweed or mud as they slide down towards the water. Very common round the shores of Port Jackson. The carapace is about three-sixteenths of an inch in width.

#### Tribe THALASSINIDEA.

31. *Callianassa* sp. ?—Inhabits the same localities as *Mycteris longicarpus*, but burrows deeper, and subsists on mud-worms. Though it is classed amongst the Podophthalmatous Crustacea, its eyes, which are reduced to mere dots, are sessile. This is not to be wondered at, inasmuch as it has very little need for eyesight, spending as it does most of its time burrowing, and but rarely coming to the surface. In colour it is of a yellowish pink, as a rule, but is sometimes white. Port Jackson; not very common. Length,  $2\frac{1}{2}$  in. from rostrum to telson; large cheliped,  $1\frac{1}{2}$  in. long.

#### Tribe SCYLLARIDEA.

32. *Ibacus Peronii* (Leach).—The members of this species pass most of their time on a muddy bottom, in not very shallow water. They are of a beautiful salmon-colour. Length, 9 in. Rare. Port Jackson.

33. *Palinurus Hügeli* (Hell.).—Closely allied to the British Rock Lobster (*P. vulgaris*). It is the common Sydney Crawfish, and sometimes grows to the length of 24 in. Subsists on a vegetarian diet, viz. fibrous marine plants. Rocky coasts of New South Wales.



## Tribe ASTACIDEA.

34. *Astacopsis serratus* (Shaw).—This animal has been given different names by different naturalists, on account of some of them getting large and some small specimens. In large examples the abdominal somites are each armed with a row of strong conical spines, but in young specimens these are either rudimentary or quite absent. There are also other differences. It is distributed with some variation over most parts of New South Wales. The colour, which also varies, is most commonly of a deep red. Attains a length of 18 in. Huxley mentions it in his book, 'The Crayfish,' under the name of "Australian Crayfish."

## Tribe PENÆIDEA.

35. *Penæus canaliculatus* (Oliv.).—This is truly a handsome species, having, when alive, the most delicate tints, and sometimes growing to the great length (for a Prawn) of 10 in. It is one of the principal Prawns of the Sydney fish-market, but is not so common as its congener, *P. esculentus*. Port Jackson; Botany Bay; Japan.

36. *Penæus esculentus* (Hasw.). — The common Prawn of Sydney, and caught in great numbers with the nets. This genus is remarkable for the large membranous appendage attached to the base of the first pleopod of the male, and called by Spence-Bate the "petasma," or curtain. In the female this appendage is quite rudimentary. Port Jackson; Port Darwin. Incidentally it might be mentioned that when the term "Prawn" is mentioned the genus *Penæus* is meant; *Palæmon*, to which the English Prawn belongs, not being known here as an article of diet.

## Tribe CARIDEA.

37. *Rhynchocinetes typus* (M.-Edw.).—This species surpasses in beauty any crustaceans that I have ever observed, the body being a beautiful semi-transparent tint, with here and there spots of light blue dotted over it. The chelæ are red with white dactyli. Altogether it is most disappointing to see their magnificent colours fade so much when the animals are preserved. They frequent semi-dark situations below low-tide mark, and if taken and put in a bottle containing sea-water die in a very short time, though

(as stated elsewhere) I have kept specimens of *Leander intermedius*, an allied form, for a week in the same bottle. At present the only way I can account for it, is, that the light, coming as it does through the sides of the bottle, is too strong for them, or that they require a constant stream of water. It could not be a question of difference of pressure, as they are procured in shallow water. Though darting away at the slightest movement, a person may attract them by keeping his hand in the water for some time, when they will presently be seen issuing in numbers from all the cracks and crannies, though before not one was visible. They must be attracted by their sense of smell, as I have often seen them advancing steadily towards my hand when there was no possible chance of them seeing it. A good deal of reconnoitring is done before they make up their minds to come close, and then the smallest specimens always come first. Altogether this species forms one of the most interesting and amusing of the Crustacea. Port Jackson; New Zealand; Chilé.

38. *Alpheus Edwardsii* (White).—These crustaceans are rather common in Port Jackson, and are familiarly known as "Nippers." They may be caught in tiny rock-pools under stones at low tide, and are also procured in nets, in company with *Penæus esculentus*. They are very remarkable for their habit of making a sharp clicking noise with the large chela when caught or irritated. The sound resembles that made by cocking a pistol very quickly, and, if the animals happen to be in a bottle, you really have to look every now and again to make sure that it is not being cracked to pieces, so sharp is the sound. Colour, light green on carapace, and traces of red on abdominal somites.

39. *Leander intermedius* (Stimp.).—Common all along our coast in small rock-pools (left by the tide as it recedes), in which, if disturbed, they seek the shelter of any small stones which are lying about. They are very hardy, as I have well proved. I kept a few of them alive in a bottleful of sea-water for a week without once changing it, while some specimens of *Rhynchocinetes typus* which were put in at the same time died within three or four hours. This difference, which I have noticed repeatedly, is hard to account for. The integument is translucent, and covered with small red spots, which are noticeable even upon the embryo within the ovum.

40. *Alope palpalis* (White).—May be found in shady nooks amongst the rocks at low tide, but is not at all common. It must also occasionally swim freely, as I have taken it from the stomach of the "Jew-fish" (*Sciæna antarctica*). Covered with short red setæ. Palpi very large. Port Jackson.

#### Tribe STOMATOPODA.

41. *Squilla lævis* (Hess).—The common "Hass-crab" of Port Jackson. Caught principally in the Prawn-nets, travelling in company with *Penæus esculentus*, on which it partly subsists. It may often be procured from the stomach of *Sciæna antarctica*, of which fish it forms one of the principal articles of food. Coast of New South Wales.

#### Order EDRIOPHTHALMATA.

##### Sub-order ISOPODA.

##### Tribe FLABELLIFERA.

42. *Ceratothoa trigonocephala* (Leach).—This is the commonest and best known of our fish parasites. As a rule, it inhabits the mouth of the "Yellow-tail," *Trachurus declivis* (C. & V.). The head is almost triangular, and deeply encased in the anterior portion of thorax. The *Ceratothoa* embryo is very different to the adult. The five segments of the pleon, which in the adult have coalesced, are movable upon each other. Pleon is nearly as long as pereion, but in the adult it is so insignificant as to be scarcely so long as one pereion somite. The telson too widens out posteriorly when the animal reaches maturity. Altogether the young *Ceratothoa* is fitted for a free existence, and no doubt the adult was the same at one time, but has been gradually adapted to living a parasitic life, thereby undergoing change of formation. Colour white. Port Jackson.

43. *Nerocila* sp. ?—This Isopod is another of the parasitic Crustacea, having for its host the Sea-mullet, *Mugil grandis* (Cast.). It is not so convex as the preceding species, and the epimera are very long. Eyes are entirely wanting. Colour sometimes dark brown, also yellow.

44. *Cymodocea pubescens* (Hasw.).—The small crustaceans of this name are "rock-borers." The boring is done exclusively with the uropods, which form two strong spikes. In burrowing

they do not go in head first, but stand on the one place, simply turning round and round, as if on a pivot, with their uropods lowered and cutting as they go. They no doubt assist very materially in the disintegration of the rocks, honeycombing them to such an extent that they are easily broken up by the waves into sand, and so contribute to form the rocks of a future geological period. When these Isopods are captured they draw themselves up into a ball, and project their uropods, which are very strong and sharp. Fawn-colour along dorsal line, reddish brown at sides of somites. Port Jackson.

Sub-order AMPHIPODA.

Tribe GRAMMARIDÆ.

45. *Talorchestia quadrimana* (Hasw.).—This is the common Sand-hopper, found in great numbers along the whole coast of New South Wales, wherever there are masses of decaying vegetable or animal matter. Length, 7 lines.

## NOTES AND QUERIES.

## MAMMALIA.

## CARNIVORA.

Stoats turning White in Winter.—In January last I received a Stoat (*Mustela erminea*) in almost white fur; it was shot at Newport, Salop, many years back (I did not book the date), but I distinctly remember that it was a very mild winter. I got one from the Isle of Wight which was quite white. I have so repeatedly had these animals in the partially white dress during mild winters that I do not now associate them with severe weather.—F. COBURN (7, Holloway Head, Birmingham).

Badgers near Scarborough.—A pair of *Meles taxus*, male and female, were captured alive at Thornton Dale, near Pickering, during the first week in March. These animals are not so uncommon in the district surrounding Scarborough and Pickering as is generally supposed, and they may be found in almost all the larger woods, but are rarely seen.—W. J. CLARKE (44, Huntriss Row, Scarborough).

## UNGULATA.

Existing Specimens of *Equus quagga*.—The material for the study of this interesting and now extinct ungulate is so limited that I may mention a few specimens observed by me when preparing an illustrated lecture on the *Equidæ*, since given on several occasions. There is a stuffed Quagga in the Natural History Museum at South Kensington, one in the Tring Museum, another in the museum at Berne, and a smaller specimen in the museum of the Jardin des Plantes, Paris. When in Paris, I also had the pleasure of seeing the living representatives of the now rare *Equus zebra*, then exhibited to the public, one at the Jardin des Plantes, the other at the Jardin d'Acclimatation. I understand that there is a fifth Quagga preserved at Edinburgh, and I have seen an equine skeleton said to belong to this species in the Medical Museum of the Owens College, Manchester. A full census of the remains of the Quagga, such as has been compiled for the Great Auk, would be of much value to zoologists.—GRAHAM RENSHAW (Sale Bridge House, Sale, Manchester).

[A specimen (young) of *Equus quagga* is contained in the South African Museum, Cape Town, which I had the pleasure of seeing when visiting that establishment.—ED.]

## AVES.

**Breeding Sites of Chiffchaff and Willow Warbler.**—Twice within recent years, in columns devoted to matters ornithological, has an animated discussion raged round the question of what are the normal respective nesting sites of the Chiffchaff (*Phylloscopus rufus*) and Willow Warbler (*P. trochilus*). Ornithology is essentially a progressive science, hence what is latest “up to date”—assuming, that is to say, the excellence of what is treated of—is of chiefest value. In this connection it is pleasant to find such a past master as Mr. Howard Saunders publishing, in monthly parts now issuing, a second edition of his charming ‘Manual.’ However, what I wished to say was this: I much hope that those who heretofore took up what seemed to me a wholly untenable position with regard to the two points at issue have noted that the most recent authority in the field, who is admittedly “at the top of the tree,” has not only placed it on record that the nest of the Chiffchaff is usually “a little *above* the ground,” and that of the Willow Warbler generally “*on* the ground,” but that he has thought well to emphasize his views by the employment, as shown, of italics. I trust now we shall hear no more about Chiffchaffs’ nests in meadow-banks, away from all sylvan tracts, which of course are the popular haunts of the species in this country in the summer.—H. S. DAVENPORT (Melton Mowbray).

**Meadow Pipits perching on Trees.**—In Mr. W. Warde Fowler’s interesting note on the Tree Pipit (*ante*, p. 122), it is said that the Meadow Pipit (*Anthus pratensis*) “is certainly not at home on trees.” This seems to be a fairly general belief among ornithologists, but so far as my experience goes it is not correct. During the winter months I have Meadow Pipits under almost daily observation, and it is an absolutely common occurrence for me to frighten them from a low-lying meadow, when they will take to the branches of the tall trees around. They will freely settle on some of the thinner branches, as well as on the thick ones. I have also repeatedly heard their notes proceeding from among the branches of the trees, where they had settled from choice, without having been disturbed by me. The meadow I refer to is at the bottom of the road in which I reside, and I have to cross it on all my walks. While I was on Achill Island, Co. Mayo, a curious bird, which Mr. Oliver V. Aplin determines to be *Anthus pratensis*, settled on the top of a low bush, and looked so curious, as it faced me with its dark broadly striped breast and rufous throat (a far clearer rufous tinge in the living bird than is now to be seen in the mounted specimen), that I was constrained to bring it down, thinking I had something unusual. This was on the mountain side, a considerable distance from their usual breeding haunts on the moorland and marshy meadows below. From the worn

appearance of the feathers I concluded that the bird was probably breeding, and searched diligently for a nest, but without success. — F. COBURN (7, Holloway Head, Birmingham).

**Food of the Barn Owl.**—So much has been written in connection with the food of this species and its admitted usefulness to the farmer, that little remains to be added. During the recent gales in March a great elm near my house was blown down. This tree had to my knowledge, for forty-five years, been the residence of a pair of Barn Owls (*Strix flammea*), who regularly nested there. Since the loss of their home I have had a small barrel, duly prepared, fixed amongst the boughs of an ancient yew, hoping thus to persuade my old neighbours to remain with us. On sawing the rotten stem of the elm into sections we found bushels of Owls' castings; these were composed of a vast number of the Common Mouse, also some Long-tailed and Short-tailed Mice, the skull of a Starling, and hundreds of the skulls and upper mandible of the House Sparrow. The Mice and Sparrows were no doubt seized from the stack-sides, for I have often seen the Owls thus employed, or sitting on the watch hard by on some post of vantage. The tenant could never understand how it was I was so anxious that the Owls should be left unmolested, and this exhibition of the *disjecta membra* of hundreds of Mice and Sparrows has come like a revelation to him. Farmers here have an absurd idea that Owls enter their Pigeon-cotes and carry off the young Pigeons, and it appears impossible to persuade them to the contrary.—JOHN CORDEAUX (Great Cotes House, R.S.O., Lincoln).

**Rare Partridges in Leadenhall Market.**—I observed in the 'Field' of the 19th March a notice from the pen of my friend Mr. Tegetmeier of the presence of a large number of Daurian Partridges in Leadenhall Market, and may remark that this is the second time that a consignment of these birds has been offered for sale in that market. I saw the first lot unpacked, and they were rolled in paper and hard frozen, and then packed in a large sugar-barrel, and arrived here in very good condition. The Daurian Partridge (*Perdix daurica* and *P. sibirica* of Pallas, *Perdix barbata*, Verr.) inhabits Eastern Siberia, the Amoor country, Dauria, &c., ranging south through Mantchuria and Mongolia to North China, and west to the Tian-Shan Mountains in Turkestan; so that the birds sold here must have traversed a great distance in a frozen state before reaching this country. This Partridge is not a rare bird in museums, or indeed in private collections, and can be had of most continental dealers, and is quite distinct from our European Partridge. Simultaneously a considerable number of Red-legged Partridges from Central Asia (*Caccabis magna*, Prjev.) were on sale in Leadenhall Market. The range of this species is given by Mr. Ogilvy-

Grant as the "South Koko-nor Mountains, Northern Tibet, and the Tsaidam plains."—H. E. DRESSER (Topclyffe Grange, Farnborough, Kent).

Canada Goose near Dungeness.—I had sent to me in the flesh two specimens of the Canada Goose (*Bernicla canadensis*) on April 26th, which were shot out of a flock of five on the sands near Dungeness, Kent, about a week before. They show no signs of having been pinioned, and flew in from the sea. The heaviest one was a male, and weighed, a week after its death, 10 lb. 8 oz. I see Mr. Howard Saunders, in his 'Manual,' does not acknowledge the occurrence of any genuine wild examples in this country. I should be happy to forward the skins to any competent authority.—GEORGE W. BRADSHAW (54, London Street, Reading, late of Hastings, Sussex).

Little Gull in Kent.—On March 3rd, near Horsmonden, a fine adult male of *Larus minutus* was obtained, and sent to Springett, the taxidermist in Cranbrook. Horsmonden is about twelve miles as the crow flies from the river Rother.—BOYD ALEXANDER (Swifts Place, Cranbrook, Kent).

Birds which nest in London.—In your last number (*ante*, p. 189) Mr. C. Meade King asks for notes on this subject. Two birds might be added to the list, both having nested in Regent's Park within the last two years, *viz.* Magpie (*Pica rustica*) and Pied Wagtail (*Motacilla lugubris*). I do not know if the former has actually reared young, but the latter species was perfectly successful in the gardens of Regent's Park in 1896. As to the number of Rooks breeding in Gray's Inn, there are ten or twelve nests occupied at the present time.—WILLIAM E. DE WINTON (7, Southampton Row, W.C.).

Some Notes on the *Nestor notabilis*, or Kea Parrot, of New Zealand.—Some live specimens of this interesting bird of New Zealand have lately been received by the Director of the Zoological Gardens in Melbourne. The peculiar birds have acquired the habit of attacking Sheep, and making holes by means of their sharp and powerful beaks in the backs of these animals for the purpose of abstracting the kidney fat, which appears to be esteemed as a luxurious diet. A large number of Sheep are annually destroyed by these birds, which has compelled Sheep-owners to set a value upon their heads, and endeavour to accomplish their extinction. It was for a long time supposed that this peculiar habit or instinct was developed by the bird getting the fat from the skins of Sheep that had been slaughtered, but this solution was never satisfactory to my mind, as there appeared nothing to connect the fat on the skins of Sheep with the live animals. I desire to offer the following solution of the mystery, which seems to me to be simple and satisfactory, and more rational than the Sheep-skin theory. In the hilly districts of the Middle Island of New Zealand there is a great abun-



dance of a white moss or lichen, which exactly resembles a lump of white wool, so much so that a friend of mine who was travelling through the country asked the driver of the coach why there were so many solitary Sheep scattered all over the hills, and was informed that these were bunches of lichen or white moss, at the roots of which were found small white fatty substances, supposed by some to be the seeds of the plant, and by others to be a grub or maggot which infested it, and which is the favourite food of the Kea. I saw a specimen of this woolly lichen which so closely resembled a bit of wool as to be easily mistaken for it. No doubt the bird, misled by this resemblance, commenced an exploration in Sheep, and this proving satisfactory originated the new habit.—F. R. GODFREY (Melbourne).

[The above note has been kindly forwarded to me by Dr. P. L. Sclater. In 'The Zoologist' (1895, p. 293) will be found a paper "On the Habits of the Kea, or Mountain Parrot of New Zealand," by Taylor White, reproduced from the 'Transactions' of the New Zealand Institute, vol. xxvii. pp. 273-280 (1895), in which the author agrees with Mr. Huddleston that the bird settles on the Sheep above the kidneys, because it is the broadest part, and it can there obtain the best grip of the wool, and that blood rather than flesh is what the bird desires. Mr. Godfrey is also in agreement with Mr. F. R. Chapman ('New Zealand Journal of Science,' 1891), who, describing a valley of the Upper Waimakariri, Canterbury, says:—"A very interesting *Raoulia*, or vegetable sheep, was very plentiful on steep rocky places; but I believe a finer species is found on Mount Torlesse. . . . It is said that the Keas tear them up with their powerful beaks, and that these birds learnt to eat mutton through mistaking dead Sheep for masses of *Raoulia*.—ED.]

Sagacity among Birds.—Some few years ago, when staying at the Great Eastern Hotel, Calcutta, I witnessed an interesting scene between three birds. It was early in the morning, and when sitting in my room I noticed a Hawk alight on the ledge about a foot wide that ran round the building. The Hawk rested just opposite my window, but did not apparently see me; it had a bone in its talons, and was soon hard at work endeavouring to tear off what little meat there was on it. But in about a minute's time two Crows arrived on the scene; one flew behind the Hawk, and the other in front. The bird behind kept coming up and giving a smart tug at the tail of the Hawk, which made him turn half-round to drive the bold intruder off, but still holding its bone. After this had been done several times the Crow gave an extra hard pull at the Hawk's tail; that bird then disengaged its foot from the bone, and, turning half-round, made a lunge towards the Crow to drive it away; but immediately the Hawk had let go the bone and turned round, the other Crow in front, which

had all the time been keeping just out of reach, immediately seized the bone, and at once flew off with it to the street below, where it was quickly joined by the other Crow, and the two birds enjoyed what they could get off the ill-gotten bone together. There being a fair number of people passing along the road, the Hawk dare not follow them, but was left outwitted on the ledge. I have no doubt similar instances have been observed by others, showing the sagacity of many birds, and I only record this note as I think that any interesting fact in bird-life should be published, and by so doing ornithologists help one another in the study of this interesting branch of natural history. — D. LE SOUËF, Assist. Direct. Zoological Gardens, Melbourne.

Ornithological Notes at Alum Bay, Isle of Wight.—The precipitous chalk cliffs stretching from Freshwater Bay to Alum Bay, in the Isle of Wight, are the favourite breeding resort of many of our sea-birds. While staying at Alum Bay, at the beginning of last month (April), I had a good opportunity of seeing them at the commencement of their breeding season, as their favourite place is the Alum Bay end. Looking over the edge of the cliff from the Alum Bay downs, at one particular spot, one sees countless Herring Gulls flying about in all directions; rows of Razorbills and Guillemots sitting on the ledges in the cliff, or dotted about in the blue sea far below; Cormorants flying to and fro; and an occasional Rock Pigeon darting out of some crevice, and whirling away out of sight with its rapid flight. Jackdaws too breed in great numbers in the crevices in the chalk, and a pair of Ravens have a nest every year somewhere in the cliff. I saw them several times wheeling about and tumbling over in the air in their peculiar manner, evidently on the look-out for Gulls' eggs wherewith to feed their young ones. My brother saw two pitched battles between one of the Ravens and a Herring Gull, in which the two birds clung on to each other, and rolled down the cliff like a black-and-white ball. But the way to see the birds to advantage is to get a boat, and row from Alum Bay round "the Needles," and a little way down the coast towards Freshwater. With a view to doing this, I interviewed a fisherman of the name of Isaacs, who seems to be the great local authority on the birds. He told me that a pair of Peregrine Falcons bred on the cliffs every year, and that many years ago he had taken both eggs and young birds, but that they had not now been disturbed for a long time. He also said that the Shag and Great Black-backed Gulls bred there in small numbers. On April 16th a friend and I were rowed round by him. It was a perfect morning, and the sea was as calm as a lake. Herring Gulls and Cormorants were flying about and sitting on "the Needles" rocks as we approached, but when we had rounded "the Needles" and gone a little way down the coast, the sight was wonderful. Herring Gulls swarmed in the air and on the rocks. Rows upon rows

of Guillemots and Razorbills covered the ledges all over the face of the cliff, and as we passed flew off in thousands over the boat and settled in the water beyond. Large colonies of Cormorants were scattered about on the cliff, flocks of Jackdaws wheeled about with clamorous cries, and here and there a family of Puffins would fly out of some crevice and settle in the water round the boat. They do not seem so strong on the wing as the Guillemots, and when getting up from the sea splash a long way through the water before rising into the air. As we rowed by, a splendid Peregrine Falcon came out of a large crevice high up on the cliff, and flew rapidly down the coast out of sight. A few minutes afterwards we saw its mate. On the broken rocks and boulders of chalk which line the base of the cliffs several Rock Pipits were hopping about. I landed among these rocks, and found about a dozen Herring Gulls' nests, all empty. The Herring Gulls are the only birds which build so low down on the cliff, and the eggs of the other birds can only be got by means of a rope. It was a most interesting sight, and I only wished it had been later in the season, so that I could have got some eggs. In conclusion, I may add that Isaacs said the birds had greatly increased in numbers during the last ten years.—BERNARD RIVIERE (Finchley Road).

**Ornithological Notes from Scarborough.**—On Jan. 15th I had brought for preservation a fine adult Shoveler Drake (*Spatula clypeata*) which had been shot on the river at Pickering. On Feb. 23rd a pair of beautiful adult Waxwings (*Ampelis garrulus*) were brought in, which had been shot on the roadside between Scarborough and Burniston. They were male and female, and were in company with a third, which escaped. On dissection I found they had been feeding upon the fruit of the wild rose, which they had swallowed whole. These make ten occurrences of this species, of which I have notes, since October last. More Crossbills than usual have frequented the fir woods throughout the district near Scarborough, and were still here up to within a month ago.—W. J. CLARKE (44, Huntriss Row, Scarborough).

#### PISCES.

**Notes from Great Yarmouth.**—Sole. I received a Sole (*Solea vulgaris*) from the fish-wharf on Jan. 22nd. It was peculiarly stunted in length, measuring  $11\frac{1}{2}$  in.; it was 6 in. broad, being at least 4 in. short of its normal length.

**Streaked Gurnard.** An example of *Trigla lineata* came to hand on the same date.

**Pole or Craig-fluke.** No fewer than six pairs of fine Poles (*Pleuronectes cynoglossus*) were displayed on one fishmonger's slab on Feb. 3rd. This

must be an exceedingly abundant species in the Wash. Several others subsequently, undoubtedly taken from the same locality.

Long Rough Dab. An example,  $16\frac{1}{2}$  in., of *Hippoglossoides limandoides* came to hand on Feb. 21st.

Cuckoo Ray. A very beautiful Cuckoo Ray (*Raia miraletus*) was taken on a line just off Yarmouth on the night of April 3rd.

Curious Plaice. I received a Plaice (*Pleuronectes platessa*) on April 8th; it measured 11 in. Across the under side, quite in the centre of its length, ran a supplementary fin. There were three fin-rays towards either margin, and a connecting web joining each. Across the rayless centre the web still extended. The fin was quite free to work.

Greenland Bullhead. An example of *Cottus groenlandicus* was taken on a hook off Yarmouth by some long-line fishermen. Length, 7 in.—A. PATTERSON (Ibis House, Great Yarmouth).

#### CRUSTACEA.

Meristic Variation in the Edible Crab.—A specimen of *Cancer pagurus* was given me on April 28th with one of the pincer-claws abnormally developed, a large double pointed fixed claw projecting from the lower claw. When the movable claw was opened the three made a perfect capital W.—A. PATTERSON (Ibis House, Great Yarmouth).

## NOTICES OF NEW BOOKS.

*Audubon and his Journals.* By MARIA R. AUDUBON. With Zoological and other Notes by ELLIOTT COUES. 2 Vols. John C. Nimmo.

THE name of Audubon is a household word wherever Ornithology is followed; it is interwoven in the annals of Zoology; and with that of Agassiz is cherished in the fast advancing and now important cult of American Natural History. As stated in the Introduction: "His place as naturalist, woodsman, artist, author has long since been accorded him."

Audubon was an ornithologist by instinct and not by training; he found his subject in the woods and took it from nature; he deserted every pursuit to follow bird-life, as his financial experiences prove, and in losing everything which goes to make what is vulgarly called "success," he found the pleasure of his life, and achieved a lasting fame. From his own journal, which is here reprinted, two extracts relating to early days and manhood will mark this period of his career: "My father being mostly absent on duty, my mother suffered me to do much as I pleased; it was therefore not to be wondered at that, instead of applying closely to my studies, I preferred associating with boys of my own age and disposition, who were more fond of going in search of birds' nests, fishing, or shooting, than of better studies. Thus almost every day, instead of going to school when I ought to have gone, I usually made for the fields, where I spent the day." In later life when he separated from his business partner Rozier, each wrote as they felt, Audubon saying: "Rozier cared only for money, and liked St. Geneviève;" Rozier writing: "Audubon had no taste for commerce, and was constantly in the forest." Consequently we are not surprised at a subsequent period of deep depression when, "without a dollar in the world, bereft of all revenues beyond my own personal talents and acquirements," he felt, the only time in his life, "when the Wild Turkeys that so often crossed my path, and the thousands of lesser birds that

enlivened the woods and the prairies, all looked like enemies, and I turned my eyes from them, as if I could have wished that they had never existed." But this was only the probationary period, and Audubon was to emerge from the wilderness.

The "European Journals," which occupy a large portion of the first volume, detail his visit to these islands, with his portfolio of matchless drawings of the birds he had studied so long, and which belonged to the country he loved so well. He was well, nay, warmly received, and when in Liverpool, to which he was so grateful, Manchester that scarcely equalled his expectations, and Edinburgh, which fairly captivated him, we find recorded the friendships of many well-remembered eminent men, and traits and reminiscences of others perhaps more familiar to some of our readers, as Bewick, Jardine, Selby, and Swainson. We have one delicious insight into the then current philosophy of society. Captain Basil Hall "called to speak to me about my paper on Pigeons; he complained that I expressed the belief that Pigeons were possessed of affection and tenderest love, and that this raised the brute species to a level with man." It was during this journey that Audubon sought and obtained subscribers to his great work, and published the first numbers of the same. The visit to Paris produced few subscribers, but afforded an intercourse with the great Cuvier.

The trip to Labrador was made in 1833, with the object of "procuring birds and making drawings of them for the continuation of the 'Birds of America,' the publication of which was then being carried on in London. The Journal of this excursion is replete with the details of bird-life, and exhibits Audubon as a writer of great descriptive power. As we sail with him to the desolate land we are gradually prepared for the physical horrors of this ornithological paradise. "When we landed and passed the beach, we sunk nearly up to our knees in mosses of various sorts. . . . A poor, rugged, miserable country; the trees like so many mops of wiry composition, and where the soil is not rocky it is boggy up to a man's waist." The weather is most frequently described under the appellations of rains, fogs, hurricanes. The drawings were made on board ship, with all its uneasy movements, and the cold was sometimes so intense as to render holding the pencil a difficult task. Yet many nests were

found, numerous birds procured, and some good observations recorded. "The Scoter Ducks, of which I have seen many this day, were partially moulted, and could fly only a short distance, and must be either barren or the young bachelors, as I find *parents* in full plumage, convincing me that these former moult earlier than the breeding Ducks."

In 1843 Audubon made an expedition in the interest of the 'Quadrupeds of North America,' the narrative of which constitutes "The Missouri River Journals," and which is now in its entirety published for the first time. There is a great charm in the naturalist's account of a region which, as he saw it then, can never be witnessed again. The old frontier life, the wretched Indians, and the then abundant big game, are soberly described, and we read:—"We have seen much remarkably handsome scenery, but nothing at all comparing with Catlin's descriptions; his book must, after all, be altogether a humbug."

The "Episodes" which conclude the second volume exhibit Audubon as an adept in that most difficult literary art of "short story" writing, and in these days of popular reprints we shall never be surprised to see them reissued in a separate form. Dr. Elliott Coues has proved an efficient zoological editor throughout, and has contributed many valuable notes. Audubon was clearly not an all-round zoologist, for not only does he seem to make the very common and excusable error of most travellers respecting the identity of the Dolphin, but also on more than one occasion speaks of the Porpoise as a fish.

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*Life and Letters of Alexander Goodman More, with selections from his Zoological and Botanical Writings.* Edited by C. B. MOFFAT, B.A., with a preface by FRANCES M. MORE. Dublin: Hodges, Figgis & Co., Limited.

A. G. MORE was one of those unique personalities with whom contact invariably produced friendship. Combined with this rare gift of provoking attachment, and being void of offence, he possessed the instincts of a true naturalist, and was endowed with many intellectual gifts; but in a world of limitations and compensations he was cursed with persistent ill health, which curtailed his official career, but could not prevent his rendering signal

service to Irish Zoology and Botany. Apart from his long service in the Royal Dublin Society's Museum, in which he eventually for a short period—until complete physical collapse ensued—succeeded Dr. Carte as Curator, his life-work must be sought in quiet and unobtrusive contributions to biological knowledge, to the assistance always rendered to other workers, and to the directing power given and enthusiasm afforded to the studies of young naturalists. Under these conditions it is difficult to analyze the career so well told in this volume, written by a sister who with unusual modesty describes on the title-page her memoir as a preface.

More's official connection with the Royal Dublin Museum commenced with his appointment as "first assistant naturalist" at the commencement of 1867. He succeeded the late Dr. Carte in the curatorship near the end of 1881, and after long physical suffering and hoping against hope for the renewed strength that never came, he resigned his position in 1887. During these twenty years, we read, "his room (in the museum) was the rendezvous of all naturalists who came to Dublin"; and after the assumption of his curatorship we find him writing to Prof. Newton: "I don't at all intend to die, or retire, for a long time yet. Not until you shall see what a Museum I will make it." He made many local natural history expeditions on behalf of his museum, and on one of these, in 1873, "a dredging and collecting expedition to Achill and the adjacent coasts," he met with an untimely adventure, from the effects of which he probably never recovered. On the lonely island of Inishkea, about eight miles north of Achill, is, or was, among its solitary inhabitants, a fetish named "Neve-ogue," about which the visitor was wise neither to enquire nor speak about. But stories had got abroad about the benighted condition of these western Irish, and a letter had appeared in print headed "Idolatry in the 19th Century." This had aroused the fierce indignation of the islanders, and, as not unusual, the wrong man paid the penalty. The unoffending More was surrounded by a group of angry islanders, "and before he could gather the meaning of the situation, a blow from a heavy piece of timber had stretched him on the ground" in an unconscious condition.

After his resignation, and while a hopeless invalid, he was still able to help the cause he had at heart, and from time to time



to engage in correspondence. In one of his letters at this time is an admonition that may be well laid to heart by all who are not thoroughly competent observers. "Do try and give up thinking you have *seen* any rare bird which you do not *shoot*. It is the most unsafe course in natural history, and leads to innumerable mistakes, and to the discrediting of the observer."

Of his papers reprinted in this volume are those "On the Distribution of Birds in Great Britain during the Nesting Season" ('*Ibis*,' 1865), and a supplement consisting of "Manuscript Notes in Mr. A. G. More's interleaved copy, with a Summary"; "On the Geographical Distribution of Butterflies in Great Britain," written in conjunction with T. Boyd ('*Zoologist*,' 1858); and "Outlines of the Botany of the Isle of Wight" (Stanford's '*New Guide to the Isle of Wight*').

Mr. More was an old contributor to this Magazine during a period extending from 1849 to 1894, and many of the notes he thus published are also reprinted in the Appendix.

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*A Sketch of the Natural History (Vertebrates) of the British Islands.* By F. G. AFLALO, F.R.G.S., &c. Wm. Blackwood & Sons.

BRITISH Zoology is not without a literature, and, judging from the plentitude of new books on the subject, we may rejoice that a popular taste has arisen for natural history subjects. Though well provided with standard books by competent authors on the different British Vertebrates, there was still room for a volume which combined the whole in an introductory but authentic method. This opportunity Mr. Aflalo has attempted to seize, and his book will be, no doubt, welcomed by those who wish to consult a primer that will prove an incentive and guide to more specialized study.

It is not an altogether unusual reproach, that some readers, and a few reviewers, are satisfied with the perusal of a preface or introduction. We can only remark that if such scanty attention was paid to this volume, the result would still be an acquaintance with one of the most interesting general essays on British Zoology that has been written for a long time. We are too apt to seek biological phenomena in other zoological regions, and to ignore the lessons to be learned in our own islands. Many who have

studied the peculiarities of insular faunas can well be reminded that that of the Isle of Wight is a home lesson, and as our author remarks: "Yet it is surely not quite devoid of interest that in that little outpost of England, separated from the New Forest and the most fishful rivers in the south country by a mere ditch, the woods should afford shelter to but few Owls and Woodpeckers, the streams hold neither Pike, nor Perch, nor Chub, nor Gudgeon; that the Ring Ousel should abstain from breeding there; that the Toad should be commoner than the Frog, the Viper in excess of the more harmless snake." Again, among the many singular and obscure causes which regulate or modify the presence of migratory species, an excellent example is drawn from the Channel Islands, where, according to Smith, 'Birds of Guernsey,' "since gin took the place of cider as the national beverage, the orchards have been abandoned, and the whole country is under vegetables for the early London market."

Mr. Aflalo is very conservative in the admission of visitant species to our fauna. Thus he omits the Turtles from the list of British Vertebrates, and gives an instance of how these Chelonians may have had a purely artificial introduction. He is, however, somewhat obscure in the paragraph devoted to the Flying-fish, which, we read, finds its way into our waters, *if ever*, at long intervals only; and subsequently that "there seems to be *little doubt* of the occurrence of living examples on our south-west coast." The italics are our own.

It is impossible in our space to notice or summarize the main details of the book, which are devoted to the Mammals, Birds, Reptiles, Amphibians, Fishes, and Lowest Vertebrates—Lampreys and Hag-fishes. The information thus given will prove useful to those who seek concise information in a convenient referential manner, though it must be remembered that few writers are sufficiently equipped to prevent some stumbles in so wide a purview of British Zoology.

Two useful Appendices are given, which comprise "Materials for a Bibliography of Books on the British Vertebrate Fauna," and "A List of Natural History Societies and Field Clubs in the United Kingdom." With reference to the first, and in relation to the scanty literature on British Reptiles, mention should have been made of the series of articles by the late Edward Newman in 'The Zoologist' for 1869.

*The Mammals, Reptiles, and Fishes of Essex.* By HENRY LAVER, M.R.C.S., &c. Chelmsford: Edmund Durrant & Co.; Buckhurst Hill: The Essex Field Club; London: Simpkin, Marshall & Co. Limited.

THIS publication forms Vol. III. of the "Essex Field Club Special Memoirs," and is a welcome addition to our county faunistic lists. With Mr. Miller Christy's 'Birds of Essex' we now possess handbooks—so far as present knowledge permits—of the vertebrate fauna of the county.

Essex offers unusual advantages to the naturalist; Epping Forest alone is a household word; it possesses a sea-board; six rivers—Thames, Lea, Chelmer, Blackwater, Colne, and Stour—afford means of investigation in the freshwater fauna; there are wide margins of marsh; whilst now that environmental conditions are more studied it must be remembered that "the climate of Essex is dry, the average rainfall being lower than in any other English county." To these natural advantages may be added the institution of the "Epping Forest and County of Essex Naturalists' Field Club," which has really fostered the study of the local natural history, and focussed the work of Essex naturalists. Thirty-eight terrestrial mammals—excluding two doubtful Bats (*Rhinolophus ferrum-equinum* and *Vespertilio murinus*), and an introduced species of Jackal—are enumerated, and ten marine mammals, which, however, include so scarce or unwilling a visitor as the Sperm Whale (*Physeter macrocephalus*). In the Reptilia, besides the Viviparous Lizard and the Blind Worm, the Common Snake, three Batrachians, and three Newts are found. The Natterjack Toad has still to be discovered and recorded. In Fishes 113 species are enumerated, but here of course large additions will constantly be made as the marine fauna is more studied. Local lists of fishes in the different rivers supply a want, though none was procurable relating to the Cam, which rises in the north-west corner of the county, but soon leaves the district. This river "holds two species, apparently naturally absent from all the rest of our Essex rivers," the Grayling, lately introduced into the Lea, and the Spined Loach.

Some beautiful illustrations by Mr. H. A. Cole embellish a small but most useful book.

*Hints on the Management of Hawks* (second edition); to which is added *Practical Falconry, Chapters Historical and Descriptive*. By JAMES EDMUND HARTING. Horace Cox.

HAWKING is an old pastime. We often in the present day hear, or read, that racing is "the sport of kings," but there is no doubt that hawking really once came under that description. Dear old Burton, in his 'Anatomy of Melancholy,' referring to the writings of Paulus Jovius, remarks of that author, that he doth in some sort tax "our English nobility for it, for living in the country so much, and too frequent use of it, as if they had no other means but hawking and hunting to approve themselves gentlemen with." It must, however, have been a fine sport then, and in an attenuated form can be still practised now, as Mr. Harting's pages amply testify. Possibly its mildest aspect was—again quoting Burton—when the Persian kings hawked butterflies with sparrows "made to that use."

This is one of those interesting books which prove how a scientific ornithologist can write like a good sportsman—using that word in its real and not current definition; and also shows how sport and a knowledge of natural history can and should go together. Both in "Hints on the Management of Hawks," and in the space devoted to "Practical Falconry," the reader who does not pursue the sport will find much to instruct him in the nature and names of birds of prey, while the chapters on "Devices for taking Hawks" and "Indian Snares for Hawks" enter the domain of another work on the 'History of Fowling,' recently noticed in these pages (*ante*, p. 134).

The illustrations leave nothing to be desired, and Mr. Harting is to be congratulated on issuing a revised and amplified second edition of a work which appeals both to the sportsman and the naturalist, and possesses the literary charm incidental to a wide reading on the subject.

## EDITORIAL GLEANINGS.

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DR. HENRY WOODWARD, in the 'Geological Magazine' (Decade iv. vol. v. p. 49) has illustrated and described a pair of gigantic antlers of the Great Red Deer (*Cervus elaphus*, Linn.):—

"In 1891, Frank S. Goodwin, Esq., of Bakewell, Derbyshire, presented to the British Museum (Natural History) a pair of antlers of Red Deer, with fragments of the calvarium attached, which had been obtained, with other cervine remains, from a tufaceous deposit of comparatively modern date near Bakewell, Derbyshire. Owing to the loss of all animal matter the antlers were in a very friable condition, and fell in pieces on being handled, although at some distant time they had been repaired partially with long strips of calico.

"Two causes rendered them of interest: firstly, they were of unusually large size, resembling the great American Wapiti (*Cervus canadensis*) in stoutness and length of beam; secondly, they proved to have been described in a letter from the Rev. Robert Barber, B.D., to John Jebb, Esq., M.D., F.R.S., which was published in the Phil. Trans. Royal Society for 1785 (vol. lxxv. p. 353).

"Notwithstanding their almost hopeless state of dilapidation they attracted the attention of Sir Edmund Giles Loder, Bart., and Mr. J. G. Millais (the latter of whom examined and made drawings of them about a year ago). An attempt was made to bring the broken antlers together again, and after much time and labour expended by Mr. C. Barlow, the Formatore, they have at length been successfully rehabilitated, and are now exhibited on the top of pier-case No. 16 in the Geological Gallery devoted to fossil Mammalia, where they form, from their size and whiteness, one of the most striking objects in the series of cervine remains.

"The following measurements have been taken since the antlers have been repaired and mounted in the Gallery:—\*

### MEASUREMENT OF ANTLERS OF *Cervus elaphus* FROM ALPORT, YOULGREAVE.

	ft. in.		ft. in.
Width at the 'nests' .....	3 9	Girth of pedicle .....	0 7 $\frac{1}{2}$
Length of right antler ...	4 0	,, above the burr ...	0 9 $\frac{3}{4}$
,, ,, left ,, ...	3 8	,, ,, 1st tine .....	0 9 $\frac{1}{4}$
,, ,, brow-tine .....	0 11	,, ,, 2nd ,, .....	0 6 $\frac{1}{2}$
,, ,, 2nd ,, .....	1 0	,, ,, 3rd ,, .....	0 6 $\frac{1}{4}$ "
,, ,, 3rd ,, .....	1 1		

\* See also 'British Deer and their Horns,' by J. G. Millais, p. 96, fig. 2, and p. 105.

IN connection with the 'Geological Magazine,' it is interesting to learn from Dr. Woodward of its considerable longevity. Writing in December, 1894, he was able to announce:—"It is now more than thirty years ago since, with my friend Prof. T. Rupert Jones, F.R.S., we commenced to edit the 'Geological Magazine,' Messrs. Longmans & Co. being our publishers. Out of the long list of distinguished supporters and contributors to the 'Geological Magazine' published in 1864, I rejoice that twenty-four original names still remain after more than thirty years, namely:—The Duke of Argyll, the Earl of Ducie, Sir Archibald Geikie, the Right Hon. Thomas Huxley, Sir John Evans, Prof. Prestwich, Prof. T. G. Bonney, Prof. Wiltshire, Prof. Boyd-Dawkins, Prof. Alphonse Milne-Edwards, Prof. Dr. A. Fritsch, Prof. A. von Koenen, Prof. E. Hull, Prof. H. G. Seeley, Mr. R. Etheridge, Mr. William Carruthers, Mr. William Whitaker, Rev. O. Fisher, Mr. James Carter, Mr. James Powrie, Mr. R. H. Valpy, Mr. G. C. Churchill, Mr. R. F. Tomes, and Mr. E. C. H. Day." This list is unfortunately not quite so complete as when published, but the magazine has lost none of its vitality.

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At a meeting of the Linnean Society, held on March 3rd, Mr. W. A. Herdman read a paper by Mr. F. J. Cole, entitled "Observations on the Structure and Morphology of the Cranial Nerves and Lateral Sense-Organs of Fishes, with especial reference to the Genus *Gadus*." It contained the first description of the lateral-line organs of *Gadus*, and pit-organs were shown to be present. The author concludes that the lateral-line system of fishes was not originally metameric, and that it has nothing to do with the branchial sense-organs. He regards it and the auditory organs as parts of a system, and their nerves (*viz.* the superficial ophthalmic, buccal, external mandibular, lateralis, and lateral-line nerves), together with the auditory, as of a series *sui generis*, and shows that the so-called lateral-line nerve of *Petromyzon* really belongs to the lateralis accessorius system (ramus lateralis trigemini, auct.), the morphology of which he fully describes. The paper dealt exhaustively both with the afore-mentioned and the subsidiary branches of the subject, which was treated in detail and historically, with an accompanying exhaustive bibliography. Prof. Howes, discussing the subject, drew attention to some observations of the cousins Sarasin, and to the experimental work of Sewall, Steiner, Lee, and others upon the auditory apparatus of fishes, which supported the author's conclusions. Referring to the investigations of Coggi, he threw out the suggestion that the secondary extension of the saccus endolymphaticus into the dorso-lateral region of the trunk—since it reaches its maximum in batrachians in which, although the tegumental canal-system is developed and lost, a partially aquatic habit is retained—might perhaps involve the auditory and lateral-

line apparatus in a correlated substitutional modification for the performance of the static and equilibrative functions, and thus further support the author's views.

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At a subsequent meeting of the Linnean Society, held on April 21st, Mr. W. P. Pycraft read a paper "On the Morphology of the Owls: Part I. Pterylography." In this, the first instalment of a series of papers on the affinities and phylogeny of the group, the pterylographic characters were alone considered, with descriptions of adults, nestlings, and embryos. The author remarked that so far as the distribution of the feather-tracts is concerned, the Owls resemble the Accipitres more nearly than any other group. They differ from them and resemble the Caprimulgi in the distribution of the adult and nestling down. The microscopical structure, however, of these down-feathers is accipitrine rather than caprimulagine. The nestling of the Accipitres is clothed by two kinds of down-feathers, for which the names "pre-plumulæ" and "pre-pennæ" were suggested; the nestling Owl and Nightjar are clothed only by down of the latter kind. The form of the external aperture of the ear seems to have been originally subject to variations, the most successful of which have become fixed by selection. In some cases there is a marked asymmetry, which may either be confined to the membranes surrounding the aperture or may extend to the skull itself. The author considered that the facts disclosed by a study of the pterylosis might justify a slight revision and rearrangement of some of the genera.

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MR. ERNEST W. L. HOLT, at a meeting of the Zoological Society of London, held on April 19th, read a paper on the breeding of the Dragonet (*Callionymus lyra*) in the Marine Biological Association's Aquarium at Plymouth, and made some remarks on the significance of the sexual dimorphism of this fish, the courtship and pairing of which were described in detail. The female was described as a promiscuous polyandrist, and seemed to exercise no sort of choice, taking the nearest male which appeared to be in a condition to further her object. The males were much more numerous, as well as larger, than the females. The brilliant yellow colour of the mature male was due to an excess of yellow pigment, which diffused into the skin. It had an acrid smell, and was highly irritating to the salivary glands. The blue colour was due to the optical properties of masses of "reflecting tissue" over a background of black chromatophores. Mr. Holt considered that the large fins and bright colours of the male of the Dragonet had been evolved by sexual selection proceeding on the lines of conspicuousness rather than on those of æsthetic charms, since the male seemed to be unable to see the female except at a very short distance, and

the converse would no doubt hold good if the male was not conspicuously coloured.

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IN 'Timehri,' the Journal of the Royal Agricultural and Commercial Society of British Guiana, Mr. J. J. Quelch has published an excellent contribution to our knowledge of "The Boa-Constrictors of British Guiana." We may quote the following statements as being of general interest to zoologists:—

"In size this Water-Boa seems to exceed all other snakes, and it would appear to be more deserving of the ancient name Anaconda than the eastern forms to which it was first applied. In fact, it may be said that the name is almost limited nowadays to this tropical American species. The length is known to reach 37 ft., but it is said that much larger specimens have been taken. On this point, however, it is hardly safe to express an opinion, since unless definite measurements are made the estimate of size can be of little value. A case in point, which would suggest caution in accepting the great lengths ascribed to certain animals, may be quoted from the writer's experience as regards the large Black Alligator, locally known as Caiman (*Alligator niger*). The length of this form is given by various travellers in the colony—as, for instance, by both Brown and Schomburgk—as from 20 to 25 ft., Waterton even recording 30 ft.; but there is no statement of actual measurement. In the writer's experience the largest forms of this species, taken in the very districts referred to by the fore-mentioned travellers, hardly exceeded 14 ft., though when seen in the water they appeared to be considerably larger. A similar example may be found in the great Arapaima Fish (*Arapaima gigas*), which is recorded as from 16 to 18 ft. in length, while in reality they hardly attain to more than half that size. Actual measurement is requisite in all such cases.

"Skins of the Water-Boa of from 18 to 25 ft. in length are frequently obtained, and in the sheltered swamps and along the creeks in the recesses of the forests it may well be that considerably larger animals would be met with. The following experience along the higher Essequibo River tends to support this. In 1894, while passing by a wide outgrowth of closely-matted grass from the swampy bank, the boat disturbed an enormous Snake, of which the head, neck, and part of the body were clearly seen at a distance of certainly not more than five feet. It was noticeable that the head was considerably more than twice as large as that of one of about 20 ft., and this seems to indicate a Snake of very large proportions. The unfortunate part of the matter is that Snakes of very great size are most likely to be seen in places where it is out of the question to secure them, as it happened in this particular case."



IN the 'Essex Naturalist' (1897, p. 169), Mr. H. C. Sorby has contributed "Notes on the Food of Oysters in Essex":—"Some years ago I was led to think that very much remained to be discovered with regard to the food of Oysters in different localities. No reliance can of course be placed on the examination of the contents of the stomach after the Oysters have been kept for some hours out of the natural water, since the food would be digested; and the sooner they are examined the better. When lying in the yacht at Paglesham, I had a good opportunity for studying this question, since my friend Mr. James Wiseman gave orders to his men to supply me with Oysters, which were brought to me and the contents of the stomach examined with a microscope only a few minutes after having been taken out of the water; so that some of the diatoms they had eaten were still alive. I found that at Paglesham the chief, if not the entire, food was diatoms. Soon afterwards I had the opportunity of observing Oysters taken out of Brightlingsea Creek, and which were examined as soon as I could, but not so immediately as in the case of those at Paglesham. I was surprised to find that the food of the Brightlingsea Oysters was very different. Diatoms were few in number, or absent; but, on the contrary, the stomachs contained very small animals, which I took to be Infusoria, or small larvæ, not easily identified. At all events, the contrast in these two cases was so great as to readily explain why the growth and flavour of Oysters fed in different waters may be so different."

WE have received from the Society for the Protection of Birds a tract entitled 'The Trade in Birds' Feathers,' reprinted from the 'Times.' The first instalment is a letter written to that journal by Mr. W. H. Hudson, from which we extract the following details:—

"Thursday, Dec. 14th, was a purple day at the Commercial Sale Rooms in the City, where feathers for the decoration of our women formed the attraction, and besides some hundreds of boxes of white Ospreys an incredible number of bird-skins of brilliant plumage, collected from all quarters of the world, were disposed of. Birds of modest-coloured plumage were also to be had; and it was surprising to see huge cases filled with Tits and other small species from Japan, a proof that the once artistic and bird-loving people of that distant beautiful country are anxious to be up to date and Western in all things, even to the extermination of their little feathered fellow-creatures. There were also some magnificent Pigeons, the most notable being the Bronze, the Goura, and the Victoria Crowned Pigeon. A curious destiny—to be pulled to pieces and used in the ornamenting of hats—of the last noble Dove, appropriately named after our august and tender-hearted Sovereign, whose love of all things, both great and small, is so well known to her subjects. Conspicuous even among the most

splendid species were the Birds of Paradise—upwards of two thousand specimens.

“From the Western world it was interesting to see two such birds as the *Rupicola*, or Cock-of-the-Rock, and the once sacred Quetzal; the first the most vividly coloured, the second the loveliest, bird on that continent, perhaps on the globe. Both species are known to be excessively rare, and it cannot be hoped that they will long escape a fate which has overtaken other persecuted species of less value commercially.

“Other kinds—Argus and Impeyan Pheasants, Jays, Trogons, Kingfishers, Orioles, Tanagers, innumerable Humming-birds, and many more—need not be spoken of in detail. I will only mention the Parrots, for there were many—125,300 specimens, mostly from India. Spread out in Trafalgar Square, they would have covered a large portion of that space with a gay grass-green carpet, flecked with vivid purple, rose, and scarlet.”

The ‘Times,’ commenting on this communication in a leading article under date of Dec. 25th last, observed:—

“It will be said perhaps that the slaughter and sale of these birds is all in the way of legitimate trade, a mere commonplace matter of supply and demand; that the law of nature is a law of rapine and ruthless slaughter; that the fowler for gain who pouches a Humming-bird or a Bird of Paradise, with as little misgiving as an angler baskets a Trout, is a mere instrument of this law to which birds themselves are subject both actively and passively; and that at worst he deals swift death to animals which would otherwise fall victims to their fellows, or to some other agency of nature ‘red in tooth and claw.’ All this is true, and perhaps to some extent it justifies the fowler and the trader. But it does not touch the wearer. She is the root of the evil. The wearing of feathers taken from birds slaughtered for the sake of them is in no sense a necessity. It does not minister in any way to the comfort or welfare of man, woman, or child. It is a mere vanity and fashion—a custom, if women would but think so, infinitely more honoured in the breach than in the observance. A large proportion of the birds whose feathers women wear are slain only for their sake. If the demand were extinguished the slaughter would cease, and the birds would live their own lives subject only to the appointed laws of their own being.”

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THE ‘Star’ recently “interviewed” Mr. Jamrach, the well-known dealer in wild animals. We gather from the information extracted that “Lions are at a discount; they breed too many in the ‘zoos.’ Elephants are steady (on their feet) at £100 apiece—rather a drop that from twenty years ago, when Jumbo fetched £2000, and the average ran £400 to £500! Giraffes are pretty high (every way). The closing of the Upper Nile and the loss of

Khartoum sent the prices sailing. Giraffes went as low as £60 before that; now they go up to £500. There are plenty, but we cannot get them. The last man who went out Giraffe-hunting lost his head.”

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THE British Museum authorities have purchased Gilbert White's original manuscript of his 'Garden Kalendar' from 1751 to 1767—an important work, a small portion of which only has been published.

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SINCE the death of Charles Darwin, his home, Down, not far from Bromley, has remained in the possession of his family. For much of the time it has been unoccupied, and it is suggested that if his family were willing to part with it, it might be purchased in order to preserve a permanent memorial of him in some way.

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THE efforts which have been made to stock the rivers of Natal with Trout and Salmon have at length been crowned with success, says the 'Natal Witness.' In 1889, Sir Charles Mitchell, Governor, appointed a Committee, with Mr. Cecil Yonge as Chairman, to see what steps could be taken, and two grants of £500 each were made. These were supplemented by a smaller sum from the Government and by subscriptions from the public, and operations were carried out from 1890 to 1892. During that period 9098 young Trout-fry were imported and turned into some of the larger rivers, and efforts were made to stock the Umkomanzi River with Salmon. Judging by the report of Mr. Yonge, just handed to the Minister of Agriculture, it would appear that the results of the efforts to introduce Trout are extremely satisfactory, particularly in the case of the Bushman's River. The report contains the following recommendations:—(1) That the Government continue to preserve and close ten miles of the Bushman's River with the drift known as Robinson's, or Ulundi, as the centre, under the supervision of a caretaker. (2) That the Umgeni be also preserved from above the MacArthur Falls. (3) That the importation of ova be continued, and in this connection that inquiry be made as to whether or not a supply of ova and breeding Trout could be obtained from the Cape Government. (4) That steps be taken to obtain a supply of young fry and spawn from the Bushman's River for future breeding purposes, and that a rearing pond or ponds be made in the vicinity of the Bushman's River, at a distance of about three hours' ride from Mooi River Station.

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“THE Danish Lieut. Olussen, Dr. O. Paulsen the botanist, and Dr. A. Hjuler the naturalist are to leave Copenhagen this month (March) for their scientific expedition to Central Asia. Their first object is the exploration

of the Jaschikul lake in the Alittschur Pamir, which lies 12,090 ft. above the sea-level, and to which they travel through Kashgar and Yarkand. Thence the expedition will cross over the difficult passes into the province of Bakhau, in the South Pamir, where photographs and plans will be taken of the ruins belonging to the period of the 'Siaposcher.' The explorers intend to spend the winter of 1898-9 in the province of Ischkaschin, in the territory of Bokhara, where a meteorological station will be erected, and researches made in botany, zoology, and ethnography. In the summer of 1899 the expedition will journey along the Amu-Darya to Khiva, on the Sea of Aral, where the ruins of the flourishing period of the history of Khiva are to be photographed. The costs will be provided in part by the Danish State, partly from the Carlsborg Fund, and partly by A. Nielsen, the Danish Consul in Rostow."—*Athenæum*.

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THE ornithology of the Philippine Islands has been much studied of late years in this country, and many papers thereon have been published by the late Marquis of Tweeddale, Dr. Bowdler Sharpe, W. R. Ogilvy-Grant, A. H. Everett, and others. In the Proc. U. S. Nat. Museum there has recently appeared "A List of the Birds known to inhabit the Philippine and Palawan Islands, showing their distribution within the limits of the two Groups," written by Dean C. Worcester and Frank S. Bourns. Both these authors have collected on the spot, and they have studied the available literature on the subject, giving a bibliography of papers consulted. Differentiating the *political* and *zoological* areas, they have separated the Palawan group—of Bornean affinities—from the "Philippines proper." In a list of known species, excluding those which occur in the Palawan group, but have not yet been found in the Philippines, 526 species are enumerated. A map and six distribution charts add to the value of a valuable contribution to zoo-geography.

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MR. WALTER FAXON has published in the Proc. U. S. Nat. Mus. Washington some "Observations on the *Astacida*, &c.," which may be taken as supplementary to his "Notes on American Crayfishes," issued in 1890. The paper generally is naturally of a technical description, but many observations are recorded as to the habits of these interesting creatures. *Cheraps bicarinatus*, Gray, according to Eyre, as quoted by Gray, "is found in the alluvial flats of the river Murray, in South Australia, which are subject to a periodical flooding by the river. It burrows deep below the surface of the ground as the floods recede and are dried up, and remains dormant until the next flooding recalls it to the surface. At first it is in a thin and weakly state, but soon recovers and gets plump and fat, at which

time it is most excellent eating. Thousands are procured from a small space of ground with ease, and hundreds of natives are supported in abundance and luxury by them for many weeks together. It sometimes happens that the flood does not occur every year, and in this case the "eu-kod-ko" lie dormant until the next, and a year and a half would thus be passed below the surface. I have often seen them dug out of my garden, or in my wheat field, by men engaged in digging ditches for irrigation. The floods usually overflow the river-flats in August or September, and recede again in February or March."

"According to Nicolet, Crayfishes are found in the rivers, brooks, and even in the forests of southern Chile, where they live in holes in the ground, around the entrance of which they construct earthworks in the shape of a cone nearly a foot in height. As is well known, *Cambarus diogenes*, Girard, erects similar mud towers or "chimneys" in the United States, and Mr. P. R. Uhler tells me that *Cambarus dubius*, Faxon, has the same habit in Western Virginia. Titian R. Peale informed Girard that he had observed mud chimneys, altogether similar to those of *C. diogenes*, along the Rio Magdalena in New Grenada, several hundred miles from the seashore. But the builders of these chimneys in New Grenada still remain unknown to science. In this connection it is worthy of note that the earliest mention of adobe towers erected at the mouth of crustacean burrows occurs in Molina's work on the Natural History of Chile, p. 208."

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WE have received the Report of the Council of the Zoological Society of London for 1897, which proves the Society, both scientifically and financially, to be in a highly prosperous condition. In the Gardens at Regent's Park the principal new building is the Ostrich and Crane house, commenced in 1896 and finished in March last year. During the past summer also a new glass house for reception of the Society's collection of Tortoises has been built adjoining the Reptile house at a total cost of £464 14s. 8d., which amount, however, will ultimately be lessened by the sum of £150 which the Hon. Walter Rothschild, F.Z.S., who is especially interested in these animals, has kindly contributed towards it. The removal of the Tortoises into their new house, which seems in every way adapted for their requirements, enables the public to view them with much greater facility than was the case in the building formerly allotted to them on the other side of the Gardens. It is also of great advantage to have the whole of the specimens of living Reptiles and Batrachians placed under the same care, and arranged in the same part of the Gardens.

The total number of deaths of animals in the Gardens during the year 1897 was 1196 as against 986 in 1896. This increase of 210 is chiefly due to the large number of small Reptiles received during the year. The

number of important deaths has been rather larger than usual. No fewer than six anthropoid Apes have died, *viz.* a Chimpanzee, two Orangs, and three Hoolock Gibbons. Among the larger Carnivora there have been also some losses. A young Tiger, two Cheetahs, two young Lions, and the Snow Leopard are among the most important of these. As an instance of longevity in confinement may be mentioned the Amphiuma, which was acquired in 1870, having thus lived twenty-seven years in the Gardens. A Reticulated Python, which was supposed to be the largest ever exhibited, had been at the time of its death twenty years in the Gardens. Two Burchell's Zebras, mother and foal, a White-bellied Pangolin, an Apteryx, and a Hyrax complete the list of the more noteworthy deaths during the year.

The number of animals belonging to the first three classes of Vertebrates living in the Society's Menagerie at the close of 1897 was 2585, consisting of 792 mammals, 1362 birds, and 431 reptiles. The corresponding number on Dec. 31st, 1896, was 2473. The total number of registered additions to the Menagerie in 1897 was 1508, of which 688 were acquired by presentation, 278 by purchase, 104 were bred in the gardens, 330 were received on deposit, and 108 obtained in exchange. The total number of visitors to the Society's Gardens in 1897 was 717,755, showing an increase of 52,751 as compared with the corresponding number in 1896. The Diamond Jubilee, as well as the fine weather, no doubt combined to contribute to this result. No such large number of visitors has entered the Society's gates since the year 1884.

The quantity and nature of the food required for the animals in the Society's Gardens are shown by the subjoined table:—

*Provisions consumed in the Society's Menagerie during 1897.*

Clover.....	126 $\frac{1}{4}$ loads	Biscuits .....	295 cwt.
Hay.....	133 $\frac{1}{2}$ „	Bread .....	6081 qtn.
Straw .....	215 $\frac{3}{4}$ „	Milk .....	4914 qt.
Oats.....	144 qr.	Eggs .....	26,404
Wheat.....	44 „	Horses .....	225
Beans .....	4 $\frac{3}{4}$ qr.	Goats.....	236
Maize .....	70 „	Flounders.....	2190 lb.
Bran .....	294 „	Whittings .....	21,360 „
Canary .....	18 „	Rough Fish .....	1016 „
Hemp .....	11 „	Shrimps .....	1248 qt.
Rape .....	1 „	Fowl-heads .....	9380
Millet .....	5 $\frac{1}{4}$ „	Greens .....	4280 bunches
Barley.....	27 $\frac{1}{4}$ „	Onions .....	5 $\frac{3}{4}$ bush.
Buckwheat .....	6 $\frac{1}{2}$ „	Cress .....	3650 bunches
Rice .....	76 cwt.	Nuts .....	26 $\frac{1}{2}$ pecks
Oil-cake .....	43 „	Lettuce .....	502 score
Mawseed .....	35 lb.	Apples .....	154 bush.
Ground Nuts .....	39 cwt.	Pears.....	40 „
Barley Meal .....	56 lb.	Grapes .....	1032 lb.

Dates .....	1452 lb.	Marrows .....	45½ doz.
Carrots .....	87½ cwt.	Melons .....	26
Oranges .....	204 hundreds	Bananas .....	1273 doz.
Potatoes .....	71 cwt.	Turnips.....	3½ cwt.
Cherries .....	19 baskets		

“NOTES on the Introduction of the Brown Hare into Ireland” is the title of a paper contributed by Mr. G. E. H. Barrett-Hamilton to the ‘Irish Naturalist’ for last March. It has been prompted by the publication of Dr. Scharff’s paper “On the Origin of the European Fauna” (Proc. R. I. Acad. ser. iii. vol. iv. July, 1897). To summarize in the words of the author:—“In the memoir alluded to above, Dr. Scharff remarks that ‘the difficulty of establishing the English Hare permanently’ in Ireland ‘is altogether unconnected with climate or food,’ and that he believes that the distribution of the two species in Europe generally seems to indicate that they will not live together (*op. cit.* i. pp. 435 and 471). If this be so, and if, as Dr. Scharff believes, the English Hare is probably the stronger of the two species, then, all other things being equal, we should expect introductions of the English Hare into Ireland to be extremely successful, since in that country not only is the native Hare a presumably weaker species, but whole tracts of country are quite without Hares at all. On analysis of the twelve instances of the introduction of Brown Hares into Ireland, of which I have been able to give some particulars, this is found to be the case. Of these introductions ten may, I think, be regarded as authenticated—*viz.* those which took place at Copeland Island, Tralulgan, Powerscourt, Cleenish Island, Strabane, Castle Hyde, Fermanagh, Baronscourt, Castlemartyr, and Lurgan. On further examination, however, it is at once evident that in several instances the imported animals were never really given a fair chance of establishing themselves in their new homes, and particularly in the case of Copeland and Cleenish Islands, where the Hares were confined to a narrow space, and probably also artificially fed. At Tralulgan the Hares were imported expressly to be killed by coursing; at Powerscourt they were either injured in the transit to Ireland, or were killed as soon as they left the protection of the demesne, and similarly in most of the remaining instances their extermination was only brought about by man himself. Yet, in spite of the efforts of their enemies, whether legal or illegal, to destroy them, we have evidence—in many of the cases which I have cited—of their power to become permanently established when given a fair chance, and the success of the Strabane introduction is alone a sufficient proof of this.”

“The refusal of the English Hares to associate with the Irish species, as reported in more than one instance, is of interest, and tends to support Dr. Scharff’s views that the two species are antagonistic, and that the Brown

Hare, being the stronger of the two, has driven the other out of the European plain into the mountains. This supposition is further supported by the behaviour of the two species in Scotland, where their respective ranges meet."

Some other interesting facts are given as to the introduction of Irish Hares into Great Britain, and Scotch Hares in Ireland and South Scotland.

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OUR excellent and invigorating contemporary, 'Natural Science,' in its last number, remarks on the present somewhat dilapidated condition of the Newcastle Museum—that is, the building, not the contents. "The connection of this Museum with Albany and John Hancock is well known, and many other naturalists of repute have carried on their work there. In consequence of this the collections are of more value than is usual in a provincial museum, and it is certainly some consolation to find" that the members of the Natural History Society of the Counties of Northumberland, Durham, and Newcastle held a special meeting on March 16th to consider how funds could be raised to provide the necessary repairs. We are glad to see that considerable financial support was promised, and that before long there is every prospect of the necessary £2500 being acquired.

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WE regret to notice the deaths of Mr. George Christopher Dennis, for many years President of the York and District Field Naturalists' Society, which took place on the 22nd of last December; and of Mr. James I'Anson, a valued President of the Darlington and Teesdale Naturalists' Field Club, on the 30th March.

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A SPECIMEN of the Common Sandpiper, seen in St. James's Park, is recorded in the 'Field' of May 7th:—"On April 25th I had the unusual pleasure to a Londoner of seeing a Common Sandpiper (*Totanus hypoleucus*) in St. James's Park, just outside the Cormorant's inclosure, and on the edge of the island. I saw it alight, uttering its usual sharp note, and it seemed as much at home there as on a Welsh llyn or a Scottish lochside, stepping daintily along, with much tail-waving, in search of food. The keeper had not seen it, though he knows the bird as a casual spring visitor there, and it is not unknown on passage on the Serpentine and the foreshore at Battersea."—CHARLES H. EMSON.





# THE ZOOLOGIST

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## ON THE FIRST PRIMARY IN CERTAIN PASSERINE BIRDS.

By ARTHUR GARDINER BUTLER, Ph.D., and ARTHUR  
GEORGE BUTLER, M.B. Lond.

IN many Passerine birds the first primary is exceedingly small as compared with the second; and in the case of the families *Fringillidæ*, *Motacillidæ*, and *Hirundinidæ*, this feather has been authoritatively declared to be absent. As far back as Jerdon's time, and probably at a much earlier date, it was stated that these groups of birds possessed only nine primary quill-feathers; indeed, Dr. Jerdon notes this as the character which distinguishes the *Ploceinæ* and *Estreldinæ*, which are admitted to have a small first primary, from the other groups which he includes in his extended family *Fringillidæ*.\*

In Seebohm's 'History of British Birds' we read:—"The Finches form a large group of birds which may at once be distinguished from all the other subfamilies of the *Passeridæ* by their combination of a stout conical bill with the entire absence of a first primary."

Of the Wagtails he says:—"The absence of a bastard or first primary sufficiently distinguishes them from the Thrushes, Tits, Crows, or Shrikes; and also from the Waxwings and Starlings, in which the bastard primary, though very small, is always present." Of the *Hirundinidæ* he says:—"They have no bastard primary."

\* He included the Ploceine Finches, the Tanagers, and the Larks.  
*Zool. 4th ser. vol. II., June, 1898.*

Some months ago the question arose between us as to the principal distinguishing characters of the Fringilline and Ploceine Finches, and (naturally) this difference of number in the primaries was the first structural point to be considered. Having a wing of the common Siskin and several wings of Waxbills and Mannikins, we examined the two types, and (to our unbounded astonishment), discovered the first primary well developed in both, but with this difference:—In the Fringillid bird the first primary was shorter than, and therefore completely concealed by, its upper covert; whereas in the Ploceid bird the first primary projected beyond its covert.

Thinking it quite impossible that, if this fact were common to all examples of all species of the two families, it could have been so long overlooked, we have gradually accumulated the wings of various species in which the first primary was declared to be absent, and we are bound to say that, not only have we never failed to find it in any species which we have examined, but that in some species, such as the Sparrow (*Passer domesticus*) and the Canary (*Serinus canaria*), it is far better developed than in many of the Ploceid Finches.

We have examined wings of the following species:—

FRINGILLIDÆ. — *Chrysomitris spinus*, *C. tristis*, *C. totta*; *Serinus icterus*, *S. canaria*, *S. leucopygius*; *Carduelis carduelis*; *Acanthis cannabina*, *A. rufescens*; *Fringilla cœlebs*, *F. montifringilla*; *Passer domesticus*; *Pyrrhula pyrrhula*; *Guiraca cœrulea*; *Chloris chloris*; *Cardinalis cardinalis*; *Alario alario*.

MOTACILLIDÆ. — *Motacilla melanope*; *Anthus trivialis*, *A. pratensis*.

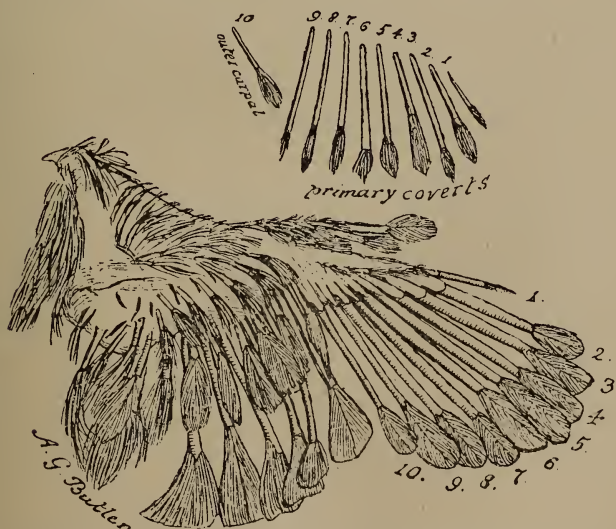
HIRUNDINIDÆ.—*Hirundo rustica*.

Being anxious to make no mistake, we were not content to examine single examples, but, wherever possible, carefully removed the lower coverts from several examples of each species; in no single instance did we fail to discover the small first primary, although in *Motacilla melanope* it is very minute and almost linear (narrowly hastate); in fact, we found it best developed in the Sparrow, and worst developed in the Grey Wagtail. Even yet, it seemed so strange that a feather which we always discovered easily should have been so long overlooked, that we were not convinced, but determined to obtain undeve-

loped wings of some species, in order to make quite certain of our fact before recording it.

From several nests of *Passer domesticus*, all of which unfortunately contained eggs only, one egg (incubated about nine days) contained a young bird from which a wing could be obtained. When placed under the microscope nine primaries were already commencing to appear from their follicles, but the first primary, the follicular depression of which was well defined, had not yet appeared.

A few days later, several young Canaries, which died seven and nine days after leaving the egg, were found to have all ten primaries, with their coverts, perfectly clearly developed; we were thus compelled to come to the conclusion that the accepted definition of these three families, *Fringillidæ*, *Motacillidæ*, and *Hirundinidæ* should be modified, and that, instead of the statement that the first primary is *absent*, the following should be substituted:—"The first primary is concealed within its coverts." It seems to us that the only explanation of the supposition that no first primary existed, is that the student has in every instance removed the concealed primary when taking off the under wing-coverts to trace the origin of the quills.



Wing of Sparrow ten days old, the primary coverts removed. Enlarged about one-third.

The examination of the wings of a Sparrow, recently taken from the nest when about ten days old, seems clearly to indicate that the so-called outer carpal covert replaces the tenth primary covert, and is homologous to that covert (which is absent); it certainly is identical with the feather which we accept as the tenth covert in the Canary and in other true Finches, as, for instance, in the Virginian Cardinal.

In the *Icteridæ*, which are said to differ from the Starlings in having only nine primaries, we have found the first primary in the Silky Cowbird, Brown-headed Troupial, Bobolink, Red-breasted Marsh-bird, Military and Yellow-shouldered Troupials, and Brazilian Hangnest; indeed, the first primary, with its upper covert, are so conspicuous in these large birds, that they can frequently be seen without even using a needle to separate them from the second primary. In the *Motacillidæ*, where the first primary is very small and lies close to the second, it might easily be overlooked, but that a feather nearly (if not quite) half an inch long should have escaped observation is inexplicable.

WHITE WAGTAIL (*MOTACILLA ALBA*) IN  
IRELAND.

BY ROBERT WARREN.

So very little was known of this Wagtail in Ireland, that William Thompson had never met an Irish specimen, and he thus speaks of it in his work on the 'Birds of Ireland':—"Is believed to be at least an occasional visitant. It is included on the following testimony. In a letter to me from Mr. R. Ball, dated Dublin, June 19th, 1846, it was stated that a few days before, when at Roundwood, he had seen a specimen of the true *M. alba*, as distinguished from *M. yarrellii*. He remarked:—"We watched it for some time, though at a short distance from us, with a small telescope used for such purposes; its beautiful plumage was very distinct from that of the common species, and its habit much more sedate than usual with Wagtails; "it wagged" but little, and walked about demurely. I am sure that I have often seen the species before. As the bird was not obtained, its occurrence would not be inserted here without my perfect reliance on the knowledge and acute observation of my informant."

Such was all the meagre information that was obtained by Mr. Thompson of this bird in Ireland, and nothing more was heard of the species until April 25th, 1851, on which day I had the good fortune of shooting, on the island of Bartragh, the first authentic specimen known to have been obtained in Ireland. I met the bird in a field where some men were sowing barley, and as it followed the harrows, picking up insects. My attention was attracted by its quiet demeanour and light grey plumage, so different from that of our native Wagtails, and after observing it for some time it occurred to me that it might be the rare *M. alba*, so, drawing the larger shot from my gun that I had for Rabbits, I put in a charge of No. 8, and knocked the bird over at the first shot. On picking up and examining it, I felt

confident that it was the rare Wagtail; but, to be certain of its identity, I sent the specimen to my old friend the late Dr. J. R. Harvey, of Cork, and he wrote to say that he "had no doubt of its being the true *M. alba*, but that, unfortunately, it had been so long delayed in the Post Office, that on its arrival it was unfit for preservation, and to his great disappointment the specimen was lost."

For several years after nothing more was seen or heard of the White Wagtail, until April 29th, 1893, when visiting Bartragh with some friends, we met a pair of Wagtails feeding on a little wet flat piece of sand at the base of the sand-hills, and about 300 yards from where I shot the bird in 1851. These birds walked about quietly, with none of the restlessness of the common species, for probably they were tired after their long flight from Spain or Africa. After observing them for some time with my glass, and admiring their lovely plumage, I shot one, the other bird flying right off out of our sight, and we did not see it again. This specimen is now in the collection of the Museum of Science and Art, Dublin.

Having shown the bird to Mr. A. C. Kirkwood (who resides on the island), I asked him to keep a sharp look-out for these Wagtails every season during the month of April; and last season, towards the end of that month, he observed a beautiful bird in the light grey plumage, a short distance from the place where I met the pair in 1893. After looking at it for some time with his glass, he went for his gun, but in the meantime a heavy rainfall coming on drove it away to shelter, and when he returned to the place the bird had disappeared. However, this season he was more fortunate, for on two occasions he met the White Wagtail on the island, and obtained three specimens out of each flock.

He met the first lot of five birds on April 30th, feeding in a field lately sown with oats, and his attention being attracted by their light grey backs and white cheeks, he brought his glass to bear on them, observing them for a long time, as they (like the birds previously seen) walked quietly about the field, with none of the restlessness so constantly shown by the common Wagtails. He then got his gun and shot three fine birds, which he kindly brought to show me. One, a perfect type of the

*M. alba*, was too much injured by the shot to keep for a specimen, but the other two I sent to Mr. E. Williams, of Dublin, for preservation.

Again, on May 10th, Mr. Kirkwood came across a small flock of fifteen birds, resting on a bare stony slope of a small hillock, near where he saw the bird last season. On looking at them with his glass, he observed that all were in the light grey plumage, but on approaching for a closer view they all rose from the hill, and pitched on the shore amongst the rocks and stones. Just then, a heavy shower coming on, he said it was amusing to see them seeking for shelter from the rain under the lee of the rocks. Sometimes two or three birds might be seen huddled together on the sheltered side of rocks or large stones, evincing a decided aversion to the rain wetting their plumage. These birds appeared to Mr. Kirkwood to be resting, and not inclined to feed, probably being tired after struggling against the stiff gale of N.N.W. wind that had been blowing for two or three days past; and that when passing over Bartragh they dropped down to rest a little before continuing their flight across the sea to Iceland, which was evidently their destination. Mr. Kirkwood obtained three birds out of this flock, and more lovely specimens of the *M. alba* I never saw, the intense black of the breast and head contrasting so strongly with the snow-white of the forehead, cheeks, and sides of neck, which extended down almost to the shoulders.

One of the specimens was very badly injured by the shots, but the other two were sent to my friend Mr. Howard Saunders, of London, who presented them to the Natural History Museum. It is a strange fact that up to the present (except on the Island of Bartragh) there is no authentic record of the capture of *Motacilla alba* in any other part of Ireland; and why Bartragh Island should be so favoured it is difficult to say. However, I may suggest that the birds met with on Bartragh were on their way to their breeding-haunts in Iceland; and as the direct course from their winter-quarters in Spain to Iceland would be across the sea, right over Ireland, and the straight line of flight passing over Bartragh and Killala Bay, is it not more likely that the tired birds would rest on Bartragh, the last point of land between them and Iceland, rather than on any of the more

inland parts of the country? It appears to me very evident that these birds, holding such a westerly course, were going direct to Iceland; for birds making Norway and Lapland their destination would keep more to the eastward on their course, a few, perhaps, touching the English coast, while the bulk of the flight would keep along the Dutch and Danish coasts.

*Addendum.*—Through inadvertence, I omitted the fact that in 1893 a specimen was obtained on Achill Island, Co. Mayo, by Mr. Sheridan, of Slieve Mort Hotel. It may interest some readers to know that, two or three days after the flight seen by Mr. Kirkwood on May 10th had left the island, they were succeeded by a little party of five birds, which remained up to the 19th, on which day I had the pleasure of seeing three of them; and on the 26th Mr. Kirkwood, calling here, informed me that a pair of the Wagtails were still on the island, haunting an ivy-covered cliff, as if going to build there. However, I do not think it likely that they will breed, and that they were only detained from continuing their northern journey by the long-continued north-west winds.



## ZOOLOGICAL RAMBLES IN THE TRANSVAAL.

BY W. L. DISTANT.

*Barberton.*—To leave the high veld as seen around Pretoria and Johannesburg, respectively 4500 ft. and 5600 ft. above sea-level, and to travel to Barberton with its altitude of only 3000 ft., backed by thickly wooded hills, is a great treat for a naturalist. Formerly, as when I first visited the State, the journey consisted of a long and weary coach-ride, but in 1895 I covered the distance in twenty-four hours, thanks to a combination of rail and coach, though long since then the passenger travels the whole distance by rail. The scenery becomes very fine after the descent is made into the Crocodile River valley, but this grand stream now contains, or did at the time of my visit, comparatively few fish. The reason is soon told. During the construction of the railway, which in parts almost follows the course of the river, it was found cheaper to give the Kafirs a couple of dynamite cartridges, with which they could obtain a fish diet, than to supply them with the usual allowance of "mealies." The completion of this railway was a very slow process, and the river thus became almost depopulated. The contractor who gave me this information, and who had himself constructed that part of the line, related an instance of Kafir ignorance or stupidity in using these cartridges. An individual, fresh to the work, lighted the fuse of both cartridges, one of which he held in his hand, while he watched the effect of the other he had thrown in the water, with a result that is unnecessary to describe. But it will be long before the Crocodile River is again well stocked with fish; the use of the dynamite cartridge is somewhat prevalent in Transvaal rivers, and if the vast railway enterprise only now commencing in Africa is conducted on similar lines, ichthyologists will soon have to record a vast diminution in specimens, if not in species.

At Crocodile Poort, where rail was exchanged for coach, and a six or seven hours' drive to Barberton was then a necessity, a

small store existed where passengers obtained refreshment. While breakfasting here on my return journey, some Kafirs brought in a very healthy young Lion cub, with the skin and skull of its mother, which they had recently killed on the opposite side of the river, thus proving conclusively that Lions were still found in this part of the Transvaal, a fact of which I had been in some doubt. Securing Lion cubs is a dangerous proceeding. I heard that a short time previously some Kafirs had found unprotected cubs, and had crossed the river three times with them to destroy their spoor, as they felt the parents would undoubtedly follow. They safely secured their retreat with the cubs, but the infuriated Lions came across some innocent Kafirs, and killed three of them. I endeavoured in vain to purchase this young specimen from the storekeeper, but found £5 no inducement. Both the skins and skulls of Lions are occasionally brought into Pretoria market by the Boers, and during the scarcity of game caused by the rinderpest more than one was killed in spots much nearer civilization than was considered probable.

But there are other noxious animals in the vicinity. I had a chat with a colonial who had embarked in Transvaal farming, and listened to a tale of woe. Porcupines (*Hystrix afro-australis*) were devastating his potatoes; they ran between the rows of "earthed-up" plants, where they easily burrowed and secured the roots; a colony of Baboons visited at uncertain intervals his "mealie" crop, as did also some "Wild Pigs," probably *Sus africanus*, whilst Locust swarms frequently ravaged the farm. My friend Dr. Percy Rendall, who resided near, and in, Barberton for some two years, and was an enthusiastic and successful naturalist and collector, has recorded the Antelopes of the district in "Field-notes on the Antelopes of the Transvaal."\*

Barberton is a quiet little town now, with memories of vanished glories and perished prosperity as a mining centre. Lofty and well-wooded mountains form its background; in front, one gazes over an undulating scene; the surface is waved, and looks like a petrified stormy sea. In the town no one seemed prosperous, and no one hopeless, and there was a Micawber-like trust in some vast future gold industry. The climate is subtropical—the temperature reached 128° F. during my visit (January)—good

\* Proc. Zool. Soc. Lond. 1895, pp. 358-362.

pineapples can be grown, but the peaches are very inferior. Few flowering plants were to be seen, as the season was too far advanced; ferns were abundant in number and species, and many terrestrial orchids were to be found.

Some very interesting Spiders are common to this locality. When in Pretoria, my friend Dr. Rendall sent me two specimens of a fine "Mygale" (*Harpactira gigas*),\* with the following notes:— (1) "Captured under a large stone, and put in a box with a Frog, which it promptly attacked and bit. The Frog died very soon afterwards. There was no combat so far as the Frog was concerned, only fright. (2) I have obtained another 'Mygale,' and some day or two after it had been killed it fell on the ground, and was promptly pounced upon by a half-grown cat, which ate a portion of the body, and then turned deathly sick, staggered about, lay down on its side panting, and seemed about to die; but, after thus fruitlessly arousing our compassion, recovered after some hours." This was probably caused by the hairs attached to the body of the Spider. Bates, giving his experience on the Amazons of a species, *Mygale avicularia*, writes:—"The hairs with which they are clothed come off when touched, and cause a peculiar and almost maddening irritation. The first specimen that I killed and prepared was handled incautiously, and I suffered terribly for three days afterwards." The total length of this formidable creature of Barberton is forty millimetres.

Another somewhat small but social Spider, *Stegodyphus gregarius*, is not uncommon either at Barberton or Pretoria. Its presence is denoted by its large irregularly shaped nest affixed to the twigs of some thorn bush, where it is liable to create a momentary impression that one is looking at some unknown lepidopteral construction. The size of the nest is clearly variable. The Rev. O. Pickard Cambridge, in describing the species, wrote†:—"A nest of this Spider, containing numerous live individuals of both sexes, some adult, some immature, was sent a short time ago by Col. Bowker from Durban to Lord Walsingham, who, kindly acting on my suggestion, sent the whole to this

\* A new species just described by Mr. Pocock (Ann. and Mag. Nat. Hist. ser. 7, vol. i. p. 316). The same author has in these pages recently described stridulation in these Arachnids (*ante*, p. 14).

† Proc. Zool. Soc. Lond. 1889, p. 44.

Society's Gardens, where, as I understand from Mr. Arthur Thomson, in whose care they are placed, the whole family are in a very active and thriving state. The nest is of considerable size, and filled a box of two feet long by nine inches wide and five deep. Above this nest I hear that the Spiders have now spun lines up to the top of the case in which they have been placed, as though for the ensnaring of flies, &c.; but as their work is entirely nocturnal no observations have yet been practicable in respect to the most interesting part of a Spider's economy. They appear to devour cockroaches and crickets, tearing them to pieces, and each carrying off his share of the prey, like a pack of hounds breaking up a Fox." As observed by Mons. E. Simon in Colombo—for the species is found both on the East Coast of Africa and in India—several hundred individuals spin on a bush an immense nest which has the form of an irregular sack, of which the interior is divided by partitions and traversed by passages.\* The nest, which I have here figured, natural size, is seen to be very much smaller than those thus described, while the dead leaves which are incorporated tend to render it inconspicuous at a distance. Some of the Pretoria nests were larger and much more foliaceous, but unfortunately this part of my collection was lost in transit, and the nest figured is the only one I now possess. Fortunately, however, its identity is beyond question, as the Spiders recognized by Mr. Pocock as *Stegodyphus gregarius* were captured after emerging from this very nest. I once placed a similarly-sized nest in a cardboard box about one foot square, and for the time forgot all about it. When I did look again, numbers of Spiders had emerged from it and spun all over the box, the contents of which then appeared like one huge nest. It is probable in such a case that the box prompted the enlargement of the nest, or it may be provided a domicile suitable for the construction of the inner arrangements. Hence such a nest might be considered of an artificial or non-natural size, and may possibly explain the dimensions of the one sent home from Natal, and described by Mr. Cambridge, as previously quoted. I neither affirm nor suggest that such large nests are not constructed in the open; I can only assert that I have never seen such, but have met with quantities of the size figured.

\* Hist. Nat. des Araignées, tome i. p. 251.



Nest of Social Spider (*Stegodyphus gregarius*, Camb.).

“Rymer’s Creek” is a happy hunting-ground for an entomologist. It is a mountain path running at the back of the town, and which gradually narrows as it is ascended, for richer vegetation waits on its higher altitude. Delightful rivulets of cold spring water afford relief to the tired and too-perspiring naturalist, while for butterflies it proved the richest rendezvous I met in the Transvaal. Here one meets with the Natal Lepidopteral fauna, such species as *Amauris dominicanus*, *Protogoniomorpha anacardii*, *Charaxes varanes*, and *Papilio ophidicephalus* never being procured on the high veld of the Transvaal.

I left Barberton on Jan. 28th, when heavy rain began to set in. It was described as having been the driest summer remembered, and the watercourses were almost empty; but I heard a few days after:—“We have had awful weather since you left us; since the morning of the 28th over twelve inches of rain have fallen. From Thursday, Feb. 6th, at 1.30, to Friday the 7th, same hour, there fell 6.04 in. The country is full; letters cannot go forward. . . . I don’t think you would know the creek again if you came back; the road is gone, and is now like the bed of a mountain torrent.”

A peculiar coincidence with this dry summer (1894-5) in Pretoria was noted in the ‘Transvaal Advertiser’:—“This is an age of records, but Pretoria is recording an experience with reference to Horse-sickness which is wholly unprecedented. There may have been one or two isolated cases in town, but Horse-sickness—as known—has utterly failed to put in an appearance this year, whilst ‘red-water’ amongst cattle is raging throughout the land.”

*The Neighbourhood of Pienaars River.*—This is one of the most easily reached and best collecting-grounds near Pretoria. It used to be a six hours’ coach journey, but the Pietersburg Railway is now, I believe, completed to the neighbourhood, so that coaching in this direction is now a thing of the inconvenient past. Driving by road there is not much to strike the traveller beyond the usual open, dreary, but healthy veld, till Hammans Kraal is reached, and then a bush or forest country commences and continues to the Pienaars River. Hammans Kraal deserves a passing notice. It is here that the arachnologist Mons. E. Simon made a stay during his visit to the Transvaal; and when, as is

sometimes the case, that locality alone is appended to scientific descriptions, specialists should add "Pretoria District."

With the bush country commences an altogether different avian fauna from the scanty one as seen on the barren veld, where mining and commerce hold their sway. Here nature offers nothing but herself, and though the naturalist will rejoice, the incipient Midas will go empty away; it is a great felicity in our journey through this world to now and then reach an oasis which affords no prospect for commercial enterprise, and where natural conditions may survive—especially in the Transvaal. Driving along this road in the Easter holidays of 1894, I witnessed one of those travelling concourses of birds which have been described by Bates on the Amazons, Stolzmann in Peru, Belt in Nicaragua, and Hudson in Patagonia. Most of the local birds were represented, and were constantly crossing the road between the bush; it was not a rush, but more of a social excursion or food exploration from one part of the bush to another; and when I returned along the same road a few days later very few birds were seen, and these only of one or two of the commonest species. I never met with such a moving and varied assembly of birds again, and they were plentiful on and off for at least ten miles of the road. In February of 1891, along this very road, I once witnessed—but from a coach, when I could do nothing—vast quantities of what was to me always a very scarce butterfly, *Teracolus celimene*, which literally swarmed over damp roadside places. But though I made many subsequent excursions over the same area, at similar and other times of the summer season, and extending over a period of three years, I never met the species again. In this spot and in the month of November a lovely *Crinum*, apparently *C. ammocharoides*, may be found in all the luxuriance of its deep red bloom. Its beauty is somewhat short-lived, and I only saw it in bloom during this month. Lieut. von Höhnel found it blooming in the neighbourhood of Lake Stefanie in April, but that date is near the commencement of the rainy season there, as November is in the Transvaal. The plant evidently comes on very rapidly with the first advent of the rains, after having been incased in the brick-like earth during the dry season. It was a most interesting subject to myself as seen in bloom; for long before I dreamed of visiting the African

continent I had vainly tried, under glass and with heat, to cultivate the large and unsightly bulb. I succeeded in producing magnificent leaves, finer than those I subsequently saw under natural conditions, but I could never induce bloom. My failure was probably due to horticultural ignorance, as success is possible; but it emphasises the fact of the mystery of environmental conditions—all so simple and apparent in nature, so intricate under artificial arrangements. Another plant which may be found here, *Sesamopteris pentaphylla*, and which is not uncommon, possesses now a more general biological interest. Dr. Gregory, in his interesting book 'The Great Rift Valley,' has described and figured as a probable case of "mimicry" a number of the homopterous insect *Ityræa nigrocincta*, which in British East Africa clustered on a stem, and thus resembled the inflorescence of this plant. I have not, however, found the insect in the Transvaal, where the plant is anything but scarce; but I have seen many similar instances of other insects drying themselves in like manner and clusters after heavy rain, notably on one occasion by the Centoniid beetle *Diplognatha hebræa*, where certainly no "mimicry" was implied. The entomological circumstance is not unusual, but seldom, I think, so effective for suggesting "mimicry" as seen by Dr. Gregory.

In August, the height of the dry season, I have collected many birds in this neighbourhood. As soon as the bush is reached one is not long noticing the Drongo (*Buchanga assimilis*), a bird I never saw near Pretoria, but which is abundant in the bush and generally seen singly. I found the Drongo nesting in November. Small noisy flocks of long-tailed Shrikes (*Urolestes melanoleucus*) frequent the sides of the forest road. They perch high; and their long tails would probably be an inconvenience if they frequented the short, thick lower bush. Two Barbets are found; the pied (*Pogonorhynchus leucomelas*) is quite common. These birds fly singly in the bush and are easily approached. The beautiful Le Valliant's Barbet (*Trachyphonus caffer*) is much scarcer. Once among the thick twigs of a high tree I could just distinguish two birds either fighting or courting, and on firing I secured a specimen of this handsome species; I seldom saw it. An interesting bird common to this area is the Pied Babbling Thrush (*Crateropus bicolor*). Mr. Buckley, as quoted in Layard's



'Birds of South Africa,' well describes their habits—"going in flocks from tree to tree, following each other almost in single file;" and "if a wounded one gets into a tree it is extremely difficult to retrieve it." This last statement was precisely my own experience; and I had to send my Zulu attendant up a tree to retrieve a wounded bird which obstinately refused to move; but it is a remarkably tame and perhaps inquisitive bird if one remains quiet. Whenever resting in the bush I almost invariably expected after a short time to see this species close to me, either hopping on the ground near by among the bushes or settling in some adjacent tree overhead. Another tame bird is the scarce—for this part of the Transvaal at least—African Buzzard Eagle (*Asturina monogrammica*). The specimen I secured allowed me to approach quite close; a second example was an equally near acquaintance at Delagoa Bay; while a third was absolutely brought to me at Pretoria which had fallen to a small boy with a catapult. It is, however, anything but a common bird; and Mr. Thomsen, who resides near Pienaars River and has well collected the birds there from time to time, told me my specimen was the first one he had seen. Dr. Bowdler Sharpe, in Layard's 'Birds of South Africa,' writes of this bird: "Only just enters the country treated of in the present work, and never seems to come as low as the Cape Colony or even into Natal, as far as we know at present."

In connection with the habits of these and other allied Accipiters in the Transvaal, I often recalled a remark of the late Frank Buckland, as to being told by "a great observer of nature and a clever sportsman" that "hawks have their regular beat, and frequent daily the same line of country, soaring along for miles and miles in quest of prey," and that "he always marked the time and place when he saw a hawk on the hunt, and sure enough the next day would find my friend at the spot as confidently as if he was expecting a friend by the most punctual of railways." In a general and qualified way I found this true in the places I regularly frequented. If not violently disturbed the same bird may be seen day after day about the same spot and near the same hour, and even a specimen of *Elanus caruleus* that was driven away at long range for several days continued to appear regularly and punctually till my son obtained a less

impossible shot, which, though doing the bird comparatively little harm, caused a cessation of the visit at that particular spot.

Although the visit to Pienaars River which I am describing was at the commencement of August and in the midst of the dry season, the social Whitefronted Weaver Birds (*Plocepasser mahali*) had commenced to build their nests. They are tame birds and gregariously occupied the branches of some trees a very short distance from the store where I stayed. They have also a cheerful note and were continually exercising their short song. The Crimson-breasted Shrike (*Laniarius atrococcineus*) is here very common, flies low in the bush, and is easily secured. At this season Blue-breasted Waxbills (*Uræginthus cyanogaster*) are also seen in small flocks, and add a fitful and brilliant colour to the little cleared spots they frequent in the bright sunlight. The well-known and somewhat discordant cry of the Grey Plantain-eater (*Schizæerhis concolor*) frequently breaks the silence of the bush, but these birds are wary and difficult of approach. They are generally seen three or four together in a high tree, but with crest erect they usually take flight before one can get within range. However, it is not necessary to give a list of all the birds obtained, though reference may be made to the Lark-heeled Cuckoo (*Centropus senegalensis*), which is not uncommon near the Pienaars River. Many times, at a distance, I mistook this bird for an Accipiter, for its habits are somewhat solitary, and it perches and remains sitting stolidly in some tree near a clearing in the bush.

In November, when the rains were frequent, and the summer season fully on, I found many more good birds in this neighbourhood. Two fine Kingfishers, *Halcyon albiventris* and *H. cyanoleuca*, were both obtained some distance from the river and in the bush; the first named I also secured near Pretoria, likewise in bush away from water. The Pied Kingfisher (*Ceryle rudis*), which, on the other hand, is not at all uncommon, I never met with away from the banks of a stream. Three Cuckoos, *Cuculus clamosus*, *Coccytes jacobinus*, and *C. serratus*, were also far from scarce during this month, and were all secured.

It was in this neighbourhood that, during my last year's stay in the Transvaal, three fine Bateleur Eagles (*Helotarsus ecaudatus*), one male, two females, were trapped—steel trapped—as their legs

unfortunately bore witness. I was very anxious to secure these, and eventually did so, though I was compelled to purchase them from the Menagerie of Fillis's Circus—then performing in Pretoria—to which they had become annexed. I brought a male and female of these birds safely home to England with me, with a collection of other living creatures—a collection, however, which had for family reasons, to be compulsorily broken up, after a Baboon had escaped from his cage and dismantled the drawing-room. Other living birds which I obtained from this district were the Black Goshawk (*Melierax niger*) and the Black-shouldered Kite (*Elanus caeruleus*).

Many of my visits to Pienaars River were of purely entomological interest. The thick bush and old timber were features unknown to the high veld, and the distance of some sixty miles introduced the collector to an almost new insect fauna. In March, towards the end of the warm season, the butterfly genus *Teracolus* is well represented. In this month I took, and not singly, *T. subfasciatus*, *T. eris*, *T. agoye*, *T. auxo*, *T. evenina*, *T. achine*, and *T. phlegetonia*; all these may therefore be considered as more or less forest or bush-haunting species. Besides butterflies, I also secured many undescribed species of moths, but these must be sought about November in the warm rainy period. In Coleoptera, as the wooded country would suggest, many Longicornia are to be obtained, and I was told by Mr. Thomsen, who collected there, that he procured some species by smartly tapping old trees with a stone near where the well-known borings were observed, when the beetles,—probably *Prionidæ*, and very possibly *Macrotoma palmata*,—would come up sufficiently near to be seized cautiously and carefully by the antennæ. I tried the experiment myself, unsuccessfully, but can implicitly rely on the authenticity of my informant. This device was quite new to me, and is I believe generally unrecorded. But searching for beetles under bark is a course likely to prove introductory to new acquaintances, as near this neighbourhood I once found beneath the bark of an old tree-stump, some three feet above the ground, a pair of the Ophidian *Trimerorhinus tritæniatus*.

It may be mentioned, in conclusion, that in this wild spot my sojourn was made possible by the existence of a good hostelry

where the naturalist or sportsman can not only live in comfort, and eat and drink with safety—the last a very questionable matter in some parts of the Transvaal where the Hebrew from Russian Poland too frequently presides—but which is, or was, kept by two cultivated Germans from Frankfurt, one of whom is a good local naturalist, and the other a charming vocalist and good fellow. I found neither “mailed” nor tight fist there.

## NOTES AND QUERIES.

## MAMMALIA.

## CHIROPTERA.

**Albinic Example of Long-eared Bat.**—I have just found (May 3rd) what I venture to think is a rather unusual case of albinism in the shape of a white Bat (*Plecotus auritus*). When first seen it was nailed up in a barn, having been picked up dead by one of the farm lads. It is pure white, without the slightest suspicion of dark tinge. It was in a rather advanced stage of decomposition, and I omitted to examine the eyes. It has been sent for preservation to Mr. Chalkley, of Winchester.—A. H. BARING (The Grange, Alresford, Hants).

## CARNIVORA.

**Stoats turning White in Winter.**—In answer to Mr. Barrett-Hamilton's enquiry on the above subject, I may say that during the past very mild winter I knew of five such specimens of *Mustela erminea* in this immediate neighbourhood, one of which was almost wholly white, except a little brown patch near each eye, and of course the usual black-tipped tail; in another specimen the top of the head was brown, and a thin brown line extended down the vertebræ from head to tail. My experience is that the head is the last portion of the body to assume the white colour; indeed, I have sometimes thought that the change must begin from the always white under parts, and gradually creep up the sides, as often the sides are quite white, whilst the back retains all the brown tint of the summer coat, the latter seeming to be invaded irregularly by the winter pelage, the line between the two colours being ill-defined and obscure. I have never seen a specimen with a light back and dark sides, though such may occur; but I have frequently noticed that the so-called white parts are often tinged with yellow. How is the change effected? Not by a new coat, for that would necessitate two apparent "moult" in a year, and one of these at a very inconvenient season, but by a gradual change of colour, for it is certain the hair is as firmly fixed in the skin during the change as it is at any other time. If we get a Squirrel with white hairs in its tail or other parts of its body, we find they easily drop out; but of course the two cases are different, and the carnivora and rodent widely separated in their constitution and habits. With regard to the Stoat, the question may be asked

why do they not all assume the ermine dress in winter? I have never seen a white Stoat in summer, but I have seen dark Stoats in winter, and it is quite certain that cold is not the cause of change to a lighter garb, as the past exceedingly mild winter has proved. Our scientific friends will tell us it is a case of heredity. In North America it seems that the colour of the Stoat is almost entirely regulated by the presence or absence of snow, and it has been stated that at the first fall of snow the change begins, and within forty-eight hours the alteration of colour is perceptible, so rapidly does it take place. Such, however, is not the case with us, for in this neighbourhood we had no snow until near the end of February; whilst the whitest Stoat I saw during the whole winter was obtained early in January. I have seen a partly white Stoat as early in the autumn as September (Mr. Harting has recorded one in August, Zool. 1887, p. 345), and I have seen them more or less frequent till near the end of April—I have a record of one on April 26th—and occurrences in May are recorded (Zool. 1892, p. 310); but most of them occur, so far as I have observed, in the early part of the year, from January to March.—G. B. CORBIN (Ringwood, Hants).

**Otters in South-western Hampshire.**—That this amphibian (*Lutra vulgaris*) is still to be found in some numbers in this locality the following facts will prove. The river Avon and its tributary brooks have during the past twelve months been unusually productive; I have heard of several being met with in the lower parts of the stream, and I know of one man who caught no fewer than eight specimens in the above-named period in this neighbourhood, seven of which were trapped in less than half a mile of water, and two of those (males) scaled twenty-eight pounds each, whilst the smallest weighed fourteen pounds. In February, when the snow lay on the ground, an Otter was “tracked” from one of the forest brooks to a large furze-bush at some considerable distance away, and there worried to death by two large dogs. Several of these forest brooks flow into the Avon, and it is possible that during the daytime Otters that fished the river during the night have retired to the quieter and less frequented brooks for their repose, as they are very seldom seen or their retreats discovered by fishermen and others who frequent the river banks. This no doubt arises in a very marked degree from the nocturnal habits of the creature; but that they sometimes travel long distances is well known, as their nightly depredations are visible where there is no apparent “cover” or hiding place. I once knew of an instance where a female Otter had her lair under some planks of a boat-house close to the weirs, which were the “hunting-grounds” (if such an expression can be rightly applied to an aquatic situation) of herself and mate; but it is not always the case that they take up their quarters so closely to the scene of their labours. Some of the forest brooks to which I allude are often productive of numbers of small Trout, so that Otters

may find food even there; and we well know they do not confine themselves to a fish diet. Young Moorhens and Coot are often taken, as well as young Wild Duck. I am informed that in April, the Otter-hounds—from Devonshire, I believe—which usually make an annual visit to this neighbourhood, killed one Otter and lost another in the small stream that separates the counties of Hants and Dorset; and only a few days ago (May 16th) I saw one that had been killed near the same place; it was a male, and weighed sixteen pounds. Some time ago a gamekeeper told me he had several times, in the early morning, seen what he thought was an old Otter and young ones disporting themselves in a particular part of the river, and in the dim twilight had once had an unsuccessful shot at them. One morning some time afterwards, however, about 9 a.m., he saw two Otters, about the size of terriers, playing like puppies in the sunshine, on the river bank. One of these he shot (which I saw), but he said he had no sooner shot than (what he supposed was) the old female and another young one made their appearance out in the stream, the larger of the two raising itself in the water, at the same time uttering a loud and shrill whistle, repeated again and again, as if anxiously calling the slaughtered cub. As far as I can learn, none of the Otters of which I have spoken were preserved, except as skins for the sake of the fur, which is much sought after for dress trimmings, &c. The man who caught the eight Otters before mentioned has been a river keeper all his life, and during the time has shot and trapped some scores of them; but he tells me that only in one solitary instance has he trapped an Otter by the *hind* leg, and he is under the impression that on occasions when his traps have been “thrown” and unoccupied, the Otter has managed to withdraw its hind foot from the jaws of the trap; and this supposition seems very feasible, if we note the difference in the form of the hind and fore feet, for the latter are comparatively (I use the word advisedly) soft and fan-like, whilst the former are tapering and rigid; and any person who has inspected an Otter must have been struck with the wonderful strength that must be developed in the short thick limbs, neck, and jaws of the cylindrical body, which, together with the glossy close-set hair and under fur, adapts it so admirably to its mode of life, and the element in which it delights to live.—G. B. CORBIN (Ringwood, Hants).

## CARNIVORA AND RODENTIA.

The Scientific Names of the Badger and the Common Vole.—In the list of British Mammals (*ante*, p. 97), by a slip the Badger was accidentally omitted, although a passing reference to it as one of the animals for which *Scomber-scomber* names were necessary was made on p. 99. As is there indicated, its technical name should be *Meles meles*, based on Linnæus’s “*Ursus meles*,” instead of the current but incorrect *Meles taxus*,

a name (in the form *Ursus taxus*) originally based on the American Badger. Since my list was published Dr. Collett has brought out a most interesting contribution to our knowledge of Norwegian Mammals (Nyt Mag. Naturvid. xxxvi. p. 264, 1898), and in this he has adopted, quite independently, all the nomenclatural principles advocated in my list. He thus lends the weight of his authority to *Scomber-scomber* names, such as *Meles meles*, *Lemmus lemmus*, &c., and uses *Lepus timidus* for the variable Hare, and "*Putorius nivalis*" for the Weasel. My unfortunate discovery of "*Neomys*" as being earlier than "*Crossopus*" was not known to him, but from his consistent obedience to nomenclature rules he would evidently have used it had he known of it. In one instance, however, he has adopted a change from the current term which, probably as much to his pleasure as my own, I am able to show is not necessary. This is the name of the Common Vole, *Microtus agrestis* of my list, whose specific name has been used from time immemorial. This animal does not occur in the tenth edition of the 'Systema Naturæ' (1758), but does, under the name of "*Mus gregarius*," in the twelfth (1766). On this basis Dr. Collett has called it "*Microtus gregarius*," but he has overlooked the important fact that, although the first edition of the 'Fauna Suecica' (1746), in which the name "*Mus agrestis*" occurs, is pre-Linnean, and therefore invalid; the second edition (1761) is after the standard date 1758, and may therefore be accepted as a valid post-Linnean work. *Mus agrestis* occurs on p. 11 of this edition, and will afford a sound basis for the use of the familiar term *Microtus agrestis* for the Common Vole.—OLDFIELD THOMAS.

**The Insectivora and Rodentia of Northumberland.**—As the occurrence in the North of England of some of the under-mentioned species of Mammalia does not seem, so far as I can trace, to have been hitherto recorded in 'The Zoologist,' I think the results of a fortnight's trapping in Northumberland, in January, 1895, may be interesting:—1. Mole (*Talpa europæa*). 2. Common Shrew (*Sorex vulgaris*). 3. Pigmy Shrew (*S. pygmaeus*). 4. Water Shrew (*Crossopus fodiens*). 5. Squirrel (*Sciurus vulgaris*). 6. House Mouse (*Mus musculus*). 7. Wood Mouse (*M. sylvaticus*). 8. Water Vole (*Arvicola amphibius*). 9. Field Vole (*A. agrestis*). 10. Bank Vole (*A. glareolus*). Nos. 2, 3, 7, and 10 were caught in the same hedge-bank, and seemingly using the same runs. I have in my possession the skins of all the above except those of No. 5, which, I may add, were shot, not trapped.—JOHN H. TEESDALE (St. Margarets, West Dulwich, S.E.).

#### A V E S.

**Immigration of the Song Thrush.**—A remarkable recent immigration of the Song Thrush (*Turdus musicus*) seems worth recording. How far it



may have extended I cannot say. I have noted the circumstance since to various friends in the neighbourhood, but none of them being "observers" of "natural history" facts, I have been unable to obtain any information as to whence the Thrushes came or whither they went. The normal number of Thrushes in my shrubberies and adjoining fields at the time of this immigration I should compute (from many years' observation of nests, &c.) at about five or six pairs, or may be one or two more. These I had seen constantly through the past winter and early spring. On March 19th, however, the number of birds on the lawn and adjoining field (of four acres) appeared to be unusual. The next day there were more still. On the following day, and up to the 26th, they continued to increase. On the 25th I counted up to fifty hopping about in the part of the field nearest to me, but the whole field was fairly covered with them. Of course it was impossible to count all of them accurately, but I feel quite within bounds when I say there must have been at least two hundred, and on the 26th even more. On the 27th the numbers were much fewer, and by the evening of the 28th the whole of them had disappeared. Since that only the normal few pairs have been seen. I have the following note of a somewhat similar but less numerous immigration on Feb. 3rd, 1892:—"A large number of Thrushes in the front field just before sunset. Probably an immigration. The normal number during all the past winter very small." This immigration was followed by a similar disappearance in the course of a few days. Scarcely a year passes but that we have a sudden appearance, in the month of August, of many Thrushes, which disappear again more or less quickly, often remaining no more than a single day; but, excepting on the two occasions noted, I have not noticed such an immigration in the spring. I believe the August movement of Thrushes has been noted before, but I fancy this spring movement has not been noted, even if observed. During the time the birds were here they were occupied in hopping aimlessly about and feeding. There was no indication of their having paired, though at the same moment there were nests building, and in one case eggs laid, of the same species in the adjoining shrubberies.—O. PICKARD-CAMBRIDGE (Bloxworth Rectory, Wareham).

Melodious Warblers in South-east Devon.—Wishing to ascertain if the Warblers (*Hypolais*) which I heard singing in May last year in the wooded undercliff at Ware, about a mile to the west of Lyme Regis, the Devonshire side of the town, had returned this season, I visited the spot on the very same day (May 4th) that I had identified the song last year, but it was cold and cheerless, and not even a Thrush was singing. On the afternoon of the 6th the weather was more favourable, and three of the Warblers were singing within a yard or two of the whitethorn bush from which the

first had been heard on May 4th, 1897. By walking quietly forwards a clear view was obtained of two of the birds perched on a small bush that was still bare of foliage, and as far as it was possible to be certain without having them actually in hand, *Hypolais polyglotta*, the Melodious Warbler, was satisfactorily identified. The morning of May 9th another visit was paid to the wooded undercliff. It was warm and summer-like after a night of rain, just the time for Warblers to be in full song; and as the result of a two hours' ramble at least a dozen of these little Warblers were recognized. In one beautiful glen, carpeted with bluebells and ground-ivy, five Melodious Warblers and a Nightingale were singing close round me, and as I stood listening to them another Melodious Warbler flew into a bush at my elbow, and commenced its song. The presence of so many of the birds makes it conclusive that those heard last year successfully nested; *Hypolais polyglotta* may now be regarded to have established itself as a summer migrant to this extreme south-east corner of Devon. It was impossible to avoid reflecting that, as so many of these Warblers had been detected in a comparatively small portion of the wooded undercliff, there were probably many others in the long stretch of similar cover between Ware and Axmouth; and that possibly the shrubberies of the old-fashioned country houses that skirt the little town of Lyme were tenanted by others. Last year the loud clear notes of the two Warblers then heard induced the belief that they were the Icterine Warbler (*Hypolais icterina*); no close view of them was obtained; one seen flying across a little glade was too distant for its plumage to be ascertained. The thickness of the cover—it is a jungle of big whitethorns, brambles, &c.—will afford the birds protection; there is little fear that they will suffer from the raids of egg-collectors.—MURRAY A. MATHEW (Vicarage, Buckland Dinham, Frome).

Meadow Pipits perching on Trees.—I can quite confirm Mr. Coburn's note as to the arboreal habits of the Meadow Pipit (*Anthus pratensis*). The bird is exceedingly common in this district in summer, and also passes through in great numbers at the periods of migration. In my experience the Meadow Pipit, when flushed, usually perches on a tree or bush if one is at hand. I have frequently seen migratory flocks of thirty or forty birds perching together on the tops of alder trees on a neighbouring marsh.—G. H. CATON HAIGH (Penrhyndeudraeth, Merionethshire, North Wales).

“Horse-match,” a Name for the Red-backed Shrike (*Lanius colurio*).—I notice (*ante*, p. 188) Mr. O. V. Aplin has written a very interesting note on this curious local name. It will no doubt interest him to know that in the course of my preparation for my shortly forthcoming book on the ‘Birds of Surrey’ I have come across this term applied to the same species in a series of hitherto unpublished notes by the late Mr. H. Long,

formerly of Hampton Lodge, near Puttenham, Godalming, to which, through the kindness of a relative, I have had access. Mr. Long was a well-known naturalist in the very early part of the century, and collected at his country seat a considerable number of rare Surrey birds. He also rendered assistance to the late Mr. Yarrell in the compilation of his well-known work, particularly with reference to the breeding of the Crossbill in the Holt Forest. Mr. Long says :—"The inhabitants of the Devil's Punch Bowl (Highcombe Bottom) and Whitmore Bottom know this bird (*L. collurio*, J. A. B.) by the strange name of 'Horse-match.'" Unfortunately he gives no further particulars of any sort, nor does he hazard any guess (as he does in several other cases) as to the origin of the name. It is nevertheless worthy of remark, as Mr. Swainson ('Folk-lore of British Birds,' p. 9) only applies it to the "Wheatear." The derivation of "horse" equalling "coarse" of Mr. Aplin is probably correct. The most ingenious suggestion, but at the same time a most improbable one, is that of "haws," *smash*, from the habit which the bird has of impaling its victim on thorn bushes. The etymological derivation will, I am afraid, put an end to this idea. Mr. Long's note was written about 1825. At the present time this name is not, so far as I am aware, in use anywhere in Surrey. May I take a last opportunity of asking any of the readers of 'The Zoologist' to send me any occurrences of rare birds which may have come under their notice in Surrey, so that my little book may be brought up to as recent a date as is possible before publication?—JOHN A. BUCKNILL (Hylands House, Epsom).

Woodchat Shrike in Sussex.—I beg to record the occurrence of a male Woodchat Shrike (*Lanius pomeranus*) on the salts near St. Leonards-on-Sea, Sussex, on May 1st. It had been seen on the day previous, and in the same place, close to a brick-field. I believe this is the third time it has been recorded for Sussex. Mr. Borrer mentions one in his 'Birds of Sussex,' and another was recorded by Mr. Parkin in 'The Zoologist' (1892, p. 229), shot at Fairlight Hill, about four miles from the spot where the present one was got. It has been identified by Mr. Bristow, taxidermist, of St. Leonards.—G. W. BRADSHAW (54, London Street, Reading).

On the Date of the Arrival of the House Martin.—In almost all the books on ornithology which I have examined, the House Martin (*Chelidon urbica*) is said to arrive a few days later than the Swallow, *i. e.* about the middle or latter part of April. Stevenson, in the 'Birds of Norfolk,' writes even of the second week in April, though he adds that the 20th may be considered an average date (vol. i. 329). There is indeed a certain amount of irregularity in the arrival as in the departure of this bird, and on the south or west coast it will occasionally appear very early indeed—*e. g.* my

friend Mr. H. C. Playne noted its arrival near Bristol on April 6th, 1894—and I find one or two very early dates in the records of the Natural History Society of Marlborough College. Gilbert White, in his Fifty-first Letter, makes it clear that he expected Martins to arrive in Hampshire by April 11th. During the last few years it has gradually grown upon me that the Martins do not appear so soon as I should have expected, and I have in consequence brought together my records for the last ten years (unluckily not quite complete) to determine what truth there may be in this. I may say that I arrive at Oxford for the term about the middle of April, and that on arriving I invariably search the favourite places which the Swallows and Martins affect as soon as they reach us. I am not therefore likely to miss them if they are here. Mr. O. V. Aplin has kindly sent me a list of records which go back beyond my own, which he allows me to publish. All his but one are from the neighbourhood of Banbury, and the one exception (1896) is from Nettlebed, in the Chilterns. He was abroad in 1893 and 1895, and for the former year I unfortunately have no record, nor have I been able to obtain one from any ornithological friend. The following table will show our respective observations:—

O. V. A.	W. W. F.
1881, May 1st .....	—
1882, April 19th .....	—
1883, April 28th .....	—
1884, May 3rd .....	—
1885, April 17th .....	—
1886, April 23rd .....	—
1887, April 29th .....	—
1888, April 28th .....	April 20th (several).
1889, May 2nd .....	—
1890, May 3rd .....	April 21st (one).
1891, April 24th .....	April 26th.
1892, April 24th .....	April 26th.
1893, — .....	—
1894, May 7th .....	May 1st.
1895, — .....	(April 13th, at Bordighera).
1896, April 26th .....	May 9th.
1897, April 25th .....	April 30th.
1898, April 30th .....	April 29th.

The results of this table, so far as they go, may perhaps be stated as follows:—1. The irregularity of the movements of this species comes out distinctly, for we have a range of *first appearances* extending from April 17th to May 9th. In Mr. Murray A. Mathew's 'Birds of Devon' I find a still longer range recorded, for in 1874 he noted the appearance of two Martins on April 2nd, while in 1891 none were seen till May 14th. This is possibly due to a double wave of migration from Africa, for Col. Irby, in his 'Ornithology of the Straits of Gibraltar,' tells us that Martins cross the Straits both in February and April; and it may be that only a few of the

earlier travellers reach this country, arriving in the first half of April, while the mass belonging to the second wave do not arrive till the end of April or beginning of May. 2. On the whole the dates of arrival are later than I myself, and I think others, had fancied they used to be. In connection with this I would draw attention to the date in my table of 1895, when I was in the South of France and the Riviera. Until April 13th I did not see a single Martin, not even at Aigues Mortes, near the Delta of the Rhone, where the Swallows were arriving in great numbers. Such Martins as arrive in England by this route could not that year have reached their destination till quite the end of the month. This record therefore seems to tally closely with the majority of those made in England. I will not venture to conclude too hastily that the arrival of this bird has of recent years been getting later, but there is some slight indication in the tables that this may be the case. If it were so the fact might be accounted for, as Mr. Aplin has suggested to me, by the very obvious diminution in the numbers of the species in this country; the first arrivals, being few and far between, would be more liable to be overlooked than in former years.—W. WARDE FOWLER (Lincoln College, Oxford).

**The Song of the Chaffinch.**—Although I am not sure that I quite agree with Mr. Witchell's views respecting the song of the Chaffinch, I am glad that he has drawn attention to it in his interesting paper in 'The Zoologist' (*ante*, p. 195). To me the song seems a remarkable one for two reasons:—1st. The difficulty with which in most cases it seems to be put together in every year, some birds requiring weeks to do this, others succeeding in a few days. 2nd. The great difference in the song of different individuals, some having a really fine and impressive song, whilst others have only a very poor and monotonous ditty. Nowhere have I heard such fine performers as in Earl Fitzwilliam's woods at Shillelagh, far famed for its splendid oak trees. At Ardmayle, near Cashel, I heard Chaffinches with call-notes differing from any I have heard elsewhere, and this year, at Killaloe, I felt certain for some time that I was listening to a Bullfinch rather than to our old friend *Fringilla caelebs*. The Chaffinch's song has been written down in various ways. Some London dealers think the best strain is like "ring ring rattle chuck wido." The German version, however, seems to me to be the best: "Pritz pritz pritz, will'st du dem mit dem Bräutigam zieren," some substituting "pink" for the initial "pritz." Perhaps some of your readers would kindly say whether they have ever heard a Chaffinch conclude its song with what fanciers call the "amen"; I mean the familiar "pink" or "fink" at the close. I have heard but one "amen" Chaffinch in my life, but I should like to hear another.—CHARLES W. BENSON (Rathmines School, Dublin).

**Notes on the Chaffinch.**—Referring to Mr. Witchell's interesting notes on *Fringilla cœlebs* (*ante*, p. 195), I may state that in my garden aviary—during the love fever especially—my Chaffinches frequently indulge in the full gurgling rattle he speaks of (and so also does the Bramble-finch\*), but I do not think we can reasonably draw the conclusion that coition occurs in the air. As the result of observation of birds in the fields and captives in my aviary, the only conclusion to be placed on the swooping flights and close contact of the birds he so fully describes, is that of their violent courtship. During this time, in my garden aviary, they are continually chasing one another (that is, male and female) from one end to the other, swooping and circling, and sometimes falling to the ground together; but I have never observed coition to take place, save on the ground and in the branches, when the male bird gives forth the full gurgling rattle aforementioned, as I noticed only two days ago. I quite thought the theory of Chaffinches copulating in the air was exploded long ago, and as the result of my own observations do not consider there is any evidence to support it. Dr. Butler also states this very clearly in the work now publishing, 'British Birds, with their Eggs and Nests.'—W. T. PAGE (6, Rylett Crescent, Shepherd's Bush).

**Rooks feeding on Elvers.**—On the 27th of April last, when fishing on the Laune, in Co. Kerry, I observed Rooks flying to the edge of the water, where they pecked at something, and then, proceeding to the bank some two or three yards away, repeated the action, flying away afterwards to a rookery near by. I knew the Elvers or Eel-fry were running, and suspected the Rooks were carrying them off to their young. To ascertain whether this was the case, I crept behind a gorse-bush, and when a Rook flew from the edge of the water and settled near me, I jumped up suddenly, and, frightening it off, I then examined the place it had hurriedly left, and found an Elver wriggling on the grass. This is probably certain proof that they were doing what I suspected.—WM. T. CRAWSHAY (33, Belgrave Square, S.W.).

**Cuckoo Questions.**—Following up my remarks on this bird (*Cuculus canorus*), (*Zool.* 1897, p. 365), I observed as the young Cuckoo grew that the foster-parents fed it most assiduously; but there is one point on which emphasis may be placed, and that is the nature of the food supplied to the foster-bird. Various species of birds which are called upon to rear Cuckoos enjoy a wide range of food and habits; it therefore falls to Cuckoos to be fed by the different food used by their foster-parents. This in turn raises

\* Last year the Bramble-finch was paired with a hen Canary—of his own choosing, for they were mixed up with others, Chaffs, &c.—and after coition indulged in the full gurgling rattle similar to the Chaff, but a little stronger. I may say, however, all the eggs were infertile.—W. T. P.

the question how far each Cuckoo is influenced by the peculiarities of the birds which rear it? I described the pugnacious habits of the one found in the nest of the Twite, in common with its kind when approached by man, and my last visit to the nest found the young Cuckoo able to fly when I picked it up and replaced it in the nest. The following morning the nest was empty, and two days later a bird which might be reasonably supposed to be the same Cuckoo was found perched on a willow about one-fourth of a mile from the nest, and alongside a Wood Pigeon which was nesting on the same tree. The Cuckoo, on being taken into the finder's hands and released, went back to its place by the Pigeon's nest. Did the Pigeon assist it in any way with its food? It certainly did not find fault with the Cuckoo as a neighbour, and it is clear that the Cuckoo at least valued the companionship, whatever benefit that might have conferred. Another question now arises, would the foster-parents follow up and support the bird as they do their own young when they leave the nest? or do the parent Cuckoos or any of them take any immediate charge of the young at this stage? Again, how do they commence to gather food for themselves? As they are supposed to require nearly all their time in the adult state to pick up the necessary food for their support in our climate, it seems to me that there must be some provision in nature more or less peculiar to the species for providing for their support from the time they leave the nest until they are capable of adequately attending to themselves. In the case noticed there were no signs of the presence of the foster-parents when the young Cuckoo was found in company with the Pigeon. The Mountain Linnet is rather demonstrative when anything calculated to disturb its young occurs, and its absence in this case would favour the idea of the duties having been concluded, although they keep close to their own young for some time after they are able to fly about. Then how do young Cuckoos proceed in leaving us? The last incidents to which I have referred occurred about the middle of July, after Cuckoos were mute; but I noticed at least one adult after that date. I have never heard in what way they leave us, whether solitary or in company. The young and adults have both to migrate from us, while there are only adults to come to us in spring. Would those which are hatched in any place return to it or its neighbourhood the following year? or would the birds in general have a tendency to retain through life their first haunts, or would they be indifferent to this? Of course they follow certain physical aspects of the country, as, for example, they frequent young plantations, these yielding abundance of food.—W. WILSON (Alford, Aberdeen).

Kites in Wales.—A few days after reading Mr. J. H. Salter's paper in 'The Zoologist' (*ante*, p. 198) entitled "Ornithological Notes from Mid-Wales," I chanced to open a volume of 'Blackwood' for 1839. From an article headed "An Excursion over the Mountains to Aberystwith," I make

the following extract:—"Two very large Kites flew into the area between the cliffs, from over the top to the right, and magnificently and gracefully sported; it was what a dance on wings may be imagined to be by free creatures in their utmost joy. After a while another swept over the opposite cliff, and came sailing in his glory among them; and they joined, varied their figure, and performed a wonderful ballet. Sometimes they seemed burlesquing what we have seen in a theatre, retreating and coming in again, and with a new vagary. We afterwards learnt that these creatures are remarkably fine, and peculiar to the place." It would be interesting to know whether the statement as to the birds in question having a distinct peculiarity is founded upon facts. If it be, and their descendants are of a similar type, it makes the miserable persecution to which they are subjected and their imminent extinction all the more deplorable. Some twenty-five years ago or more I saw, in an aviary in a garden near Beddgelert, a Buzzard that had been taken from the rocks above Pont Aberglaslyn. I was greatly struck by the size of the bird, so much larger, at least so it seemed to me, than any mounted or living specimens I had ever seen.—T. VAUGHAN ROBERTS (Nutfield, Watford).

**Disappearance of the Lapwing in North Lincolnshire.**—This bird (*Vanellus vulgaris*) has practically disappeared as a resident species; each year they have got scarcer, and at the present time I do not think there is a single pair nesting in the parish or neighbourhood. Not many years since a pair or two might be found in almost every field, and a considerable number of young were hatched and got away. One of the most familiar sounds on warm spring nights used to be the calling of the Peewits in the low grounds and marshes. Now all is changed, and we only know it in varying numbers as a spring and autumn migrant. I attribute its disappearance to several causes,—the netting of the old resident stock in the winter, the persistent plundering of the nests by egg-gatherers, also the destruction of the eggs by Carrion Crows and Rooks, but especially the latter. Another reason probably is the conversion of much of the arable land into permanent pasture. I should like to know if the Lapwing has become scarce in other localities in the country where once common.—JOHN CORDEAUX (Great Cotes House, R.S.O. Lincoln).

**Birds which nest in London.**—I hoped that Mr. Meade King's communication (*ante*, p. 189) would have elicited some information as to the alleged recent nesting of the Sedge Warbler (*Acrocephalus phragmitis*) by the Serpentine. For a good many years past I have walked down the whole length of the Serpentine early in the morning on six days out of every seven, during eleven months in each year, solely for the purpose of observing birds; in spring and summer I often do so twice a day. Moreover, many



of my friends observe birds regularly in Kensington Gardens and Hyde Park, and report to me the results of their observations. So if the Sedge Warbler has recently nested by the Serpentine, it is remarkable that I should have neither seen nor heard anything of it, especially as it is an extremely noisy and self-assertive species. According to my experience it is a very uncommon visitor to the Serpentine; I have only come across it in three years out of the last ten. On the other hand, the Reed Warbler is a fairly regular spring visitor. The House Martin (*Chelidon urbica*) nested annually on the houses in Kensington Gardens Terrace till 1887. As to the Rooks in Gray's Inn, having carefully watched their nesting operations, I am doubtful whether there are more than half a dozen occupied nests at the present time. It is to be hoped that Mr. W. de Winton is right in estimating the number at ten or twelve. There are two inhabited nests of the Carrion Crow in Kensington Gardens this year. Mr. Meade King rightly takes exception to the inclusion of the Wild Duck in the list of species breeding in London. I do not know of any place within four miles of Charing Cross where the Wild Duck nests, or is at all likely to nest. The birds on the Serpentine are perhaps the wildest of all the London park Ducks, but they must all be considered semi-domesticated. Even after the annual slaughter of parti-coloured specimens, I doubt whether of the birds left, more than half are coloured like wild birds. If *Anas boschas* is to be included in the list of wild species nesting in London, it is time to consider the claims of *Columba livia*.—A. HOLTE MACPHERSON (51, Gloucester Terrace, Hyde Park, W.).

Your correspondent, Mr. C. Meade King, is not quite accurate in stating (*ante*, p. 190) that the rookery in Gray's Inn is the "last London rookery." In the grounds of "Rookwood," High Street, Hampstead, about three pairs nest annually. This is some hundred yards within the four-mile radius.—H. RATCLIFF KIDNER (West Hampstead).

**Birds in London.**—The Sky Lark (*Alauda arvensis*) is to be heard at Shepherd's Bush, London. At first when I heard it from my garden I thought it was a caged bird singing somewhere near, yet thought the song too full and joyous for a captive; and several mornings since, when foraging for my aviary pets on some open ground near, it rose within a short distance, and commenced singing joyously but a few feet above my head. I feel sure its nest is close at hand (though I failed to find it in the short time at my disposal), as I have since heard and seen it almost daily in and about the same place for the past six weeks.—W. T. PAGE (6, Rylett Crescent, Shepherd's Bush).

[Mr. W. H. Hudson, in his 'Birds in London,' relates that "during the last two exceptionally mild winters a few Sky Larks have lived contentedly in the comparatively small green area at Lambeth Palace."—ED.]

Ornithological Notes from Sark.—In the early spring of the present year I spent a week (March 22nd–30th) on Sark with some college friends, and possibly some notes on the birds to be found on the island at that time of the year may be of interest to readers of 'The Zoologist.' We observed in all some forty species, and very probably overlooked others, as during the first half of our stay a strong gale was blowing from the north, with frequent showers of rain and snow, which made it both difficult and unpleasant to hunt for birds. We saw four species of Gulls—the Herring Gull, Greater and Lesser Black-backed Gulls, and the Kittiwake, of which the first mentioned was by far the commonest. The Kittiwake nests on the "Autelets," a group of rocks, very difficult to climb, on the west of the island. Four or five pairs were there at the end of our visit, and I do not think many more nest on the island, as the fishermen say they are not at all common. The Razorbills and Guillemots arrived on March 29th, and took possession of the ledges on the "Autelets," where they nest later on in the year. I counted from fifty to sixty of each species. The Shags were very numerous, and were busy with their nests, in some of which, I think, eggs had already been laid. They appear to nest principally on the "Autelets," the Moie de Mouton, and on the rocks around Pot Bay. I only saw one Cormorant, and, as the fishermen do not seem to know the bird, they are probably uncommon. We saw a great number of Oystercatchers all round the island; they were chiefly in pairs, but occasionally we saw five or six, or even more together. The Chough is not common on the island, but I believe it breeds there regularly. One fisherman told me he had not seen more than one pair for some time, but another thought there were in all about six pairs. I myself saw one pair in Dixcart Bay, where I was told they nest, and on another occasion five together on the western side of the island. We saw one pair of Ravens, and found their nest in the side of a cliff on the Moie de Mouton; it contained two or three young birds well fledged. The Kestrel was not at all uncommon, and the Sparrowhawk is also said to inhabit the island, but we did not notice it during our visit. Rock Pipits were fairly numerous, and one or two pairs of Stonechats might be seen wherever there was any gorse growing. I noticed one or two Cirl Buntings, and also a pair of Firecrests, which were very tame. The Wheatear appeared on March 28th, and the Chiffchaff on the 30th. We also observed the following birds:—Mistle Thrush, Song Thrush, Blackbird, Redbreast, Goldcrest, Hedgesparrow, Great Tit, Blue Tit, Wren, Meadow Pipit, Greenfinch, House Sparrow, Chaffinch, Linnet, Yellow Bunting, Starling, Magpie (common), Jackdaw, Carrion Crow, Sky Lark, and Lapwing (flock of seventeen). The fishermen say that the Gannet visits Sark in the summer, and that the Puffin nests on L'Etac, an island off Little Sark, but we saw neither of these birds during our stay on

the island. A gentleman who knows the island well told me that the Black Rat is the common Rat on Sark; and certainly the only specimen we saw on the island was black, and appeared to be an example of *Mus rattus*.—F. L. BLATHWATT (Weston-super-Mare).

Ornithological Notes from Corsica. Correction.—During last April I spent a week in Corsica, and with the help of a small weapon discovered that I made two bad mistakes in the notes published in 'The Zoologist' (1897, p. 254). I hasten to correct them, and apologise to readers of this Magazine for my carelessness. The delightful little Finches which are so numerous on the mountain slopes are Citril Finches (*Chrysomitris citrinella*), and not Serins. The species of Lark which is common in the island, and which is the only one I could find this year, is the Wood Lark (*Alauda arborea*), and not the Crested Lark. The mistake I made in saying that Crested Larks were common was due to some confusion I was in with regard to the songs of these two species. I am able to add two species to my former list. Ring Doves (*Columba palumbus*) were plentiful in some of the pine forests, and a Spotted Flycatcher (*Muscicapa grisola*) was at Ghisonaccia on April 17th. Crag Martins (*Cotile rupestris*) were very numerous in the gorge between Ghisoni and Ghisonaccia, and were building their nests.—HERBERT C. PLAYNE (Clifton College).

Appearance of Migrants in Aberdeenshire, 1898.—With this mild winter a Lapwing was observed on the 14th January, and heard also on the 15th, some being continually about after that date. Curlew, March 9th, and a little later the largest flock which I have yet seen. On same date I also heard some migratory Warblers singing, being earlier than on any previous year; they are seemingly on the increase here. Water Wagtail seen March 24th, Ring-Ouzel end of March (this bird comes decidedly earlier now than it did some years ago). The Lark and Mavis were both singing on March 9th. Cuckoo heard May 1st. Dunlin Sandpiper was seen May 7th. I saw a Wheatear or White-rumped Stonechat on May 10th at old ruins, Coreen Hills, surrounded by heather, this being the most moorland place at which I have ever seen this bird. I have not yet noticed either the Grey or Yellow Wagtail, which generally appear here before this date.—WM. WILSON (Alford, Aberdeen).

#### INSECTA.

Cicada attacked by Mantis.—In 'The Zoologist' for 1897, p. 160, I mentioned some of the many enemies which prey upon Cicadas. I have recently received from Mr. Alec Ross, of Johannesburg, two specimens, the attacker and victim, which I respectively identify as *Miomantis fenestrata*, Fabr., and *Tibicen carinatus*, Thunb. Mr. Ross informs me:—

“The Mantis was sitting on a grass-stem, holding the Cicada on its back, and biting it on the hind wing, which you will see is damaged in consequence. My attention was attracted to it by the unusually loud noise the Cicada was making.” This narrative is also interesting as showing that the stridulation of the Cicada is also used as a sign of alarm or pain, and is not of a purely sexual or æsthetic character.—ED.

**Southerly Extension of the East African Butterfly Fauna.**—Durban, the well-known port of Natal, is the home of several good lepidopterists, the name of Col. Bowker being a host in itself; consequently the butterflies of that neighbourhood have been well and persistently collected, and there is little chance of prominent species being overlooked. Of late years several species hitherto considered as part of the Mozambique fauna have appeared at Durban, such as *Godartia wakefieldii*, which I took myself when at that spot in 1896. Last year Dr. Dimock Brown, who was in England, called and showed me a specimen of *Crenis rosa*, originally described from Delagoa Bay, which he had captured in the Durban Botanical Gardens; and now Mr. A. T. Millar informs me that this year at least a dozen specimens of that species have been captured about Durban, and in such splendid condition as to prove they had but recently emerged in the imago condition; so that *C. rosa* may now definitely be included in the Natal lists. The route followed is evidently the coast forest belt, which extends from Delagoa Bay to and beyond Natal, and further visitors may be expected.—ED.

## NOTICES OF NEW BOOKS.

*Essays on Museums and other Subjects connected with Natural History.* By Sir WILLIAM HENRY FLOWER, K.C.B.  
Macmillan & Co., Limited.

SIR WILLIAM FLOWER in this volume has collected and published most of the principal essays and addresses which he has from time to time written or delivered on Zoological—including Anthropological—subjects, and which from their non-technical character appeal not only to naturalists but also to the usual cultured reader. There is always a danger that the special element of a man's great success may prove a cloud which serves to obscure his other qualities. We are so apt to think and read of the author as the greatest of contemporary Museum Directors, that we are liable to overlook the fact that his influence on Zoology has been exercised over a wider field, and that his services to Anthropology in England have been of a signal character.

The first seven chapters or essays are altogether devoted to "Museums," a subject which to the general public would probably be thought threadbare, by the rank and file of ordinary curators has been canonised and fossilised, and which is now in its renaissance both in Europe and America, with potentialities for instruction which democracies have hardly yet suspected, and which in time they will very heartily support. The Museum of the future must serve two purposes; not only must it prove the temple for scientific study and research, by vast accumulation of specimens, and not by a limitation to examples as in a Noachian collection; but it must be made to attract and instruct our general humanity in the secrets and charms of the animal life to which it belongs, of that which has preceded its era, and of that which has vanished and is still vanishing from its contact. The time is past when the wretched holiday seeker, uninstructed in zoology, unassisted by state-paid instructors or guides, wanders his weary way past miles of glass cases crammed with stuffed skins, and

eventually emerges tired and unenlightened to ardently seek refreshment of another nature. We unhesitatingly say that this official obscurantism is no longer possible, and that it is owing to chiefs like Sir William Flower that it is dying now and will be incapable of resuscitation in the future. A zoological museum is capable of a vast æsthetic leavening of the masses; a love of nature is universal and precedes art. The degradation of museums to the present zoological ignorance of the masses is not desired, but a levelling up of the latter is the thing needful, when natural history may be seen to be a thing of national importance, and worthy of real national support. At present, as Sir William observes, "the largest museum yet erected, with all its internal fittings, has not cost so much as a single fully-equipped line-of-battle ship, which in a few years may be either at the bottom of the sea, or so obsolete in construction as to be worth no more than the materials of which it is made."

Pregnant with meaning, not only from its matter, but also by its place of delivery, is the paper read before the Church Congress in 1883, on "the sequence of events which have taken place in the universe, to which the term 'evolution' is now commonly applied." Great as was the import of this communication to such an audience fifteen years ago, it is more than probable that a similar Congress at the present day would appreciate the subject as less disturbing and more familiar. Than Sir William Flower no better enunciator could have been found of the "doctrine of continuity" to a body of men whose studies lay outside a philosophical conception which yet made its presence felt in all regions of thought. It required in such an assembly the cautious handling of an expert, so that the teaching of the naturalist should neither appear as an inerrant dogma, nor, as is sometimes the case, a stream of biological assumptions or suggestions. In fact, among some zoologists, and other speculative writers of the day, an opinion by the author of this book may well be considered, "that natural selection, or survival of the fittest, *has, among other agencies*, played a most important part in the production of the present condition of the organic world, and that it is a universally acting and beneficent force continually tending towards the perfection of the individual, of the race, and of the whole living world." We have ventured to italicise a few words.

Space will only allow us to draw further attention to two really zoological treatises (XIV. and XV.)—on Whales past and present—which it should be noted are to be found in this volume; to some well-known anthropological addresses; and to biographical sketches of Rolleston, Owen, Huxley, and Darwin.

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*A Student's Text-Book of Zoology.* By ADAM SEDGWICK, M.A., F.R.S. Vol. I. Swan Sonnenschein & Co., Limited.

THE appearance of this work is but little subsequent to the Text-Book of Parker and Haswell, recently noticed in these pages (*ante*, p. 132). Its aim is distinctly stated—"to place before English students of Zoology a treatise in which the subject was dealt with on the lines followed with so much advantage by Claus and his predecessors in their works on Zoology." This volume—the first—deals with the whole of the animal kingdom except the Arthropoda, the Echinodermata, and the Chordata, which will form the subject of the second volume. A third may probably be issued devoted generally to the facts and principles of Zoology.

Books of this character can be reviewed in two ways: either criticised by a specialist for some weakness or novelty in his own particular study to which he may have devoted his life; or brought to the notice of the general zoologist or naturalist, as a comprehensive whole, where the latest knowledge may be sought by the specialist on the general subject, and where the general student may expect to find special information on the concrete subject. The labour and anxiety to produce a modern text-book is now necessarily enormous, and a feeling of great responsibility arises in writing a notice of a work which, if it fulfils its purpose, must prove a technical encyclopædia to zoologists who study only the histories of the mature life of animals, and who seek instruction in deeper biological principles. Our pages, we need hardly remind the reader, are devoted to the former, but we all frequently need an authoritative guide to the latter. It is thus a mistake to altogether appreciate these works as students' text-books; they cover a wider area, and are, in the true sense, works of reference.

Prof. Sedgwick is an advocate of a preliminary knowledge of Zoology being acquired by the study of types, a method largely

introduced into this country by Huxley, as a basis from which extended studies can be made, and the present work is stated as designed to assist those further studies. The study of types is now an excellent and almost universal method, though Prof. Ray Lankester has recently proposed that a second course might be pursued in the study of "exceptional, puzzling, and debateable animals," by which *significance* of structure could be considered as the means of *discussing* affinities.

The classification is generally in agreement with that of the recent work of Parker and Haswell, but with some differences. Thus those authors appended the Nemertean to the Phylum Platyhelminthes, whilst Prof. Sedgwick treats them as a distinct Phylum—Nemertea. He also considers the Polyzoa and Brachiopoda as constituting distinct Phylla, but which Parker and Haswell treated as classes of Molluscoida. These authors also placed the Mollusca after the Arthropoda, whilst in the work under present notice they follow the Rotifera. The position of the Echinodermata is also differently considered. We simply draw attention to the differences in method of these two notable publications because they have both appeared almost synchronously, and also because modern classifications are taken as representative of current views on derivation.

Although this text-book is necessarily of a technical description, there are still scattered some of those facts or incidents in life narratives so appreciated by the contributors and readers of this Magazine. As an instance, we may quote from the general remarks on the Mollusca. About 25,000 species are known, and are found in the sea to a depth of nearly 3000 fathoms. "Their duration of life, where known, varies from one to thirty years; the Pulmonates generally live two years, but the garden snail has been known to live five years. The oyster is adult at about five years, and lives to ten years. The *Anodonta* do not arrive at sexual maturity till five years, and live for twenty or thirty years."

We shall await with interest the completion of the work.

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*Birds in London.* By W. H. HUDSON, F.Z.S. Longmans, Green & Co.

BIRDS in London must be the ornithological subjects of the many who can seldom escape from the metropolis, or who, with Dr. Johnson, like to feel the high tide of life at Charing Cross. Though the scene of this book is neither laid in the City nor a restricted London, but embraces much suburban territory dear to villadom, including even Richmond Park, the general area is one over which the builder has now much sway, and whose wild nature, where not curtailed, is at least much bricked in. Consequently we are prepared for the tale which is told. "For many years there have been constant changes going on in the bird population, many species decreasing, a very few remaining stationary, and a few new colonists appearing; but, generally speaking, the losses greatly exceed the gains." The Magpie and Jay still exist at a distance of six and a half to seven miles from Charing Cross, and the Woodpigeons have come to town and apparently come to stay. Both the Moorhen and Dabchick have settled down in St. James's Park; the Jackdaw and Owl are still resident in Kensington Gardens; the Sparrow is always with us, to which in numbers the Starling ranks next, though "the Starlings' thousands are but a small tribe compared to the Sparrows' numerous nation." We have all seen Fieldfares in the suburbs, but in 1896 a few alighted in a tree at the Tower of London. Mr. Hudson remarks the disappearance of the Greenfinch from several localities, and we think that most observers will have noticed the scarcity of this bird round London. Forty years ago it was a very abundant bird round Nunhead, when schoolboy inspection of the store-cages of the professional catcher seldom failed to discover it as the principal captive, and many a "bright" bird have we purchased for a penny. Now the erstwhile market gardens have disappeared, thanks to the industry of the builder and the increase of the population, but Mr. Hudson reports the bird as still sheltered in Nunhead Cemetery.

The great enemy of the London birds is the Cat. "Millions of Sparrows are yearly destroyed by Cats in London," and the author thinks "that not more than two young birds survive out of every dozen of all the Sparrows that breed in houses." The

number of these feline marauders in London is estimated at not less than half a million, while ownerless Cats, which are thus thrown more on their own resources, are considered to reach in the same area the prodigious quantity of from eighty to a hundred thousand. These furies hunt the parks by night. "The noisy clang of the closing park gates is a sound well known to the Cats in the neighbourhood; no sooner is it heard than they begin to issue from areas and other places where they have been waiting, and in some spots as many as half a dozen to a dozen may be counted in as many minutes crossing the road and entering the park at one spot." No wonder that lovers of birds—either wild or in captivity—are "death on Cats."

This book contains no lists of birds, but is devoted to general facts, many of which are of an anecdotal character. Some good stories are told, and perhaps one of the most piquant is that of Mr. Cunninghame Graham writing to an eminent ornithologist for advice as to obtaining Rooks for his trees, and receiving a lengthy reply "pointing out the fallacies of Socialism as a political creed, but saying nothing about Rooks." Mr. Hudson writes in a delightfully unconventional manner, a by no means too frequent occurrence in these days; he is also not afraid of "calling names." Thus a local birdstuffer "who killed the last surviving Magpies at Hampstead" is not inappropriately styled a "miscreant," and the keeper who destroyed the last Ravens' nest in Hyde Park justly earns the title of "injurious wretch." The author is a true lover of birds, as his own words best testify. "Without the 'wandering Hern,' or Buzzard, or other large soaring species, the sky does not impress me with its height and vastness; and without the sea-fowl the most tremendous sea-fronting cliff is a wall which may be any height; and the noblest cathedral without any Jackdaws soaring and gambolling about its towers is apt to seem little more than a great barn, or a Dissenting chapel on a gigantic scale."

## EDITORIAL GLEANINGS.

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“MIMICRY,” of which we hear so much, and know so little; a theory well substantiated by facts, but too often scandalized by loose suggestions and more or less ingenious guesses; a doctrine somewhat neglected by zoologists, and far too much in the hands of the evolutionary camp followers,—still demands, in very many details, verification by experiment. Mr. Frank Finn, the Deputy-Superintendent of the Indian Museum, Calcutta, has, since 1894, undertaken this work in the province in which he now resides, and has published the results of thorough and well designed experiments in a series of papers (i.-iv.) in the ‘Journal’ of the Asiatic Society of Bengal. The details of these experiments, carefully studied, will serve to qualify much current misconception; at the same time the results are not negative, but, on the whole, confirmative. In butterflies the *Danainæ* are generally considered as highly protected. With birds, Mr. Finn tells us:—“The common Babblers (*Crateropus canorus*) ate the Danaine butterflies readily enough in the absence of others, but when offered a choice showed their dislike of these ‘protected’ forms by avoiding them. This avoidance was much more marked when the birds were at liberty, though even so a few of the objectionable butterflies were eaten.” “In several cases I saw the birds apparently deceived by mimicking butterflies. The common Babbler was deceived by *Nepheronia hippia*, and Liothrix by *Hypolimnas misippus*. The latter bird saw through the disguise of the mimetic *Papilio polites*, which, however, was sufficient to deceive the Bhimraj and King Crow. I doubt if any bird was impressed by the mimetic appearance of the female *Elymnias undularis*. But this is not a first-rate imitation, and a mimic put to a very severe test when offered to a bird in a cage or aviary.”

As a result of the whole series of experiments, the following conclusions are reached by Mr. Finn:—“1. That there is a general appetite for butterflies among insectivorous birds, even though they are rarely seen when wild to attack them. 2. That many, probably most, species dislike, if not intensely, at any rate in comparison with other butterflies, the ‘warningly-coloured’ *Danainæ*, *Acræa viola*, *Delias eucharis*, and *Papilio aristolochiæ*; of these the last being the most distasteful, and the *Danainæ* the least so. 3. That the mimics of these are at any rate relatively palatable, and that the mimicry is commonly effectual under natural

conditions. 4. That each bird has to separately acquire its experience, and well remembers what it has learned." And that, therefore, on the whole, the theories of Bates and Wallace are supported by the facts detailed.

THE following extracts are from an excellent summary in the 'Globe':—

"In his introduction to a Report just issued by the Scotch Fishery Board relating to investigations on the life-history of Salmon, Dr. D. Noel Paton (Superintendent of the Laboratory) states that the curious life-history of the Salmon has always been a subject of the deepest interest, not only to the zoologist and physiologist, but also to the sportsman and the fisherman. In spite of the most careful study by scientific investigators, the migrations of the Salmon, and the various changes in condition which it undergoes, are even now far from being fully understood, and the careless observations and foolish traditions of keepers, fishermen, and ghillies have only served to involve the matter in a deeper cloud of mystery.

"*Questions to be answered.*—What force urges the fish to leave its rich feeding-ground in the sea? Is it necessary that it should enter fresh water in order to perform the act of reproduction? Does it require or procure any food during its sojourn in the river, and, if not, how is it able to maintain life, and to construct its rapidly-growing genital organs? In the female the growth of these is enormous. In April or May the ovaries constitute only about 1.2 per cent. of the weight of the fish.—in November they are no less than 23.3 per cent. In a fish of 30 lbs. in the spring they weigh about 120 grms.—in November they weigh over 2000 grms. The increase in the testes in the male is not so marked, but is sufficiently striking. In April or May these organs are about 0.15 per cent. of the weight of the fish, while in November they are 3.3 per cent. From what are these structures formed? As they grow, the muscle, as is well known, undergoes marked and characteristic changes. Not only does it diminish in amount as the season advances, so that the fish which have been some time in the river become smaller in the shoulder and back, but it loses its rich, fatty character, while it becomes paler in colour. Are these changes in the muscle connected with the growth of the ovaries and testes? And if so, in what manner and to what extent? On the other hand, in fighting its way up rapids and over falls an enormous amount of muscular work is accomplished by the Salmon. Whence is the energy for this work obtained? Are the changes in the muscle connected with the performance of this work, and if so, to what extent are these changes connected with the muscular work, and to what extent with the growth of the genitalia? Lastly, the question arises, to what extent do these changes in the muscle modify the value of the flesh as a food stuff?

“*Facts established.*—In the investigation of some of these questions, most excellent work has already been done, not only in Holland and Germany upon the Salmon in the Rhine by Dr. Hoek and Professor Miescher Ruesch, but also by Mr. Archer, the Inspector of Salmon Fisheries for Scotland, in conjunction with Mr. Grey and Mr. Tosh. The careful series of observations embodied in the annual reports are well worth careful study by the zoologist and the Salmon fisher. They should help to dispel the absurd traditions which cling around the history of the Salmon, and to pave the way for the complete solution of many of the problems we have enumerated. The present investigation is a continuation and amplification of these researches, and would have been impossible without these previous laborious studies. Briefly stated, these investigations of the Fishery Board have established the following facts:—That some Salmon spawn every year, though there is strong evidence that all do not do so. That the genitalia of fish coming from the sea develop steadily from April on to the spawning time, and that the genitalia of Salmon in the earlier summer months develop more rapidly than those of Grilse. That the proportion of the weight of the fish is constant for all sizes of Salmon. That Salmon continue to feed while in the sea until September. This is shown, firstly, by the presence of food in the stomach of a certain proportion of the fish captured, and, secondly, by the fact that the fish leaving the sea are somewhat heavier—from 2 to 3 per cent.—in August and September than they are in the earlier months, whereas if they had entirely stopped feeding they should have been lighter. If Salmon do feed in the sea, it is perhaps curious that food should be found in so small a percentage of those captured at the mouths of rivers. But it must be remembered that the estuary of the river is not the natural feeding-ground of the Salmon, and it is probably only by chance that food is still in the stomach of fish captured there.”

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“MR. CONSUL HEARN, in his latest report on the trade of Bordeaux to the Foreign Office, makes some striking observations as to the folly of the destruction of birds. He points out that the appearance of the *Cochylis*, a most destructive insect, is contemporary with the destruction of small birds in the vineyards. No sooner does the ‘chasse’ open than every man and boy is seen with a gun, stalking and ‘potting’ every small bird he can get near enough to. The consequence is that there is literally no bird life among the vines, and consequently insect life now reigns supreme. On one property alone, from July 20th to Sept. 10th, 5000 days’ labour of women and children was alone employed in looking for and destroying the eggs and larvæ of this insect. ‘But if only birds were allowed free action they would,’ the Consul says, ‘assuredly, gladly accomplish this

work, and the women and children might be employed in more remunerative labour. In the streets of Bordeaux, during the autumn and winter, Thrushes and Starlings are offered for sale by thousands, and yet these birds live exclusively on insects.' It is not surprising to learn that a Bill is shortly to be introduced into the Chamber for the protection of birds 'useful to agriculture.'—*Westminster Gazette*.

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It is evident that the crusade against murderous millinery needs to be renewed, and that in quarters where one would have supposed it to be least necessary. A lady communicates to the 'Christian World' the startling fact that at the May meetings she has noticed Ospreys everywhere, even on the platform. At one important ladies' missionary meeting, both the lady who presided and a missionary who described the cruelties of Indian life wore Ospreys. She supposes they have been told that their plumes were imitation, but adds that in nineteen cases out of twenty they were real.

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IN 'Popular Science News' (New York), Mr. John Mortimer Murphy has contributed a most interesting article on the Alligator. We read that "the Alligator is rapidly disappearing in the settled regions of Florida, and becoming scarcer every day even in such remote regions as the Everglades, owing to the war of extermination waged against it by hide-hunters, taxidermists, and dealers in curiosities. These pursue it night and day, year in and year out. The little fingerlings just out of the nest are in great demand, as they are worth from two to three dollars per hundred in the local markets. The 'curio' dealers who purchase them often resell them at a dollar each to northern visitors, or else they kill and stuff them into card-plates, cigar-holders, or whatever else their fancy suggests, and dispose of them at good prices. The young are frequently lured from their lurking-places by a poor imitation of the grunts of their mother, and men expert in mimicking her may capture a large number in a day, as they respond promptly to the calls, and pour out of cavities in hot haste to see the caller. The most expert 'gator callers' I ever knew were swamp rangers, both white and black, who were born and bred within a short distance of an Alligator swamp, and therefore knew every intonation of the saurian's voice. These men could make a matron charge wildly at them across a broad stream by imitating the frightened cries of her young, or lure a decrepit old bull by mimicking the grunts of the female. They could, in fact, delude both old and young, and often earned good sums by their art."

ENORMOUS flocks of Starlings have this year taken possession of and made their nests in the huge chimneys of Buckingham Palace, and these in great numbers forage for their food in the private grounds of the palace.—*Daily Chronicle*, May 9th.

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THE announcement of the untimely death of Dr. C. Herbert Hurst, formerly on the staff of the Zoological Department of the Owens College, will be received with general regret. We take the following obituary notice from the columns of 'Nature':—"Dr. Hurst was an alumnus of the Manchester Grammar School, and studied biology under Professor Huxley with conspicuous success. After some experience as a resident science master in a boys' school he entered the Owens College as a student in 1881, and in January, 1883, was appointed to the post of Demonstrator and Assistant Lecturer in Zoology under the late Professor Milnes Marshall. For eleven years he filled this office with conspicuous diligence and success, and not only earned the grateful recollection of several generations of students of the College, but also laid under obligation a much wider circle of zoologists by his share in the production of the 'Text-book of Practical Zoology,' which has made the names of Marshall and Hurst familiar in every biological laboratory, not only in this country but in the world. In 1889 he took advantage of a prolonged leave of absence, granted by the College authorities, to pursue his studies at the University of Leipzig, where he carried out a valuable investigation into the life-history of the Gnat (*Culex*), for which he was awarded the degree of Ph.D. Latterly he had undertaken what he termed 'a systematic criticism of biological theory,' in the course of which he published discussions on 'The Nature of Heredity,' 'Evolution and Heredity,' 'The Recapitulation Theory,' and other kindred topics. In these essays certain modern views were subjected to trenchant and unsparing criticism, for Dr. Hurst was a keen controversial writer, and never hesitated to express himself clearly and forcibly, even at the risk of obloquy and unpopularity. His last writings were, 'The Structure and Habits of *Archæopteryx*,' and 'A New Theory of Hearing.' In 1895 Dr. Hurst left the Owens College to fill a similar position in the Royal College of Science, Dublin. His premature death deprives Zoology of a zealous and upright worker who was most esteemed by those who knew him best."

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To compass the death of an Elephant is no light matter. Sportsmen by the head-shot now no longer pursue the slow, costly, and painful method described by Gordon Cumming. Recently, an Elephant contained in "Barnum and Bailey's Show," which had been visiting Liverpool,

exhibited traits which, in safety to the public, demanded its destruction. Strangulation was the method selected as being the most merciful, and the following particulars are extracted from 'Nature':—"At the appointed hour those specially invited, among whom were several veterinary surgeons, Dr. Forbes, Director of the Liverpool Museum (to whom the body was generously to be handed over as a gift from Mr. Bailey to the museum), Dr. Roberts and Mr. Burnham, of the Society for the Prevention of Cruelty to Animals, found the Elephant standing quietly in one of the large tents, in line with some twenty to thirty others. A new Manilla rope was loosely wound three times around its neck, and its legs, fully stridden, were securely chained each to a post firmly driven into the ground alongside each limb. The animal was intentionally not isolated from its fellows, as it was feared that if separated by itself it would become restive and ill-tempered. The rope surrounding the beast's neck had one end secured to three strong pillars in the ground, some distance away and slightly in advance of the fore feet; and the other, which terminated in a loop, was hooked to a double series of pulleys, to the tackle of which ninety men were attached. When all was ready, the slack was gently, quietly, and without any apparent annoyance to the Elephant, which kept on eating hay, taken in till the coils round its neck were just taut. The word was then given, 'Walk away with the rope.' Amid perfect silence the well-disciplined company walked away with it without the least effort. So noiselessly and easily did everything work that, unless with foreknowledge of what was going to take place, one might have been present without realizing what the march of these men meant. The Elephant gave no sign of discomfort, either by trunk or tail; its fellows standing close by looked on in pachydermatous unconcern; and at the end of exactly thirty seconds it slowly collapsed, and lay down as if of its own accord. There was absolutely no struggle, and no motion, violent or otherwise, in any part of the body, nor the slightest indication of pain. In a few seconds more there was no response to the touch of its eyelashes or other parts of the eye, and this condition remained for a few minutes; but through, perhaps, the leakage into the chest of a small quantity of air, some slight sensitiveness returned to the eye, seen on touching its inner angle, though not the cornea. On slightly tightening up the rope, the chest gave one or two short throbs, and after six and a half minutes all movements ceased, and sensation was entirely lost; while at the end of thirteen minutes from the order to 'walk away,' the eye had become rigid and dim."

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As we go to press we have heard with the greatest regret of the death of Mr. Osbert Salvin, the well-known ornithologist and entomologist. An obituary notice will appear in our next issue.



# THE ZOOLOGIST

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## MOTHS AND THEIR CLASSIFICATION.

BY E. MEYRICK, B.A., F.Z.S., F.E.S.

PROBABLY no group of animals has suffered so much at the hands of unscientific systematists as the Lepidoptera, and the reason of this is not far to seek. It is directly attributable to the great range of colour and variety of marking which are so striking a characteristic of the group, instantly attracting the attention of the superficial student, and causing him to neglect structural details as unnecessary, or even to intentionally reject them as contradicting the testimony of colour, and therefore untrustworthy. Allied species, he argues, are usually similar in colouring; therefore similar species are allied; which, however, does not follow.

It is true that this theory is now seldom put forward in a simple and unadulterated form. Dr. von Gumpenberg, indeed, has lately issued an elaborate monograph of Geometers, in which all structural investigations are cast to the winds, and the genera defined solely by colour and marking, but it does not seem to have been warmly received. But in a modified form the theory is still so extremely popular that it exercises considerable influence over the views of almost all lepidopterists. This modification consists in classifying species by superficial appearance in the first instance, and then trying to find structural excuses for it afterwards. No better example of the consistent working of this method can be found than in the works of Guenée. In the six

volumes which he contributed to the 'Species Général des Lépidoptères,' I cannot recall a single instance in which he has suffered structural characters to override superficial; and yet each genus and family is prefaced by a careful statement of structural points which may readily, nay, is almost certain to be mistaken for a diagnosis, until one tries to work with it. For example, in characterizing his Geometrid family *Acidalidæ*, he correctly states "indépendante bien marquée aux quatre ailes; costale des inférieures isolée de la sous-costale ou simplement rapprochée," of which the equivalent in my terminology would be "vein 5 well-developed, 8 in the hind wings not connected with cell or near base only," which are really essential characters of his genus *Acidalia* and its allies, and no exceptions are mentioned. Moreover, if the characters given for the *Acidalidæ* and the *Larentidæ*, for instance, are compared throughout, it will be seen that there is no absolute distinction between them except in the latter of these two characters, the corresponding point for the *Larentidæ* being "costale des secondes ailes presque toujours bifide," that is, "8 in the hind wings anastomosing with cell to beyond middle." Now if we proceed to examine the genera attributed to the *Acidalidæ*, we find the first, *Synegia*, really has 5 in the hind wings obsolete, and should therefore be placed (not only correctly, but on Guenée's own definition) in his family *Boarmidæ*; the second, *Drapetodes*, is not a Geometer at all, but belongs to the *Drepanidæ*, having 5 approximated to 4 in both wings; the fifth, *Pomasia*, and the seventh to tenth, *Cambogia*, *Asthenia*, *Eupisteria*, *Venusia*, all have 8 in the hind wings anastomosing strongly with the cell, and belong in truth to the *Larentidæ*. The family definition has in fact been disregarded altogether. On the other hand, the characters given for the *Apamidæ* and *Hadenidæ*, for instance, have little reference to structure, and are practically identical; hence it is not surprising that species rightly referable to the same genus are placed by Guenée, some in one and some in the other of these two families, which are separated from one another by four other considerable families of *Noctuæ*. Now these are not isolated instances, but fairly typical examples of the whole work; and yet this classification, having been adopted by both Doubleday and Stainton, has held the field in Britain for forty years, and has become so

familiar that to most British entomologists all deviations from it seem artificial and unnatural.

In a sound system of classification the various groups must be capable of actual diagnostic definition in words, or the system is unworkable; they must be defined by structure, or it is misleading; and the system must be based on the study of the phylogeny (or scheme of ancestral descent), or it is artificial. Of late years some progress has been made in classifying the Lepidoptera in accordance with these principles, and as the general lines of such a classification are now fairly well established, it may be of interest to give a sketch of the results already reached, as illustrating principles of universal application.

Four-winged insects usually have some contrivance for holding together the two wings on one side, and ensuring their common action. Thus in the Hymenoptera (bees, &c.) there is a row of hooks and eyes; in the Trichoptera (caddis-flies) there is a membranous process (jugum) from the dorsum of the fore wings near the base, which projects beneath the edge of the hind wings, whilst the following part of the dorsum extends above it; again in the Lepidoptera there is normally a stout bristle or group of bristles (frenulum) rising from the edge of the hind wings near the base, and passing under a catch on the under side of the fore wings. Some Lepidoptera do not possess this frenulum, and in such cases the basal angle of the hind wings is made more prominent so as to project beneath the base of the fore wings and prevent dislocation. But some five years ago Prof. Comstock made the discovery that in two families, the *Hepialidæ* and the *Micropterygidæ*, instead of the usual lepidopterous structure, there is a jugum, quite as in the Trichoptera. There is no difficulty in seeing this structure, at any rate in the *Hepialidæ*, some of which are very large insects of five or six inches expanse of wing, and it remained undiscovered so long simply because no one had thought of looking for it; a striking instance of the ease with which characters of the highest importance can be overlooked by competent observers, unless their attention is specially directed towards them. Now it was known previously that these same two families agree together in possessing several additional veins in the hind wings, which are not found in any other Lepidoptera; these veins could not have been evolved from non-

existent structures, and are therefore ancestral; hence these two families constitute not only a separate group, but the oldest group of the Lepidoptera, and may be termed *Micropterygina*. Their close affinity to the Trichoptera is shown by the possession of the jugum, and by the fact that the complex neuration of the *Micropterygidæ* is practically quite identical with that of certain Trichoptera (as *Rhyacophila*). As the Trichoptera usually possess a much larger number of veins, especially in the hind wings, they must be the older group, and the Lepidoptera must have originated from them. The most ancient *Micropterygidæ* known are found in New Zealand, though the majority are European; but these little insects are so readily overlooked by collectors that their distribution is insufficiently ascertained. The *Hepialidæ*, standing considerably isolated from these, are presumably the highest development of a once extensive group, intermediate forms being apparently all extinct; they are now very widely distributed, probably as a result of their very powerful flight, but would seem to be Indo-Malayan in origin.

The next point is to ascertain the connection of the typical Lepidoptera with the *Micropterygina*; this cannot be at more than one point, since it is highly improbable that the frenulum and fixed type of lepidopterous neuration could have been evolved twice. This transition is undoubtedly indicated by the New Zealand genus *Mnesarchæa*, which in the character of the palpi and the neuration of fore wings approximates closely to some forms of *Plutellidæ* and *Tineidæ*, whilst remaining by strict definition a true Micropterygid. The origin of the *Tineina* is thus established; and in the two above-mentioned earliest families (divergent branches from the same stem) the excessively long antennæ of the *Adela* group, and the occurrence of long six-jointed maxillary palpi in many genera of the *Tineidæ*, as also the porrected habit of the antennæ in some genera of *Plutellidæ*, are distinct reminiscences of their Trichopterous origin, and may be quoted as examples of reversion. Further, there can be no question that the other families of the *Tineina* constitute a line of development originating in the *Plutellidæ*, all these being typically smooth-headed; whilst the *Tortricina* form a parallel branch taking its rise from the *Tineidæ*, all these being typically rough-headed. Whether the *Tortricina* are maintained as a

separate group, as has usually been done, or, in accordance with the views of Lord Walsingham and Mr. Durrant, merged in the *Tineina*, is only a question of name and convenience, and therefore of no marked importance. It should be noted that in all the families of these groups there are normally three free veins (1*a*, 1*b*, 1*c*) between the cell and dorsum in the hind wings, though in cases where the area of wing is very small, as in some of the minute *Tineina*, these and most of the other veins are liable to disappear.

Here may be considered two particular cases, those of the *Aegeriadæ* and *Trypanidæ*. The *Aegeriadæ*, popularly known as "clear-wings" from the hyaline spaces on their wings, used formerly to be oddly placed near the *Sphingidæ*, but are in all essential characters undoubted *Tineina*, parallel in development with the *Gelechiadæ* and *Oecophoridæ*. The *Trypanidæ* (*Cossidæ* of some) must be regarded as unspecialized *Tortricina*, marking the transition from the *Tineidæ*; the comparatively gigantic size of the single British species is at first sight somewhat startling, but this is not always maintained in exotic forms, and there is really no other distinction at all. The wood-feeding habit of the larva is very characteristic of that group of the *Tineidæ* from which it is derived.

Having now established in the *Tineina* a base of origin, with which the connection of the general body of Lepidoptera has to be traced, we may consider what characters can be held to indicate nearness to or remoteness from this base. The best indication for this purpose will be furnished by the presence or loss of some ancestral character which when once lost is incapable of redevelopment. Prof. Comstock has employed the frenulum for this, but the choice appears to be unfortunate, for three reasons, *viz.* (1) the proportion separable as having lost the frenulum is comparatively small; (2) the frenulum may have been lost in different groups quite independently, and has in fact obviously been so lost in several families; (3) as the frenulum is apparently only the modification of hairs which are always present, there seems no reason why it might not exceptionally be redeveloped by reversion. A better character is furnished by the presence or absence of vein 1*c* in the hind wings, which is found to be usually constant not only in families, but in main groups,

and a vein once lost can never be regained; but of course the loss may have, and apparently has, taken place independently in more than one line of descent. The whole of the remaining Lepidoptera may then be classed in two groups (*Psychina* and *Pyralidina*) which normally retain this vein, and four others which have entirely lost it.

The *Psychina* are a group of families of unspecialized type, which in fact approach the *Tineina* so closely as not to be separable as a whole by any single character, though each family considered by itself is so separable; at the same time the four families composing it are nearly related together in their lowest forms, and may therefore be regarded as parallel developments. Even the markings of the wings show this want of specialization, as they are, when present, irregular and without definite type of arrangement, and all the families show a marked tendency (in the *Psychidæ* becoming a fixed character) to produce thinly-scaled or semi-hyaline unicolorous forms. It is probable that this indicates approximate relationship to the *Fumea* group of the *Tineidæ*, to which the *Psychidæ* also display their affinity by their apterous females and the case-bearing habit of the larva; on this ground they have even been included together in the same family, but the true *Psychidæ* are always distinguished by the anastomosing subdorsal veins of the fore wings. The *Zygænidæ* include many large butterfly-like forms, brilliantly coloured with metallic blue, crimson, and white; the short, stout, often tuberculated and rather hairy larvæ are of an early type, and though apparently very different in form and habits to the *Psychidæ*, both are probably the modified descendants of internal wood-feeders. The *Heterogeneidæ* (*Limacodidæ* of some) are remarkable for their larvæ, which are an exaggeration of the *Zygænid* type, the legs being often very short and retractile, so that the larva appears to be appressed to the leaf like a slug, whilst the dorsal tubercles are often developed into clusters of stinging spines; and for the small hard oval cocoons, which open by a lid. The tibial spurs of the imago are long, as in the *Tineina* generally, whilst in the allied families they are very short or absent, but there is here probably some connection with bulk or weight. Finally, the *Zeuzeridæ*, whilst structurally related to the *Psychidæ*, show by the wood-feeding habit of their larvæ and other characters

collateral affinity with the *Trypanidæ*, traceable to their common descent. The rather confusing cross-relationships between these several families are characteristic of little-specialized forms; it is as if one had to disentangle a network of small divaricating twigs close to the stem, whilst the course of the larger branches is comparatively easy to trace.

The *Pyralidina* are commonly distinguishable from the other groups already mentioned by the structure of vein 8 of the hind wings, which is brought down so as to closely approach or anastomose with vein 7 beyond the cell. Another character almost constant throughout the group is the stalking of veins 8 and 9 of the fore wings; it is quite constant in most of the families, but in the mainly tropical family *Thyrididæ* these veins are more usually separate; we may therefore with considerable probability regard the *Thyrididæ* as ancestral. Finding further that they nearly approach the *Heterogeneidæ*, both structurally and superficially, whilst the other families are of a peculiar type which is remote from anything else, we shall be justified in looking to the *Heterogeneidæ* as the origin of the group. The mutual relations of the nine families composing this extensive division need not be discussed here in the main; but the case of the *Pterophoridæ* may be mentioned. These curious insects, the well-known "plume-moths," usually have the wings very narrow, and split into two or three feather-like lobes; hence the neuration tends to be much degraded for want of room, but in the earliest forms (and recognizing the transition afforded by the small Australian family *Tineodidæ*) it approaches the Pyralid type; with which also the unusually long and slender legs, the structure of the head, and the larval appearance and habits are also in accordance. The *Orneodidæ* (in which each wing is split into six plumes) can be traced to the same source.

Coming now to the groups which have vein 1c of the hind wings constantly absent, it will be convenient to study first the *Papilionina*, generally termed "butterflies." Notwithstanding the amount of attention bestowed on this attractive group, little has been written as to its origin. It is characterized by the clubbed antennæ, and absence of the frenulum, both these features being found in other cases but not in combination. As it falls into two sections, of which one (*Hesperiadæ*) has all the veins of

the fore wings separate, and the median spurs of the posterior tibiæ usually present, whilst the other has always two or more veins stalked, and the said spurs always absent, there can be no doubt that the *Hesperiadæ* are the most ancestral family. Their very simple neuration closely resembles that of the *Thyrididæ*, but is not found elsewhere in the higher groups, and there is no discordance in other structural characters; moreover, the tendency to show pale semi-hyaline spots in the fore wings, and the development of specific colour-characters on the lower surface of the hind wings, are marked points of superficial resemblance. Similarly knobbed antennæ occurring in the higher *Caradrinina* (*Agaristidæ*) have been thought to indicate relationship to the *Papilionina*; but there the frenulum is always strong and persistent, and the required simple type of neuration is never found. Hence we must suppose that the *Thyrididæ* are the true starting-point of the group.

The *Lasiocampina* comprise five families of no great extent altogether. In these the frenulum either is or tends to be absent, and vein 8 of the hind wings is frequently approximated to 7 beyond the cell, the group being always separable from the *Caradrinina* by one or other of these characters. In the *Pterothysanidæ*, *Lasiocampidæ*, and *Endromididæ* the frenulum is constantly absent; in the *Drepanidæ* and *Callidulidæ* it is sometimes present, though tending towards obsolescence, and these two families, which are apparently collateral developments, must be the more primitive. They approach the *Thyrididæ*, and the *Callidulidæ* also appear to show near collateral relationship to the *Papilionina*, for which, except that the antennæ are not knobbed, they might sometimes be mistaken even by an expert.

The *Notodontina* include all those families of the higher Lepidoptera in which vein 5 of the fore wings, instead of being approximated at its origin to 4, is parallel with it, or even sometimes more approximated to 6, thus appearing to form an independent vein from the cell, instead of a branch of the vein which forms the lower margin of the cell. There is no reason to suspect that this modification has arisen more than once, the whole of these families agreeing well together in all other respects. The *Eupterotidæ*, mostly large insects which, both in the imago and larva states, have considerable relationship to the *Lasio-*



*campidæ*, are probably the least specialized; as they possess a frenulum, they cannot justly be derived from the *Lasiocampidæ* themselves, but have probably a common ancestor not far removed. From this original family are derived four branches, viz. (1) the *Bombycidæ* (this name has often been wrongly applied to the *Lasiocampidæ*, but here denotes *Bombyx mori*, the "silkworm" moth, and its allies) and *Saturniadæ*, which have lost the frenulum entirely; (2) the *Notodontidæ*, *Polyplacidæ* (*Cymatophoridæ* of some), and *Sphingidæ*, stout-bodied forms, whose larvæ are commonly furnished with various prominences; (3) the *Uraniadæ* and *Epiplemidæ*, in which veins 6 and 7 of the fore wings are normally stalked; (4) the several families formerly called *Geometrina*, whose larvæ have usually lost two or three pairs of prolegs.

Lastly, the *Caradrinina* contain seven families, of which the *Ocneriadæ* (*Liparidæ* of some) is doubtless the most ancestral, making in fact a close approximation in many points to the *Psychidæ*, and showing a tendency to exhibit similar apterous females. In this, and the allied family *Hypsidæ*, vein 8 of the hind wings is connected by a bar with the middle of the upper margin of the cell. In the *Agaristidæ*, *Caradrinidæ*, and *Plusiadæ* (these two latter forming the old group *Noctuæ*, whose name is untenable, belonging by right of priority to an owl), this is modified so that 8 anastomoses with the cell-margin very shortly near base, the *Agaristidæ* being characterized by the apically swollen or sometimes clubbed antennæ, the *Caradrinidæ* by the obsolescence of vein 8 in the hind wings, which in the *Plusiadæ* is well-developed. In the *Arctiadæ* a further modification takes place, 8 anastomosing with the cell-margin for a considerable distance from base. In the *Syntomididæ* is reached the extreme of change in this direction, 8 becoming wholly absent by coincidence with the cell-margin and 7.

In this scheme the *Caradrinina*, *Notodontina*, *Papilionina*, and *Tortricina* are all terminal developments, *i. e.* growths which lead to nothing beyond themselves, and in translating this scheme into a linear form it would be possible to take any one of these as top, and the other branches in any convenient succession. But, considered as a whole, the *Caradrinina*, from the difficulty of sharply defining the families (which implies comparatively little

extinction), and their dominant character, as shown by their wide distribution and the prodigious number of similar species and individuals, must be thought to be the most recent. The following order correctly expresses the phylogeny as indicated above, whilst paying some regard to collateral relationship also, viz. \**Cara-drinina*, \**Notodontina*, *Lasiocampina*, \**Papilionina*, *Pyralidina*, *Psychina*, \**Tortricina*, *Tineina*, *Micropterygina*; where the asterisk marks terminal developments.

It is not uncommon to see futile discussions as to which of two groups, reached by different lines of descent, is the higher, *i. e.* the more highly organized. The question is not only always unanswerable, but the answer would be quite valueless if found; all that can be done is to find the more recent.

In conclusion, a word as to the practical value of structural characters in classification. Characters of colour and general form are bad only because they are particularly liable to be modified by changes of environment. Now some structural characters are quite as liable, and are therefore equally bad. For example, in birds the shape of the beak is obviously likely to be modified in accordance with a change of food, and is therefore (as between allied forms) probably little better than a colour character. Yet the teeth of mammals, used for the same purpose, afford an excellent character, because the element of number comes in, which gives definition and admits of greater variation. It may be doubted whether any group of animals exhibits a better character than the neururation of insects, which displays sufficient complexity and variation in the number and interconnection of the different veins, whilst at the same time it is practically unaffected by external forces, except occasionally the easily calculable influence of a change in form of wing; moreover, the modifications effected are often irrevocable, and therefore less puzzling to follow.

## THE MAMMALIA OF GREAT YARMOUTH AND ITS IMMEDIATE NEIGHBOURHOOD.

BY ARTHUR PATTERSON.

GREAT YARMOUTH, the second town in importance in Norfolk, and celebrated the world over for its Herring fishery and "bloater cure," stands on a peninsula; it is bounded on the east by the North Sea, and on the west by the River Yare, from which it derives its name. It is situated in lat.  $52^{\circ} 36' 40''$  north, and long.  $1^{\circ} 44' 22''$  east. From London it is 108 miles in a direct line, and south-east from Norwich nineteen miles "as the crow flies."

Southwards to Lowestoft extends a long line of cliffs, averaging 30 ft. in height, "composed principally of disrupted crag, sand, and clay, beneath which has occasionally been laid bare a stratum of blue clay, the wreck of the Lias."\* In these cliffs the remains of the Mammoth, and on one occasion the skull of a Beaver, have been met with.

Northward runs a long range of low sandhills, which, like the cliffs southwards, have been and are suffering severely from the encroachments of heavy tides; as recently as Nov. 29th, 1897, the sea broke through immediately north of Winterton, drowning a number of Rabbits on the warren. Owing to want of sufficient care in keeping up the sandhills, and encouraging the growth of the marrum grass (*Ammophila arundinacea*), *Agropyrum junceum*, the sand-sedge (*Carex arenaria*), all of which are indigenous to the locality, they are become no longer a sturdy barrier against the wild ravings of the rough North Sea. The North and South Denes are less conspicuous undulations of blown sand held together by the creeping roots of the rest-harrow (*Ononis spinus*), the sea-purslane (*Arenaria peploides*), and others. Within the past few years the furze, which came quite up to the town

\* C. J. and James Paget, 'A Sketch of the Natural History of Great Yarmouth,' p. iv. 1834.

boundary upon the North Denes, has been all but exterminated, and the sand-dunes levelled for golfing and building purposes.

To the west of the town lies a great alluvial level, once the bed of the *Garienis Ostium*. Dyked and drained, this large area forms most valuable marshland, affording pasturage for many herds of cattle. The famous Broads are remains of this fine estuary. Breydon, another portion of it, five miles long and one in width, at the juncture of the Yare, Waveney, and Bure, remains a great salt-water tidal basin; its northern point reaches the town quays. "By the improved banking of the rivers" a large tract that was once under water has been reclaimed, and the drainage and cultivation following have, in the course of years, produced great changes in the natural productions of the district. The country a few miles northward becomes more hilly and wooded, as it does southward of Breydon. There is, however, nothing deserving of the name of a wood, except at Fritton, within the ten mile radius included in this paper.

Very pithily and concisely the Pagets (referring to the various classes of the local fauna) remark:—"In none of them have the changes described as taken place, in consequence of cultivation, been so much felt as in the Mammalia, nearly all of which, with the exception of the few species which it is a matter of profit to preserve, are either totally exterminated, or in rapid progress towards being so." To the few exceptions referred to may be added such as from their amazing fecundity, and the gradual extirpation of their natural enemies, are becoming a pest and a scourge to cultivation itself; the Field Vole and the Brown Rat are instances in proof. And so long as the lesser birds of prey and the Weasel family are so incessantly persecuted, will this evil continue and increase.

Lubbock\* makes mention of a species of Dog—the black curly-coated Retriever—as "very common here, though not entirely peculiar to the county—the Yarmouth Water-Dog, as they are generally termed in other parts of England." The sagacity of this species is referred to in the case of one kept many years ago at a drainage mill adjoining Breydon. It regularly searched the flint-stone "walls" in winter for wounded wildfowl, which usually seek some nook or cranny. "When the

\* 'Fauna of Norfolk,' p. 4 in 1845 edition.

wind was north-east, and many Ducks in the country,\* he sometimes carried home eight or nine fowl of various kinds in the same morning." How he evaded scrutiny and interference, and picked up his trail after each home-going, are interesting matters of detail. An animal of the same breed was kept in the seventies by the late G. Overend, a famous collector of local birds; it exhibited some remarkable traits, fetching newspapers, and exchanging them with various friends of his master, and other notable things. It is still fairly common in the locality, but has been superseded by the Spaniel by the very few gunners who follow up shooting along the "walls" and on the marshes.

With regard to the species mentioned in the following list, our knowledge of the Chiroptera may be mentioned as yet being in an unsatisfactory state; but few sportsmen, save novices, ever trouble themselves to bring down such mean game; and, as their habits make observation an awkward and at best but a casual matter, one or two other species than those enumerated may really be frequenting the neighbourhood, but are as yet awaiting detection. Amongst the Insectivora, the "Oared Shrew" † has not yet been observed in the locality. All the *Mustelidæ*, with the exception perhaps of the Weasel, are yearly becoming scarcer. The *Phocidæ*, on the other hand, are more frequent in their visits. Opportunities for observing the Cetacea have always been and will remain difficult and casual. The Rodentia have become restricted, or have increased, according to the circumstances which affect their natural economy.

At present the list comprises the following:—1. Chiroptera (four). 2. Insectivora (four). 3. Carnivora and Pinnipedia (ten). 4. Rodentia (twelve). 5. Cetacea (eight). Of these two carnivores and one rodent are now extinct, one rodent may be referred to as a subspecies, and one *Phocidæ* as doubtful.

The first list of Yarmouth Mammalia was published in 1834 by the Brothers Paget, in their 'Sketch of the Natural History of Great Yarmouth,' a much less perfect one being published in 1863, by Dr. B. T. Lowne, under the title of 'A Popular Natural

\* These good old gunning times are now but matters of tradition, the drainage of the marshes, increased traffic, and greater scarcity of wildfowl considerably accounting for the local decrease.

† A variety of *Crossopus fodiens*.

History of Great Yarmouth.' Various records have been made of locally occurring species in the volumes of the 'Transactions' of the Norfolk and Norwich Naturalists' Society. In March, 1896, the Yarmouth Section of that Society published a list of the species compiled by the present writer.

The following abbreviations will indicate the status of the several species and explain the references:—C. common; F. frequent; F. C. fairly common; R. R. rather rare; R. rare; A. accidental; E. extinct; [ ], doubtful; Trans. Norf. and Nor. Nat. Soc., 'Transactions' published by the Norfolk and Norwich Naturalists' Society.

LONG-EARED BAT (*Plecotus auritus*). R.—Have seen and identified examples only on two occasions. One was picked up in the town dead, having in its flight struck the gable of a house and killed itself.

NOCTULE or GREAT BAT (*Vesperugo noctula*). F. C.—Several may be seen at one time any summer's evening in the vicinity of water, the Bure being a favourite haunt. Occasionally are very noisy. Will answer to a good mimicry of their shrill notes, and fly close to the performer. Having on one occasion a slightly wounded specimen shrieking in my pocket, its companions came so near that I could feel the "whisk" of their "wings." Its prey is the Cockchafer (*Melolontha vulgaris*), and the Watchman Beetle (*Geotrupes stercorarius*) by preference, whose hard wing-cases it may be heard scrunching.

PIPISTRELLE (*V. pipistrellus*). C.—Abounds in old houses, outhouses, and churches. I have seen it flitting about in church during evening service. On several occasions have seen examples flying about in the centre of the town at noonday. Discovered two skulls in the "pellet" of an Owl near Yarmouth in August, 1896.

PARTI-COLOURED BAT (*V. discolor*). A.—Reference is made to an example taken from the rigging of a vessel lying in Yarmouth Roads in the year 1834 (*vide* Trans. Norf. and Nor. Nat. Soc. 1873-74, p. 80).

HEDGEHOG (*Erinaceus europæus*). C — Local prejudice is still strong against this useful vermin destroyer. I have a suspicion it is not so common as formerly. A friend in whose possession a female produced young was gratified in seeing her

rear her progeny. I have signally failed in tempting a mother even to notice her offspring.

**MOLE** (*Talpa europæa*). C.—Undoubtedly on the increase on the marsh-lands, and indeed elsewhere, now that Weasels are being so ruthlessly exterminated. On dry uplands have observed it tunnelling near the surface in strawberry-beds, eagerly pursuing the Strawberry Beetle (*Harpalus ruficornis*), which in the day-time remains quiescent about a couple of inches below the surface. I have observed examples swimming in the Bure. Cream-coloured Moles are not rare. “A large rusty-white variety was common at Oby” (*vide* Trans. Norf. and Nor. Nat. Soc. 1870-71, p. 74). Mr. Last Farman records a Mole with two snouts found at Haddiscoe. He has also found maize in Mole-heaps far from habitations; also “pints of worms tied in knots” therein.

**COMMON SHREW** (*Sorex vulgaris*). C.—More often found dead than seen alive. In a barrow-load of Owl-pellets I examined at Tunstall, in August, 1896, I found as many skeletons of Shrews as Field Mice (*Mus sylvaticus*). Local, “Ranny”; “Shrew-mouse.”

**WATER SHREW** (*Crossopus fodiens*). F. C. — “Marsh ditch-banks; rather rare” (Pagets). More numerous than is generally supposed. Its timidity of disposition and retiring habits make it exceedingly difficult of observation; and even when unaware of one’s presence its movements are not easily distinguished, as it worms itself amongst the luxuriant herbage at the ditch-sides. Mostly its tiny bullet-like “plump” into the water is the only indication of its proximity. The variety known as the “Oared Shrew” I have not met with here.

**FOX** (*Vulpes vulgaris*). A.—“Now (1834) very seldom seen” (Pagets). Undoubtedly the indigenous local race is extinct. Its occurrence as a straggler is of very rare occurrence. One seen at Haddiscoe, about twelve years ago, crossing the river (L. Farman).

**PINE MARTEN** (*Mustela martes*). E.—The Pagets, referring to the Marten as *Viverra foina*, speak of it as “formerly at Herringfleet and Toft; now extremely rare.” Has probably been extinct in this neighbourhood for half a century.

**WEASEL** (*M. vulgaris*). C.—Notwithstanding incessant persecution is still fairly common. It is no unusual thing to see strings of carcasses hanging to warren-fences and gamekeepers’

“corners.” The Pagets’ remark still holds good: “Occasionally seen in the town.” On two occasions I have observed it drop from hay-waggons passing along the streets. Have seen it on the marshes assiduously hunting for Field Mice. Local, “Mouse-hunter.”

STOAT (*M. erminea*). F.—Still fairly frequent on Rabbit-warrens and in game-preserves. White and blotched examples are occasionally found in winter.

POLECAT (*M. putorius*). R.—“Not uncommon about farm-yards” (Pagets). This remark does not hold good to-day. Rapidly verging on extinction in Norfolk, it is seldom if ever seen now within the ten-mile radius.

OTTER (*Lutra vulgaris*). F. C.—In the Pagets’ list this species is referred to as “now seldom seen on any of the Broads where it was once not uncommon.” Scarcely a winter passes but one or more are killed; it is astonishing that any remain considering the relentless persecution it is subjected to. Is undoubtedly less rare than is generally supposed; its cautious movements and secretive disposition, combined with the great range of its habitat, enabling the species to defy speedy extirpation. I have kept as pets several from the Broad district; one was a huge savage animal that came to grief through its love for duck-flesh. Another example became so tame as to run loose about the house, and play on the hearthrug with the children. Two, over which I had supervision when in Ireland, were keen on Barcelona nuts thrown to them by the public. The Tench is a favourite prey of the local race.

BADGER (*Meles taxus*). E.—Writing in 1834, the Pagets remark:—“Thirty years ago these were common, especially about Bradwell and Browston, but they are entirely exterminated.” Is undoubtedly extinct in East Norfolk. One or two “escapes” have been killed in my recollection. I have kept several in confinement, finding them generally very untractable, differing greatly in this respect from *Vulpes vulgaris* and *Lutra vulgaris*, which in my possession have even exhibited traits of strong affection.

SQUIRREL (*Sciurus vulgaris*). F. C.—In Fritton Woods, and neighbouring woody districts. A few dead specimens brought to market every winter.

DORMOUSE (*Muscardinus avellanarius*). E.—The only evidence



I have of its claim to this list is its presence on Pagets' list: "Occasionally seen in small woods." But I have no knowledge of its occurrence in this part of Norfolk in the present day.

HARVEST MOUSE (*Mus minutus*). F. C.—Though not included in Pagets' list, has an undoubted claim to figure in our own. Nests are occasionally found at Haddiscoe; Mr. L. Farman reports finding them in "quantity in the bottom of barley-stacks." Specimens have been procured alive from that locality.

LONG-TAILED FIELD MOUSE (*M. sylvaticus*). F. C. — Have met with this species occasionally on the North Denes. Have seen a dead one dug out of the "run" of a hunted Stoat, and seen it actually pursued by the Weasel. It appears to be of a very retiring disposition.

COMMON MOUSE (*M. musculus*). C.—Far too common. Whilst a local baker was hunting down a stray Rat, he discovered its lair. He was surprised to find several freshly-killed mice in it. The inference is that the Rat had caught these for food. There is a common local saying that "where you find Mice you are free from Rats."

BLACK RAT (*M. rattus*). C. — "This species still remains here, though its numbers are gradually decreasing; it is now seldom found, except in the ceilings and upper stories of old buildings" (Pagets). "Probably extinct in this county" (Trans. Norf. and Nor. Nat. Soc. 1883-84, p. 674). Than at the present moment the Black Rat was never more numerous at Yarmouth. I have known it from boyhood, and in succeeding years have frequently met with examples, generally dead and mutilated, in the Rows, thrown out from malt- and other warehouses. In 1895 it again forced itself into notice by the apparent increase, although, peculiarly enough, it seemed to flourish in the south-western corner of the town, Regent Street forming a margin to its northward distribution.\* Putting a premium on every specimen brought to me, I received over a hundred examples within a few months. Two were examined by Mr. Eagle Clarke, of Edinburgh, who wrote, March 5th, 1896:—"The Rats you send me are most undoubtedly the old English species, *Mus rattus*, and their occurrence in abundance in Yarmouth is an interesting fact. *M. rattus* and *M. alexandrinus* are considered to be *races* of the

\* I have recently known several killed north of Regent Street.

same species, the black *rattus* being the form found in temperate regions, and the brown *alexandrinus* the tropical one." In summer the Black Rats become troublesome in private houses, warehouses, and stores, and in sail-lofts are keen upon the Russian tallow used there. From one loft I received a whole family of half-grown *rattus* with a white spot in the centre of the chest. As the malting season returns they seem to again concentrate their forces in the maltings. In 1895, having heard of certain smacks being infested with them, I made arrangements with the "watchers," who "smoked" each vessel as it came into port, to secure specimens. After a day and a night's burning of pepper in the vessel, all apertures being closed by boards and mud, the hatches were taken off. I have seen them lying in all conceivable places, the largest generally being near to the stove. From one I had the pick of forty Rats. Amongst them were two or three *M. alexandrinus*. Vide Trans. Norf. and Nor. Nat. Soc. vol. vi.

[Var. *Mus alexandrinus*.—This variety is a duplicate in size and build of the preceding. It is by no means common; I have had less than a dozen examples in all. Most of these came from one large smacks' store-house. The general colour was grey, becoming dirty white below, and inclining to a decided brown upon the backs of some. Gradations from *M. decumanus* to *M. rattus* are not found, nor are any of the physical characteristics of *M. decumanus* observed in this.]

BROWN RAT (*M. decumanus*). C.—"Grey" would be preferable to "Brown." Will undoubtedly increase in proportion to the extirpation of the *Mustelidæ*. It is a pity gamekeepers do not turn their attention to it rather than to its *bonâ fide* enemies, the Stoat, Owl, &c. Abounds on Breydon and the river "walls"; it here assumes a semi-aquatic life.

COMMON FIELD VOLE (*Microtus agrestis*). C.—Unquestionably on the increase. Abundant on some marshes. Is the favourite prey of the Kestrel (*Falco tinnunculus*).

WATER VOLE (*M. amphibius*). C.—Found at almost every ditch-side. "The fact that the Water Vole is somewhat carnivorously inclined, or rather is piscivorous, I am fully satisfied, having observed them on several occasions devouring small fish left on a 'rond' beside my house-boat when moored in Kendall

Dyke. They simply cleared the flesh from the bones. The late Sir E. Newton, in a letter some time previous, suggested the number of broken fresh-water Mussel shells (*Anodonta cygnæa*) as being the work of Voles. On Sept. 12th, 1896, I examined a number at Lound, when I was led to the conclusion that the animals were actually responsible. One valve only was broken, and that always on one particular side, presumably the easier side broken. The excrement of Voles lay against every little batch of broken mollusc.\* On one occasion I actually observed a Vole in the daytime endeavouring to drag a Mussel up the bank, and have since received a communication from West Norfolk which clearly pointed out the Vole as partial to Crayfish. Four white examples were killed at Haddiscoe in 1892 (L. Farman).

HARE (*Lepus timidus*). F. C. — Becoming yearly scarcer. I frequently observed this species on the marshes before it was excluded from the game list. Appears, however, to be rather more numerous this year than for some time past. In 1887 Mr. Last Farman shot one at Haddiscoe, almost white in colour, weighing eleven pounds. A mottled Hare caught at Horsey, Nov. 28th, 1896.

RABBIT (*L. cuniculus*). C. — Abundant on the adjacent warrens. Prior to 1880 was frequent on the North Denes, but with the advent of rail and golfers, and the destruction of the furze, it disappeared. Prior to that date, in spring, young bucks not infrequently wandered to within the town boundary; and in the early eighties several made themselves notorious by locating in the cemetery, from which, for the sake of decency, it was found necessary to dislodge them. An earless example was taken in the neighbourhood two years ago, and is now in the Yarmouth Museum.

COMMON SEAL (*Phoca vitulina*). R. R.—Sir Thomas Browne† mentions the killing of a Seal at Surlingham Ferry, “having continued in the river for divers months before.” At that time the Salmon was undoubtedly no stranger to the Norfolk rivers. “One [Seal] weighing fourteen stone killed, March, 1822” (Pagets). Of late years Seals appear to have increased in the Wash, where they are comparatively safe from molestation, and

\* See the writer's note in Trans. Norf. and Nor. Nat. Soc. vol. vi. p. 293.

† Sir Thomas Browne's Works, Wilkins' edit. iii. p. 325.

even the fishermen look upon them with no unfriendly feelings. Almost yearly during the past decade I have one or more records of occurrences, having drifted hither during heavy tides. In 1896 a coastguardsman killed a specimen sleeping on the beach with his sword-stick. Several have been shot. On Nov. 3rd, 1891, a Seal seized a codling fast to a line against the Yarmouth jetty. Two hooks fastened to it; in endeavouring to land it on the beach the "snoods" broke, and the animal got away.

GREY SEAL (*Halichærus gryphus*). R.—Two were killed in the Wash in 1881, where the species undoubtedly occurs occasionally. A young female, drifting into the neighbourhood, came up the river, and was shot on Breydon, Nov. 28th, 1882; it is now in the Norwich Museum. I feel certain another was killed in December, 1897, which I did not see.

[WALRUS (*Trichechus rosmarus*). ?.—The claim for this species to be included in the local list is doubtful. "Although now confined to the icy seas of the Arctic Circle, the Walrus was probably not uncommon on our shores in times long past. The skull is said to have been found in the peat near Ely."\* On May 1st, 1893, the fore part of a Walrus skull with one tusk in place was dredged up in a shrimper's trawl off Yarmouth. The tusk, 11 in. long, has since been halved lengthwise, and has the appearance of dirty marble. There are a few barnacles still attached to the skull.]

ATLANTIC RIGHT WHALE (*Balæna biscayensis*). A.—Under the name of *B. mysticetus*, the Pagets refer to "a small one taken near Yarmouth, July 8th, 1784." It is highly improbable that this species has ever occurred here, and the Whale referred to was doubtless the Atlantic Right Whale (*B. biscayensis*). Formerly several Yarmouth vessels were engaged in the Whale fishery, and there yet remain several jaw-bones of this animal fixed in various parts of the town, one or two being built in gable walls, and two are to be seen planted as arches in gardens. One standing in the gas-house premises was there when the South Denes were yet unenclosed; it was the custom for those who rambled thither on Sundays to pass through it. Several aged inhabitants still boast of having done so.

COMMON RORQUAL (*Balænoptera musculus*). A.—As *B.*

\* Southwell, 'Seals and Whales of the British Seas,' p. 35.

*physalis* the Pagets refer to this species as having "several times been taken in the Herring-nets." An example was stranded on Winterton beach, Jan. 12th, 1857, and was killed by the fishermen, who, in conjunction with two or three townspeople, exhibited about twenty tons of the carcase on the Church Plain, Yarmouth. The skull is preserved in the Museum of the College of Surgeons. Another at Happisburgh, March 1st, 1875.

LESSER RORQUAL (*B. rostrata*). R.—A full-grown example, thirty feet in length, found its way into Yarmouth harbour on June 8th, 1891. It was attacked by several boats' crews, and, after an exciting hunt, during which the animal received severe wounds, mostly self-inflicted, it succumbed. It was drawn into the lifeboat shed and exhibited, afterwards being preserved and taken on tour to various parts of the country. On Dec. 8th, 1896, an adult dead specimen was stranded on Gorleston beach, where it became very speedily a most unwelcome and unsavoury object, and had to be buried in sections.

SPERM WHALE (*Physeter macrocephalus*). A.—The basal portion of the skull of a Sperm Whale stands in the north-west doorway of St. Nicholas Church. It was long known as the "Devil's Seat." "In the churchwardens' accounts for 1606 there is a charge of 8s. for painting this chair, which clearly proves its antiquity."\* There remains little doubt, although the date is uncertain, that this example was killed in the latter part of the sixteenth century.

BEAKED OR BOTTLE-HEAD WHALE (*Hyperoödon rostratum*). R.—As *Delphinus bidens* the Pagets refer to "a large one caught in a Herring-net, November, 1816. A smaller specimen about twenty years before."

GRAMPUS (*Orca gladiator*). R. R.—The Pagets refer to occurrences as follow:—"A specimen weighing 4 cwt. and 11 ft. long found alive on the beach, July 21st, 1823; another, 16 ft. long, caught about 1694,† according to Sir Thomas Browne." Another brought into Yarmouth June 25th, 1867; weight 14 cwt. An example, 7 ft. 6 in. long, taken into Lowestoft harbour on Nov.

\* Southwell, 'Seals and Whales of the British Seas,' p. 87.

† As Sir T. Browne wrote apparently in the year 1662, and says "four years ago," this capture would take place 1658; in Wilkins's edit. iii. pp. 325 and 326, second paragraph.

12th, 1894 ; seven days after another of exactly the same dimensions brought into Yarmouth by a Herring-boat.

PORPOISE (*Phocæna communis*). C.—Frequently seen in the fishery grounds, and not seldom observed when passing through the Roads in summer. Has been seen up-river, and been stranded on Breydon mud-flats. “Two foetal young ones were taken from a Porpoise at Yarmouth on Dec. 7th, 1881,” Southwell (Trans. Norf. and Nor. Nat. Soc. iii. p. 672). A very large shoal passed through the Roads, Jan. 11th, 1890. An example 39 in. long stranded July 18th, 1891 ; the teeth were barely through the gums.

WHITE-BEAKED DOLPHIN (*Delphinus albirostris*). F.—This species, which “was first recorded from Norfolk” (Trans. Norf. and Nor. Nat. Soc. iii. p. 672), has several times been observed, and taken since. Six are recorded prior to 1885. I have met with the following :—Example 7 ft., Gorleston, April 17th, 1890 ; another, 4 ft. 8 in., on South Beach, April 19th, 1891 (the Gulls had been busy at it) ; one, 7 ft. 4 in., went through the bridge to Breydon, Aug. 30th, 1891 ; it had forty-four teeth in the upper jaw, forty-eight below. Several got aground in shallow water at the Caister “patch,” Sept. 16th, 1891 ; they struggled over a considerable area into deeper water. One brought in alive, June 13th, 1894 ; length, 8 ft. 6 in. ; was exhibited alive on the Marine Parade, but ordered off by police. It was killed in a fish-house, and found to be a gravid female ; the young contained was 3 ft. 6 in., the short snout was not beyond the arch of the “forehead,” which was exceedingly convex. It was apparently within a day or two of birth. Most of the examples examined were females. Local, “Scoulter.”

THE COMMON DOLPHIN (*D. delphis*) has not as yet been detected here.

THE INSECT VISITORS OF FLOWERS IN  
NEW MEXICO.—II.

BY T. D. A. COCKERELL,

Entomologist of the New Mexico Agricultural Experiment Station.

THE present paper relates mostly to some investigations made in September and October, 1897, during a trip northward up the Rio Grande Valley. The localities visited were Rincon, Albuquerque, Santa Fé, Española, Embudo, and Rinconada.

Rincon, N. M., Sept. 14th.

While the train stopped I was able to do a few moments' collecting, and obtained three species of bees:—

- (1). *Nomia foxii*, Dalla Torre. One female at flowers of *Solanum elæagnifolium*.
- (2). *Perdita callicerata*, Ckll. At flowers of *Baileya multiradiata*.
- (3). *Halictus* sp., apparently new, at flowers of *Gutierrezia sarothræ*.

Albuquerque, N. M., Sept. 15th to 17th.

Altitude 5026 ft. Lat. 35° 05'. Annual precipitation, 7.19 inches. Mean temperature: annual, 55.8°; for September, 68.5°.

The following flowers, which were collected, were not observed to be visited by bees:—*Gaillardia*, prob. *pulchella*, *Aster multiflorus*, *Eriogonum rotundifolium*, *Oreocarya* prob. *suffrutescens*, *Abronia fragrans*, *Astragalus* sp., *Salvia lanceolata*, *Carlowrightia linearifolia*, *Anemiopsis californica*, *Chrysothamnus* (i. e. *Bigelovia*) *bigelovii*, *Flaveria angustifolia* (almost over). The *B. bigelovii* was common by the roadsides in the part of the town known as the Highlands, and was badly infested by some gall-making dipteran. I am indebted to Prof. E. O. Wootton for the names of these plants.

The following flowers were visited by bees:—

- (1). *Cleome serrulata*; visited by *Bombus morrisoni*, Cr., *Podalirius urbanus* var. *alamosanus* (Ckll.), and *Perdita zebrata*, Cr.
- (2). *Grindelia* sp.; visited by *Ashmeadiella buconis* (Say), which is new to the fauna of New Mexico.
- (3). *Bigelovia wrightii*; visited by *Prosapis asinina* var. *bigeloviae*, Ckll. ined., *Nomia nevadensis*, Cr., *Epeolus occidentalis*, Cr., and *Colletes armata*, Patt.

- (4). *Helianthus annuus*; visited by *Perdita albipennis* var. *hyalina* (Cr.), *Pseudopanurgus æthiops* (Cr.) *Melissodes agilis*, Cr., *Andrena helianthi*, Rob. (new to N. M.), and *Nomia persimilis*, Ckll. ined., ♀. The females of *Nomia persimilis* mimic *Andrena helianthi* to such a degree that when collecting them I did not distinguish the two species.
- (5). *Asper* sp. with purple rays; visited by males of *Nomia persimilis*, Ckll. ined.

There is one thing to be noticed in connection with the above records, namely, that the flowers which attracted the bees are not only of bright colours, but occur in large masses, so as to be visible from a distance. The other eleven flowers are either comparatively inconspicuous, or do not occur in large masses, except perhaps the *Anemiopsis*, which seems quite unsuited for bees.

Santa Fé, N. M., Oct. 3rd to 5th.

Alt. 7,026 ft. Lat. 35° 41'. Ann. precip. 14.69 in. Mean temp.: annual, 49.6°; for October, 51.0°.

The end of the bee season was at hand, and few species were on the wing. *Bigelovia* or *Chrysothamnus speciosus* var. ? *latisquameus* (det. E. O. Wooton) was still in flower, and attracted *Halictus ligatus*, Say, ♂, *Colletes americana*, Cr., ♀, and females of *Melissodes*, besides some undetermined males of *Halictus*. In a garden, marigolds and marguerites were yet in bloom, and I watched them with interest because, although garden flowers are usually unattractive to wild bees, they are visited when the wild flowers are mostly over, at the end of the summer. The result was as follows:—

- (1). Marigolds; visited by males of *Halictus ligatus*, Say, and males and females of some small species of *Halictus* not yet studied.
- (2). Marguerite; visited by one ♀ *Perdita snowii*, Ckll. This was a most interesting capture, as the species was hitherto known only by a unique specimen taken in Colorado. On Oct. 2nd I took at the marguerite a ♀ *Perdita zebrata*, Cr. (which normally visits *Cleome*), and a ♀ *Halictus*.

A single patch of the wild golden-rod (*Solidago canadensis*), almost over, was visited by a ♀ *Halictus* on Sept. 20th.

Española, N. M., Sept. 25th.

Two males of *Halictus* were taken while the train stopped. There were found here, close to the station, not only the common *Xanthium canadense*, but a quite different species of *Xanthium*, which to my surprise is reported by Prof. Wooton as differing from anything in the herbarium of Columbia University.



Embudo, N. M., Sept. 25th to 27th.

Alt. 5800 ft. Lat. 36° 10'. Ann. precip. 9.74 inches.

This locality was entirely new ground, entomologically speaking.

The following flowers were collected, but were not observed to be visited by bees:—*Nasturtium sinuatum*, *Campanula parryi*, *Melilotus indica*, *M. alba*, *Fallugia paradoxa*, *Amarantus palmeri*, *A. græcizans*, *Bahia absinthifolia*, *Aphyllon multiflorum*, *Euphorbia serpyllifolia*, *Polygonum* (perhaps *pringlei*). These were all determined by Prof. E. O. Wooton. In the Mesilla Valley *Melilotus indica*, when massed in quantity, as was not the case at Embudo, is attractive to small bees (*Halictus*, *Sphæcodes*, *Calliopsis*, *Prosapis*) at the beginning of May. I have taken *Nomia nevadensis* at *Fallugia paradoxa* at Albuquerque at the end of June; it is fairly attractive to hymenoptera when occurring in quantity; when collected at Embudo it was nearly over, only an occasional flower being seen. On Aug. 13th, at Mesilla, I saw *Aphyllon multiflorum*, Gray, persistently visited by a *Ceratina*; a single honey-bee also visited the flowers. The flowers turn indigo blue when subjected to cyanide fumes.

The following flowers at Embudo were visited by bees:—

- (1). *Cleome serrulata*. Almost over; visited by *Prosapis* n. sp., ♀.
- (2). *Bigelovia* (or *Chrysothamnus*) *viscidiflora* (det. E. O. Wooton).
- (3). *Bigelovia* sp.

There were two species of *Bigelovia*, but unfortunately when collecting I did not at first appreciate this fact, and the collections were not separated. From the lower-growing form I took *Perdita rhodura*, Ckll. ined. (abundant), *Andrena vulpicolor*, Ckll. ined. (several), *Podalirius maculifrons* (Cr.), *Agapostemon* sp. ♂, and a ♂ *Colletes* new to me. On the taller species *Perdita affinis*, Cr. (new to N. M.) was common. The other *Bigelovia* bees at Embudo were *Colletes americana*, Cr., ♀, *C. simulans*, Cr., ♀ (new to N. M.), *Perdita subfasciata*, Ckll. ined. (one), *P. townsendi*, Ckll. (hitherto supposed peculiar to the White Sands), *Calliopsis coloradensis*, Cr. (one), and sundry females of *Melissodes*. The new *Andrena vulpicolor* is a particularly fine species, with the thoracic pubescence of a foxy-red colour.

To complete the list of Embudo bees, it may be mentioned that a female *Agapostemon texanus*, Cr., was taken from a hole in the ground.

Rinconada, N. M., Sept. 26th.

This is only a few miles above Embudo. Two species of flowers were visited by bees:—

- (1). *Verbesina encelioides*; visited by *Halictoides marginatus* (Cr.), *Heriades variolosa* (Cr.), which is new to N. M., *Megachile* sp. ♂, *Megachile* sp. ♀, and *Megachile* sp. ♀.
- (2). *Bigelovia*, a tall species; visited by *Melissodes menuacha*, Cr.,

*Colletes americana*, Cr., *Colletes* sp. ♂ (new to me), *Agapostemon* sp., ♂, and *Calliopsis* n. sp. near *coloradensis*. Also by the butterfly *Pyrameis cardui* and the syrphid fly *Chrysogaster bellula*, Williston.

It is thus seen that the visitors observed at these two Compositæ were entirely different.

Las Cruces, N. M., Sept., Oct., 1895.

The following collections of autumnal bees have not heretofore been reported:—

- (1). *Verbesina encelioides*; Oct. 9th, visited by a ♀ *Pseudopanurgus athiops* (Cr.).
- (2). *Aster hesperius*, Gray; Oct. 4th, seemed little attractive to bees: visited only by *Agapostemon melliventris* (Cr.), ♂, and a ♂ *Halictus*.
- (3). *Baileya multiradiata*; Oct. 23rd, visited by *Parandrena rhodocera* (Ckll.).
- (4). *Helianthus annuus*; Sept. 21st, visited by *Panurginus perlavisi* (Ckll.), *Halictoides marginatus* (Cr.), in great numbers, *Andrena pulchella*, Rob., *Melissodes agilis*, Cr., and *Podalirius maculifrons* (Cr.).

It is curious that the sunflower *Andrena* at Las Cruces should be *A. pulchella*, while that at Albuquerque is *A. helianthi*.

Las Cruces, N. M., Aug. 23rd, 1897.

In the *Larrea* zone close to Las Cruces the following were collected by Prof. C. H. T. Townsend and the writer from flowers of *Cevallia sinuata*, Lag. (Loasacæ):—

*Melissodes luteicornis*, Ckll., ♂, *Centris casalpinia*, Ckll., ♂, *Podalirius californicus*, Cr., ♂, *Anthidium maculifrons*, Sm., ♂, *Bombus* near *fervidus*, prob. n. sp.

Mesilla, N. M., Aug. 21st, 1897.

The flowers of *Martynia* sp. were observed to be visited by *Podalirius vallorum*, Ckll., ♀. On Aug. 19th, at Mesilla Park, *P. vallorum* ♂ was visiting a cultivated *Chilopsis*. The two species of flowers mentioned, though of quite different affinities, are not dissimilar in colour and form.

Mesilla, N. M.

## OBITUARY.

## OSBERT SALVIN.

THE death of this well-known and highly-respected ornithologist and entomologist took place suddenly, though not altogether unexpectedly, at Hawksfold, near Haslemere, on June 1st, from an old-established heart disease, which had been borne stoically and contemplated cheerfully. He was born at Finchley in 1835, and was the only surviving son of Mr. Anthony Salvin, a well-known architect. Shortly after graduating at Cambridge as Senior Optime in the Mathematical Tripos of 1857, he made a Natural History Expedition to Tunis and Algeria, in the company of Mr. W. H. Hudleston and Mr. (now Canon) Tristram, both of whom survive. In the autumn of the same year he made the first expedition to a country with which his life's work was to be largely associated; this was his visit to Guatemala, where he stayed chiefly in company with the late Mr. G. U. Skinner, the well-known collector of orchids, till the middle of 1858, revisiting the same region in about a year, and for a third time in 1861, in company with his friend and future coadjutor, Mr. F. D. Godman. After his marriage, in 1865, he with his wife made a fourth journey to Central America. There can be no doubt that these expeditions incited the project and prepared the way for the publication of 'Biologia Centrali-Americana,' of which 142 parts have already appeared, and which is still unfinished.

From the foundation of the Strickland Curatorship in the University of Cambridge, in 1874, Mr. Salvin accepted and held that office until 1883, when he succeeded to the family estate. As an ornithologist, he edited the third series of the 'Ibis,' of which he was one of the founders; was author of a 'Catalogue of the Strickland Collection' in the Cambridge Museum; to the British Museum Catalogue of Birds he contributed the enumeration of the *Trochilidæ* and *Procellariidæ*; completed and arranged the late Lord Lilford's 'Coloured Figures of British Birds,' and

was the author of many ornithological papers, some published by himself alone, and others conjointly with Dr. Sclater and Mr. Godman. With the last named he contributed the ornithology to the 'Biologia Centrali-Americana,' still uncompleted. As an entomologist he was a lepidopterist, and confined himself to the Rhopalocera. His great work is of course in the 'Biologia,' written in conjunction with Mr. Godman, and nearing completion with the *Hesperiidæ*. In this last family we see a matured view of treatment, where the structural characters of anal appendages are largely used in specific differentiation, a principle not insisted on in the earlier parts of the work.

But a bare recital of published work scarcely fulfils the compass of this obituary notice. In association with his life-long friend Mr. Godman we see a capacity and love for scientific zoology combined with the accident of wealth which are phenomenal. The publication of the 'Biologia Centrali-Americana' is an unique event both in project and realization. Its conception not only proclaimed a devotion to zoological labour on the part of its editors, but declared an optimism in the expected assistance of other workers, which was generally seen to be amply justified. The expense of production would have strained the available finances of a small state, and would have required a financial vote—not likely to have been granted—of an enlightened empire. Such amounts are privately wasted every year, but seldom contributed to science, especially to such a sober and non-advertising science as zoology.

Nor must we overlook the fact that, though of a modest and retiring nature, Mr. Salvin still exercised a great personal influence in official biology. He not only was a member of, but also a frequent office-holder in, our Natural History Societies, to which he was a regular visitor and active councilor, while his friend and coadjutor is a Trustee of the British Museum. It is probable that it will be long before such an union occurs again as produced the 'Biologia,' and made the rooms in Chandos Street such a zoological rendezvous.

## NOTES AND QUERIES.

## MAMMALIA.

## CHIROPTERA.

Daubenton's Bat in the Conway Valley.—When staying at Bettws-y-Coed last May, I used to see this Bat (*Myotis daubentoni*) every evening, skimming in its characteristic and unmistakable fashion over a quiet reach of the Llynwy. I also saw it at Llyn-yr-Afange, a beautiful pool on the Conway, whose name is said to recall the fact that the Beaver once inhabited the stream.—CHAS. OLDHAM (Alderley Edge).

## AVES.

Nightingale Nesting at Wells, Somerset.—I am pleased to report that a pair of these beautiful songsters (*Daulias luscinia*) have again nested in a wood just outside the town known as Park Wood. The nest, composed of dried grasses and last year's oak leaves for the exterior, with finer grasses and the skeletons of old oak leaves for the interior, is placed in the centre of a tall grass-stalk, supported on one side by the low hanging branch of the wild sloe, and contains five eggs, all of a uniform olive-brown colour; the nest is uncommonly deep and cup-shaped. On leaving the nest the female flew a few yards through the undergrowth, keeping close to the ground, the reddish tint of the tail-feathers being very noticeable. It is worthy of note that five young ones were hatched here in safety last year.—STANLEY LEWIS (39, High Street, Wells, Somerset).

When does the House Martin arrive?—Having noted the arrival of spring visitants for thirty-nine years, I should say that Messrs. Fowler and Aplin's records show very well the average time of arrival of this species (*Chelidon urbica*). In the following thirty-seven records (those for years 1863 and 1864 unfortunately lost) by my brothers and myself, there is a considerable gap between the earliest and latest notes, *viz.* April 13th and May 12th; but we early became accustomed to expect the bird considerably later than the Swallow, and not so very much before the Swift. It will be noted that this year (1898) gives the only record of arrival so early as second week in April.

1860, May 12th (two) .....	Ealing.
1861, April 25th (several) .....	Ealing.
1862, April 28th (one) .....	Rainham, Kent.
1865, April 28th (one) .....	Rainham, Kent (visiting old nest).
1866, April 16th (two) .....	Rainham, Kent (visiting old nest).
1867, May 4th (five) .....	West Drayton.
1868, April 23rd (one) .....	Sandhurst.
1869, April 28th (one) .....	Belvedere.
1870, April 25th (one) .....	Wells, Somerset.
1871, May 4th (several).....	Wells, Somerset.
1872, May 3rd (one) .....	Lewisham.
1873, May 5th (one) .....	Lewisham.
1874, April 24th (several) .....	Windermere.
1875, April 19th (one) .....	Nottingham.
1876, April 23rd (two) .....	Southend, S.E.
1877, May 12th (one).....	Lewisham.
1878, April 27th (one) .....	Gloucester.
1879, April 23rd (four) .....	Southend, S.E.
1880, April 19th (one) .....	Nottingham.
1881, April 19th (one) .....	Walton-on-Thames.
1882, April 25th (one) .....	Nottingham.
1883, May 4th (one) .....	Nottingham.
1884, April 30th (one) .....	Nottingham.
1885, April 20th (two) .....	Nottingham.
1886, April 24th (one) .....	Nottingham.
1887, May 3rd (one) .....	Brixton.
1888, April 30th (one) .....	Nottingham.
1889, May 5th (two) .....	Brixton.
1890, May 7th (five) .....	Northfleet, Kent.
1891, April 25th (one) .....	Nottingham.
1892, May 8th (three) .....	Greenhithe.
1893, May 1st (one) .....	Nottingham.
1894, May 2nd (two) .....	Brixton.
1895, April 25th (one) .....	Brixton.
1896, May 5th (one) .....	Nottingham.
1897, May 4th (three) .....	Tooting.
1898, April 13th (one) .....	Dulwich.

The above dates worked out show that the bird was first seen once in the second week of April, five times in the third week of April, fourteen times in the fourth week of April, thirteen times between April 29th and May 6th, four times between May 7th and 12th; and therefore twenty-seven out of thirty-seven records give the arrival between April 22nd and May 6th. Mr. Fowler's records come out rather stronger than my own in averaging the arrival of the bird between these dates, *viz.* thirteen out of sixteen. — F. D. POWER (299, Cold Harbour Lane, Brixton).

Nesting of the Greater Spotted Woodpecker near Bath. — Quite recently (June 19th) I discovered a nest of the Greater Spotted Woodpecker (*Dendrocopus major*) near this town, which contained young ones. The hole was in an ash tree, and, judging from its worn appearance and scarcity of wood-chips, had evidently been used more than one season. The incessant noise of the young birds first attracted my attention to the spot, and I am

certain they must have betrayed their whereabouts to several people besides myself, as the noise they make can be heard a considerable distance. I visited the nest on two consecutive days, and by keeping quiet obtained each time a close view of one of the parent birds, probably the hen. I also photographed the nesting site. I am sorry to say that the tree has been "blazed," and a number painted on it, which evidently means that it is to be cut down, though when I cannot tell. I shall be very sorry when the tree falls, as the Greater Spotted Woodpecker is a great rarity around Bath, and this is the first instance of its nesting here which I have personally come across. It is far rarer than its congener, the Lesser Spotted Woodpecker, and I have not seen a living specimen for a number of years. The bird was very uneasy at my presence so near the nest, and made a great noise; its note was a sharp "chick." I will not mention the exact locality of this nest, for reasons which all will understand.—C. B. HORSBROUGH (4, Richmond Hill, Bath).

**Nesting of the Greater Spotted Woodpecker at Wells, Somerset.**—On May 14th of this year I was fortunate enough to find the nesting place of a pair of Greater Spotted Woodpeckers (*Dendrocopus major*). On my approaching to within a few yards of the tree one of the parent birds flew out of the hole. On again visiting the nest (May 28th) I found it contained young ones; the parent birds came and went several times whilst I remained unseen, and the cries of the young ones I could distinctly hear. The entrance hole, hewn out by the birds themselves, is situated six feet from the ground in the trunk of a small and somewhat decayed apple tree; the diameter of the hole is exactly two inches in the clear. On bringing the young ones food, I noticed that the old birds always alighted on the trunk close to the ground, and climbed upwards to the hole. These lovely birds are very uncommon in this district, and are entitled to every protection.—STANLEY LEWIS (39, High Street, Wells, Somerset).

**Breeding of the Gannet.**—When off Berry Head in my yacht, I saw, on May 28th last, about ten or twelve Gannets (*Sula bassana*) fishing. I cannot call to mind that I ever saw these birds so far south at this time of year. Can any of your readers inform me whether they breed anywhere in that neighbourhood?—R. J. BALSTON (Springfield, Maidstone).

**Scaup in Bedfordshire.**—On the 22nd May last I saw a bird of this species (*Fuligula marila*) on the sewage farm at Bedford, which from its plumage was apparently a female. It had dusky plumage and a white face. This bird remained in the neighbourhood for some days. It is possible, having regard to the date, that this bird had escaped from some ornamental water, but of course it may have been blown inshore by a gale. Perhaps some of the readers of 'The Zoologist' may have heard of the escape of

one of these birds, in which case all doubt as to the genuineness of the occurrence would be satisfied.—ALAN FAIRFAX CROSSMAN.

**Alleged Kentish Plover in Bedfordshire.**—On the 26th May last I was watching a small party of Ringed Plover and Dunlin at the Bedford Sewage Farm. On observing the former closely through my field glasses, I noticed that one of them differed considerably from the rest, more especially in not having the complete black gorget, but only black patches on the shoulders, and also in having dark legs instead of yellow ones as the rest had. It was also a lighter colour on the back. I made a note of these points, and found, on reference to Mr. Howard Saunders's 'Manual,' that I was correct in identifying this bird as the Kentish Plover (*Ægialitis antiana*). I am not aware of the occurrence of this bird in Bedfordshire on any previous occasion.—ALAN FAIRFAX CROSSMAN.

**Iceland Gull in Co. Sligo in Summer.**—On June 18th, when driving from Enniscrone to Oghill, about two miles from the sea, I passed a field that was being prepared for turnip-sowing, and to my great surprise, amongst a flock of about twenty immature Herring Gulls, I perceived an Iceland Gull (*Larus leucopterus*). The bird, as usual, was very tame, feeding within three or four yards of the man and horses, and, as it fed within ten or twelve yards of the public road where I was standing, I had an excellent opportunity for observing it with my glass. It appeared to be a bird of last year, for, although the head and neck were very light coloured, the shoulders and back were rather dark; but the long white primaries were very conspicuous. Probably the bird would not exhibit the creamy coloured stage of plumage until after this autumn's moult. The occurrence of the Iceland Gull in summer is very unusual, and the only other occasion on which it has been observed at this time of year in this county was on June 5th, 1896, when an adult specimen was found dead on the sands of Mullaghmore by Mr. C. Lanham, of Tempo Manor, Co. Fermanagh.—ROBERT WARREN (Moyview, Ballina).

**Note on the Petrel, *Oceanodroma castro* (Harcourt).**—In recently looking over the Fourteenth Report on Danish Birds,\* compiled by Herr Herluf Winge, and published in the Danish journal 'Videnskab. Meddel. fra den naturh. Foren. i Kjöben.' for 1897, pp. 237–310, I was surprised to learn that two examples of this species (better known as *O. cryptoleucura* (Ridg.), but see the 'Ibis,' 1898, pp. 313, 314) were killed at lightships in September and October, 1896. Herr Winge has access to specimens in the University Museum at Copenhagen, and, after comparison of the two specimens in question with skins of *O. leucorrhoa*, he is evidently of opinion that

\* Fuglene ved de danske Fyr i 1896. | 14 de Aarsberetning om danske Fugle. | Ved | Herluf Winge. | Med et Kort.



*O. castro* cannot with justice be considered as specifically distinct from the last-mentioned species. In support of this view Herr Winge gives a table of measurements (*ut supra*, p. 247), intending to show that the two examples of *O. castro* differ from each other as much as from a typical example of *O. leucorrhœa*.—W. RUSKIN BUTTERFIELD (St. Leonards-on-Sea).

Notes from the Isle of Man, 1897.—The bay of Castletown, the shore of which at low water shows a considerable extent of low weedy rock, interspersed with tide-pools and rough gravelly patches, is perhaps the most suitable resort in the island for shore birds, to which the general character of the Manx coast is not attractive. During May, 1897, small parties of Whimbrel (*Numenius phæopus*) frequented the shores; they left about the commencement of June. A party of eight or ten Turnstone (*Streptilas interpres*) was also on the rocks, and some dozen of Sheldrakes (*Tadorna cornuta*), of which at least one pair probably stayed to breed somewhere in the neighbourhood. On the little greensward and sandy links bordering the shore, Wheatears (*Saxicola ananthe*) appeared in numbers in May, but all seemed to pass on as the season advanced. Late in May considerable numbers of Dunlin (*Tringa alpina*), mixed with Ringed Plover, arrived on the sands. Parties continued to be seen in June, and again in July and August; they were abundant, many in breeding plumage. Their tameness contrasted with the shyness of the usual winter residents of the same species. The Redshanks (*Totanus calidris*), which for the greater part of the year enliven the tide-pool, almost disappeared during the early summer; by the beginning of July they were returning; also many "Black-headed" Gulls (*Larus ridibundus*), often still bearing the dark hood, and Common Sandpiper (*Totanus hypoleucus*) made their appearance here and there on the coast; one of these, roused from a stagnant pool, settled on a garden wall close by. On July 22nd I rowed from Port Erin round the Calf of Man. Sea-birds were there in very large numbers, especially Puffins (*Fratercula arctica*). As they are strictly protected by the proprietor, it is to be hoped that this interesting islet, now quite unassailable, at least from the land side, may long continue to be a refuge. On Nov. 28th, a cold and stormy day, a Swallow (*Hirundo rustica*) and Martin (*Chelidon urbica*), the former certainly and the latter probably a young bird, were flying together around the walls of Castle Rushen. They had been in the neighbourhood for about a fortnight previously, but after this day were not seen. On Dec. 23rd I found the remains of a Chough (*Fregilus graculus*) on the edge of a mountain summit 1400 ft. above sea-level, in the district which is the headquarters of the bird in the Isle of Man. On Dec. 26th there was in the bay a "Black-headed" Gull with the dark hood complete. The early assumption of this character seems not uncommon in our mild winter climate.—P. RALFE (Castletown, Isle of Man).

Birds singing during Thunderstorm.—It was curious to notice, during a heavy thunderstorm on May 23rd, many Thrushes singing most lustily, and also a few Chaffinches. The terrible peals of thunder, flashes of lightning, and the deluge of rain did not disturb them in the least. Are there many species of birds which sing under such conditions?—C. B. HORSBRUGH (4, Richmond Hill, Bath).

The Protection of Wild Birds and their Eggs.—I have long had it on my mind to address a few words on this subject to 'The Zoologist,' and my pen has been quickened by the receipt during the last few days of letters and circulars from sundry sources inviting an exchange of eggs. My egg-collecting days have long since gone over, and though, admittedly, I once on a time derived an immense amount of pleasure from the hobby, it was never associated with such wanton and wholesale spoliation as obtains in certain districts nowadays—in flagrant and contemptuous defiance of the law. I write in no narrow-minded spirit, for I am very tolerant of egg-collecting in a humane fashion by boys who have a *penchant* for natural history, and of egg-collecting in reason by scientific ornithologists; but my hobby just now, and for the future, is the devotion of my energies to the preservation of birds, and the protection, within certain limits, of their eggs. Since the middle of April I have been wandering about the country, studying birds in their breeding haunts; I wound up my tour by staying for a week at a very pretty spot in one of the western counties, which boasts a stringent and not altogether ill-conceived "order" for the protection of sundry wild birds and their eggs during the summer months. I say "not ill-conceived" advisedly, for some of the "orders" of a kindred nature issued by County Councils elsewhere can only be regarded as legislative absurdities. However, this by the way. As for any heed or respect being paid to these "orders" in the majority of cases, it is out of the question to expect such a thing; while the following will illustrate the lengths to which contempt for the same can go. Before the end of my sojourn in the county to which I have particularly referred, I found that many of the boys for miles round were in the habit of collecting eggs for a certain individual in the neighbourhood, and of course were paid for them. This I heard incidentally had been going on for years. If ever I met a boy on the road, and enquired if he had any eggs, the answer was sure to be, "Yes; but I'm going to take them to ———." I went to one boy's home, and glanced over the result of his depredations; scores and scores of eggs, most of them belonging to our commoner summer migrants, in all stages of incubation, and many of them of no value whatsoever, met my eye. Nests were taken wholesale as well as eggs, and in the nests were placed slips of paper purporting to bear the dates on which the various clutches were taken. Such dates were mostly imaginary, as I had ocular proof; but this is a detail.

Now it is quite conceivable that complete clutches, with alleged full *data*, of eggs of the Redstart, Blackcap, Garden Warbler, Golden-crested Wren, Dipper, Kingfisher, Redbreast, Common Sandpiper, Goldfinch, Turtle Dove, Tree Pipit, Chiffchaff, Nuthatch, Green Woodpecker, and Long-tailed Tit, &c., despatched here and there to collectors at a distance, may bring in exchange some rarity not procurable at home. But, to my thinking, a collection of eggs so vicariously amassed, and by means of pillage so eminently unscrupulous, is shorn of attractiveness and merit in no inconsiderable degree; while for a scattered army of boys, naturally reluctant from the very nature of their bargain to exercise the slightest discrimination, to be notoriously holding what may be appositely defined as oological briefs for an individual whose daily avocation is of a strictly professional nature, surely constitutes—in face of modern, and, at all events, well-meant legislation for wild birds and their eggs, and the fact that private enterprise is now doing excellent work in the same interests throughout the length and breadth of the country—a reflection on the neighbourhood. There can be few—very few—who have sympathy with the greed that prompts an organized spoliation of the nests and eggs of our wayside and woodland minstrels.—H. S. DAVENPORT (Melton Mowbray).

#### AMPHIBIA.

Toad attacked by a Frog.—A number of notes have recently been published in the 'Field' describing "cannibalism" among Snakes; it may be useful to state that the practice is not unknown among Batrachians. When in the Transvaal I found that the electric lights of Pretoria not only attracted insects, but were regularly visited by Batrachians, who enjoyed the banquet of falling insects after impact with the light above. On one occasion my son, at one of these zoological rendezvous—and we must not forget the Bats that constantly hunt above—found a Toad (*Bufo regularis*) half-swallowed, head first, by a large Frog (*Rana adspersa*). He brought me the two specimens still in that condition, and they are now in my collection, though the Frog naturally disgorged the Toad on immersion in spirit.

The subject of "Enemies of the Toad" received some attention in the pages of 'The Zoologist' for 1897 (pp. 339, 369, and 432). We have now added the Frog as above, and fish also must be enumerated among the numerous animals that attack this unsavoury creature. Live Toads are stated to be the best bait for Cat-fish ('Audubon and his Journals,' vol. ii. p. 210); whilst Mr. Hudson once examined a good-sized fish (*bagras*) which had evidently died shortly after swallowing a large Toad ('The Naturalist in La Plata,' p. 78).—ED.

## NOTICES OF NEW BOOKS.

*The Angora Goat, and a Paper on the Ostrich.* By S. C. CRONWRIGHT SCHREINER. Longmans, Green & Co.

Now that so much attention is focussed on Southern Africa, it is quite refreshing to find that the *Hominidæ* are not the only mammals studied in the area, and that, besides the introduced Boer farmer, there is also the Angora Goat. We are absolutely dead weary of the political questions connected with the Boer, and rejoice to study the less exciting but more scientific problem of his Goat. And here let us at once clear the ground by a definition; by Boer we do not necessarily mean an inhabitant of the Transvaal, but the farmers who trace their descent back to the early settlers, are of principally Dutch and French origin, who use the "Taal" dialect, so largely Dutch in its construction, and are found all over South Africa, under the British flag as well as beneath those of the two Republics.

The first part of the volume is devoted to the history and derivation of the various breeds of domestic Goats, and our author agrees with the now generally accepted opinion that they are all principally derived from the Persian Wild Goat (*Capra ægagrus*), and that the blood element of the Wild Goat of Thibet (*Capra falconeri*) in the Angora breed must be small indeed, as "the outward twist of the horns, so pronounced in *Capri falconeri*, is unknown in the Angora (whose horns have the twist inwards) or any other domestic variety."

One reason for the great success with which the Angora breed flourishes in South Africa is pointed out by Mr. Schreiner in the fact that "our veld and climate are almost identical with those of the province of Angora." And this remark is true for the Colony, for practically "the Transvaal has no Goats and the Free State not a very large number." In 1893, the Cape had 2,811,206 Angora Goats, and 2,819,749 Common Goats. The effects of crossing is favourable to the fecundity of the Angora, the modern

breed having often two kids at a birth, the Kurd Goat having seldom less than two; while at the Cape, Angoras descended from a cross with the Boer Goat, generally have twins, often triplets, and sometimes four young at a birth. But as Angoras in the Colony "are becoming purer and more what they should be, the tendency of ewes to have more than one (even now not common in the best stud flocks) becomes less and less."

The first importation of Angoras into the Cape Colony (or South Africa) was made in 1838 by Colonel Henderson, formerly of Bombay); and of the fourteen Goats that landed, only two, a ewe and her ram kid, may be noticed, for the other twelve rams had been rendered impotent before leaving Turkey. As remarked by our author:—"The day on which the little fellow leapt ashore, beside his dam, fifty-nine years ago, at Table Bay, is a memorable date in the history of South African pastoral products." It is indeed! for South Africa is economically a "poor man's country"—"black man's country"—the usual appellation; take away its mining capacity and it is again within measurable distance of a pastoral condition. The introduction of the Angora Goat is therefore an event of more real significance to many in S. Africa than an enlargement of boundaries or a diplomatic triumph. The natives from the time they were first met possessed a practically indigenous Goat, and the "Boer Goat of to-day strikes one as an animal peculiarly South African, as it browses on the arid kopjes of the Great Karoo." This hardy animal, with its coat "short, smooth, and coarse, of almost any colour or combination of colours, frequently being dappled," which can live and thrive where other stock would die, with its pungent and strong flesh naturally survives, and according to the 1891 census numbered then no fewer than 3,444,019, or about 250,000 in excess of the number of Angoras. They can be trained—the Kapaters—as "voerbokken," leaders to flocks of sheep and understanding certain words of command. "It is an odd spectacle to see a couple of immense gaily-coloured Kapaters marching as directed to the front of a flock, and sedately—one almost imagines proudly—leading the way into a kraal or through a gate with the sheep trooping closely after them." These Boer Goats have supplied the mothers of nearly all the Cape Angoras.

The volume is well illustrated, and is full of statistics as to a

very staple industry of South Africa, and is of interest alike to the zoologist, farmer, and political economist. The paper on the Ostrich appeared in these pages last year.

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*Elementary Practical Zoology.* By FRANK E. BEDDARD, M.A. (Oxon.), F.R.S. Longmans, Green & Co.

THIS small volume forms one of "Longmans' Practical Elementary Science Series," and is intended as a guide to the elementary zoology required by the Science and Art Department. It might with advantage be used as a school course of zoological teaching, for its small compass would not make it too great a competitor with other studies, and its contents could be mastered by the teacher, which is after all the desideratum of an elementary book of science, if it is eventually to reach the pupil.

Mr. Beddard commences with the *Amœba*, follows on with the *Hydra*, and then discusses the Earthworm, on which he is so well known as an authority; to which succeeds the Crayfish, ever memorable from the classic of Huxley; the Cockroach, another type recently investigated by Miall and Denny; and successively treats of Insects and their metamorphoses, the Pond Mussel (*Anodonta cygnæa*), the Snail, the Frog, and thence to Vertebrates. We are not surprised to read that "the classification of the animal world adopted in this book will be found to differ from many schemes of classification in vogue," and most students will agree with the author that this may be "because of the uncertainty of our knowledge, and the consequent variability of opinions."

An elementary biological fact, not too often emphasised in elementary works, is clearly and tersely stated by Mr. Beddard with reference to the reputed distinction between animals and plants. "It is not possible to draw a clear line between plants and animals." How fundamental this appreciation is to any intelligent conception of organic evolution it is unnecessary to remark; to have it clearly stated in a primer is no small service. There are some apparent phenomena which, even now, ordinarily educated people only disbelieve because they are told to do so, such as the seeming movement of the sun; and such observers will feel little doubt of the essential life differences between an Ox

and an Oak; but when we approach what may be called the introduction to organic life, we may well hold with the author, "that there is no absolute criterion for determining whether a given unicellular or few-celled organism is a plant or an animal." Such axioms really lie at the base of all biological philosophy, and to have them taught early is to have them taught well.

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*Ackworth Birds: being a List of Birds of the District of Ackworth, Yorkshire.* By Major WALTER B. ARUNDEL. Gurney & Jackson.

THIS is the latest addition to our local lists of British birds; it is confined to "Ackworth and the neighbourhood around for a distance of from three to four miles"; the soil is for the most part loam or clay, and in some places is marl; it is about fifty miles from the sea-coast at its nearest point; the river Went—a small stream tributary to the river Don—runs through the centre of the district, which also includes the lake at Nostell and Hemsworth Dam; while against these natural beauties we read that "half-a-dozen collieries are worked within, or close to, the district, towards its northerly and westerly confines."

The total number of species enumerated is 149, of which 54 are permanent residents, 26 regular summer residents, 9 regular winter residents, and 60 visitors. We are glad to find "that, in spite of the arts and designs of the gamekeeper, the Magpie is common in all wooded parts." In connection with this bird an observation by a local farmer is recorded, of five Magpies surrounding a Fox who was devouring a Rabbit, and on his being disturbed picked up the remainders. A "Rooks' parliament," as witnessed by Dr. George Wood and the first Lord St. Oswald, is an example of what has been loosely called the romance of natural history. "A multitude of Rooks were formed up in a large ring, in a field, round a solitary, dejected-looking member of their species, and were making a great noise and flapping of wings, the only silent and quiet bird being the miserable individual in the centre of the ring. All at once there was perfect quietude and stillness, which lasted a minute or two, when suddenly the noise was resumed with unabated vigour, and the birds forming the ring closed in upon the unhappy one and

instantly despatched it, literally pulling it to pieces, amidst a general tumult. Dr. Wood was unable to say whether the victim, upon which judgment was summarily dealt, had been previously injured, or was otherwise imperfect." With a diseased pity for evil-doers who incur severe penalties, our soul goes out to that Rook.

There are many other interesting observations and facts in avian life to be found in this small volume. A Cuckoo was found a prisoner in a Redbreast's nest at Ackworth Court, the nest being so encompassed by ivy-growth as to make it necessary to cut away the stems in order to liberate the mighty fledgling. The importance of a Heron to a Trout-stream is amply verified by the statement that "out of the gullet of a Heron, shot at Ackworth in 1890, fell three Trout, each of about half a pound in weight." This list appears to have been made with care, and is much more than a mere inventory.

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*A Pictorial and Descriptive Guide to the Lake District.*  
Ward, Lock & Co. Limited.

ALTHOUGH not announced on the title-page, this 'Guide' has been edited and largely written by Mr. G. W. Murdoch, who conducts the natural history columns of the 'Yorkshire Weekly Post.' Besides its natural beauty, Lakeland will ever remain classic with the name of Wordsworth, while De Quincey first drew attention to the evidences of a prolonged Norse or, as he expressed it, Danish occupation of the district. The poet Gray is generally credited with having "discovered" the Lake District, which he visited in 1769, and described in his 'Tour in the Lakes;' but, as Mr. Murdoch observes in his introduction, "it was neither industrial progress nor Gray the poet that 'opened up' the Lake District, but Wordsworth, Southey, the Coleridges (father and son), Wilson ('Christopher North'), De Quincey, and afterwards Mrs. Hemans, Harriet Martineau, Dr. Arnold (of Rugby), James Spedding, and (in many ways one of the most charming of all that brilliant intellectual galaxy) the gifted Dorothy Wordsworth."

We are not, however, principally concerned with literature—in its restricted meaning—in these pages, nor with Border raids



and plunderings, but rather with the "natural history of the Lake District" which forms a new feature of this 'Guide.' This contains a reference to most publications on the subject, and it is noteworthy to read of John Gough, the blind naturalist of Kendal, born in 1757, who "was the first (blind though he was) to throw much true light on the bird-life of his native county." The Mammals, Birds, Reptilia, Amphibia, and Freshwater Fishes (under Angling), are briefly alluded to, and we can recommend this inexpensive 'Guide' to all lovers of nature who contemplate visiting this beautiful region.

## EDITORIAL GLEANINGS.

IN the last 'Annual Report of the Board of Regents of the Smithsonian Institution' for the year ending 1895—date of publication 1897—Dr. R. W. Shufeldt, author of 'Scientific Taxidermy for Museums,' draws attention to the "Taxidermical Methods in the Leyden Museum, Holland." This contribution has been induced by the receipt of "a MS., illustrated by a large series of photographs, received from Mr. H. H. ter Meer, jun., on the staff of, and præparator to, the Museum of Natural History of Leyden." The author explains that in Holland taxidermy is discouraged by the fact "that the Dutch biologists filling the more influential positions do not exert themselves either by pen or word to powerfully promote the art among them. . . . For some years past Mr. H. H. ter Meer has practised what Kerr, his able instructor, had taught him, and with 'extraordinary dexterity' he sews strips of tow side by side upon the sculptured body of the mammal, in such a manner as to exactly imitate the superficial muscles and other parts in the way they occur in nature. Mammals' heads are 'carved out of peat,' and it does not matter out of what substance a mammal is modelled, provided the form is reproduced exactly as it would be were the animal alive, and that it is possible to drive pins in it without bursting or breaking the artificially prepared body, in order to press the skin into the hollows between the muscles. Kerr's methods of imitating the superficial anatomical parts require much patience and time to learn and successfully practise, and this is apt to discourage many young taxidermists at first, as it did Mr. H. H. ter Meer; but its advantages are so great when once accomplished, that no abandoning thereafter is ever entertained by the expert." Mr. ter Meer has also "succeeded in inventing a material, after years of experiment and practice, that possesses the moulding properties of clay, and that dries with great rapidity, and never cracks after once setting." This new material, and what can be accomplished by its use, has received the approval of Sir William Flower, Dr. Bowdler Sharpe, and the artist, J. G. Keulemans, who all visited the Museum to investigate the process. "In terms most unqualified he condemns the methods of mammal mounting practised by Mr. Montagu Browne at the Leicester Museum, and described in his recent work."\* Dr. Shufeldt considers he is quite correct in pointing

\* 'Practical Taxidermy,' *vide* 'Zoologist,' 1897, p. 378.

out that it is simply impossible to get the correct form of a large mammal for the purpose of a model by taking casts in plaster "of its lifeless, flayed body."

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THE importance of understanding the correct attitude of birds in a state of nature cannot be minimised by the taxidermist. Dr. R. W. Shufeldt, in 'Shooting and Fishing' (New York, June 2nd), has given some "Pictures of American Partridges," the result of studies with the photographic camera made on the Texan Bobwhite (*Colinus virginianus texanus*), and the Chestnut-bellied Scaled Partridge (*Callipepla squamata castanogastris*). Referring to the first photograph, Dr. Shufeldt remarks:—"The picture not only shows the correct form and colour distribution of the bird, but in addition thereto one of the very common attitudes it is likely to assume after alighting in a tree." Some interesting notes on the life-history of this bird are given. "William Lloyd, of Marfa, Texas, informed Major Bendire by letter, several years ago, that 'the Texan Bobwhite is a bird of the lowlands, and is not found above an altitude of 2000 feet. Their food consists of small berries, acorns, grain, buds and leaves of aromatic herbs and small shrubs, varied with occasional beetles, grasshoppers, and ants, especially the winged females, of which they seem to be very fond. They are very unsuspecting, and their low notes, uttered while feeding, attract a good many enemies. I have seen Foxes on the watch, and the Marsh Harrier perched in a clump of grass on the look-out, waiting for them to pass. But the many large Rattlesnakes found here are their worst enemies. One killed in May had swallowed five of these birds at one meal; another, a female, evidently caught on her nest, and a half-dozen of her eggs; a third, four Bobwhite and a Scaled Partridge. The young are also greatly affected, and many killed by heavy rains in June and July; numbers perish then from cold and protracted wet weather. When alarmed by a Hawk sailing overhead they run under the mother for protection, as domestic chickens do.'"

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THE Annual Report of the Royal Zoological Society of Ireland contains many items of considerable zoological interest. The Council has learned by gradual experience that one of the most essential conditions in the construction of a zoological house is to raise both it and the adjoining paddocks high above the level of the surrounding ground, and to provide in this way a ready and sure means of drainage. Damp is much more destructive to animals than cold, and in a perfectly dry house, with dry paddocks, it is often remarkable the amount of cold which animals generally supposed to be delicate will endure without any appreciable effect on their health or spirits.

In the breeding of Lions, the Society has not met this year (1897) with its

usual success. Two litters have been born, the first with Hypatia as the mother, consisting of one male and three females, and the second with Portia as the mother, consisting of one male and two females. Unfortunately all these cubs died shortly after birth.

“The Cape Hunting Dogs (*Lycaon pictus*) may now be said to be thoroughly acclimatized. They live all the year round in the most perfect health in an open-air den, and they breed regularly once a year, and apparently always at the same time. The first litter was born on Jan. 6th, 1896; the second litter appeared on Jan. 3rd, 1897, and at the present moment we look forward to the arrival of a third litter. If our calculations are correct, this interesting event should take place at precisely the same period of the year as on the other two occasions. All the cubs of the first litter died. Very special precautions were taken on the occasion of the second birth, but out of a litter of five only one was reared. A foster-mother, in the form of an Irish Terrier, having become available, the temptation to remove some of the puppies and place them under her care proved too strong to be resisted. Accordingly two puppies were selected for this purpose. The following day one of the three puppies left with the mother was found dead in a remote part of the den. Evidently the keeper's hand had touched it, and the mother had in consequence repudiated it, and thrust it out into the cold. This caused alarm for the safety of the remaining two, and it was determined to place a third with the foster-mother. One cub only was left with the mother, but on the next day it had totally disappeared. Evidently the mother had devoured it. Of the three puppies that were placed with the foster-mother, two died, one from natural causes, and the other from an accident. The survivor was difficult to rear, and required constant care on the part of the keepers. In the course of time, however, it gradually grew out of its early weakness, and when five months old it was presented by the Council to the Zoological Society of London. So far as we have been able to learn, this is the first Cape Hunting Dog which has been reared in Europe.” During its growth several interesting points were noted. As early as six weeks after its birth it began to show its untractable disposition by snapping at anyone who touched it. When nearly four months old a curious coincidence occurred, which brought out very forcibly the innate savagery of the animal. A small terrier puppy was placed in the same cage, and in a short time the two little dogs became very good friends. Unfortunately, however, in their play the terrier scratched with its sharp teeth the foot of its companion, and the moment the Cape Hunting Puppy saw the blood it attacked its own foot with the greatest fury. Before the keeper could interfere it had torn off a toe and lacerated its foot to a very considerable extent. Fortunately the wound healed well, and in the course of time the animal was very little the worse of its extraordinary attack upon itself.

The Society is still unfavourably handicapped by a paucity of members and consequent narrow income. "The Zoological Society of London receives somewhere about £6000 per annum from members' subscriptions. The Royal Zoological Society of Ireland has received this year from a similar source £394."

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THE Eleventh Annual Report of the Liverpool Marine Biology Committee and their Biological Station at Port Erin (Isle of Man), by Prof. W. A. Herdman, is now before us, and it is to be hoped, with the writer of the Report, that a larger and better equipped laboratory at Port Erin or at Hilbre may arise. "Liverpool owes much to the sea; it is asking but little that she should take her place in supporting oceanographic research." A Curator (Mr. H. C. Chadwick) has now been appointed, who will reside at Port Erin; much good and interesting work has been accomplished by visitant naturalists, for "in this age, pre-eminently that of Biology—the age of Darwin, Pasteur, and Lister—it is coming to be recognized equally over Europe and America that nowhere more than in Marine Biological Stations has the work of the great masters been followed up and extended, and that nowhere else can be found a more natural and happy union of the philosophy of science and of industrial applications." The concluding remarks of Prof. Herdman breathe the new biological aspirations:—"As we have recorded, in the earlier part of this Report, science students from our colleges are beginning to attend the Biological Station for purposes of work. That is very satisfactory; but we shall not be content with science students alone. We desire to interest and educate the general public in natural history, and to give all university students opportunities of studying living nature. Students of science study, to some slight extent at least, Arts subjects—Literature, History, Languages, and, it may be, Philosophy; but how very few of the ordinary Arts-students have even the most elementary acquaintance with any experimental or natural science. Fortunately, it is now becoming rare to hear an educated person boasting of ignorance or indifference to science, but it is still very unusual to find anyone who has received a non-scientific education and who understands and appreciates the natural phenomena by which he is surrounded. The elements of nature-knowledge should surely always form part of a liberal education; and a most instructive portion of the course on nature-knowledge would be a couple of weeks spent amongst the researchers at a biological station. It is a revelation and an inspiration to the young student, or the inexperienced, to spend a forenoon on the rocks exploring and collecting with specialists who can point out at every turn the working of cause and effect, adaptation to environment, and the results of Evolution. It is equally instructive and inspiring to have a day at the microscope with, say, our authority on

Copepoda, studying the nature and ways of animals which are probably of greater economic importance to the world than the wheat plains of Manitoba or the gold of Klondike."

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THE Annual Report of the Millport Marine Biological Station for 1897 has been issued. As regards the excellence of the position for this young but thriving station, we may quote the words of Sir John Murray, at the opening of the new building in May of last year:—"The station was excellent in many respects, but when all was said it was of very modest pretensions. In respect to accommodation, and to tanks and all appliances which were now necessary for the thorough investigation of the ocean, it did not attempt to compare with many similar institutions in this country, and on the Continent of Europe and in America. Still, it was a place of very great possibilities, and there was one respect in which it was superior to all the stations with which he was acquainted, and that was as regarded its position. Around the islands of Cumbrae they had every variety of sandy beach, of rocky shore, and of muddy bank, each of them with its own peculiar fauna and flora, and the rise and fall of the tide was such that these could be reached with very great facility. The researches of the Rev. Canon Norman, and of Dr. and Mrs. Robertson, had made these shores familiar among naturalists. Within a very few miles of that place, in the direction of Arran, there was a depth of 600 feet, where there were a great many deep-sea animals living quite unlike those found round about the shores. In upper Lochfyne and in Lochgoil there were still the remnants of Arctic fauna and flora, as was long ago pointed out by Mr. Smith, of Jordanhill. In numerous places, where rivers enter into the Clyde sea-basin, there was a great variety of animals which lived in the brackish water, and at the mouth of the firth they found quite a different set of conditions. On one occasion the Duke of Argyll found that the shores around Kintyre were lined with a thick bed of organisms, which showed that sometimes the waters of the Gulf Stream were driven into this area. They had thus within easy reach of the Millport Station a great variety of organisms, and of conditions, a charming and attractive combination which was always desired by the inquiring naturalist."

From the Report of the Curator, Mr. Alex. Turbyne, we learn that it is now twelve years since the 'Ark' was beached in Millport by the then Dr. John Murray, F.R.S., of the 'Challenger' Expedition, and until May last she was, to the zoologist and botanist, the only centre of scientific interest in the Clyde district. Still, during that time she proved an incentive to visits of, amongst others, Prof. Haeckel, the late Prof. Schmidt, and Prof. Agassiz; and this goes to prove—if proof were necessary—that the new station was a necessity, and will be a great gain to marine biology.

The Robertson Museum is also a by no means unimportant part of the Institution. "Mrs. Robertson having kindly handed over to the Committee the collections of her late husband, it was found that the cases fitted up round the walls of the Museum afforded quite inadequate accommodation for all the specimens. A large double case was accordingly added, fitted with forty-eight drawers and trays, to receive the valuable collections of Carboniferous and Glacial Fossils, and these collections will be exhibited to any who are interested in them, besides being at the disposal, for reference, of specialists or others working at the Station."

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THE Gatty Marine Laboratory of St. Andrews, directed by Prof. W. C. McIntosh, does not publish Annual Reports, but still continues to effect a great amount of active work. As the Professor writes to us, "Marine zoology proper and the zoology of the fisheries form the chief pursuit." At the end of 1896, however, there was published at Dundee an excellent brochure on the Gatty Marine Laboratory, written by the Director, in which, among other matters, reference to the chief laboratories at present in existence was made. "It is a remarkable fact that whereas about thirty years ago no such institution existed in any country, a chain of them now encircles the world." On the question whether a Marine Laboratory as that of St. Andrews, which sprang into existence for the sake of the fisheries, should be in connection with the University alone, or subsidized by a Public Department, is answered by Prof. McIntosh in favour of the former. "A University Marine Laboratory gives greater freedom in investigation, and the administration is untrammelled by the frequent demand for results as a *quid pro quo* for the public expenditure (which may only cover the original equipment and the attendant); in short, is no longer under the necessity of showing what it has done for the fisheries of the country, and is removed from the intricate network of the political sphere."

St. Andrews as a site for the study of marine animals has a reputation probably as ancient as the foundation of its University—founded in 1411—"for amongst the early records of the latter allusion is made to the marvels of the sea and its inhabitants as a means for improving the minds of its students." The new Marine Laboratory owes its existence to the generosity of Dr. Charles Henry Gatty, who presented the University with a sum of £2500 for that purpose. The number of naturalists who resort to this establishment, and the papers published by the Directors and others connected therewith, bear ample testimony to the great work done at St. Andrews for marine zoology.

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THE Jersey Biological Station is, we are surprised to learn, run by purely private enterprise, and that of one man. Mr. James Hornell, its Director, writes us:—"You may not be aware that the work done here is

totally without financial support from public or private bodies. I have to keep it going by my work in micro. and lantern departments, and, being without financial backing of any kind, you can imagine how uphill the work is." The official publication is 'The Journal of Marine Zoology and Microscopy,' edited by Mr. Hornell, of which two volumes have now been completed. In the last issue the Editor has contributed a most interesting paper on "The Possibilities of Fishery Improvement in Jersey." The inshore fishermen, such as we have in Jersey, the men who fish in small undecked boats, find their own particular grounds rapidly becoming depopulated, and, unable to seek the more distant fishing-grounds, are compelled either to seek new occupations, or to languish on earnings that are miserably insufficient. Along the French coast a similar evil state of matters exists; thus, my esteemed friend Dr. Canu, Director of the Station Aquicole at Boulogne, and the foremost authority on pisciculture in France, writes:—"In the eastern portion of the English Channel, the majority of the banks formerly frequented on account of the number and the quality of their fish, have long since witnessed the loss of their reputation; they are even partially abandoned." And again:—"The diminution of fish catches on the banks which line our Channel coast can no longer be disputed. . . . The decrease of our small northern fishing ports is more eloquent than any statistics upon this point. So well authenticated and so well recognized by the fishers themselves is this decadence in Jersey, that it requires little or no demonstration from me. Indeed, in view of the absence of local statistics as to catches, it is impossible of verification in figures. However, I have the authority of our best-informed fishermen for stating definitely that a diminution of 30 per cent. to 40 per cent. has been observable in their catches of many of the most important of our local fishes during recent years, such as Sand-eels, Gras-dos (Smelts), Gurnard, Conger, Whiting, Sarde (Red Bream), Flat-fishes, &c., to say nothing of the dead Oyster and Ormer fisheries, or of Black Breems and Lobsters, about which we have statistics, definite and incontrovertible. The decrease which is caused by actual scarcity of the fish themselves is most marked in the catches of the Flat-fishes generally (Plaice, Soles, Turbots, &c.), the Bream, Sand-eels, Gras-dos, and Lobsters; in the case of the larger Round-fishes, such as the Whiting and the Conger, the cause is probably due to the marked decrease in the supply of bait available in Jersey, especially so in the case of the Squids (*Sepia* and *Loligo*), and of the 'red-cat' bait-worms (*Nereis*). Seven or eight years ago Plaice of large size were common in the large bays, measuring some fourteen inches long on the average; to-day such fine fish are extremely rare, and our market depends for its supply upon imports from Plymouth, Lowestoft, and Grimsby. It is significant to notice that the decline in Plaice coincides with the sudden increase in the use of set-nets and draw-nets in our bay that occurred a few years ago."



# THE ZOOLOGIST

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WILLIAM TURNER, THE FATHER OF BRITISH ZOOLOGY.

By REV. H. A. MACPHERSON, M.A.,

Author of 'A History of Fowling,' 'A Fauna of Lakeland,' &c.

THE near advent of the International Zoological Congress, to be held at Cambridge during the present month, renders it fitting that attention should be drawn to the important part which Cambridge played in training the first naturalists bred upon English soil. That the revival of learning trained the youth of this country to concentrate their thoughts upon the study of dead languages is, of course, an obvious commonplace; it would be a grievous mistake to infer from this circumstance that a spirit of higher research was wholly absent from the minds of the ambitious youths who gathered together at Cambridge to acquaint themselves with the truths of philosophy. Any such erroneous surmise is disproved by the work accomplished by William Turner, to whom the title of "Father of British Zoology" may fairly be applied. This voluminous writer was apparently a man of humble extraction,—one of a family of that name resident at Morpeth,—where his father carried on the trade of a tanner. It was in rambling in the copse woods near Morpeth that the future naturalist spent his early years, searching for birds' nests in the thickets, or listening to the winter songs of the Dippers (*Cinclus aquaticus*), as those sprightly birds

curtseyed on the rocks in the rapid eddies of the north-country streams.

When young Turner at length awoke to realize the possibilities of life, and yearned to secure a college education, he found his path to success barred by the poor circumstances of his family. Happily, an exhibition placed at his disposal by Lord Wentworth smoothed the difficulties of the poor scholar. In due course he became a member of Pembroke Hall, Cambridge. There he studied with Ridley and other men who afterwards became famous in history, and there he took his degree in 1529-1530, being also elected a fellow of his college in the latter year. His cotemporary naturalist, John Caius, was about twenty-three when he was elected to a fellowship at Gonville Hall. If we venture to conjecture that Turner obtained his fellowship about the same age, it would appear that he was born about the year 1507, *i. e.* during the last years of Henry VII. He spent the next ten years of his life as a Cambridge don, acting latterly as senior treasurer of his college. As he constantly resided within easy reach of the then undrained fens, in which Savi's Warbler (*Locustella luscinioides*) reeled to its brooding mate among the forests of reeds, it is not surprising that he acquired an intimate knowledge of the habits of British wildfowl. Did he seek to traverse the quaking bogs in quest of some rare flower which was needed for his herbarium? Why, then, the Black-tailed Godwit (*Limosa belgica*) yelped round the track of the venturesome naturalist. Had he occasion to search for water-plants in the ponds of the district? Why, then, his intrusion into a region of watery waste must of course be resented by the clouds of Black Terns (*Hydrochelidon nigra*), which filled the air above their breeding colonies with deafening clamour as they hovered about their eggs, or swept hither and thither in tumultuous confusion. But Turner must have enjoyed his greatest triumph when he visited the wild Cranes (*Grus communis*) that *then* returned annually to breed among the fens. His interest in these fine birds must have been very great, for he took pains to find the young Cranes in many seasons. (This we know from the emphatic language which Turner himself employed on purpose to confute the assertion then current that the Crane did *not* breed in England: "Apud Anglos etiam nidulantur grues in locis

palustribus, et earum pipiones sæpissime vidi, quod quidam extra Angliam nati falsum esse contendunt.”)

But Turner does not appear to have confined his field work to the neighbourhood of Cambridge. If he was eager to watch the Marsh Harrier or “Balbushard” (*Cinclus æruginosus*) quartering the marshes of Ely in quest of Duck or Coot, assuredly he was no less pleased to visit the Cormorants which nested on the lofty trees also occupied by a Norfolk Hernery.

But Turner was a man of strong religious convictions, and he lived in times which encouraged strife. Good naturalist as he was, he allowed his better judgment to be overpowered by sectarian bitterness, and for a time he lost his liberty. Released from prison, probably about 1542, he wisely went abroad, and occupied himself with his favourite hobbies. His continental travels enabled him to become acquainted with the habits of the White Stork (*Ciconia alba*), the Hoopoe (*Upupa epops*), and other birds which he had never met with in England. The pleasure which he derived from his wanderings must have been immense. For example, when he climbed the Alps, he became aware for the first time of the existence of a species which he had never heard of before—the European Nutcracker (*Nucifraga caryocatactes*). To us the bird would be simply an *old* favourite, whose undulating flight recalled many happy hours spent amidst glorious pine forests; but to Turner it was a revelation, a form such as he had never contemplated,—its flight strange to his eye, its note weird, its coloration unique in his experience. Then, too, there was the curious fact that (as the Swiss peasants assured him), it did not feed upon grain or carrion like the Rooks and Crows of his own country, but it depended upon the harvest of nuts which the coppices of the wooded valleys supplied, reminding him of the little blue Nuthatches, or “Nut-jobbers,” as the country-folk called them (*Sitta cæsia*), the birds whose shrill notes and lively actions had so often cheered him when strolling through the Cambridge gardens. Turner travelled into Italy, and even attended the botanical lectures of Lucas Ghinus at Bologna before he journeyed to Zurich, the home of Conrad Gesner. The meeting between the two great naturalists must have possessed many interesting features, and there can be no

doubt that they were mutually impressed by one another's attainments.

Gesner, for example, was careful to allude to Turner in after years in terms of sincere admiration. On quitting Zurich, the English traveller journeyed to Basle, and thence to Cologne. During his residence in the latter city, in 1544, he printed the first ornithological work that the New Learning was destined to produce. Turner was still comparatively young, probably on the right side of forty, but his scholarly taste had already induced him to apply his critical skill to the difficult task of determining the particular species of birds described by Aristotle and Pliny. Accordingly, he entitled his little book, 'Avium præcipuarum quarum apud Plinium et Aristotelem mentio est, brevis et succincta historia ex optimis quibusque scriptoribus contexta.' Trifling as this may appear beside the ponderous tomes of Gesner and Aldrovandus, the fact remains that it forms no unimportant contribution to the science of the sixteenth century. Indeed, Gesner quoted every line that Turner printed, only adding the contents of such private letters as passed between his friend and himself in the interval between 1544 and 1555. It was, by the way, in 1550 that the Privy Council unsuccessfully nominated Turner for election as Provost of Oriel College, Oxford. The fact deserves notice, because Oriel was destined to be Gilbert White's college. But however bitterly Turner may have felt the loss of this and other expected preferment, he found consolation in his zoological pursuits, and was always ready to amplify a previous statement from his latest experience. Thus he early pointed out the distinctions which appeared to separate the Black Kite (*Milvus migrans*) from the Red Kite (*M. iclinus*), stating that the Kites which he had met with in Britain were larger and redder than the Kites which he had seen in Germany; adding that, while the Red Kites frequented towns and cities, in which they became so bold as to snatch food out of the hands of children, the lesser and blacker species rarely appeared in the vicinity of towns. He is at pains to explain that, though he had very often seen the Black Kite in Germany (probably in the valley of the Rhine), he had never met with it in Great Britain. He returned to the subject in a later letter to Gesner, in which he makes the following statement (literally rendered):—"We have

Kites in England, the like of which I have seen nowhere else. Our own birds are much larger than the German birds, more clamorous, more tending towards whiteness, and much greedier. For such is the audacity of our Kites, that they dare to snatch bread from children, fish from women, and handkerchiefs from off hedges and out of men's hands. They are accustomed to carry off caps from off men's heads when they are building their nests."

Another admirable specimen of Turner's discriminating skill may be found in his lucid refutation of the absurd theory that the Robin (*Erithacus rubecula*) and the Common Redstart (*Ruticilla phœnicurus*) did not represent distinct species, but were in fact identical. Turner truthfully explains to us the woodland habits of the Redbreast in the nesting season, adding that he spoke from personal knowledge: "*Hæc quæ nunc scribo, admodum puer observavi.*" He describes the dress of both sexes of the Redstart, its habit of nesting in holes in trees and crevices of walls, its characteristic actions, and much besides; concluding with the remark that while the Redstart disappears from Britain before the arrival of winter, Redbreasts can be found all through the year, though it is not until the end of autumn, when the young Robins have almost entirely acquired the red plumage of the breast, that these birds withdraw from their summer haunts into the towns and villages. Again, he surprises us with the statement that he knew white Herons (*Ardea*) to occur in England in rare instances; but, ever anxious to guard against any misconception, he shrewdly points out that such white birds as he is referring to belonged to no foreign species of Heron, but agreed with their blue companions in every particular except their absence of coloration.

Had such a statement been made by anyone except Turner, we should at once have jumped to the conclusion that the so-called "white" Herons were neither more nor less than Spoonbills (*Platalea leucorodia*); but in the present case the suggestion is mentioned only to be dismissed. For, in the first place, Turner was well acquainted with the Spoonbill as a British bird. It may well have been upon the authority of Turner that Gesner wrote that the Spoonbill ("*Plataea nostra*") "is captured in England on the shore of the sea, and when kept in confine-

ment feeds upon fish, together with the intestines of fowls and other kitchen refuse." Certain it is that when Turner was in Italy he saw white Egrets ("Albardeolas" he calls them), which, he says, only differed from the "Shovelard" of the English in lacking the broad bill of the Spoonbill. And secondly, Turner states that the rare white Herons which occurred in Britain not only joined company to the common blue Herons (*Ardea cinerea*), but actually bred with them, and produced offspring by their union. Here are his words:—" *Visa est etiam alba (ardea) cum (not inter) cyanea apud Anglos nidulari, et prolem gignere. Quare ejusdem esse speciei satis constat.*" This last sentence disposes of the idea which Turner may himself have considered, that these white Herons represented one of the white species of Egrets, such as he had met with in Italy. Clearly, the white Herons which occurred in Britain must have been albinos or white varieties of the common bird, such as have been obtained in modern times.

Gladly would we linger to discuss Turner's numerous references to the bird-life of Merrie England, picturing in our mind's eye the havoc which the blue "Henharroer" (*Circus cyaneus*) wrought in well-stocked poultry-yards, the Osprey (*Pandion haliaëtus*) purloining stock-fishes from the stews, and the Shel-drake (*Tadorna cornuta*) fighting round her nest hard by the tideway of the Thames; but present interests require us to indicate that Turner did not confine his attention to ornithology.

We have hitherto failed to ascertain that Turner studied mammals like his brother Cantab, Dr. Caius; but both the courtly doctor of medicine and the militant divine were keenly interested in the fish fauna of the British Islands. It was Dr. Caius who first discovered that the Ruff (*Acerina vulgaris*) existed in the waters of an English river—the Norfolk Yare (the doctor was a *Norfolk* man). Yet the notes which Dr. Caius published himself, or sent direct to Gesner, however interesting, will hardly bear a safe comparison with the list of British Fishes which Gesner received from Turner.

Turner was residing at Wissenburg when he drafted this rough catalogue, probably at a distance from his private memoranda: he wrote it in 1557. Eleven years later he evinced his sustained interest in the subject by alluding in print to his

intention of publishing a work upon the names and natures of the Fishes to be found within the dominions of Queen Elizabeth. But the catalogue of 1557 was a remarkable production for the middle of the sixteenth century, and refers to many old names of British Fishes. Thus the title of "Keeling" is applied to Cod (*Gadus morhua*) of a particular size. Or again, Turner's remarks have a historical value, as when he represents that the Smelt (*Osmerus eperlanus*), which rarely ascends the Thames higher than Woolwich at the present day, used in his time to follow the tides as high up as Kew and Brentford in the spring of the year. How carefully Turner studied the specific characters of fishes may be guessed from the gravity with which he rejects the fallacious opinion entertained by some of his countrymen that the Sprat, or "Sprote," as the Londoners of those days termed it (*Clupea sprattus*), was not the young of the Herring (*Clupea harengus*), nor an immature form at all; but a valid and distinct species of fish. We can well believe that Turner's failure to produce his promised monograph of British Fishes was due in part to the strange vicissitudes of his career; in part to the encroachments of his Herbal upon his spare time.

Whatever shortcomings may be detected in the writings of William Turner, the man himself is worthy of our homage, not only as the first sturdy Englishman who essayed to study our insular fauna in a spirit of intelligent research, but also because, like Dr. Caius and Dr. Fauconer of his own generation, he delighted to clasp hands with brother naturalists across the "silver streak," thus bringing to our own remembrance the signal truth that the naturalist belongs to no single motherland, but is united with his comrades in the bonds of a generous friendship wherever the waves and the winds may carry him.

Dear old Turner was not spared to attain a very great age. His failing strength lasted long enough to enable him to correct the text of the edition of his Herbal printed in 1568; but that same year brought his sorely troubled life to a peaceful termination. On July 7th the great Northumbrian naturalist "quietly" laid his head upon the pillow and passed away. We gather from the epitaph which Jane Turner placed upon her husband's monument in St. Olave's Church, that the veteran was "*ac tandem*

*corpus senio, ac laboribus confectum,*" when he answered the last roll-call.

The flowers that Turner loved so well had only blossomed for five more seasons when another famous *alumnus* of Cambridge laid aside his study of zoology. On July 29th, 1573, the spirit of John Caius fell upon a heavy slumber.

Oxford men are not disloyal, but we *do* envy our sister University the memory of these early naturalists, who surely owed whatever was noblest in their characters to the wise and discriminating education of their *Alma Mater*.



MIGRATION AT THE SPURN LIGHTHOUSE IN 1897-98.

BY JOHN CORDEAUX, F.R.G.S., M.B.O.U.

I AM again (as in 1896) indebted to Mr. W. G. Cawnter, one of the light-keepers of the Spurn, for the following notes of birds observed by him at the Light in 1897 and part of 1898 :—

FEBRUARY, 1897.

15th.—A few Starlings struck, and a Thrush killed.

MARCH.

30th.—One Lapwing, one Grey Plover, one Little Grebe, two Larks, one Fieldfare, and several Chaffinches struck and were killed. Wind W.N.W., overcast, and drizzling rain.

APRIL.

18th.—The Ringed Plovers are breeding; several nests have from one to two eggs.

19th.—A very large flock of Dunlins on the coast.

27th.—Lesser Tern seen for the first time.

28th.—Several Redstarts, Warblers, and Chiffchaffs struck. S.W. breeze, very gentle; night very dark.

MAY.

6th.—Several Chiffchaffs struck. Overcast, W., gentle breeze.

8th, 2 a.m.—Several Chiffchaffs and Redstarts striking. S.S.W., gentle, overcast.

26th.—Sedge Warblers, Whitethroats, and Redstarts flying around lantern. Light air from S.; night very dark.

JUNE.

17th.—Swift killed at lantern; several flying around.

JULY.

1st.—Young Starling killed against lantern. N.E. (4), overcast and drizzle.

- 4th.—Flock of young Rooks flying about the place.  
 25th.—Large numbers of Swallows flying southward.  
 26th.—Several to south.  
 28th.—Two Fern-owls on the sands.

## AUGUST.

- 26th.—A Gull struck dome of lantern and was killed. "It is nineteen years since a Gull struck a lantern in my charge."  
 27th.—Several Swifts observed.  
 30th.—Several Warblers and Whitethroats struck. S.W., moderate, overcast and rain.  
 31st.—A few Swifts flying around.

## SEPTEMBER.

- 2nd.—A large number of Swifts (about fifty) roosting in the tower-windows. Some Warblers flying around and striking lantern. W.N.W., moderate, dark and overcast.  
 3rd.—Towards evening a number of Swifts flying around, but less than on the 2nd: several roosting in tower-windows.  
 4th.—Several Kestrels observed flying south.  
 30th.—A large number of birds flying about light, a few Knots striking. Several Snipe during the day.

## OCTOBER.

- 2nd.—A large number of birds—Curlews, Knots, Thrushes, Larks, Plovers, and Golden-crested Wrens—flying around the light. W.S.W., gentle, dark and overcast.  
 7th.—Several Starlings struck; two Wigeon (young males) struck the base of the lantern and were killed. W.S.W., dark, overcast, showery.  
 9th.—Many Golden-crested Wrens about the place.  
 18th.—Lark struck and killed; several Crows passing to the south; also great numbers of Linnets.  
 21st.—First flight of Woodcocks.  
 23rd.—Several Starlings struck the lantern. E., moderate, overcast, but very clear. Robin observed for first time.  
 24th.—Several Starlings and Larks struck.  
 27th, 3 a.m. to daylight.—A few Starlings struck.

## NOVEMBER.

1st.—A lot of Crows flying south; several Thrushes about dunes, and also striking.

5th.—A few Starlings struck. Dark, and drizzling rain.

20th.—Stormy Petrel caught on lantern gallery. W., dark and misty. Flock of Geese seen flying south during day.

21st.—Flock of Ducks to south.

24th.—An immense number of Knots flying south. A large number of birds flying around the light—Knots, Golden, Grey, and Green Plovers, Woodcocks, Snipes, Starlings, and Thrushes; many killed by striking. S., night dark and clear, with frequent showers of drizzle.

25th.—Several Woodcocks shot amongst dunes.

26th, 7 p.m.—A Knot struck and was killed.

29th.—Several Geese about; one shot.

## DECEMBER.

7th.—Two flights of Stock Doves to the south during day. (These would probably be Ring Doves, *Columba palumbus*.—J. C.)

11th.—During the week large numbers of Rooks to south.

24th.—Large flock of Ducks to south.

26th, 5 a.m.—Sanderling struck and killed.

## JANUARY, 1898.

12th.—Knots, Curlews, and Plovers flying around light. S.S.W. (2), overcast, misty.

13th.—Gulls, Wigeons, Knots, and Plovers flying around light. S.W. (2), overcast, misty.

14th.—Larks and Starlings around light; Sanderling killed. W.S.W. (2), overcast.

15th.—The same.

## MARCH.

11th.—Starlings and Larks striking lantern. S.E. (3), overcast.

13th, 1 until 2.30 a.m.—Starlings, Curlews, Lapwings, and Sanderlings around light. Overcast, misty.

16th.—Starlings and Larks around light.

17th.—The same.

22nd, 1 to 3 a.m.—Starlings and Larks striking.

24th, 4 a.m.—A few Starlings flying round; Gold-crested Wren struck and killed.

Mr. Thomas O. Hall sends the following notes from Flamborough Lighthouse :—

“ We had a very straggling migration of Rooks and Jackdaws ; they commenced on Oct. 21st, and, as we had a continuance of winds from S.S.E. to S.S.W. for seventeen or eighteen days, so the migration continued to Nov. 7th. We had then a great rush of Fieldfares, with scarcely any other birds. It was the greatest rush of Fieldfares I have seen for at least twenty years *during the autumn migration*. They commenced about 11 p.m. on the night of Nov. 24th, and continued to daylight on the 25th. I once saw as large a rush of Fieldfares four years ago, in January, coming from the north and flying south ; this was after a heavy fall of snow in Scotland.

“ On Feb. 13th, at midnight, there was a slight migration of Fieldfares and Golden Plovers ; they appeared to come from the eastward, at least they were travelling westward.

“ On Feb. 9th, at 9.30 a.m., I was up in the lantern, and, hearing a great cawing, I looked out, and saw a flock of about two hundred Rooks coming from the eastward ; they flew over the top of the lantern and settled in the field beyond, feeding for an hour, and then going west. There has been a great migration, but no sorts of birds in any quantity except the Fieldfare. I think this light has never been a good one for birds ; they get in the red rays of light and fly away, but in the white ray they get dazzled, and fly to the lantern-windows.”

## ROUGH NESTING NOTES FROM YORKSHIRE.

BY OXLEY GRABHAM, M.A., M.B.O.U.

HERONS had eggs the second week in February in spite of most inclement weather, and they still hold their own in face of persistent trapping on the trout streams. I remember some years ago, when fishing for the first time a well-known stream which shall be nameless, my wrath at seeing five Herons gibbeted hard by; a few days' experience, however, convinced me that a clean bill cannot unfortunately be given to them, for they often destroy fine fish which they cannot possibly eat, out of sheer devilment, and fond as I am of them, I must own they do a good deal of harm; however, I believe fully in the principle of live and let live, and would gladly sacrifice a few fish for the pleasure of seeing this stately bird. Thanks to the protection afforded it on certain estates, it is likely to gladden the eyes of the field naturalist for some time to come.

Woodcock are increasing yearly, and I know of a wood where over twenty pairs have bred this year, but the young are off long before the shooting season. The same increase I have noted in the breeding of Snipe and Redshank. I know of many colonies of the latter, one numbering nearly twenty pairs of birds, and so far from the nests always being placed in a tuft of grass, with the blades most carefully concealing the eggs, as we are told in the books, I have frequently found them on the open moor amidst the short ling, without any attempt at concealment; and I have found Snipe in exactly similar places.

The Lapwing, despite the netting, egging, and shooting that it has to contend with, holds its own well in most places: this I attribute to their wonderful adaptability to circumstances. I find their nests equally on the highest fells, in the marshy plains, on the moorlands, and amidst enclosed ground, and no matter how their eggs are taken, in a very short time they are laying again. I see Mr. Cordeaux states that the Lapwing is getting scarcer in

Lincolnshire, but it is not so in the "broad-acred shire," and long may it be before its "mournful, piercing, despairing cry" ceases to be a common country sound.

On June 3rd, with Mr. James Backhouse, I watched on a certain fell, 2225 feet above the sea-level, at the distance of only five or six yards, a Dunlin brooding her just-hatched young; it was sleeting and bitterly cold, and the poor little birds must have wished they were back in the shell. There were a nice lot of the birds about, and the name they are known by in this district is "Jack Plover."

On the estate of a well-known Yorkshire naturalist, whose grounds are a perfect paradise of bird-life, and a haven of refuge to rare and common alike, the Nuthatch, Lesser Spotted Woodpecker, and Hawfinch have bred this year; and what is of still greater interest, though the nest could not be found, the owner told me that the Crossbills, which are there all the year round, were seen carrying bits of bark, fir-needles, moss, wool, &c.; but the covers are so dense that though every effort was made to trace the birds, the attempts hitherto have failed.

The Turtle Dove is yearly increasing its range, and it breeds in parts of the county where a few years ago it was unknown.

In secluded places the Goldfinch, locally known as "Redcap," still breeds not uncommonly, despite the fact that I knew of nearly forty being caught by one birdcatcher in less than a week one autumn.

The Pied Flycatcher is by no means rare, and all the nests I have examined were lined with the leaves of *Luzula campestris* or *pilosa*. In one valley I knew of a dozen pairs, but they each keep to their own district, and the nesting places are a good distance apart. I never found hair myself in a Pied Flycatcher's nest; they are very loosely put together and difficult to get out intact.

The Grasshopper Warbler has been common. Most people consider it rare, but it is a very peculiar little bird and wants a good deal of knowing. After a spell of cold weather they will sometimes leave the district entirely, or, as they did in one locality this year, remain there but keep perfect silence. There is a good deal of art in finding their nests; my tutor therein, a past master at the game, has found more Grasshopper Warblers' nests than

any one else that I ever heard of. I am not going to reveal the secret, for I have had bitter experience of that sort of thing. I once knew of a pair, and told a man who I thought was above suspicion, but he promptly went and shot one of them, which taught me a lesson I have not forgotten. Suffice it to say that under certain conditions the bird will sulk, and nothing will induce her to leave the nest; and in one instance on being touched by mistake, she feigned death, and allowed herself to be handled as if dead—a quivering of the eyelid was all that showed she was shamming. They are most prolific little birds, and I have known thirty eggs taken from one pair. I very much deprecate this sort of thing, but there are times when in pursuit of knowledge and experience, especially if one has to rely upon the good offices and information originally imparted by another, when all one can do is to sit tight. I may say that I see no harm in taking a clutch of eggs whatever, but after that I believe in allowing the birds to lay again, which they always do, and rear their young in safety. I found a nest of *Locustella naevia* on May 30th, containing five fresh eggs. The nest was in a big tussock of *Aira cæspitosa* (common turfy hair-grass), in the middle of a big osier-bed, or willow garth as it is called in the county, and was made of a foundation of willow-leaves, &c., and coarse grass, a very little moss, and lined with finer grass—a bulky nest. All the Grasshopper Warblers, when driven off their nests in thick cover, run along the ground a few yards, for all the world like a Mouse; then fly up on to some twig, reed, &c., for a few moments; and afterwards drop down into the thick grass.

I have examined a large number of Swifts' nests this year, and so far from their being small and loose structures, they have been most bulky, and in every instance they contained fresh flowers with long stalks of the buttercup. Now I have found fresh flowers of the buttercup in the nest of our old friend "*Passer damnabilis*;" and I have often wondered whether the Swifts occasionally take possession of these nests and agglutinate them together with their salivary secretion. But I have found Swifts' nests still containing fresh buttercups, with no Sparrows near, so that the Swifts must have taken them there themselves, though I never saw, or met with anyone who had seen them doing so. With all due deference to so excellent an authority

as Mr. Howard Saunders, I must demur to his statement that when three eggs are found in a Swift's nest they are probably the produce of two females. I have found this to occur so often, and in isolated nests, that unless for the sake of argument one supposes the Swift to regularly lay in each other's nests, the evidence, to my mind, is strongly in favour of the hen bird by no means infrequently laying three eggs.

Kingfishers are certainly not so rare as many people suppose, but they are often unobserved. I knew of a nest, the young of which were reared within two miles of York Minster.

I witnessed the prettiest ornithological sight that I have seen for many a long day, on June 15th, on a certain large sheet of water. I rowed out to examine a Great Crested Grebe's nest, which was made on a foundation of various species of *Potamogeton*, surmounted by a quantity of stalks of a large *Equisetum* or mare's-tail. There were two other similar nests near, and I have generally found one or more of these false nests near the true nest of the Great Crested Grebe. The idea is that the cock bird uses them as resting-places or look-out stations; and though I have not been able to verify the same myself, still it seems a feasible explanation. When I arrived within a couple of hundred yards of the nest I could see through my glasses that the old bird was greatly excited. She allowed me to advance within forty yards of her, when I stopped my boat and saw that the eggs had been hatched, for she had three young ones, two or three days old with her; one was on her back, and the other two were tucked away, one under each wing. She gradually sunk herself in the water till only her head was above it, and then dived, coming up a long distance from where she went down. I never before had the pleasure of seeing a Grebe dive with her young ones, and it was a sight I most thoroughly appreciated. While the Great Crested Grebe is, if anything, on the increase, the Little Grebe, in my experience, is slightly diminishing in numbers; there are plenty in the winter, but few in the breeding-season, and they do not breed on the big sheets of water, as the large Pike play havoc with them. They are well known throughout all the three Ridings as "Tom Puddings," a cognomen which I do not remember to have seen mentioned in any book.

On this same sheet of water where the Great Crested Grebes



were, I detected through my glass three pairs of Tufted Ducks, and on looking over a small island I found two nests, each containing ten eggs completely covered up with down. The other Ducks which I have found breeding this season in a wild state in various parts of the county are the Mallard, Teal, Shoveller, and Pochard.

Nightjars have been common. I took a friend to obtain a photograph of two eggs *in situ* that I had found on a moorside. The hen harmonized so beautifully with the dead bracken and bare ground that it was some time before I could make him see her. After photographing the eggs he fastened green cloth over the camera, tied a thread to the shutter, and then hid behind a large stone about twenty yards away. Though an hour was allowed she failed to come back, so we pinned portions of the bracken, which was growing all round, on to the green cloth, and then hid up again, when, after waiting about twenty minutes, on she came. Allowing a few minutes for her to settle, my friend took his shot, and an excellent one it has turned out.

This same friend told me of a prolific nest. Four years ago he found a Carrion Crow's nest; the next year it was tenanted by a Long-eared Owl, very abundant in the county; last year a Sparrowhawk took possession, and this year a Kestrel.

Everybody heard with the greatest regret of the recent shooting of an Osprey near Beverley—*audi alteram partem*. Some time ago, on the gentleman's estate I have before mentioned as being such a paradise for birds, an Osprey appeared and remained for six weeks; when, although it levied heavy toll on the big Trout in the lake, it was a welcome visitor, and allowed to pursue its own habits. Would that there were more such naturalists, and such havens of refuge! Some men, I verily believe, would shoot at an archangel himself if he appeared on the wing. A fine of five shillings is ridiculously inadequate; when five pounds can be obtained for the specimen it is no deterrent at all.

I am afraid that the laws relating to bird-protection are in many cases but a farce; for example—shade of *Dracon!*—in some places the eggs are allowed to be taken, but not the young or old birds, and, as Mr. Southwell pointed out in an excellent letter to 'The Field,' it is not fair that the onus of getting up a

prosecution should rest with a private individual. It is not the ornithologist who takes one clutch for scientific purposes who does the harm, but the professional collector who decimates whole colonies time after time. I frankly own that I am indebted for a great deal of my knowledge of the various nesting-places, resorts, and habits of some of our rarest birds to men who, unfortunately, are sometimes tempted by the ridiculously high prices paid by collectors to shoot these birds in the breeding-season, for the sake of their plumage; but I strongly maintain that it is the collectors who are the most to blame—*qui facit per alium facit per se*—and not these men who are not too well endowed with this world's goods, and who, most of them, are decent fellows, struggling to earn an honest livelihood. Only this season I have known, in the county, of Cormorants being shot on the coast; Dotterel on the wolds; a Honey Buzzard, Turtle Doves, and Nightjars in the plains, in full breeding plumage, and in open defiance of the law; but what can I do? As Mr. Southwell truly remarks, even if one felt inclined to take up these cases, would it do any good? The penalties are so inadequate, and above all, though perhaps this may seem a selfish view to some, these men's mouths and others like them would be eternally closed, which when one is working up a county fauna would be a most serious thing. So that, however much one may deprecate and deplore the destruction of our favourites, the most that can be done is to see that this destruction is not wholesale. I have often procured immunity for the remainder by a little judicious expenditure of the current coin of the realm. These men rely on one's honour "not to give them away," so that one is compelled as it were to a certain extent to "bow oneself down in the house of Rimmon."

I forgot to mention that, while visiting the cliff-climbers at Bempton, where the Guillemots, Razorbills, Puffins and Kittiwakes are as numerous as ever, I was told that a Guillemot, pure white except for its black head, had been frequently seen by them.

In conclusion: I was much interested in an article that appeared in 'The Zoologist' some little time since, on the time of day at which various birds lay their eggs. I have taken particular notice this season, and the conclusion I have come

to is that no hard and fast rule can be laid down, for while many birds—Thrushes, Blackbirds, Chaffinches, &c.—generally lay between the hours of ten and twelve a.m., a Reed Warbler I had under observation laid all its eggs before six a.m., while a Spotted Flycatcher laid its clutch in the afternoon after three p.m.

## NOTES AND QUERIES.

## AVES.

The Whinchat in Co. Dublin.—I have long been anxious to make the acquaintance of the Whinchat (*Pratincola rubetra*) in Ireland; yet, although I frequently visited what I thought were suitable localities, I was never fortunate enough to do so until June 9th last. I will not, for obvious reasons, specify the locality in which I met my long-sought friend; sufficient to say that it was about twelve miles distant from the Irish metropolis, and that there, on the day I have mentioned, I was delighted to hear the familiar “u-tick” which I heard last in the Rhone Valley. With my glass I perceived that there were four Whinchats in the field; the male was flitting from bush to bush singing gaily, whilst the female seemed to be employed in feeding one of two young ones by her side. On the 11th I returned with my son Ambrose, when we got quite near the birds, which were far from being shy. My friend Mr. Edward Williams, naturalist, tells me that a few years ago he observed Whinchats in the very same locality.—CHARLES W. BENSON (Rathmines School, Dublin).

The Marsh Warbler in Oxfordshire.—Last year I published no account of the Marsh Warblers (*Acrocephalus palustris*) which have now for seven successive summers occupied an old osier-bed in this neighbourhood; my last communication to ‘The Zoologist’ was in August, 1896 (p. 286). In 1897 they had arrived by June 4th, sang vociferously for about ten days, and then quieted down as usual when the nest was being built. There were beyond doubt two pairs. I was away till well into July, and when I returned they were still in the osiers with their young; there they remained till the 22nd, when I lost sight of them. This year my observations have been, I think, sufficiently interesting for publication. The day on which I first heard them was again June 4th; I had already heard the bird near Abbeville in France on May 28th, but have never yet heard it in England till the first week in June. On the 10th the osiers were alive with the brilliant singing of at least two or three males, in a space about half an acre in extent. The Sedge Warblers seemed entirely outdone, and the listener could regale himself with the strains of the rarer species undisturbed by any other songs. On the 20th, after some careful watching, I found a nest with five eggs almost in the exact spot where I first found

one in 1893, which is now in the Oxford Museum; and on the 21st I found another, containing one egg, in the identical spot almost to a square yard where I found one in 1895 (June 26th). This close adherence to the same site year after year has also been noticed by my friend Mr. Playne near Bristol. The same day a young friend from Oxford, whom I had invited to study the bird, discovered a third nest with four eggs in a new site. This was a little further from the edge of the osier-bed than has so far been the case; but my experience entirely confirms Mr. Seebohm's statement (or rather that of his German informant) that it is almost useless to look for the nest in the *centre* of any dense thicket. All the eggs were very characteristic, of a clear greenish or bluish white ground colour; but the spots and blotches were somewhat larger and more numerous in one clutch than in the others. On the 25th Mr. O. V. Aplin came to look at these three nests, and we had the pleasure of a leisurely inspection of the sitting bird in two cases out of the three. Looked at from a yard or so away, the colour of the back is a light uniform neutral brown, with a shade of olive, and the eye-stripe is only discernible when looked for closely; it passes not over the eye, as described in Mr. Howard Saunders's 'Manual,' but through it. By this time the nest which, when I originally observed it, had one egg only, contained three, but the previous day there had been four. This nest differed from the others in having more or less wool in its composition, and a large loose lump of wool in the lining. This attracted my attention, for I had never seen wool in a Marsh Warbler's nest before; there is sometimes a little moss, and this was the case also with the nest of which I am speaking. We saw a Cuckoo this day at the osier-bed, and I had seen one there once or twice before; but it did not occur to me as yet to associate the disappearance of an egg or the peculiar make of the nest with the presence of this mischief-maker. But on the 27th, when I next looked at the nest, there were only two eggs, and my suspicions began to be aroused, for there was no sign that any human being had been to the spot. On the morning of the 28th the bird was no longer sitting, and the eggs were all gone. There was no trace of them underneath the nest, among the roots of the meadow-sweet, in which this nest, like all the others this year, had been built. On examining the nest more closely I thought I saw something at the very bottom, underneath the lining, which as usual was of dry grass and horsehair, with the addition, as I have said, of some wool and a few minute fragments of moss, and, putting in my finger, I felt an egg. I then cut away the meadow-sweet, with the nest in it, and, getting it into a good light, could see a Cuckoo's egg, of the greenish-brown type often found in the nest of the Reed Warbler and other birds, almost hidden, and quite firmly fixed below the lining. The nest could be held upside down without displacing the egg, which occupied a small hole or chamber

in the floor of the nest. As I was going that day on a visit to Mr. Aplin, I took the nest with me; we extracted the egg from its hole, blew it and replaced it, and had the nest photographed.\* This is, I believe, the first instance on record in this country of a Cuckoo's egg being laid in a Marsh Warbler's nest. Whether this can throw any light on the peculiar position of the egg in the nest may indeed be doubtful; but I am inclined to guess that this Cuckoo is in the habit of depositing her eggs in the nests of Sedge Warblers or Whitethroats, and that, finding herself too late for these (for a Whitethroat that had a nest hard by had been sitting a long time, and the Sedge Warblers in the osiers had young already), she put the egg into the Marsh Warbler's nest when only one or perhaps two eggs had been laid in it. And it is just possible that the striking contrast between the Cuckoo's egg and those of the intended foster-parent enabled the latter to discover the intruder, which she buried in the bottom of the nest out of sight, adding some new materials, *e.g.* the wool I have mentioned, with this end in view. However this may be, the facts are as I have described them, and the nest will be placed in the Oxford Museum, with the Cuckoo's egg thus buried, so that anyone who may be studying the ways of the Cuckoo and its victims will be able to form an opinion for himself. On July 1st I was glad to find that the birds were evidently at work on a new nest; the cock was singing vigorously in heavy rain at six in the afternoon, a sure sign of renewed activity. After a short absence I returned on the 6th, to find that another of the three nests had been discovered and destroyed; but in the third the young were just ready to fly. They are now (July 9th) about in the osiers with their parents, whose warning notes, more musical and agreeable than the harsh grating of the Sedge Warblers, are to be heard on every side. The plumage of the young birds is, as I observed two years ago, much darker and more rufous than that of the parents, and the throat and breast are of a warm buff. I may add that the vigorous singing still going on shows clearly that one new nest at least has been built within the last few days.—W. WARDE FOWLER (Kingham, Chipping Norton).

**On the Nesting of the Spotted Flycatcher.**—A pair of Common Flycatchers (*Muscicapa grisola*) nesting in my garden built their first nest on the spouting against the house, which unfortunately was pulled away during building repairs. The second nest, which they started to build a few days after, on May 31st, was placed in a rose tree nailed to the house within a few feet of the old site. On June 6th the nest was finished, and on the 7th the first egg was laid. To notify at what hour the eggs were laid, I visited the nest at 5 a.m. the next morning without finding a further addition; the

\* It may be as well to state that the Cuckoo's egg was quite fresh when blown; it was small even for a Cuckoo's, but had the usual hard shell.

hen bird was on the nest, however, at 7 o'clock, and at 8 a.m., to my surprise, three eggs were deposited, which caused me to make a more careful examination as to the possibility of any egg that might be laid on the edge of the nest and roll in subsequently. On the 9th, however, two more eggs were laid, and the bird commenced to sit, another egg (making a clutch of six) being added afterwards. On June 23rd three eggs were hatched, one of the remaining three being infertile. On the following morning there were four young, and in the evening the last egg was hatched. On July 6th the three young ones reared out of the five left the nest, and, as frequently happens, also left the immediate locality, neither the old nor young having been seen since in the garden. To what extent the double laying exists I am unable to say, but with close watching in future it may be possible to throw further light upon this subject. Construction of nest, 7 days; depositing clutch of six eggs, 4 days; incubation, 14-15 days; young in nest, 12-13 days; total nesting, 37 days.—J. STEELE-ELLIOTT (Clent, Worcestershire).

**Spotless Eggs of the Spotted Flycatcher.**—An answer to a correspondent, signing himself "Isham," in the 'Field' of July 23rd, to the effect that "spotless eggs of the Spotted Flycatcher (*Muscicapa grisola*) are very unusual," and further embodying a doubt as to the correct identification of the species, has just caught my eye. May I, as one almost as familiar with birds' eggs as the letters of the alphabet, and in the interests of a future generation, put it on record with all humility in the pages of 'The Zoologist' that upwards of a quarter of a century's unremitting birdsnesting has left me with the fixed conviction that of all the varieties of eggs, such as drab unspotted Chaffinches', white Robins', pink Jays', blue unspotted Blackbirds', &c., one is liable to come across, there is no freak so fashionable as a Spotted Flycatcher's nest containing a clutch of eggs with the ground colour, generally a pale blue, unruffled by spot or speck. At p. 77 of that pleasant little work, 'Our Summer Migrants,' the author, referring to the Redstart, writes as follows;—"It is not unusual to find the nest, containing five or six pale blue eggs, upon a peach or plum tree against a wall; upon a crossbeam of a summer-house." Personally, I have never known a Redstart nidificate except in a hole, or at all events in a covered site; and I make no doubt that much confusion has been generated in the past by eggs resembling and wrongly identified as Redstarts' being discovered in nests which in reality belonged to Spotted Flycatchers.—H. S. DAVENPORT (Melton Mowbray).

**Cuckoos recently observed in Aberdeen.**—Two young Cuckoos (*Cuculus canorus*) were successfully hatched this year on natural pasture on my farm. In both cases the foster-parents were the same species as in the

former year—Mountain Linnets (*Linota flavirostris*). On May 30th a Cuckoo's egg was detected in a nest, and in a day or two a young one was hatched. The egg was nearly like those of the foster-parents; just a little longer or perhaps a little larger, with the general colouring of the other eggs. The nest altogether contained four eggs. The first day after hatching the young Cuckoo (a weak creature) was in the nest, while two young and an addled egg of the foster-parents were lying near, but had all disappeared by the following day. The young Cuckoo, which had less down than the other two, could not have evicted them; but who evicted and who carried away it is impossible to tell. The same care and attention was given this one as the other described in 1897, and on June 22nd it flew away from the nest, and was seen three days later still attended by the foster-parents. This went on to the 7th July, that being the last occasion on which it was seen. This bird was remarkable for the uniform darkness of its plumage. On June 22nd the second one was found in a nest nearly one hundred yards from the other. It was about half-grown, and the four eggs of the foster-birds were found lying in a small hollow such as might be made by a bullock's foot. They were about three feet from the nest and chipped, either through the young birds having been about to emerge from the shell, or, as is just possible, had been removed by the bill of a bird, and received the marks that way. It is difficult to understand how they could have all been ejected by the young Cuckoo and rolled so regularly together by themselves. On July 7th this bird was seen moving about at a short distance from the nest, and returning to it again. On July 9th it had deserted it, but the foster-parents were still moving about near the nest, while the three were seen for some days later flying about in the vicinity. It seems probable that the Cuckoo would place her egg in nests of birds whose eggs are at different stages of incubation. Would it be too much to suppose that the eggs in this case had been set apart to feed the young one? They were destroyed because they might have attracted Hooded Crows or similar depredators, otherwise it would have been interesting to note whether the young Cuckoo would have used them for food. The colour of this Cuckoo was extremely rufous, the plumage being in strong contrast to the other one; whilst the bird of 1897 was between the two in this respect. It is fairly reasonable to suppose that the eggs had both belonged to one bird, more especially as it is well known that some days elapse between the production of each egg of the Cuckoo. We had no means of ascertaining the sex of either of these birds, as colour does not denote it; so we must find other reasons for so great a variation in colour which these two presented. As observations of these birds were practically of daily occurrence, it was remarked that there were no appearances of the old Cuckoo being about; still the latter might put in an appearance at night or in the morning when



there was no one to see her. Thus we are without sufficient evidence to say that she had no interest in them. This is the first time which I have known of two young ones being reared near each other. Regarding the numbers of eggs which one Cuckoo will produce in a single year, and which various naturalists have estimated at from twenty to five, we should favour the latter number, or perhaps even less; but we believe that it would differ very much with varying conditions. When we consider that in two years in this neighbourhood three pairs of Mountain Linnets have been hatching Cuckoos, another two pairs having done so in former years, while no case was observed in that time of other birds doing so, we are bound to place this bird as the favourite foster-parent of the locality; and if Cuckoos were laying many eggs the effect would be such as to curtail the foster-bird seriously in numbers. I cannot find a reason why this should be so, for there are plenty of other birds, such as Larks, Brown Linnets, Hedge-sparrows, Robins, Wagtails, Chaffinches, Yellowhammers, &c., which might serve this purpose. It is also noticeable that the favourite is quite a local bird, as it does not extend into the low part of the country, and hence it is not generally noticed in natural history works as one of the usual foster-parents of the Cuckoo. Another point to be observed is that this bird has little connection with woods, moors being its favourite haunt; while Cuckoos are very fond of frequenting plantations. We have seen in the one case that the egg resembled those of the foster-birds, while that each of the young birds differed in the colour of plumage. Then the date of leaving here—July 7th is the last date which the Cuckoo was heard. I believe that they do not stay long after we cease to hear them; for instance, one which frequented my garden or its vicinity since their arrival has disappeared, and while some may remain for a while, everything leads me to think that they flit about the end of July. Then of course the foster-birds here will not follow far; so that the young Cuckoos must shift for themselves, or obtain some guidance from parent Cuckoos or other promiscuous birds of their own species.—W. WILSON (Alford, Aberdeen).

**Mallard and Pintail interbreeding in Captivity.**—Last year I induced my friend Mr. R. Mann to pair a drake Pintail (*Dafila acuta*) with a female Wild Duck (*Anas boscas*), but a Mallard found access to his neighbour's mate, and her eggs hatched into pure-bred Mallards. This year the Pintail succeeded in pairing with a Wild Duck for a second time, and five eggs hatched. One duckling was killed by a Herring Gull, but the other four have feathered, and promise to be handsome specimens of this well-known cross. They most resemble the Pintail in immature plumage.—H. A. MACPHERSON (Allonby Vicarage, Cumberland).

**Breeding Range of the Scaup-Duck.**—I do not agree with your correspondent, Mr. Crossman (*Zool. ante*, p. 319), when he presumes that any

stray Scaup-Duck (*Fuligula marila*) must have come from an ornamental water. It is just possible that, as in the case of the Teal, the breeding range of this species may be creeping further southward. I am not aware that the Scaup has been known to breed even so far south as the Stewartry of Kirkcudbright; yet on May 25th, 1892, I saw a pair of these birds frequenting Jordieland Loch, a sheet of water on the moors about five miles from the town of Kirkcudbright. I need hardly repeat from my notes that: "The male had a black neck and breast, the upper parts of the body also being dark, the under parts white. The female was similarly marked, but dusky. Their cry was hoarse compared with that of the Mallard." Looking to the season at which I saw these birds—at the time a female Mallard had her young, little puffs of down, in the water in another part of the loch—I think that the Scaup may have bred either there or in the vicinity, although unfortunately I could not certify this. The Teal breeds in fair numbers in that part of the country; the numbers to be seen in winter do not all remain to breed, but I think these are on the increase. It is not improbable that the same climatic tendency that keeps the Teal may ultimately keep the Scaup.—J. W. PAYNE (Edinburgh).

Occurrence of the Fork-tailed Petrel on the Yorkshire Coast.—I have a fine example of this Petrel (*Cymochorea leucorrhoea* Vieill.), taken on the beach at Filey on March 26th of this year, after some heavy westerly gales. This bird has been set up with the wings expanded, and the light smoky grey of the upper wing-coverts is very conspicuous. Both this and the closely allied Ridgway's Petrel (*Oceanodroma cryptoleucura*) of the Canary Seas are figured in Lord Lilford's 'Illustrations.' In the latter the tail is not deeply forked, but nearly square. The upper tail-coverts are described ('Ibis,' 1897, p. 54) as white tipped with black; this feature, however, is probably common to both, as my Filey bird has the tips of the white upper tail-coverts and the shafts of the same very dark.—JOHN CORDEAUX (Great Cotes House, R.S.O., Lincoln).

Bird Notes from the Northern Cairngorms.—The following account of some of the birds which are to be found near Aviemore, Inverness-shire, is the result of a few rough notes made by myself this summer (June 24th–July 7th) during a holiday spent in the district with three fellow-tourists. We made Coylum Bridge our headquarters, from whence we explored the forests of Rothiemurchus and Glenmore, and the northern slopes of the Cairngorm Mountains. Our first expedition was to Lochan Eileau, where we hoped to see the Ospreys (*Pandion haliaëtus*), a pair of which are said to have nested on a ruined castle in the loch, with varying intervals, for the last century. We were much disappointed to find the eyrie deserted, but on enquiry were told that a pair had arrived as usual in May. Soon after

their arrival, however, a third bird, presumably a male, appeared on the loch, and a fierce fight ensued between two of the birds, the result of which was that the eyrie was shortly afterwards deserted. Although no young appear to have been reared on the castle this year, a pair of Ospreys seem to have remained in the neighbourhood, as a bird was seen on the castle about the middle of June, and I myself saw a pair flying in circles high above the loch on July 6th. We saw an Osprey's nest which had been built in a large fir tree overhanging Loch Morlich, but were told by the keeper that it had not been used for the last five or six years. Another interesting bird we noticed was the Greenshank (*Totanus canescens*), of which species we saw three or four pairs, all of which, from their manners, appeared to have young. Their alarm-cry is exceedingly resonant, and they also utter a chattering note, like that of the Kestrel. We only saw one young bird, which I flushed from some marshy ground, while the parent birds were flying over my head, calling loudly. It was fairly strong on the wing, so the Greenshank must be rather an early breeder. This species often perches on trees; in fact, we saw them more often on the tops of small firs than on the ground. They seem, however, to have considerable difficulty in keeping their balance on trees, and probably only resort to them when they suspect danger. We met with several parties of Crested Tits (*Parus cristatus*), both in Rothiemurchus and Glenmore forests. They do not appear to be at all uncommon in the district, and when once we had learnt their call-note, we came across them nearly every day. The note to my ear sounds like a spluttering "ptur-r-r-re," rather low, and sometimes preceded by a shrill "zi-zi-zi." Some of the young had apparently just left the nest, and were being fed by the parents. We also saw several parties of Crossbills (*Loxia curvirostra*), consisting of both young and old birds, in Glenmore Forest, where they had probably been reared. The Common Sandpiper (*Totanus hypoleucus*) was particularly numerous on the shores of all the lochs which we visited, especially on Loch Morlich, on the banks of which we found two nests, each containing four eggs. This bird follows the streams well up into the mountains, and we saw them up to about 2000 feet above sea-level. We saw plenty of Black-headed Gulls (*Larus ridibundus*), either fishing on the lochs or following the plough like Rooks, and we found a colony of about two hundred pairs which were nesting on a marshy loch near Aviemore, where the nests were built among the reeds, and usually almost floating on the water. A great number of Oystercatchers (*Hematopus ostralegus*) breed on the banks of the river Spey, above Aviemore. The birds were exceedingly numerous and very noisy, and we found one nest with three eggs, and many others which only contained shells. The young birds on being handled feign death, drooping their necks and relaxing all their muscles, so that they appear quite limp

and helpless. This species is also to be found on most of the lochs, and we saw one on Loch Eunach, at an elevation of about 1700 feet. On the west of this loch is a precipice of about 2000 feet, where in former years a pair of Golden Eagles are said to have had their eyrie. Coots, Teal, and Wild Duck (*Anas boscas*) might also be seen on most of the lochs, usually followed by a brood of young. We noticed a Red-breasted Merganser (*Mergus serrator*) on the Spey, accompanied by two young birds, and on another occasion I saw four birds flying over Loch Morlich, which from their size and general black and white appearance must, I think, have been male Goosanders (*M. merganser*). Near this loch we found a nest of the Ringed Plover (*Ægialitis hiaticula*), containing two eggs. Ptarmigan (*Lagopus mutus*) were fairly numerous on the mountains above the altitude of 3000 feet, but we seldom saw them at a lower elevation. We noticed many of their egg-shells scattered about among the rocks, the contents of which had evidently been sucked by Grey Crows, and also came across young birds in various stages of growth. The hen birds were remarkably bold when they thought that their young were in danger.—F. L. BLATHWAYT (Weston-super-Mare).

#### PISCES.

*Centrolophus pomphilus* on the Norfolk Coast.—A specimen of the "Black Fish," a species not hitherto recorded as met with on the Norfolk coast, was found, still living, cast up by the sea on Sea Palling beach about the 27th of March last, after the severe weather, accompanied by north-east gales, which had prevailed for the few previous days. It had been stuffed when I saw it, but in a fresh state measured 12 in. in length and 3½ in. in depth.—THOMAS SOUTHWELL (Norwich).

Notes from Great Yarmouth.—As is generally known, the Mackerel (*Scomber scomber*) is very eccentric and capricious in its habits, sometimes suddenly leaving a noted locality, and, after being away for an uncertain time, as suddenly turning up again. Our old Mackerel fishery of May and June died out in the seventies, owing to the fish forsaking the coast. Strangely enough, they came in afterwards with the Herrings, numbers being taken, even up to November. This year something like the old order of things obtained, and great quantities of Mackerel have been landed on the fish-wharf. On May 9th I have a record of heavy catches. A 13½ lb. Salmon (*Salmo salar*) was taken in a draw-net off Gorleston, May 17th. An example of the Scribbled Mackerel (*Scomber scriptus*) came to hand May 18th, another June 19th. Two Sting Rays (*Raia pastinaca*) observed on the fish-wharf; one weighed over 15 lb. This fish has been taken off our coast in rather more than usual numbers this spring. A

"double Turbot" (*Rhombus maximus*), with only a white under side to the head, and with one eye in the usual "notch," May 24th; dark on both sides, and also spined. A nine-inch Sea Angler (*Lophius piscatorius*), the smallest I have seen locally taken, was caught in a shrimp-net on June 3rd. An exceptionally fine Surmullet (*Mullus surmuletus*) was brought in on June 14th; weight, 2 lb. 10 oz. — A. PATTERSON (Ibis House, Great Yarmouth).

Sea Lamprey in Cumberland.—On the 20th of July I had the pleasure of weighing a fine example of the Lamprey (*Petromyzon marinus*). It was one of a pair which had ascended the river Eden, probably for the purposes of reproduction, and was taken near Carlisle. It scaled about 2½ lb. I only mention it because, though a common fish in many English rivers, it is a comparatively rare fish in the north-west of England. The last local example that I had handled previously was taken in Morecambe Bay, near Ulverston.—H. A. MACPHERSON (Allonby Vicarage, Cumberland).

#### AMPHIBIA.

Notes on Batrachians: Frog attacking Toad.—The interesting paragraph in 'The Zoologist' (*ante*, p. 323) on Frogs attacking Toads reminds me of a curious incident which I witnessed some time ago. I used to keep a number of Frogs and similar creatures out of doors in a cool airy situation close to a cellar window, where they lived in harmony for a long time. One day, when feeding them, I remember noticing a Common Frog (*Rana temporaria*) and a Common Toad (*Bufo vulgaris*) both eyeing a tempting morsel—a worm, I believe. Suddenly the Toad seized and speedily swallowed the worm. The Frog remained staring at the spot where the worm had been, and then, as if realizing his loss, deliberately turned and bit the Toad over the jaw. I was much astonished at this exhibition of revenge on such an animal, as the worm had completely disappeared, and it certainly was not a belated attempt to obtain it. I have never known another instance, and I have had considerable experience in keeping these and similar creatures, having studied the following species:—*Testudo græca*, *Emys europæa*, *Lacerta agilis*, *Zootoca vivipara*, *Anguis fragilis*, *Tropidonotus natrix*, *Rana temporaria*, *Bombinator igneus*, *Hyla arborea* (one has lived four years here), *Bufo vulgaris*, *B. calamita*, *Triton cristatus*, *Lissotriton punctatus*, and *Salamandra maculosa*. — GRAHAM RENSHAW (Sale Bridge House, Sale, Manchester).

#### MYRIOPODA.

Mode of Progression among Millipedes.—During a stay at Waterval-onder (East Transvaal) in November last, I was much surprised at the

number of Millipedes moving about among the fallen leaves, and more so at their peculiar method of hurrying off when disturbed. This they did by turning on their backs, and retreating with an undulating and wavy motion without at all using their feet. This so attracted my attention that I repeated the observation with these Millipedes on more than a dozen occasions, and in every instance their action was the same. — A. DUNCAN (Johannesburg).

#### PRESERVATION OF ZOOLOGICAL SPECIMENS.

It was with great pleasure that I read in 'The Zoologist' you are about to open the pages of that magazine to notes on taxidermy, and I also perused Mr. Oxley Grabham's remarks with the greatest interest. I hope the new venture will meet with the support which it thoroughly deserves, and I am looking forward very much to the contributions of other taxidermists.

All large works on this subject are expensive, and as far as I know there is no periodical which devotes any attention to this most fascinating art. I know well how disappointing it is to a beginner to have his attempts at stuffing severely criticised by some professional who sees faults which the tyro perhaps fondly imagined did not exist. I can fully endorse Mr. Grabham's statement to the effect that one must have any amount of patience, and be devoted to the study of whatever branch or branches of taxidermy he desires to pursue. I am devoted to stuffing, and attempt everything which falls into my hands, from caterpillars to fish. This last is the most difficult of any subject in which to attain even moderate proficiency. I now imagine (in error, perhaps) that I have mastered the faults and peculiarities of the beginner as far as the birds are concerned, though there are still some birds which are extremely difficult to skin, let alone stuff, in a workmanlike manner. For instance, the novice may perhaps endeavour to skin a Cuckoo or Woodcock, and fail miserably in the attempt. Even a good professional will admit that these two birds, as well as a few other species, require extra care in the skinning; they are generally very fat, and their skins are as delicate to handle as wet blotting-paper.

Decidedly the bird for the beginner is the Starling, being not too large, and having a fairly tough skin. It is indeed too true, as Mr. Grabham remarks, how often one sees birds placed in impossible positions, legs and beaks painted the wrong colour; and this is done not only by amateurs, but, alas, by a few professionals, who certainly ought to know everything about the creatures they set up. After a bird has been skinned, the question naturally arises as to the kind of preservative which must be used. There are so many different sorts, their name is almost legion. Most, I think, are

equally efficacious, but I would strongly warn everyone against the use of alum for bird-skins, as it tends to make them brittle, and I fancy is not of much effect against the attacks of *Dermestes*. For the skins of large animals it may be useful. I always anoint my specimens with carbolic acid and a special kind of powder containing such, and make a mixture of the two, which I paint on the skin of the creature I am preserving. Arsenical soap should also be avoided, as it is undoubtedly dangerous to have much to do with this poison. That an ounce of practice is worth a pound of theory is an axiom which no one would think of disputing, and the beginner who can start away under the supervision of a professional is to be envied. I had to wait several years before such a chance was available. Most professional taxidermists I have met have been very kind in giving me many hints, which have been of the greatest use, and they themselves are always glad to hear of any new "discoveries," even if they do not adopt them. Presuming, therefore, that the following suggestion may be of some use to those readers who study taxidermy, and also in meeting a well-recognized difficulty, I should be pleased to hear if my idea meets with any approval. Everyone has noticed, even in the cases of the South Kensington Museum, where a sheet of glass is made to represent water, the utter absence of ripples, and this is all the more noticeable where a bird is stuffed swimming or at rest in the water. My plan is to paint, in *very* dilute glue, those ripples which would naturally occur from the motion, however slight, of the bird in the pool of water. I have found it the most realistic of any plan which I have as yet come across, and I sincerely hope it may be of some use to others until a better one is substituted. The glue does not crack or chip off (according to my experience) as one might expect. I very much want to know of some cheap way of making a large hole in a sheet of glass, as is done in the National Museums, in order to receive the body of a bird or the stump of a tree. I should be delighted to hear of any feasible plan which would answer my purpose. Another thing I should like to know is the address of some firm which supplies really good artificial flowers, leaves, &c., at moderate prices. Good accessories are of great advantage to the life-like effect of a carefully-finished case.

A few words more as regards the accessories, more especially the rock-work: anyone who has a taste for painting and an eye for colour will find it of no great difficulty to successfully imitate the colour of any stone, and a well-painted scene at back of a case is a great *pièce de résistance* of undoubted value to the general *tout ensemble*. Witness some of Rowland Ward's cases; the beauty and perfection of detail are charming. It is most satisfactory to look at cases made years ago and compare them with those which have recently been finished. The amount of improvement which is acquired by constant practice will be noticed at once. I think a case

arranged and set up by oneself is usually more valued than if it had been done by a professional, at least that is how I feel. I am sure no one who has any aptitude for taxidermy will ever regret having taken up such a delightful subject, and beginners need never give up in despair if they have to throw away their first twenty attempts at stuffing, as they cannot possibly hope to attain great proficiency at a bound. It only needs practice and a good knowledge of the habits of the creature which it is proposed to set up. This last point is important, for by neglecting it mistakes will assuredly occur which would otherwise have been avoided. It is not of much use to *chance* getting a good attitude for a bird or animal, but before attempting to set it up it is advisable to think of every conceivable pose which could be assumed strictly in accordance with nature. Good books ought to be consulted for correct positions, or the natural attitude may be obtained by observing live specimens.

In conclusion, I would impress on everyone, whether amateur or otherwise, to make it a rule to label every specimen most carefully with particulars as to date, locality, and sex; any other remarks might be added if desirable. A collection, no matter in what branch of natural history, is practically valueless without any data. The value of any collection is so much more enhanced by careful and truthful notes, and the amount of extra trouble is well repaid should the collection ever be offered for sale.—C. B. HORSBRUGH (4, Richmond Hill, Bath).

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CORRECTION.—In the note on Daubenton's Bat in the Conway Valley (*ante* p. 317), for "Llwgwy" and "Llyn-yr-Afange" read "Llugwy" and "Llyn-yr-Afangc."—CHAS. OLDHAM (Alderley Edge).



## NOTICES OF NEW BOOKS.

*The Fauna of British India, including Ceylon and Burma. Birds.*  
 Vol. IV. By W. T. BLANFORD, F.R.S. Taylor & Francis.  
 1898.

THE description of the vertebrate animals of British India, in eight volumes, is—by this concluding and fourth volume on birds—now completed. India has not only been the training-ground for our soldiers, but has been an area—and long will be—productive of the best traditions in zoology and zoologists. We need not recapitulate the well-known names that were made in India and have become household words in zoology, and which, with perhaps the exception of Ferdinand Sloliczka, have been those of our own countrymen; nor is it necessary to recall the many instances in which the first zoological inspiration was received in that torrid clime which one usually leaves, but which one never forgets. Again, its field naturalists, or in other words its sportsmen, have always been renowned and will continue to exist; in fact, our Indian Empire is a zoological influence from which few sympathetic spirits have escaped.

In the present work the number of Indian birds regarded as distinct species is estimated as 1626, which fairly agrees with Hume's enumeration in his 'Catalogue' of 1879, which reached a nett total of 1608; and perhaps this expresses a somewhat synthetic concord between good authorities, when the personal equation of individual discrimination between species and varieties is considered. It must also be remembered that of the four volumes devoted to Aves in this series, the first and second were contributed by Mr. E. W. Oates, and the remaining two by Mr. Blanford, so that the general specific consensus of opinion is still more marked. Vol IV., now before us, is devoted to the gallinaeous, wading, and swimming birds.

Ornithological publications such as these are of course primarily intended for the Indian or Oriental student; they may

be expected to say a last word in synonymy, and to serve a ready means for the identification of species. But their value extends over a larger field than the faunistic area in which they are centred, as many species have a wide range and their distribution is fully treated, so that in the problem of zoogeography the volumes must be shelved for consultation by the investigators of other faunas. We frequently find surprising additions in unexpected migrants. Thus, in the Petrels, our old maritime friend the "Cape Pigeon" (*Daption capensis*) is included on the authority of a specimen shot in the Gulf of Manaar, between Ceylon and the mainland, the skin of which is preserved in the Hume collection.

The completion of the vertebrate portion of this work should let loose some unused energy among Indian zoologists. They may now accept, and cease to too ardently criticise—for some years at least—the nomenclature of the series. We do not say that finality has been obtained; that, at least so far as specific treatment is concerned, is a question for the future, and must be based on more extensive knowledge than exists at present. But the Indian ornithologist can now estimate that his work is largely one of observation; he possesses a formula of identification that will be hard to beat, and with which he may be expected to remain content. The bionomical field is now the one to explore. Thanks to Messrs. Blanford and Oates one branch of Indian ornithology is thoroughly brought up to date, and is in line with the best current scientific conceptions. If the ubiquitous theorist can now be controlled, and observers take up the work, the volumes comprising the 'Fauna of British India' will not have been written in vain.

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*Bird Neighbours.* By NELTJE BLANCHAN; with introduction by JOHN BURROUGHS. Sampson Low, Marston & Co.

THIS is a book written by a lady, and refers to North American birds. It is a somewhat sumptuous work possessing fifty-two coloured plates, and is what may be styled an extra-scientific rather than a non-scientific volume. It is intended to promote the knowledge of birds, but is not in any sense a primer of ornithology. Just as we sometimes find a Professor of natural

history who is not a naturalist, so we have in our authoress a lover of birds who is clearly not a scientific ornithologist. With this we have no complaint to make, for under the present circumstances we rather welcome the innovation, as the book makes no pretence to be anything but "an introductory acquaintance with one hundred and fifty birds commonly found in the gardens, meadows, and woods about our homes"; and systems are but a set of propositions to yet secure finality, while all should know their birds and their habits. We like the book for its purely American independence. Emerson has exclaimed for his countrymen—"We will walk on our own feet; we will work with our own hands; we will speak our own minds." And certainly our authoress has proved her emancipation on this point, for we find a perfectly new treatment of the subject. Thus after a rough sketch of "Bird Families" we have "Habitats of Birds," in which species are grouped according to the positions they frequent, such as in the upper or lower parts of trees, among foliage and twigs or on conspicuous perches, birds of the woods or their edges, birds found near water, birds that sing on the wing, &c. Then the birds are enumerated according to their seasonal appearance; again, according to size; and lastly,—and this is the method of the book,—"grouped according to colour." It is thus abundantly clear that we are alone with the birds, and for the nonce we may well discard all our classifications if we are with any pleasure to read these pages. The treatment is, therefore, an individual one; each bird is as unconnected and free from all systematic restraints as though a scientific ornithology had never spread its net of avian order. We pass from the Titmouse to the Jay; from the Nightjar to the Cuckoo. Colour is here the main plank of an alliance.

If our English Jay is evil in the sight of the gamekeeper, the Canada Jay (*Perisoreus canadensis*) is answerable for a long list of offences. We read that, according to Mr. Hardy, there is scarcely anything "which can be eaten that they will not take; and I had one steal all my candles, pulling them out endwise, one by one, from a piece of birch bark in which they were rolled; and another peck a large hole in a keg of castile soap. A duck, which I had picked and laid down for a few minutes, had the entire breast eaten out by one or more of these birds. I have

seen one alight in the middle of my canoe and peck away at the carcase of a beaver I had skinned. They often spoil deer saddles by pecking into them near the kidneys. They do great damage to the trappers by stealing the bait from traps set for Martens and Minks, and by eating trapped game, &c."

'Bird Neighbours' is written by a lover of birds, and will increase that love in others who may consult its pages. We must not expect to find science everywhere, but nature is universal; and he who has learnt to love the last will almost inevitably seek the first.

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*The Birds of Montreal.* By ERNEST D. WINTLE. Montreal: W. Drysdale & Co. London: John Wheldon & Co.

THIS volume is devoted to the avifauna of the district of Montreal. The area covered by the work "is principally the island of Montreal, situated at the confluence of the Ottawa with the St. Laurence River, thirty-two miles long by about ten miles broad at the widest part." It is the centre of attraction for a large number of North American birds during the migratory periods in the spring and fall, and many species remain to breed. Two hundred and fifty-four birds are enumerated, arranged in a somewhat unfamiliar classification, commencing with the *Podicipidæ* (Grebes) and terminating with the *Turdidæ*. The first part is devoted to an enumeration, with binomical notes; the second part consists of "abridged descriptions" of the species. The last portion of the volume consists of "Original Sporting Sketches" by various authors.

The book is naturally of local interest in the first place; but is also valuable for material in the study of avian geographical distribution. A few plates are given, but these are of a somewhat primitive description, recalling those in old works of travel.

The preface is dated 1896; but the volume has only just reached our hands.

## EDITORIAL GLEANINGS.

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THE Trustees of the British Museum have appointed Professor Ray Lankester as Director of the Natural History Department. He succeeds Sir William Henry Flower, who retires, through ill health, on Sept. 30th. The remuneration is £1200 per annum.

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WE recently (*ante*, p. 236) referred to a paper by Mr. Faxon on some "Observations on the *Astacidæ*, &c." Since then Dr. Emar Löönberg, in the 'Zoologischer Anzeiger,' has contributed to the same subject "Some Biological and Anatomical Facts concerning *Parastacus*." *Parastacus hassleri*, Faxon, is found in Chile, and Mr. P. Dusén has related some facts as to its life-history. This Crayfish lives in slightly sloping, moist meadows. The humidity on the surface was, however, not greater than that Mr. Dusén could walk there with dry shoes," and there was no open water, lake, or river in the neighbourhood. Here the Crayfishes had made vertical holes in the earth, and round these holes they had erected "mud chimneys" out of the clayey material which they had carried up from their burrows. These chimneys had often a height of 2-3 decm. The results arising from Dr. Löönberg's study of this species are, "that in *Parastacus hassleri* a partial hermaphroditism is prevailing, but male and female organs are not functionary in the same individual, neither are ripe elements of both sexes produced by the same specimen. The hermaphroditism could thus be called rudimentary." The *Astacidæ* seem to offer a most interesting study to zoologists, both by their functions and habits.

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IN the 'Western World' for May last, a correspondent writes:—"In a very few weeks the last remnant of the Buffalo tribe, so far as Manitoba is concerned, will be removed from Silver Heights, near Winnipeg, where they now are, to the National Park at Banff. They have been given by Lord Strathcona to the Dominion Government, with a view to their preservation in the park, but how long they will stay there is another question. It is only too likely that their natural instincts will, in spite of their half-tame condition, reassert themselves and induce them to wander off in any direction. The herd numbers seventeen in all. There are five pure bred males, eleven, seven, six, five, and two years old; and four pure bred females, eleven, six, four, and two years old; one aged half-bred cow about sixteen years old, one three-quarter bred heifer three years old, one

three-quarter bred bull seven years old, and one three-quarter bred bull five years old. Four calves of last year, two of them pure, make up the lot.

"It is now well-nigh thirty years since the first Buffalo calves were brought in by Indians for James Mackay, of Silver Heights. A little later, when the herd had increased to about twenty, they were taken to Stony Mountain, where, having been bought by the late Col. Bedson, with the exception of the few claimed by Sir Donald Smith as his share, the bulk of the herd, including a few cross-breeds, were sold to "Buffalo Jones," who was then speculating on getting up a company to breed crosses on domestic cows for the sake of the robes, as well as the extra value of the meat. Besides a few owned by private individuals, there is still a wild herd preserved by the U.S. Government in the National Park at the head of the Yellowstone. In the Smithsonian Institute at Washington is a splendidly mounted group of stuffed specimens set up by Mr. Hornaday, who was sent out in 1883 to procure for that purpose a few specimens out of a small remnant then existing in the Bad Lands on the Upper Missouri. Some of the finest specimens were killed on that expedition. The bull stands 6 ft. high, and is set up just as he stood at bay, after he had been shot by Hornaday, and his leg broken. Millions of Buffalo were killed between 1873 and 1883, and some of the higher valleys looked white all summer with the skeletons of countless Buffalo that had been killed for the sake of their hides, the meat going to feast the wolves."

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IN the May number of the 'Osprey,' Mr. George Harlow Clarke, the Naturalist to the Peary Polar Expedition, 1893-4, contributes an article on "The Birds of Bowdoin Bay." Bowdoin Bay is situated far up the western shore of Greenland. It is "some five miles wide, extends inland a distance of about twelve miles due north from Inglefield Gulf, an arm of the Polar Sea penetrating the coast between Smith Sound and Baffin Bay." "A list, based on observations covering a period of twelve consecutive months, of the birds frequenting the bay comprises nineteen authenticated species." Some others were seen, but as yet they can only hypothetically be accorded a place in the limited ornithology of the bay. The most conspicuous bird is the Raven, and scarcely less numerous is the Rock Ptarmigan (*Lagopus rupestris reinhardti*). These birds are indisputably resident species, and the Eskimos aver that the Snowy Owl and Greenland Gyr-falcon also "brave the vigorous sunless winter of that latitude. Prominent as summer visitors are the Mandt's Guillemot, Little Auk, Kittiwake and Glaucous Gulls, Eiders—King and Northern—Old Squaw, Snowflake, and Greenland Redpoll." The Red-throated Diver rears its young in that locality; the Wheatear was first seen on August 21st, 1893, but on July 4th, 1894, a nest containing seven eggs was found on the shore of Inglefield Gulf, a few

miles east of the bay. Knots and Turnstones were reported during July and August, and the Ring Plover was occasionally seen. The advance guard of Burgomasters and Kittiwakes arrived early in May, and in June, 1894, a solitary Snow Goose passed overhead, an occupied nest of the species being discovered in the Tucktoo Valley, beyond Bowdoin Glacier.

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WE have received the Report of the Marlborough College Natural History Society for the year ending 1897. This Society shows every mark of vitality. Its president is Mr. E. Meyrick, the well-known lepidopterist; it has been found necessary to limit the number of school members to three hundred; while its financial position is shown by a credit balance of about £100.

Among interesting facts to be found in these pages is a census of the Rooks' nests in College Grounds, compiled by Mr. Meyrick:—"The nests were counted on April 6th, when there were found to be 13 in the trees facing B House, 153 in the Wilderness, 8 on the Mound, and 1 in a willow lower down the garden; total, 175, being an increase of 7 on last year, but not yet quite up to the record of 1894. During the last two years there have been (each year) two nests in the elms in Mr. Morrison's meadow at the top of Kingsbury Hill; this attempt at forming a new colony is probably due to stragglers from the College settlement."

Another note relates to a climbing habit in Frogs:—"We have made a curious discovery this summer in our garden. Some Frogs have taken up their abode for the last month in two deserted Blackbirds' nests, built in round thick box bushes about two feet from the ground. One Frog is generally to be seen alone sometimes on or near the edge of the nest, sometimes comfortably ensconced in the middle, only his head peeping out. In the other nest there are now always two Frogs."—(E. A. M.; July 20th).

An Anthropological Record, giving statistics of weight and measurement of all boys passing through the College, is a very valuable feature of these Reports. We read that in 1897 "some modifications have been introduced into our practice. The dynamometer test has been discontinued; the results attained by it were very fluctuating, being probably largely influenced by the condition of the subject on the particular day, and it has also been found difficult to get boys to pull to their full capacity, the action being unfamiliar. The chest measurement hitherto taken seems also unsatisfactory, as it is difficult to determine when the chest is really normally expanded, neither too full nor too empty. In place of these we have now substituted two chest measurements; one of the chest expanded to its fullest capacity, and one taken when it is emptied as far as possible. The mean of these two measurements may be regarded in practice as indicating the normal girth, and the difference between them gives a measure of the total capacity of expansion, and may be taken as an index of the efficiency of respiration."

PROF. MCINTOSH recently delivered a lecture in Aberdeen on "The Resources of the Sea." The following extracts are taken from a report of the lecture which appeared in the Aberdeen 'Daily Free Press':—

"He remarked on the enormous length of time and the large extent to which fishing had been carried on for the commercial sponge, the red coral, trepangs, the lob-worm, and similar marketable forms of fish life, and he said it was very interesting and instructive to find that after ages of eager pursuit there is as yet no sign of the extinction of these species. For ages man has gathered the sedentary and creeping shellfishes, such as Mussels, Cockles, Periwinkles, for food and bait, often without the slightest restriction, as in the case of the Periwinkle and Limpet; yet extinction has not ensued in the much-abused and easily reached Mussel, which has suffered, on the one hand, from reckless fishing, and, on the other, from the very varied suppositions of Mussel-merchants and politicians. In dealing with food fishes, he remarked that at first sight it seems almost incredible that such species as the Cod, Haddock, Whiting, Herring, Plaice, and Sole could withstand the vast annual drain caused by the operations of fishermen. Yet at this moment all these species in the open seas present as wide a distribution, and, in some, as little diminution in numbers, as if the constant persecution of man had not been. It is true that the large examples of the common species of food-fishes become fewer by persistent fishing, but it cannot be said that, in the case of either round or flat fishes in the majority of the areas, signs of extinction are apparent. Even, if, in the waters within a reasonable distance of land, fishing were carried to such a degree that it would be no longer profitable to pursue it, it is possible that the adjoining areas and the wonderful powers of increase of the few fishes remaining would by-and-by people the waters as before, because everything in the sea around, including the plentitude of food—so nicely fitted for every stage of growth—would conduce to this end. It has apparently been beyond man's power either to reduce to vanishing point or greatly to increase the yield of the open sea. The larger forms of such species as the Halibut, for instance, may be thinned by constant attacks, but the race continues as before with a resilience and pertinacity none the less sure that they are often doubted and may be denied."

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THE Syndics of the Cambridge University Press have undertaken the publication of a series of monographs upon material obtained by Dr. Arthur Willey, Balfour Student of the University of Cambridge, from New Britain, the Loyalty Islands, and other Islands of the South Pacific during the years 1895-1897 inclusive. The work will embody the zoological results of the expedition, and will, it is expected, be completed in five or six parts.



# THE ZOOLOGIST

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## BIOLOGICAL SUGGESTIONS.

### ASSIMILATIVE COLOURATION.

BY W. L. DISTANT.

#### PART I.

MR. DARWIN admits that there are unknown laws of development and variation, and certain direct actions of external conditions, which to some extent modify animal forms; but, so far as yet known, these can only be permanently preserved or increased, when useful, by means of natural selection. We are not now discussing whether this view is strictly correct, or whether there are not probably unknown laws determining the lines of directions in which alone natural selection can profitably and permanently act. There may be such, and the present writer is disposed to think there are such; but these have not been proved to exist.—A. R. WALLACE.

We are not enunciating ascertained truths; we are simply recording the results of study.—G. H. LEWES.

ANY student of natural history who cares to analyse the vast strides made by his science during the last thirty years must be impressed by the great advance which has taken place in the philosophical conception of the origin of animal colouration. "Protective resemblance," "mimicry," and "utility markings" are now by-words with every naturalist, whilst some scientific theory has replaced much teleological wonder. Although our new views are in very many cases explanations of old observations, these views have in friends and foes alike created such a host of good observers, who are anxious to support or demolish advanced

theories, that purely zoological suppositions are often the forerunners of original experiment and the discharge of a battery of new or little-known facts. In this way the opponents of evolution have been of the greatest service to the cause. They have acted as deterrents to too hasty generalizations; by their contentions a greater precision in the argument has been attained; while the facts adduced as weapons in their controversy have not only often proved new, but actually supportive of the cause attacked, and have not infrequently become honoured inmates of the evolutionary armoury.

Much biological controversy is only of a more or less forensic character. It has often occurred to the writer that considerable interest would attach to biological briefs being drawn up by different theorists, and the same handed to eminent Queen's Counsel to be made much, or little of, as ingenious argument could bolster up or destroy. Dean Buckland, as related by his son, once placed the evidence for the former existence of hyænas in England before "one of the most learned judges in the land," with the further argument of their equally rapacious and ravenous character. And now, said the Dean, "what do you think of that, my lord?" Such facts, replied the Judge, "brought as evidence against a *man*, would be sufficient to convict and even hang him."\* Judicial consideration would be most beneficial in many biological theories, where the facts are strong but the argument weak, or, as is not altogether unusual, the strength of the advocacy is in an inverse ratio to that of the evidence. There is also a danger, now that we have entered so many of nature's portals, in believing that our present keys will open all locks, and that our explanations of many problems in animal colouration are sufficient for universal application. It seems more probable, however, that we have captured many outworks, and threatened the citadel, but certainly not secured it, and under these circumstances one may offer some suggestions and indulge in some criticism, as at a council of war, without being proclaimed a deserter from evolutionary principles, or an enemy to advanced ideas of natural selection.

How far have we at present accounted for the varied animal colouration which we see around us? the glory of our cabinet-

\* 'Curiosities of Nat. Hist.,' Pop. Edit., 2nd ser., p. 53.

drawers, the mysterious wonder in the galleries of our museums, the charm of travellers abroad, and appreciative lovers of nature at home. Very much, when the difficulty of the problem is considered, and especially where the utility of animal disguises and mimicking appearances has been unravelled by the magic wand of "natural selection," or "the survival of the fittest." But very little when we wish to understand the larger element in the phenomena of colour, to which we are, at present, unable to take the initiatory steps of defining its exact purpose in the battle of life. Some colour-development appears to be inscrutable as the green bones in the Mud-fish (*Protopterus annectans*), and the common Gar-fish (*Lepidosteus* sp.). As Darwin remarks, in the Hornbill (*Buceros bicornis*) the inside of the mouth is black in the male and flesh-coloured in the female.\* In the twelve-winged Bird of Paradise (*Seleucidides nigricans*) the mouth and throat are of a "vivid grass-green colouring," which was seen by Guillemard in the course of feeding, when the bird threw a cockroach in the air and caught it lengthways.† At St. Kilda, Mr. R. Kearton describes how on a small ledge of rock in the mouth of a cave "I observed a little patch of brilliant orange colour appearing and disappearing simultaneously with the sound," which that writer was endeavouring to unravel: "it was the open mouth of a Black Guillemot."‡ In the Transvaal, the writer was informed by a poultry fancier of Pretoria that his imported White Leghorns lose the yellow colour of their legs; the young chickens exhibit that colour, but again lose it as they grow older. The body cavity of some Lizards is deep black; the pigmentation does not affect the entire lining of the body cavity, but only a part of it which is sharply differentiated from the rest; the palate of the Ourang-outan is black, that of the Chimpanzee flesh-coloured, with no pigment at all.§ In the preparatory stages of Lepidoptera there appears to be, as a rule, no relation either in tint or brilliancy of colour between larva, pupa, and imago.|| But there are exceptions, as in the case of that well-

\* 'Descent of Man,' 2nd edit., p. 426.

† 'Cruise of the Marchesa,' 2nd edit., p. 434.

‡ 'With Nature and a Camera,' p. 61.

§ Beddard, 'Animal Colouration,' 2nd edit., p. 10.

|| So among Molluscs—"The colour of the shell does not necessarily

known and undesirable garden moth, *Abraxas grossulariata*, in which the larva and pupa are both prominently marked with yellow and black, and the perfect insect exhibits the same prominent hues. Plants often develop colour in response to purely environmental conditions. Mr. Scott Elliot observes:—"I have noticed everywhere that in places . . . where there is plenty of sunlight and not enough humidity to form a large amount of branches and leafage, the surplus nourishment is usually disposed of in bright colouring. A curious instance of this effect carried to extremes is an orchid (*Disa erubescens*, Rendle), which is all over the curious red colour which one often sees on the leaves and stems, *e.g.* of our common Herb Robert in England. Other instances of this sort of flora may be seen, *e.g.* on the limestone hillocks about Alexandria and on Table Mountain summit."\* Mr. Wallace enumerates as instances of colour needing "no special explanation," those algæ and fungi which have bright colours—the "red-snow" of the Arctic regions, the red, green, or purple seaweeds, the brilliant scarlet, yellow, white, or black agarics, and other fungi; also the varied tints of the bark of trunks, branches, and twigs, which are often of various shades of brown and green, or even vivid reds or yellows.† Prof. Marshall Ward also remarks:—"The red colour often assumed by parts of plants other than flowers, especially young leaves, afforded an instance of the danger of pushing an explanation too far. In many instances it doubtless served to absorb some of the sunlight, and so protect the chlorophyll of young organs; but such a case as the red colour in the lower layers of the floating leaf of a water lily demanded some other explanation."‡ Dr. Bonavia, amid much speculation, has truly written: "Phænogams, such as the carrot and beetroot, develop their orange and crimson colours in what we should consider as total darkness."§ We must all agree with Darwin that "hardly any colour is finer

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correspond with that of the mollusc. The latter may be of an intense black, the shell being quite white; the 'animal' may be a most brilliant creature with a variety of many colours, and its test merely of some uniform sombre hue." (Edgar Smith, 'Roy. Nat. Hist.,' vol. vi. pp. 322-3.)

\* 'A Naturalist in Mid-Africa,' pp. 93-4. † 'Darwinism,' p. 302.

‡ 'Royal Institution Lecture,' February 13th, 1896.

§ 'Phil. Notes on Botanical Subjects,' p. 89.

than that of arterial blood; but there is no reason to suppose that the colour of the blood is in itself any advantage; and though it adds to the beauty of the maiden's cheek, no one will pretend that it has been acquired for this purpose."\*

All our present knowledge of animal colouration is derived from motive; show us a practical use for the same in the creature's life, either in "protective and aggressive resemblance or mimicry," or in warning or nuptial colours, and the same is at once found to dovetail in that marvellous intellectual conception of this our time, so well known as Darwinism. But let the purpose be unknown, as is the general rule,—though probably no form exists in nature but is the outcome of use, now, or once,—and explanation reaches the standard of pure and scant hypothesis, scarcely to be avoided under the limitations of our present knowledge, nor to be condemned in the absence of experimental test. Poulton has advanced the proposition that the bright hue of many Sea Anemones may be explained under the term and theory of "warning colours," † and that—based on experiments made by Garstang—the tentacles of Sea Anemones were distasteful to fish. ‡ But we learn from McIntosh and Masterman that "it is a well-known fact that adult Cod are extremely fond of Sea Anemones, and some of the rarest species may be procured in their stomachs;" also that Sea Anemones are a favourite bait for Cod in some parts of Scotland. § Darwin has pointed out how colour and constitutional peculiarities go together, and he learned from Prof. Wyman that in Virginia the Pigs were all black because they "ate the paint-root (*Lacnanthes*), which coloured their bones pink, and which caused the hoofs of all but the black varieties to drop off." || Superabundant vigour in the male sex often produces excess or rather extra-development in colour, "as a cock Brambling will occasionally assume a black throat, or a cock Sparrow a chestnut breast, or a Rose Pastor a reddish head." ¶ Although colours in fruits and plants have in many cases an equally important function as in animals for

\* *Descent of Man*, 2nd edit., p. 261.

† 'The Colours of Animals,' p. 166. ‡ *Ibid.* p. 200.

§ 'The Life-histories of British Marine Food-fishes,' p. 38.

|| 'Origin of Species,' 6th edit., p. 9.

¶ J. H. Gurney, 'Zoologist,' 3rd ser., vol. xviii. p. 295.

protection, attraction, or aggression, there are still immense exceptions to the rule. This is particularly evident to anyone who has witnessed the glorious autumnal tints exhibited by the foliage of trees along the mountain slopes of the Rhine and Danube, and on the shores of the Canadian lakes.\* These beautiful shades of red, violet, and yellow merely denote the proximate fall of the leaf and chemical processes incidental thereto. Many leaves—due to anthocyanin—are highly coloured on their under surfaces, a process probably which absorbs light and changes it into heat, and thus “in the ever green leaves of those plants in the depths of the forest which are natives of inclement regions, this advantage is obtained from the layer of anthocyanin developed on the lower leaf-surface, that every sunbeam, even in the cooler seasons, can be utilized to the utmost.” †

We may probably have reached a stage in our investigations where suggestion may at least be valuable during a halt, and, where consideration may be given to facts, and attention to questions, which do not altogether quite advance new theories nor disprove older ones. Let us bring grist to the mill, even if others alone are capable of producing the meal; surely the naturalist can collate his facts, give his experience, and propound his views, without seeking a “patent” for every idea, or to be the parent of another theory. At the present time, among many students of biology there seems a desire to advocate what may be called a personal theory. Such workers will, with the greatest avidity, dissect and criticise the theories advanced by others. But their own theory is sacred, is, in fact, “totem.” This feeling is almost a form of survival. According to Turner, one Samoan saw his god in the Eel, another in the Shark, another in the

\* Brehm has described similar autumn beauties in the woodlands of Western Siberia. (*‘From North Pole to Equator,’* p. 130.)

† Kerner and Oliver, *‘Nat. Hist. Plants,’* vol. i. p. 521. A case which seems to imply non-utility in vegetable markings is given by Prof. Thiselton-Dyer:—“There is a variety of the common oak with marbled foliage. A tree at Tortworth has borne acorns, and these are striped. At first sight it might seem odd that a variation in foliage and fruit should be correlated. But it is not so; the marbling is due to the partial suppression of chlorophyll in those portions of the ground-tissue which are exposed to light; and this tract of tissue is continuous in the leaves and the carpels” (*‘Nature,’* vol. liv. p. 293).

Turtle, another in the Dog, another in the Lizard, and so on through nearly all living things. A man would eat freely of what was regarded as the incarnation of the god of another man, but the incarnation of his own god he would consider it death to injure or to eat. And so it is with our own theoretical bantlings; surely they must live whatever else may perish. As Lecky has remarked of earlier days of the Church: "Whenever a saint was canonized it was necessary to prove that he had worked miracles"; it would appear now, that to be famous as a naturalist, one must be at least original in theory.

There seems at present a danger of being too conclusive, as though the study of animal life is *only* advanced by the promulgation of new views that shall be canonized by a more or less general acceptance; that the observing must be combined with the inventing faculty; that to be behind a theory is to be behind the knowledge of the day. On the other hand, there lurks an opinion, even in powerful and highly qualified quarters, that to suggest a new interpretation of natural phenomena without the most absolute appeal to scientific verification is a deadly sin; that theory is heresy; and that the "romance" of natural history is only expounded by the cautious systematist. Safety seems only possible in the almost forlorn hope of clearing these intellectual Scylla and Charybdis, these opposing schools who both see it all *clare et distincte*.

If we seek to understand animal colouration, the knowledge will scarcely be acquired from the facts to be derived from the world as we know it. As recently remarked: "But we must remember that such protective resemblances—if in reality they exist—are of very ancient date; and that in the early days of mammalian life on the earth the warm-blooded quadrupeds were an exceedingly feeble folk when compared with contemporary birds and reptiles. It is therefore quite possible that many of the characteristic markings upon creatures living to-day—which are often so difficult to explain—are mere vestiges of a state of affairs which existed in very ancient times, and which demanded special means of protection."\* If the earliest forms of life are to be sought only in an ancient geological record, it is also in that phase of animal existence that the beginnings of colouration

\* Louis Robinson, 'Wild Traits in Tame Animals,' p. 243.

must have developed ; and this we may imagine to have been of an assimilative hue, for, as Poulton has remarked, "all animal colour must have been originally non-significant ; for, although selective agencies have found manifold uses for colour, this fact can never have accounted for its first appearance."\* We may think with Grant Allen, who asserts of the unbroken green hue which was the dominant feature of the flowerless carboniferous era : "Equally unvaried, no doubt, was the hue of the articulate creatures which fed amid those green jungles of tangled fern and club-moss. A few scorpion-like insects, an occasional cockroach, beetle, or other uncanny creeping thing may still be detected in the *débris* of a forgotten world ; but no trace of a bee, a moth, or a joyous butterfly can be discovered in these earliest ages of animal life."† Many phases of plant-life can only be understood by a knowledge of past geological conditions. Mr. Harshberger, of Pennsylvania, has recently discussed the origin of the vernal flora of his own land, and has apparently shown that the flowering time of many plants and trees is a direct product of heredity from the glacial period.‡ It therefore seems possible that assimilative colouration may have been a first and very general consequent in animal development ; that such a view is suggested by many facts ; and that the subsequent protective resemblance acquired by numerous living creatures through the process of natural selection, when life had advanced to the competitive stage, is far too frequently used as an explanation for whole series of uniform phenomena in colouration, which have probably survived unaltered from remote antiquity, and which by their very essence were "outside the law"§ of natural selection, or un-

\* 'Colours of Animals,' p. 13.

† 'The Colour-Sense,' p. 38.

‡ 'Science,' new ser. vol. i. pp. 92-8.

§ The reader will readily apprehend that by the term "law" we mean observed, constant, sequence in phenomena. As Prof. Huxley remarks :— "The habitual use of the word 'law,' in the sense of an active thing, is almost a mark of pseudo-science ; it characterizes the writings of those who have appropriated the forms of science without knowing anything of its substance" ('Collected Essays,' vol. v. p. 79). And again :—"We have succeeded in finding out the rules of action of a little bit of the universe ; we call these rules 'laws of nature,' not because anybody knows whether they bind nature or not, but because we find it is obligatory on us to take them



altered survived as the "fittest." For, as remarked by Paul in a sense that cannot, however, be called biological, that without he had known the law, neither had he known sin; so, until animal life had developed from its little differentiated phase to the advanced stage when a struggle for existence ensued, natural selection scarcely existed as a controlling force. There was doubtless what may be suggested as an evolutionary impulse,\*

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into account, both as actors under nature, and as interpreters of nature" (ibid. p. 81). John Stuart Mill has given a similar definition ('Three Essays on Religion,' p. 6).

\* This evolutionary impulse might be perhaps defined in the words of Matthew Arnold as applied to another subject: "That awful and benevolent impulsion of things within us and without us, which we can concur with, indeed, but cannot create." Apparently similar to the "idioplasm" of Nageli. On the other hand, the terms "impulse" and "stimulus" lack a clear definition. "Here, as in so many similar cases, a phrase, a technical term, a word, is introduced to designate the process observed, and not infrequently those who use it ultimately come to think they have given an explanation of the process, while they really have only stated it. This is especially the case with the term 'stimulus.' What is a stimulus? From the present state of our knowledge we cannot yet give a concise answer to this question, consequently explanations in which this word is inserted are, as explanations, incomplete" (Kerner and Oliver, 'Nat. Hist. Plants,' vol. i. pp. 776-7). Mr. Mivart would apparently recognize this internal force as "instinct," postulating: "Instead, then, of explaining instinct by reflex action (as a reflex action accompanied by sensation), I would explain reflex action, processes of repair, and processes of individual and specific evolution, by Instinct—the wonderful action and nature of which we know as it exists in our own personal activity" (Proc. Zool. Soc. 1884, p. 473). Mr. Orr uses several equivalents, such as *elementary nervousness*, "which makes possible and necessary the formation of co-ordinations and associations as the result of repetition of the necessitated reactions." *Inherited impulse of growth*, "which in combination with external forces constantly drives the organism forward on its course of development, and, even while the enviroing forces remain the same, is constantly exposing the developing individual to new stimuli, because it is constantly changing the individual." *Hereditary impulse*, "which is the result of the long previous history of the organism" ('Theory of Development and Heredity,' pp. 108, 143, 198). In all these terms we are reminded of the "internal perfecting tendency" of Aristotle. Again, Kölliker's idea of the evolution of forms from "internal causes" on the basis of a "general law of evolution"; Kölliker subsequently explained that his internal causes were physico-chemical (see Eimer, 'Organic Evolution,' Eng. transl. pp. 49, 50). Mr. Dixon recognizes this factor in the migration of birds: "Young birds *are not* born with this hereditary know-

subject to many conditions, of which at present we know as little of one as the other. This phenomenon may be seen in many ways, quite independent of environmental conditions. Plants would certainly be thought to flower in response to the climatic conditions of the year; yet Kerner observed the earliest date of flowering of a number of willows growing in the Botanic Garden at Innsbruck for a period of twelve years, and thus not only arrived at an average date for the first opening of the male flowers in some fifty different kinds of *Salix*, but, as he remarks:—"It will be observed that the two alpine willows, *Salix retusa* and *S. jacquiniana*, flowered on an average in the twelve years on the same day, and that their hybrid, *S. retusoides*, kept also to that date."\* Again, every angler knows—at least everyone of experience and observation—that, as the Countess of Malmesbury has expressed it, "each river has certain hours during which the fish rise in preference to any other."† But the "law" of natural selection had as much a beginning in time, and in biological time, as the "moral law"—practised in some form or another by the greater part of mankind—must have been unknown to our more bestial ancestors; little understood by prehistoric man, and only fully developed as human civilization and slavery advanced hand in hand, through peace and plenty, through misery and despair. In fact, the term "natural law" is as loose and ill-defined as that of "moral law." All that we see, all that we can reduce to rational conception, are natural phenomena, different or more evolved to-day than what little we know of them in the past; while that scanty record represents merely an appreciation of a form of evolution which took place in time estimated only by theoretical calculation, and under conditions of which we practically know nothing. We see sequences of natural phenomena, which we call natural laws, and we can no more realize the antecedents of these phenomena than we can conceive an era when our so-called natural laws were neither existent, necessary, nor consequent. We are thus compelled to seek a time prior to or independent of natural selection, or else logically to apply it

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ledge, but only with a strong inherited impulse to undertake the habit or function" ('The Migration of Birds,' amend. edit. 1897, p. 100).

\* Kerner and Oliver, 'Nat. Hist. Plants,' vol. ii. p. 574.

† 'Badminton Mag.' vol. i. p. 43.

as a law acting through space and time; so that we narcotise our mind with a new dogma: not that in the beginning was the "word," but "natural selection."

This endeavour to make natural selection the all and all of evolution\* has in some cases brought about a reaction which denies its efficacy *in toto*. Thus the Rev. G. Henslow, in a recent interesting work, ascribes the origin of species "to the joint action alone of two great factors of evolution—variability and environment." Mr. Henslow does good service in recording a large number of facts and observations, which go to prove to demonstration that the environment largely induces the form and structure of vegetable life, and he formulates the proposition that these features are due "to the responsive power of protoplasm, which, under the influences of the external forces of the environment, builds up just those tissues which are the best fitted to be in harmony with the environment in question."† But, alas! *La phrase est le tyran de notre siècle*. The term "responsive power of protoplasm" is, like that of "germ plasm," workable, but unprovable. It refers to a fact, and seeks to explain it by a suggestion. But even if we accept this "responsiveness of protoplasm to the environmental conditions," natural selection is not banished, but only limited. It is still a cause, but not an absolute one; it has had an elementary and preserving process in a stage of life it did not create. Thus, if spinescent characters in plant-life seem undoubtedly due to drought, and usually possess an arid environment, as one may read who ever gazes on the Transvaalian veld, plants still survive, and could only have survived the effects of the foraging powers of the immense herds of ruminants which formerly swarmed over the land, by the possession of spines of defence.‡ Although these animals are

\* Darwin himself distinctly stated, and again reaffirmed, "I am convinced that natural selection has been the main but not the exclusive means of modification" ('Origin of Species,' sixth edition, p. 421).

† 'Origin of Plant-Structures,' p. 14.

‡ Dr. Meyer, quoting Grisebach ('Vegetation der Erde'), and detailing his own observations in East Africa, writes:—"The plants are protected on the one hand against drought, and on the other against animals, by a partial suppression of the leaves, of which in a certain number the fibro-vascular bundles become indurated and form thorns from an inch and a half to two inches long. . . . It is self-evident that with such a suppression of the foliage

now practically extinct from so many areas, their former presence is proved by the hard-wooded and spinous trees and shrubs which have almost alone survived. And thus natural selection has acted on the original flora and fauna in which this obscurely understood evolutionary response to environmental conditions played such a vast and primary part. Natural selection is not the act of creation, but the effect of competition; it guides the battles, and directs the forces it did not provide. There seems indeed some prospect of "natural selection" being relegated by some writers to the old armoury of teleology. Thus a recent writer has remarked that it is held by "Wallace and others among our deeper-thinking naturalists, that the workings of natural selection are incomprehensible unless we regard them as guided by a controlling intelligence."\* A much more weighty argument is "that the conception of the struggle for existence has derived its force, not wholly from actual observation of what occurs, but very largely from inference as to what, it is believed, must occur."†

We may, however, quit these realms of suggestion, and observe how even in our scanty geological records we see exhibited some phases of the commencement of a struggle for existence. Thus, after a period of animal evolution which may be computed by millions of years, and in which fish abounded, perhaps not yet altogether under a severe stress of selection and survival, the Mesozoic period arrives, when, in the words of Oscar Schmidt, "the Placoids and Ganoids, hitherto predominating in the ocean almost without a foe, now found overwhelming enemies in the true Sea-lizards or Enaliosaurians, especially the Ichthyosaura and Plesiosaura."‡ Here we see natural selection, with its iron and implacable rule, a real factor

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there must be a corresponding diminution of transpiration, and the tree is enabled to preserve its sap when, during the dry season, its roots cannot any longer obtain a supply of moisture" ('Across East African Glaciers,' p. 68).

\* Kirby, 'Nature,' vol. liii. p. 77.

† Thomson, 'Natural Science,' vol. viii. p. 22. The Right Hon. A. J. Balfour has now invoked—perhaps sarcastically—the aid of "natural selection" to account for such a theological conception as "free will" ('Foundations of Belief,' p. 20).

‡ 'Doctrine of Descent,' p. 74.

in the lives and development of these creatures, connected and increasing with an advancing animal evolution, but still only a term to express the modifying influences incidental to a struggle for existence.\* In fact, natural selection is more an effect than a cause. It was incidental and consequent to the progress of evolution in animal life, and ever increasing its sway in ratio with the vast increase of living things became the giant modifying influence, and modelled, painted, exterminated, and sustained the fauna and flora which by their dangerous fecundity came under her rule. But because a phenomenon is ancient it is not necessarily eternal—theologians discuss those questions—and if logic imperatively demands an antecedent to natural selection, biology must refuse to recognize that undoubtedly mighty and modifying influence as a First Cause.† “We attach too exclusive an importance to adaptation . . . when we think to explain by selection every similarity between the colouring of an animal and that of the ground on which it lives. For, as we have seen, animals may become similar in colour to their surroundings, actually adapted in colour, quite by chance; for instance, in consequence of the direct necessary action of light, *i. e.* of the surrounding colours, and therefore without selection, many really wonderful cases of adaptation, apparently due to selection, probably come under the category.”‡

It seems a probable suggestion that assimilative colouration was a very constant factor in an early stage of animal life, and

\* To understand the philosophical conceptions in Biology previous to the Darwinian epoch, which may be said to have commenced with the publication of the ‘Origin of Species’ in 1859, we may with the greatest instruction reperuse the ‘Essay on Classification,’ written by that master naturalist, Agassiz, the preface of which bears date 1858, the same year that simultaneous papers by Darwin and Wallace were read before the Linnean Society, and the way made straight for the theory of natural selection. In the essay of Agassiz only three references are made to Darwin, and those purely bibliographical, recording more or less *technical memoirs*. In a philosophic sense the ‘Essay on Classification’ may be described as the last charge of the Old Guard.

† It will be remembered that Mr. Mivart has brilliantly advanced his thesis that “species have been evolved by ordinary *natural laws* (for the most part unknown) aided by the *subordinate* action of ‘natural selection’” (‘Genesis of Species,’ p. 333).

‡ Eimer, ‘Organic Evolution,’ Eng. transl. p. 144.

that it has come down as a survival to the present day in a host of instances to which we have applied the explanation of "protective resemblance." The reason why it has thus survived is not because it contradicts, but because it does not require the modifying influence of natural selection. It neither broke the "law," nor did it arise through the controlling action of the "law"; and where species uninfluenced by the impulse of variation, or unharmed by a too rapid or excessive fecundity, existed in assimilative colouration to the surroundings which have remained unchanged, and subject to no climatic changes enforcing migration, such species have survived, and do appear to-day, in their original assimilative colouration.

The suggestion receives support from many facts recorded by travellers and naturalists, which, taken singly, have only the appearance of curious observations, but, considered together, exhibit more cumulative force. According to Dr. A. Leith Adams, "there is, moreover, a seemingly strong disposition for the lower parts of animals to become white in winter, *i. e.* the parts in closest contact with the snow; thus, the under surfaces of the Deer tribe are always whitest."\* Mr. J. Newton Baskett would seem to favour the same suggestion with regard to the colour of birds' eggs:—"To my mind the suggestion comes that many of our early birds with spotted eggs may have reverted from green and dead grass nesting to shingly or brilliant pebbly regions, carrying with them the bluish, greenish, creamy, or drab grounds, and by that tendency to variation for which we can never account—a thing as mysterious as life itself—they here, through the agency of natural selection, began a mottled colour-adaptation which has developed so highly in our shore birds, Gulls and their relations."† The well-known and much-quoted observation made by Canon Tristram in North Africa cannot be omitted here:—"In the desert, where neither trees, brushwood, nor even undulation of the surface afford the slightest protection to its foes, a modification of colour which shall be assimilated to that of the surrounding country is absolutely necessary. Hence *without exception* the upper plumage of *every bird*, whether Lark, Chat, Sylvain, or Sand Grouse, and also the fur of *all the smaller*

\* 'Field and Forest Rambles,' p. 124.

† Papers, "World's Congress on Ornithology," Chicago, pp. 97, 98.

*mammals*, and the skin of *all the Snakes and Lizards*, is of one uniform isabelline or sand colour.”\* Brehm writes:—“The birds, the reptiles, and even the insects show the same stamp, though form and colouring may vary greatly. When any other colour besides sandy yellow becomes prominent, if hair, feather, or scale be marked with black or white, ashy grey or brown, red or blue, such decorations occur only in places where they are not noticeable when looked at from above or from the side.”† But he also remarks:—“The fact that almost all the desert animals agree in colouring with their surroundings explains why the traveller who is not an experienced observer often sees, at first at least, but little of the animal life.”‡ This appears to better illustrate the survival of an original assimilative colouration than to afford an example of the strict definition of what is meant as “protective resemblance,” which affords an extraneous means of survival under an increased competition of life. Mr. Beddard, discussing the effects of temperature and moisture on the colours of animals, considers it “at least possible that the tawny colours of desert animals, which have been so often brought forward as an instance of adaptation to the hues of their environment, may be due to a similar cause.”§ Mr. Quelch, writing on the Birds

\* ‘Ibis,’ vol. i. p. 429. I do not remember meeting with this remark in the Canon’s ‘Great Sahara,’ and it may have been an observation recalled when the specimens were more closely examined. Such reflections are no less valuable when subsequent considerations. Some exceptions to this rule were, however, given by Canon Tristram to Mr. Darwin: “Thus the male of *Monticola cyanea* is conspicuous from his bright blue colour, and the female almost equally conspicuous from her mottled brown and white plumage; both sexes of two species of *Dromolæa* are of a lustrous black; so that these three species are far from receiving protection from their colours; yet they are able to survive, for they have acquired the habit of taking refuge from danger in holes or crevices in the rocks” (‘Descent of Man,’ second edition, p. 456). According to Dr. Merriam: “The theory of the direct action of environment in modifying colour, as in the bleached types of the desert regions, is not borne out by observations, and is disproved in the case of nocturnal types” (Balt. Meet. Am. Soc. Nat.; see ‘Science,’ new ser. vol. i. p. 38). Another American authority—Mr. Orr—accepts the theory, and remarks:—“Living matter seems to be in a general way capable to a certain extent of photographing colours when exposed for many generations” (‘A Theory of Development and Heredity,’ p. 50).

† ‘From North Pole to Equator,’ p. 336.

‡ *Ibid.* p. 331.

§ ‘Animal Coloration,’ 2nd edit. p. 60.

of British Guiana, states that "the purple tints on the throat, breast, and body of *Cotinga cayana*, *C. cærulea*, and *Xipholena pompadora* can be changed to a brilliant red by exposing them to heat in such a way as to affect those feathers without singeing—an indication of the possibilities in nature under changing thermal conditions."\* Where everything is of one assimilative hue, such universal protection—if it were such—would rather tend to neutralization in all such properties, and other qualities would be necessary in the struggle for existence, the absence of which might mean starvation and extermination to many species, or *vice versâ*—the correlative undue multiplication of others; facts which certainly do not appear on the surface. An American writer in studying the same problem has given a similar opinion. As he observes, "its tendency is to bring the colours of the animals to agree with those of its surroundings; for this reason it has been classed as protective colouration, notwithstanding the fact of its occurrence on all the species of a locality whether in need of protection or not."† The very essence of the theory of protective resemblance, as a means of survival consequent upon the slow but sure action of natural selection, is a special, not a general effect,—a particular, not an universal attribute,—but one of the many and diverse qualifications which enable animals and plants to survive in the competitive struggle for existence. If such a suggestion is reasonable or probable, we ought at least to find some supportive facts, and these can be gathered, though scantily, for the observations of travellers and naturalists do not appear to have been greatly attracted in that quarter.‡ M.

\* Papers, "World's Congress on Ornithology," Chicago, p. 124.

† Garman, 'Proc. Am. Ass. Buffalo, N. Y.' 1876, p. 200.

‡ We must, however, carefully guard against hasty or erroneous observations. Thus the early South African traveller, Le Vaillant, was told of a race of red Elephants, which he afterwards observed were of the same tint as the soil on which they were found. But after killing one he proved his surmise, that the colour was only due to their wallowing in moist and marshy places ('Travels in the Years 1780-85,' Eng. transl. vol. i. p. 266). Again, Von Hönel describes the hairless bodies of old male Buffaloes in East Africa as being of "the colour of the mud—black, grey, brown, or reddish brown, as the case may be—in which they last wallowed" ('Discovery of Lakes Rudolf and Stefanie,' Eng. transl. vol. ii. p. 21). Chanler has a similar observation as to a "red" Rhinoceros ('Through Jungle and Desert, p. 120).



Porchinsky, one of a scientific party engaged in exploring the Caucasus, also witnessed a nearly complete phenomenon of assimilative colouration. The southern limit of the region explored was the steppe of Erivan, a plain covered with sand, with some patches of variously coloured clays appearing in the low hills. A remarkable feature of the animal inhabitants of the steppe, insects and reptiles, and especially of the Lizards, is the most perfect agreement of their colouration with that of the steppe. The same thing was also observed in the steppe of Elizabethpol.\* This is a similar observation to that made by Canon Tristram in North Africa, and induces the same comment. Dr. A. Leith Adams remarks:—"The colour of the plumage of many desert-loving birds, like the denizens of arctic regions, assimilates to that of surrounding objects, and, moreover, as has been truly said, we also find the bleaching influence of the desert, and the dry and cloudless climate imparting their hues to the Egyptian monuments. So much is the latter the case that the eye fails at first to receive an impression of their immense antiquity, owing to the absence of the grey colouring and weather stains which give so venerable an aspect to those of Northern Europe. There is thus a stamp imprinted on all the animate and inanimate objects, in accordance with their haunts, as, for example, the desert Chats and other birds are much paler in colouring than those which frequent the cultivated districts on the river's banks."†

If this appears to be evident on the surface of the earth, the same phenomena seem to exist in the abyssal depths of the ocean. From recent deep-sea researches we know that the floor of the ocean is probably a vast undulating plain of mud; and, to quote both Sir John Murray and Mr. Hickson, of all the deep-sea deposits, the so-called "red mud" has by far the widest distribution. According to the testimony of the late Prof. Wyville Thomson and his colleagues in the 'Challenger' Expedition, this red clay is the residuum left after the calcareous matter of the *Globigerinæ* ooze has been dissolved away; and Sir John Murray is of opinion that "probably the majority of deep-sea species live by eating the surface-layers of the mud, clay, or ooze at the bottom, and by catching or picking up the

\* Commun. to St. Petersburg. Entomol. Soc.; see 'Nature,' vol. xv. p. 16.

† 'Naturalist in the Nile Valley and Malta,' pp. 50, 51.

small organisms or minute particles of organic matter which fall from the surface, &c.”\* Now how far does assimilative colouration appear to obtain in these dreary depths? Sir John Murray speaks of the “red and brown tints of the majority of deep-sea organisms.”† Mr. Hickson’s statement that “the deep-sea fish are usually devoid of any pronounced spots, stripes, or other markings is now well recognized,” and it seems to be “a very general rule among fishes that as they migrate into deeper water the spots and stripes so conspicuous among many forms living on the surface and in shallow water disappear, and the colouration of the body becomes more evenly distributed and uniform.” “Among the Crustacea various shades of red are the prevailing colours.” “The colouring of the deep-sea jelly-fishes is said to be usually deep violet or yellowish red.” “Moseley records most minutely the colour of some of the deep-sea anemones and corals, and calls attention to the very general presence of madder-brown in the soft parts.” “The pelagic Schizopoda are usually quite pale and transparent; the deep-sea forms, on the other hand, are frequently, if not invariably, of a bright red colour.” Mr. Hickson concludes that the fauna of the deep sea, taken as a whole, is not characterized by the predominance of any one colour, but “the shades of red occur rather more frequently than they do in the fauna of any other zone or region.”‡ Mr. Beddard, arguing from the many cases of degenerate eyes among deep-sea animals, considers it reasonable to suppose that vision is impossible. “The inevitable conclusion, therefore, from these facts appears to be that the brilliant and varied colourations of deep-sea animals is totally devoid of meaning; they cannot be of advan-

\* ‘Compte-Rendu,’ Third Inter. Congr. Zool. Leyden, p. 107. “The scientific men engaged in the ‘Challenger’ Expedition came at last to the conclusion that the red clay was mainly produced by the decomposition of inorganic material, such as the pumice discharged into the air during volcanic eruptions, which after long floating about on the surface of the sea must become waterlogged, and sink together with the various kinds of dust already mentioned. The evidence which they cite indicates that this red clay accumulates very slowly, and that it owes much to the above materials; but that some part of it may be, directly or indirectly, due to chemical action does not seem improbable” (T. G. Bonney, ‘Story of our Planet,’ p. 209).

† ‘Compte-Rendu,’ Third Inter. Congr. Zool. Leyden, p. 107.

‡ ‘The Fauna of the Deep Sea,’ pp. 61, 62, 63, 65, 66, 135.

tage for protective purposes or as warning colours, for the single and sufficient reason that they are invisible.”\* Some shore species of crustaceans are found to turn red when kept in the dark; hence Mr. Faxon is inclined to believe that in the deep-sea species the prevalence of red is “due to a modification of the pigments, induced by the darkness in which the creatures dwell, either through chemical action, or more probably through a physiological process originating in the eye, and affecting the pigment-cells by a reflex action. In either case the prime cause is a purely physical one—the more or less complete absence of light in the depths of the sea.” . . . To those who may enquire why deep-sea crustaceans should be red-tinted in general rather than of any other colour, Mr. Faxon quotes Pouchet’s explanation, that “the pigments of the xanthic series (red, orange, and yellow) in Crustacea are contained in contractile anatomical elements—the chromatoblasts—while the blue pigment is never found in the substance of the chromatoblasts, but is held in free solution.” “Under the influence of the abyssal darkness there is supposed to be so great an expansion of the red chromatoblasts that any effect from the cyanic tints is completely overpowered.”† Another explanation has been advanced to account for a similar colouration of the deep-sea flora. The blue colouration of the water is due to the decomposition or absorption of the red, orange, and yellow rays of light in their passage through the water, and owes its hue to those rays of high refrangibility,

\* ‘Animal Coloration,’ 2nd edit. p. 37.

† Review in ‘Nat. Science,’ vol. viii. p. 119, of “Reports on an Exploration in charge of A. Agassiz by s.s. ‘Albatross,’ 1891, xv.: the Stalk-eyed Crustaceans,” by Walter Faxon.

As regards the deep-sea fishes, according to Dr. Günther, their colours “are extremely simple, their bodies being either black or silvery; in a few only are some filaments or the fin-rays of a bright scarlet colour. Among the black forms albinos are not scarce” (‘Introd. Study of Fishes,’ p. 300). On the other hand, fishes do exhibit assimilative colouration. Mr. Brown-Goode writes:—“On certain ledges along the New England coast are rocks covered with dense growths of scarlet and crimson seaweeds. The Codfish, the Cunner, the Sea-raven, the Rock-eel, and the Wry-mouth, which inhabit these brilliant groves, are all coloured to match their surroundings; the Cod, which has naturally the lightest colour, being most brilliant in its scarlet hues, while others whose skins have a large and original supply of black have deeper tints of dark red and brown” (‘Science,’ vol. xv. p. 211).

such as the blue, which are allowed to pass through. "The rays on the further side of the red, not perceptible to our eyes—the so-called dark heat-rays—are likewise absorbed in their passage through the water, and an object at some depth under water would therefore only be reached by rays of high refrangibility, particularly blue rays. The conditions of illumination for plants growing in the depths of the ocean are consequently in reality quite unfavourable. It is not only that a portion of the light falling on the surface of the water is reflected, and the other portion is weakened by its passage through the water, but besides, those rays which are necessary to the formation of organic matter by the chlorophyll granules in the plant-cells are abstracted from the light which passes through; for the chlorophyll granules need just the red, yellow, and orange rays if they are to perform their functions; only under the influence of these rays can the decomposition of carbonic acid, the separation of oxygen, and the formation of carbohydrates take place. The blue rays do not assist at all in this respect; they are even hurtful to these processes, since they assist the oxidation—that is, the decomposition of organic substance. Consequently, phycoërythrin, the red pigment of the *Floridæ*, now appears, and indeed so abundantly, that the chlorophyll granules in the interior are quite hidden by it. This colouring matter displays a very marked fluorescence, that is to say, it absorbs a large portion of the light rays falling on it, and gives out other rays of greater wave-length. The blue rays are to some extent changed by it to yellow, orange, and red, and thus the chlorophyll granules finally receive those rays which act as the propelling force in the decomposition of carbonic acid. But this also affords an explanation of the remarkable phenomenon that sea-plants are only coloured green close to the shore, and only in the most superficial layers of water, while lower down they appear red. Only quite on the surface the emerald-like *Ulvaceæ* and *Enteromorphas* sway hither and thither, forming thus a light green belt; these algæ are to be sought for in vain in the depths beneath. Of the plants which flourish below this region it can no longer be said that they grow green; this mark of vegetation has entirely vanished. Green has given place to red. All the innumerable *Floridæ* are reddened—sometimes a delicate carmine, sometimes a deep purple; then again a light brownish red,

and a dull dark crimson.”\* As further remarked:—“In the dark bosom of the earth a green leaf would be quite useless, and as a matter of fact there is not a single plant whose green tissue is situated in the depths of the soil.”†

Even the obscure problem of the colouration of mankind may have originally—and before migration became such an important factor in modification—been due to a more or less assimilative colouration. Thus, in Central Africa, Schweinfurth has remarked:—“The complexion of the Bongo in colour is not dissimilar to the red-brown soil on which they reside; the Dinka, on the other hand, are black as their own native alluvium.” And again:—“Any traveller who has followed the course of the main sources of the White Nile into the heathen Negro countries, and who has hitherto made acquaintance only with Shillooks, Nueir, and Dinka, will, on coming amongst the Bongo, at once recognise the commencement of a new series of races extending far onwards to the south. As trees and plants are the children of the soil from which they spring, so here does the human species appear to adapt itself in external aspect to the red ferruginous rock which prevails around. The jet-black Shillooks, Nueir, and Dinka natives of the dark alluvial flats stand out in marked distinction to the dwellers upon the iron-red rocks, who, notwithstanding their diversity in dialect, in habit, or in mode of life, present the characteristics of a connected whole.”‡ Dr. Schweinfurth also observes that “the circumstance is suggestive of Darwin’s theory of ‘protective resemblance’ among animals.” But as such a view of protective resemblance has not hitherto been applied to the colour of mankind, and as it would be extremely difficult to defend such a proposition, it might at least be suggested as probable that we have here another survival of an original and somewhat universal assimilative colouration. Similar observations have been made by many travellers. Livingstone describes the colour of the soil composing the plain of the Kalahari Desert as in general “light-coloured soft sand, nearly pure silica,”§ and that the Bushmen inhabiting these plains are

\* Kerner and Oliver, ‘Nat. Hist. Plants,’ vol. i. pp. 389-90.

† *Ibid.* p. 665.

‡ ‘The Heart of Africa,’ vol. i. p. 261.

§ ‘Miss. Travels and Researches in S. Africa,’ p. 47.

generally of a "light-yellow colour."\* In Equatorial Africa, Emin Pasha states that the people of Magúngo are of a black colour, "through which, however, appears very distinctly a red ground tone"†; and he further describes "a streamlet dyed red with the iron that impregnates the soil." † In Unyóro the same author writes of the exposed "red clayey subsoil," § and describes the people of this district as reddish brown in colour. || Again, in the Wádelai district, he writes of the inhabitants as "in colour black, with a reddish brown tinge." ¶ In Mashonaland Mr. Eckersley states that the soil of the plateau between Umtali and Salisbury consists, for the most part, of decomposed granite, &c. "Large areas of red soil are, however, frequently met with," &c.\*\* Of the Mashonas, he writes: "Their skin has a fine healthy glow, its colour being dark chocolate brown, some shades removed from black." †† According to Ratzel, "Stokes, one of the most experienced of all Australian travellers, sums up his judgment in the phrase, 'The Australians vary as curiously as their soil.'" †† Lord Geo. Campbell in one of the Fiji islands, describing the men engaged on the yam-grounds, adds: "Working on the brown soil, which is very much their own colour too." §§ Richtofen, in a work—apparently still untranslated into English—in his physical exposition of the soil of Northern China, to which the German name of *Löss* has been applied, states that this *Löss* is so predominant in the basin of the Wei river, on which stands Singanfu, that its yellow hue affects the whole landscape, and even tinges the atmosphere. ||| Its suggested partial application here to the colour of the Chinese, as an incident in the argument, requires no further emphasis.

\* 'Miss. Travels and Researches in S. Africa,' p. 78.

† 'Emin Pasha in Central Africa,' p. 16.

‡ *Ibid.* p. 20.

§ *Ibid.* p. 50.

|| *Ibid.* p. 52.

¶ *Ibid.* p. 143.—According to Dr. Junker, "a decided black complexion nowhere occurs, and that it would be merely more correct to speak of a brown, a copper, or chocolate-coloured, than of a black race in Africa" 'Travels in Africa, 1879-1883'; Engl. transl. p. 190).

\*\* 'Geographical Journal,' vol. v. p. 35.

†† *Ibid.* p. 43.

‡‡ 'History of Mankind,' vol. i. p. 339.

§§ 'Log Letters from the "Challenger,"' p. 147.

||| 'China—Ergebnisse eigener Reisen und darauf gegründeter Studien.'

It is true that assimilative colouration seems to have little modified the colour of indigenous races, even in Africa, if we take a comprehensive view of the whole area. But we must not forget that men have so often migrated from their original birthplaces, and more than that, much mixture has taken place. Emin Pasha remarks on "the intermingling of separate tribes and peoples in Central Africa consequent upon war, plundering raids, dividing of the spoil in women, slavery and exchange of slaves, and in a much less degree on intermarriage"; and further, "that it is almost impossible to obtain skulls of really pure race." He also observes: "Whether the great variation in the colour of the skin observable among all Negro tribes is to be attributed to these mixed relationships, I do not venture yet to decide."\*

The relationship between the surface hue of the geological floor on which the primary races of men may have developed their individuality of colour, and the prevalent tints of those races, has been little studied, though that investigation might also throw much light on the areas where racial segregation established those divisions which in any other group of animals would at least be considered specific. Even in our own country this old connection between land and man has been pointed out by the late Prof. Ramsay: "Thus it happens that the oldest tribes now inhabiting our country are to be found among the old palæozoic mountains, which, composed of the most ancient of our geological formations, and rising up into the highest grounds, must have been the first parts of the British islands to rise above the waters during the last elevation of the land."† This observation is doubtless capable of more universal application, and human assimilative colouration might prove a reasonable hypothesis if we could only trace the early dispersal of our species in a scientific manner and spirit, without the aid of a Hebraistic "Tower of Babel," or the view once advanced by ethnologists of a Caucasian nursery based on a still earlier attempt to locate the "Garden of Eden." The boldest of new theories are at least not more grotesque than the *explanations* of quite recent times, and whereas the last were believed to be final, the first are advanced only as propositions for future verification or

\* 'Emin Pasha in Central Africa,' p. 197.

† Cf. Extracts from Lectures—'Anthropological Review,' vol. i. p. 486.

dismissal. Even journalism has referred to the connection between land and man, and a writer in the 'St. James's Gazette' (January 6th, 1881) on the London Clay remarks:—"In the old days all London lay upon the few scattered patches of pleistocene gravel which here and there cap the surface, because it was only on the gravel that water could be obtained from springs or wells. Hence the original development of the suburbs, as Prof. Prestwich has pointed out, followed with unerring precision the zig-zag course of the pleistocene tracts." "In Caithness the best cereals, cattle, and men were raised on the boulder clay, and where it was wanting, the corn, cattle, and men were miserable."\* Frank Buckland states:—"The geological formation of a district I found, in examining recruits for the regiment, has considerable effect upon the stature of its inhabitants; *coal-producing* counties, as a rule, generally grow the tallest, and, at the same time, the largest-boned men."†

But although facts may be found to support new suggestions, such as a possible original assimilative colouration of man, the quest for such produces other recorded observations, which, though not altogether contradictory to the view, still point to other causes, support other conclusions, and reassert the problem we seek to solve. Thus we find indications of the influence of food in human colouration. The ship "Strathmore" was wrecked upon one of the rocks of the "Twelve Apostles," an island in the Crozet group, on July 1st, 1875, and the survivors of the passengers and crew, before being rescued, remained there for a period of six months and twenty-two days. Of the events that occurred during that time we have the narrative of Mrs. Wordsworth and her son. Speaking of a period four months subsequent to the wreck, and when Penguins' eggs had begun to furnish the castaways with ample food, Mrs. Wordsworth remarks:—"The eggs did everyone a great deal of good; those who had been

\* Cleghorn, 'Anthropological Review,' 1868, No. 20, p. xxi.

† 'Curiosities Nat. Hist.,' popular edition, 4th series, p. 9.—A similar observation is recorded by Mr. Atmore in South African ornithology:—"The Rock-chat (*Saxicola cinerea*) is abundant in the Karroo—and, by the way, how well this class of birds obeys the geology of the country; wherever there is Karroo soil you find them. The same also with the 'Kalkvent-je' (*Macronyx capensis*), which is found in every patch of grass country, but never in Karroo soil" (Layard's 'Birds S. Africa,' Sharpe's edition, p. 242).



haggard and miserable got quite plump and fresh ; some of them ate about thirty at a meal, and we now saw each other with clean faces, for we used the eggs as soap ; while a most remarkable thing was that everyone had fair skins and light hair, dark faces and hair being quite changed, black hair turning brown or red, and fairer people quite flaxen. As for myself, my complexion was pink and white, like a girl's" (this after four months' constant exposure to the weather), "with white eyebrows, yellow hair, &c." The survivors were rescued on Jan. 21st, 1876, and the same lady subsequently writes :—"Charlie looks well and firm now, his hair had got quite flaxen, which did not suit him at all, but now it has nearly recovered its original colour."\* Here, presumably, the colouring factor is considered as the constant diet of Penguins' eggs. As Darwin has observed : "There can, however, be little doubt about many slight changes, such as size from the amount of food, colour from the nature of the food."† Climatic conditions are not altogether inoperative, and an extreme case is recorded by Andersson in the Ovambo country, South-west Africa. In describing the bitterly cold nights experienced in the month of June, he states that one of his men, Timbo, a native of Portuguese East Africa, suffered much from the low temperature, and one morning the members of the expedition were amazed at finding "his dark shiny skin suddenly changed into a pale ashy grey."‡

The view of a direct action caused by a constant food on animal colouration has frequently been remarked. Mr. Harvie Brown thought that the Sand Martin might derive its black or dark-coloured plumage in North Russia by constant feeding on Mosquitos.§ Most natives of Brazil take pleasure in intercourse with animals. They are in the habit of attaching Monkeys and Parrots to themselves, and by feeding the latter on fish they produce red and yellow feathers when the plumage is green.|| The Bullfinch is well known to turn black when fed on hemp-seeds, and the Canary to become red when fed on cayenne pepper.¶ According to Mr. Harting, "Bullfinches are not the

\* 'Nature,' vol. xiv. p. 527 (quoted from 'Blackwood's Magazine').

† 'Origin of Species,' 6th edition, p. 6.

‡ 'Lake Ngami,' p. 210.

§ 'Zoologist,' p. 5162.

|| Oscar Peschel, 'The Races of Man,' p. 423.

¶ Romanes, 'Darwin, and after Darwin,' vol. ii. p. 218.

only birds which have been observed to turn black from feeding on hemp-seed, nor is hemp-seed the only seed which conduces to such a change of colour. Larks have been known to become black after being fed for some time on hemp-seed; and the late Mr. Blyth informed us that he had seen one of the little Amandavat Finches which had become black, though fed entirely on canary-seed.\* Again, there is the "change produced in so many of the Green Parrots by the native peoples of Guiana, who, by feeding these birds on a special diet, consisting largely of pounded corn or maize, produce eventually yellow-coloured birds."† A pair of American Screech Owls (*Megascops asio*) which were fed in captivity largely on liver, and which were originally in typical grey plumage, exhibited subsequently, especially in the larger female Owl, an actual change from grey to red-brown in individual feathers, and the red phase was not thought entirely, if at all, due to new feather-growth.‡ By mixing madder with the food of a female mammal, Flourens produced a red colour in the bones of the fœtus. By placing the eggs of a Salmon Trout in waters which only nourished White Trout, Coste noticed the eggs became gradually paler, and produced Trout which had lost the characteristic colour of their race.§ "If a Horse has an addition of arsenic to its usual food, its hair becomes more glossy; and Holmegreen has proved that if Pigeons are fed with meat they change not only the colours of their feathers, but also their odour."|| In the Salmonoids the flesh is frequently of a marked pinkish hue, "brought about by the crustaceans on which these carnivorous fishes so largely feed."¶ By changing or varying the food of lepidopterous larvæ, much variation has been produced in the depth of colour of the imagines.\*\*

The whole problem of the colouration of mankind centres largely on the question of what was the tint or hue of the skin of

\* 'Nat. Hist. Selborne,' Harting's edition, p. 118, *note*.

† J. J. Quelch, Papers, "World's Congress on Ornithology," p. 124.

‡ A. P. Chadbourne, 'The Auk,' new series, vol. xiii. p. 321.

§ De Quatrefages, 'The Human Species,' p. 247.

|| 'Problems of Nature, Researches and Discoveries of Gustav Jaeger,' Engl. transl. p. 38.

¶ Lydekker, 'Roy. Nat. Hist.,' vol. v. p. 494.

\*\* *Cf.* Kock, Goss, Gregson, and others.

our earliest ancestors; not altogether what we mean by "primitive man," but rather of the creature that gradually became less simian, and more and more human. Of this missing link we know absolutely nothing as to the colour of its—or perhaps we should say his—skin; neither do we of the colour of fossil Apes. As Dr. Büchner has remarked: "The Orang or Orang-outan which inhabits the Asiatic Archipelago is of a *yellowish red* colour and *brachycephalous*, or short-headed, like the Malays; whilst the Chimpanzee and the Gorilla, both of which are indigenous to Africa, are black and *dolichocephalous*, or long-headed, like the Negroes."\* There is also much truth in the statement of Winwood Reade, that many ethnologists discuss the question as though the original colour of mankind was white; "but the naked primeval men were probably dark, for white is a colour injurious to wild animals, and seldom if ever found in the fauna of the forest."† Of fossil Apes we know more or less of the anatomical structure, but our conclusions as to colour can only be equivalent to our pronouncing the colour of a prehistoric man whose skull was found in Africa as black; of one found in Europe as necessarily white; or another discovered in America as red. That secret belongs entirely to the past, and its solution can only be suggested by induction. As De Quatrefages has remarked: "The first men who peopled the centre of human appearance must at first have differed from each other only in individual features."‡ Their colour would have been uniform, either derived from their more brutish ancestors, or possibly, as their habits became less arboreal, a more assimilative colouration may have ensued to the soil on which they walked. Then, as migrations followed and the more plastic forms of these last evolved children of nature reached centres of different geological conditions, we might imagine that again assimilative colouration played a part; and these incidents of early wanderings and colour absorption of the long, long ago, when the species was still clay in the hands of Nature,§ the potter, gradually became permanent,

\* 'Man—Present, Past, Future,' p. 125. With reference to colour, the observation had also occurred to Agassiz. ('Essay on Classification, p. 182.)

† 'African Sketch Book,' vol. ii. p. 523.

‡ 'The Human Species,' p. 244.

§ We use this term as defined by J. S. Mill: "Nature means the sum of

and in a creature that had reached the stage of protection afforded by human society, and of aggression by human invention, were outside the ordinary action of natural selection, and became fixed and hereditary. The colour of mankind can in no sense come under the explanations of protective or aggressive resemblance, mimicry, warning or nuptial colouration, &c., and if there are physiological advantages appertaining to the different hues in connection with the climates in which these differently coloured races are found, these advantages are probably incidental to, or rather the effects of, a perfect acclimatization. Perhaps suggestion in this problem is too crude and too early; and, as Tylor cautiously observes, "the great races—black, brown, yellow, white—had already settled into their well-known characters before written record began, so that their formation is hidden far back in the præ-historic period"\*; or, as Darwin more precisely writes, "we are far from knowing how long ago it was when man first diverged from the Catarhine stock; but it may have occurred at an epoch as remote as the Eocene period; for that the higher Apes had diverged from the lower Apes as early as the Upper Miocene period is shown by the existence of *Dryopithecus*."† We may well conclude that our earliest progenitors had a more or less hairy covering, but if we are ignorant on this very point, how much less should we speculate on the colour of the same.

There is considerable evidence to be obtained that surface geology induces assimilative colouration in plants as well as in animal life. Thus in the charming 'Letters of Rusticus,' and in connection with the locality of Godalming in Surrey, this passage occurs:—"The soil is a bright red sand, which extends from the chalky range of cold poverty-stricken downs crossing the country

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all phenomena, together with the causes which produce them; including not only all that happens, but all that is capable of happening, the unused capabilities of causes being as much a part of the idea of Nature as those which take effect" ('Three Essays on Religion,' p. 5). There is also a purely literary or artistic idea of Nature, which sometimes becomes hysterical, and finds an amusing illustration in a sentence quoted by Max Nordau: "Nature is so indifferent, so unappreciative. Whenever I walk in the park here, I always feel that I am no more to her than the cattle that browse on the slope" ('Degeneration,' p. 319).

\* 'Anthropology,' p. 85.

† 'Descent of Man,' 2nd edit. p. 156.

from Reigate to Farnham. Between the chalk and the sand is an exceedingly narrow tract of blue clay, sometimes scarcely ten yards in width. These three distinct soils do not gradually intermingle, but are separated by the most abrupt transitions, and their effect on the produce where the three soils occur in the same field is very marked. . . . Wherever the sand bears the red tint of iron, the chief natural produce is furze; but this colour, as we proceed westwards, yields to a blue tint. The two colours stain the wool of the sheep which range the wastes, and the red and blue are very conspicuous in their fleeces, the blue being much preferred."\* In Hampshire, Mr. Starkie Gardner states, "the heath is in some patches of a magenta colour where a crimson clay patch forms the soil."† Lord Walsingham's head keeper told Mr. R. Kearton that "stiff clay land on which pheasants feed produces dark-coloured eggs, and a light sandy soil pale-coloured ones"; and the writer remarks: "This contention he certainly supported by several instances which he brought under my notice, although other keepers to whom I have mentioned the circumstance have no faith in its accuracy."‡ "In British Guiana some have gone so far as to say that they can tell when an auriferous district has been reached by the prevalence of certain kinds of birds and Monkeys. This can be easily understood when the close connection of the trees with the soil, and the fruit with the animals, is considered."§ In the Magúngo country of Equatorial Africa, Emin Pasha speaks of "the red clayey ground," and describes the red blooming *Canna* as "being everywhere abundant."|| These observations could doubtless be multiplied if interest was awakened on the question, as on the "reddish argillaceous earth, called 'Pampean mud,'" which overspreads the Rio Plata region,¶ or on the immense granite formation which forms one of the geological features of the State of Perak in the Malay Peninsula, of which "the prevailing colour is blue."\*\* The nature of the environment has

\* 'Letters of Rusticus,' pp. 1-2. † 'Nature,' vol. xv. p. 230.

‡ 'With Nature and a Camera,' p. 166.

§ James Rodway, 'In the Guiana Forest,' p. 81.

|| 'Emin Pasha in Central Africa,' p. 26.

¶ Orton, 'The Andes and the Amazon,' p. 283.

\*\* Tenison-Woods, 'Nature,' vol. xxxi. p. 152.

also a distinct effect upon the structure of plants. Thus in the Mediterranean regions *Ranunculus ficaria*, as compared with the typical species growing in England, "bears finer and larger flowers and leaves, so that it is generally recognised as the variety *Calthæfolia*." *Caltha palustris* "has itself no recorded variety in low-lying situations." "When, however, this plant manages to get away from its habitual environment, and to reach 'mountainous places' (Hooker), it puts on characters which descriptive botanists have independently noticed and variously named as varietal or specific. It is commonly known as *Caltha minor*." "Many experiments have shown that if plants, or their seeds, be taken from lowlands and planted on alpine regions, all those that change their structures at once begin to assume more or less the same anatomical and morphological characters as the plants normally growing in highland regions."\* Again, according to Kerner, a plant of the grass *Glyceria fluitans* "growing on damp soil on the edge of a stream over the water had linear *bluntly-pointed* leaves, whose sheaths were on the average 15 cm. long, the blades 23 cm. long and 8.5 mm. broad. After this plant had been submerged under rapidly-flowing water in the following year, leaves unfolded, which tapered gradually to a point, with a sheath having a mean length of 47 cm., and blades 73 cm. long, but only 5 mm. broad. The blades produced in running water were three times as long, and actually rather narrower than in the air."† According to Varigny, "Curtiss had seen in some places near the Potomac *Bidens cernua* acquire a height which is six times the common average height of this plant, and he has seen the same in *Oxalis stricta*; C. Lemaire states in D'Orbigny's 'Dictionary' that, while cultivated hemp grows no higher than a metre and a half in France, in Piedmont it attains three and four metres; and if Italian stock is planted in France it rapidly reverts to the small variety in the course of two or three years." "It is also well known that where mountain plants are transferred to the valleys and plains they lose the hairy covering which they generally possess, while valley plants transferred to the mountains acquire this same covering." "The common Dandelion (*Taraxacum dens leonis*) has in dry soil leaves which are much more

\* Henslow, 'Natural Science,' vol. vi. pp. 386, 388, 389.

† Kerner and Oliver, 'Nat. Hist. Plants,' vol. ii. p. 502.

irregular and incised, while they are hardly dentate in marshy stations, when it is called *Taraxacum palustre*.\* “Plants growing on chalky soils, when compared with those growing on richer soils, are often more thickly covered with down, which is usually of a white or grey colour. Their leaves are frequently of a bluish green tint, more deeply cut, and less veined, while their flowers tend to be larger and of a lighter tint. . . . Sea-salt has the general effect on many different kinds of plants of producing moist fleshy leaves and red tints.”† The Rev. Hamlet Clark records a remark made to him by “one who evidently knew the subject”—“The quality of wine depends always and absolutely on the locality in which the vineyards are cultivated, *not* on the stock whence the young trees are derived. The same vine which in the South of France produces French wines will, if transplanted to the Cape, produce Cape, to Madeira, Madeira, to Teneriffe, Teneriffe wine.”‡ According to Allan Gordon Cameron, “The ground-tint, so to speak, among Old World Deer—genera *Cervulus* and *Cervus*—is from brown to black, but unmistakably dark; among New World Deer, on the other hand,—genus *Cariacus*,—it is a light stone colour, sometimes very light indeed. Before me, as I write, are the antlers of a British Stag and of an American Black-tailed Deer, which to a casual observer exhibit almost the difference in colour between black and white. It seems to me that a contrast of this kind, which is fairly constant in the respective species, cannot be ascribed either to the quality of the fraying post or to the constituents of the blood-stain on the antlers, but must be a specific character of the bone structure, which reacts differently to more or less similar external conditions. Variation in the colour of horns, both in Oxen and Antelopes, seems to point the same way.”§ Moseley was told that the Goats which are wild on the island of St. Vincent, one of the Cape Verde Islands, “have all attained a red colour resembling that of the rocks.”|| As the Rev. H. A. Macpherson remarks, “the colour of Red Deer varies not only with the

\* ‘Experimental Evolution,’ pp. 72, 91, 95.

† Romanes, ‘Darwin, and after Darwin,’ vol. ii. p. 207.

‡ ‘Letters Home,’ p. 90.

§ ‘Field,’ January 16th, 1897.

|| ‘Notes by a Naturalist on the “Challenger,”’ p. 54.

summer and winter coat—for that is obvious—but also with particular districts.”\*

In the New Hebrides the soil of nearly all the islands consists of a “rich volcanic mould.” Pigs, Fowls, and Dogs are said to have been brought into the islands within the last one hundred years, and Capt. Cook has the credit of having introduced the first two. The Fowls have gone wild in the bush, and have “become small and of bantam-like appearance, and are generally of a brownish colour, with all white tail feathers.”† This is only approximate evidence; but more direct testimony is afforded by Mr. Lydekker, who states: “The rich red soil of Devonshire is tenanted by a breed of cattle readily distinguished by the deep red colour of their hair.”‡ According to the same authority, in certain parts of America, the Falkland Islands, Australia, New Zealand, and other countries, the cattle introduced from Europe have run wild, and form vast herds. Those found in Texas and on the Argentine pampas have become of a nearly uniform dark brownish red colour; while in the Ladrone or Mariana Islands, in the Pacific Ocean, all the wild cattle are white with black ears.”§ It would be interesting to know the prevalent surface colour of the soil at Porto Santo, an island near Madeira. To relate a well-known fact, in the year 1419 a few Rabbits born on board ship of a tame Spanish Rabbit were put on the island. The animals not only increased so enormously as to become a pest, but in the course of four hundred and fifty years have developed into a distinct variety or species, which is distinguished among other acquired peculiarities of structure and habits by a “peculiar colour.”|| Mr. Lydekker confirms this statement, and states that the descendants of these Rabbits “have now formed a breed distinguished by their small size, the reddish colour of the fur of the upper parts and the grey tints of that below. So different indeed are these Rabbits from the ordinary kind that the two kinds will not even breed together; and if the history of the Porto Santo race were not known, it would undoubtedly be re-

\* ‘Red Deer’ (Fur and Feather Series), p. 43.

† Somerville, ‘Journ. Anthropol. Instit.’ vol. xxiii. pp. 364, 390-1.

‡ ‘Roy. Nat. Hist.’ vol. ii. p. 170.

§ *Ibid.* p. 172.

|| Haeckel, ‘History Creation,’ Engl. transl. 4th edit., vol. i. p. 150.



garded as a distinct species."\* In Queensland the Rabbit has apparently acquired poisonous qualities. Lumholtz relates:—"The next night we made our camp on an island, and the squatter at once went out to shoot Rabbits with his rifle. The Rabbits had been placed on this island a few years previously, and although there was no fresh water, excepting when it rained, still they thrived very well, and had greatly increased in numbers. Strange to say, these Rabbits are said to be poisonous, doubtless on account of the food on which they are obliged to subsist. The squatter informed me that a year ago he had visited the island and shot some of these animals, which were roasted and eaten, but had made both him and his companions ill." † They vary also remarkably in colour. Prof. Strong states:—"I have seen more parti-coloured Rabbits in Australia than I have ever seen in Europe. Near Queenscliffe numerous instances occur, not merely of white and black Rabbits, which are common, but of Rabbits with beautifully striped skins." ‡ In Paraguay the domestic Cat has become one-fourth smaller, its body is slender, its hair short, shiny, thin, and pressed closely to the skin, especially on the tail, which is almost naked (Rengger).§

(To be continued.)

\* 'Royal Nat. Hist.,' vol. iii. p. 200. In the face of this and other testimony it is somewhat startling to find Weismann stating no alteration has taken place: "The Rabbit which was brought by sailors to the Atlantic island of Porto Santo has bred abundantly, and remains unchanged in this locality" ('Essays upon Heredity,' &c., Engl. transl. 2nd edit. vol. i. p. 271).

† 'Among Cannibals,' p. 322.

‡ 'Zoologist,' 3rd series, vol. xviii. p. 406.

§ Eimer, 'Organic Evolution,' Engl. transl. p. 102.

## THE AUTUMN SONG OF BIRDS.

BY CHARLES A. WITCHELL.

THE songs of birds are worth investigating; but before progress can be made in the knowledge of the why and wherefore of these songs, we must ascertain how and *when* they occur. The last particular is especially important. It is very well to attribute the songs of birds to an erotic origin; but that will hardly account for the Robin and Starling recommencing in July or the first few days of August. Nor will it account for autumnal songs which are preceded by a period of silence (*e. g.* the Chiffchaff), or which are followed by a silence, which is not the case with the Robin and Starling. The September songs of Willow Wren and Chiffchaff are so exceedingly few and far between, as compared with the spring songs, that they may very probably proceed from birds that did not breed in spring, or whose nests were destroyed.

My particular reason for calling attention to this theme is that my own observations seem to conflict with some other records. This may be due to the fact that I have always been "an early bird"; while other observers with less exacting avocations may be more of midday or evening observers. When articulated and subsequently in a practice at Stroud, where most of my observations were made, I never loafed after birds during office hours, but was out on nearly half the fine mornings from 6 or 6.30 till 9 o'clock a.m.

In a paper on the autumn song of birds (*Zool.* 1894, p. 410) Mr. O. V. Aplin says that the Willow Wren (after being silent from mid-June) strikes up again about the second week in August. The words "strike up" are, however, also applied to the Robin and Starling in November or October. Mr. Aplin has assured me that the remark does not, in the case of the latter birds, mean commencing to sing, but the employment of a new style of song. As, however, in the same paper he has a special reference to the Starling as singing in October (why October,

when it begins early in August?), I can only regret that Mr. Aplin was here less careful than usual in expressing his meaning. Unfortunately for me, Mr. Aplin, while not in the least minding my attempting to correct him, found it impossible to believe that I had supposed him ignorant of the singing of the Robin and Starling early in August. But that is just what an ornithologist of repute might overlook. To take a similar instance: How many generations have observed the Swift! Yet, how many scientists will admit its night-flight as a fact? The mimicry of wild Lark and Thrush: how long has it been admitted? It may be denied that the latter mimics the Crow or Land Rail, for its pipe is not suited to coarse cries; but its general mimicry is bound to be admitted sooner or later.

The only previous letter I had received from Mr. Aplin described the wonderful mimicry of a bird which was carefully identified as a Sedge Warbler. But Mr. Warde Fowler told me that in the opinion of the listener the bird ultimately resolved itself into a Marsh Warbler.

Returning to autumn songs. I heard the Wren and Robin nearly every morning from July 7th to August 15th; but not once the Chiffchaff. That bird has a true autumn song, though only one or two here and there indulge in it.

As to the Willow Wren, I have made careful observations on every day but two from June 1st to August 19th. Those two days were cold and wet, so probably there was then nothing to observe. In June and July I observed at morning and evening. My opportunities were easy. In front of my cottage is a small meadow, flanked on two sides by a dense thicket, so I have only to open a window to hear the birds. In the back garden I am within hearing of two other thickets. I pass three others on my way to the railway station, which I reach by nine o'clock.

The Willow Wren has this interesting feature (due perhaps to pugnacity), that when one begins to sing, another will begin almost at the same moment; and when many are in song at the same spot, their successive descending songs make a sort of "chiming," very sweet to hear. I do not know any other bird with this habit. In May the chiming can be heard all day.

I am sending a copy of my notes to the Editor, and will here only summarize them.

The Willow Wrens sang every day but one in June, the 27th, which was wet and cold. From three to five or six were heard at the same time on every fine warm morning. On cold mornings only one or two could be heard.

The evening song (after seven) was abandoned early in July. July 13th was cold, and no Willow Wren sang; 14th, two, occasionally. From 15th to 24th two could generally be heard in the morning; sometimes one. On 25th (7 to 8 a.m.) four or five were singing, sometimes chiming. 26th to 28th, five or six could be heard. 29th and 30th, cold; one heard. Thence to August 14th from one to three or four could be heard, except on the 7th, which was wet. From 14th to 17th two could generally be heard. On 18th none. 19th, two occasionally. 23rd to 28th, none.

There was no doubt of the song when audible. When two or three were singing I heard about twelve phrases per minute (counted). If any were singing I never had to listen for a minute without hearing them.

But though this year the Willow Wrens were not silent in the latter half of June, I had previously formed the opinion that in some years they are so silent, although the species is otherwise our most persistent summer singer. Had I never risen before nine o'clock I should never have noticed the July singing. Since the middle of July it has been the sole Warbler in song.

I may say I have observed the July singing of this bird for many years. A particular incident fixes my memory of one occasion of the kind. More than twenty years ago, at Stroud, I was developing into what the Americans might appropriately term a "collector-fiend," and wished to "procure" a Willow Wren. It was on the 15th of July I went to a thicket where these birds swarmed, and I shot two with a catapult, but found them in heavy moult. Another came along; he sang beautifully, and I shot him. He fell, but rose again and sat on a twig, with one thigh shattered and hanging loose. But he sang his little strain. Another came and attacked him, and he flew a few yards, while I crept after like a murderer. He sang again, his wings pulsating with the notes. I shot him dead. His death probably saved the lives of many birds, for it made me give up the procuring of specimens. But it also made me remember that the Willow Wren sings in mid-July.

## NOTES AND QUERIES.

## MAMMALIA.

## RODENTIA.

Conduct of a Rabbit when pursued by Dog.—One day in July last, when my daughter was walking in my garden here, a little Dog which was with her put up a Rabbit (*Lepus cuniculus*) from one of the flower-beds, which was chased for a short distance by the Dog, when it squatted in the grass, the Dog running round it, wagging its tail and barking. After a few moments it started off again, but, after running about one hundred yards, again squatted, the Dog running round and barking at it as before; when the Rabbit, which was quite full-grown, allowed my daughter to pick it up, and she brought it to me. It seemed as if dazed, and made no attempt to escape.—WM. BORRER (Cowfold, Horsham, Sussex).

[There are many records, and from all parts of the world, of wild animals taking refuge with man when pursued by their enemies.—ED.]

## AVES.

The So-called St. Kilda Wren.—In a review of one of Mr. C. Dixon's publications—I fancy the title had something to do with vanishing birds—in the 'Spectator' of July 30th ult., the writer refers to Mr. C. Dixon as the discoverer of the St. Kilda Wren (*Troglodytes hirtensis*). Possibly some reader of 'The Zoologist' will correct me if I am in the wrong, though I have certainly long been under the impression that the St. Kilda Wren was "discovered" years before Mr. C. Dixon ever set foot on the island, and that every well-informed ornithologist was aware of—well, the fact. I gather from my researches that exactly two hundred years ago, in 1698, the possession of a Wren by St. Kilda was recorded by Martin, in his 'Voyage to St. Kilda'; that in Macaulay's 'History of St. Kilda,' 1764, the species is again mentioned; that in 1831 Atkinson paid a visit to the island and identified the little bird; while, in June, 1883, Barrington likewise came across it on some half-dozen occasions, though he failed to secure a specimen. As Mr. C. Dixon's journey to St. Kilda was not undertaken till 1884, I fail to appreciate the validity of the claim put forward by the late Henry Seebohm on behalf of his understudy, and repeated by an anonymous reviewer in the 'Spectator' only so recently as last month

How far *Troglodytes hirtensis*, the Wren found on St. Kilda, is justified in being advanced to specific rank may be open to argument, though the best authorities appear to look with disfavour on such an advancement; but, touching rightful pretensions to whatsoever *éclat* there may be associated with the discovery and re-discovery of the little bird on the island, there is surely no room for two opinions. — H. S. DAVENPORT (Melton Mowbray).

**Scoters in Summer.**—Early on the morning of June 7th, when a few miles off Southernness, hundreds of Scoters were flying round the yacht. Four Velvet Scoters (*Aedemia fusca*) were detected, and no doubt there were others. In July, when sailing over the same spot, I observed the birds again, and I have often seen numbers of them in summer in the same locality. On the evening of June 13th, whilst fishing in Wigton Bay, a pair of Red-throated Divers (*Colymbus septentrionalis*) were seen. The birds were in full summer plumage, being apparently paired, and from their manners, had I been a little further north, I should have had no doubt as to the existence of a nest not far off. I visited several old nesting places of the Chough on the Kirkcudbrightshire coast, but not a bird of the species was to be seen, and I fear they have gone, never to return. Talking to an old fisherman, who was a close observer of birds, I gathered that fifty or sixty years ago they were common in several localities. Latterly they seem to have been driven away by the Jackdaws, which have increased in numbers.—J. J. ARMISTEAD (Solway Fishery, Dumfries).

**Ivory Gull on the Solway.**—On Aug. 3rd, when riding at anchor in the Solway Firth, I had the gratification of observing one of these rare birds (*Pagophila eburnea*) from my yacht. We had just had tea, and the scraps had been thrown overboard for the birds, which soon came round the yacht in considerable numbers. They were a mixed lot, by far the largest proportion being of the Black-headed species, interspersed with a few Common Gulls, and also some representatives of the Herring and Lesser Black-backed kinds. One bird of a creamy-white colour attracted my attention, and as it came round for the third time, I distinctly saw that it had black feet; its bill was dusky, as far as I could see. Something suddenly alarmed the birds, and they retired to a distance and settled on the water, and I had not another good opportunity of observing the stranger that day. Next morning, however, on turning out early to weigh anchor, I saw it again. This time it was feeding on the ooze, in company with some Black-headed Gulls, about one hundred and fifty yards away. It bore a striking resemblance to a white Pigeon, and a novice would have had the impression that one of these birds was feeding amongst the Gulls. — J. J. ARMISTEAD (Solway Fishery, Dumfries).

Birds nesting in August.—For the last two years I have noted in ‘The Zoologist’ a list of nests with eggs and young found on Bank Holiday in Cambridgeshire. This year I was in the same district, but searched mostly in a different direction, and the following were my discoveries:—One nest of Bullfinch, with one naked young and four eggs hatching; three nests of Thrush, with eggs stale, apparently deserted; one nest of Turtle Dove, with two eggs; one nest of Wood Pigeon, with two eggs; two nests of Meadow Pipits, with four and five eggs respectively, all apparently fresh; two nests of common Whitethroat, with young; eight nests of Yellowhammer, with eggs, mostly fresh; two ditto, with young; one nest of Tree Sparrow, with two eggs deserted; two nests of Linnet, with eggs; one ditto, with young; six nests of Greenfinch, with eggs, half of them fresh; two ditto, with young; one nest of Hedgesparrow, with one egg in hatched-out nest; two nests of Blackbird, with eggs deserted; one of these contained one handsome egg of deep spotless blue, with a rich zone of brown at the large end. This does not include new nests of Wood Pigeon, House Sparrow, Swallow, and House Martin, which I did not examine.—ROBERT H. READ (7, South Parade, Bedford Park, W.).

Coition of Birds in the Air.—Readers of ‘The Zoologist’ have doubtless been interested in some remarks that have lately appeared on this subject in the pages of that Journal. I therefore send you a short account of a personal observation. Whilst passing along one of the roads skirting Clifton Downs, about the middle of June last, I noticed some six or eight pairs of House Martins (*Hirundo urbica*) engaged in collecting mud from the road. Suddenly a pair alighted within three or four yards of me, where I could see them quite plainly. Immediately they dropped into the road the male bird jumped on the back of the female, and appeared to attempt copulation. In an instant, however, the hen slipped from under him, and flew toward me, pursued by the cock bird, uttering loud cries. When quite close, I distinctly saw the male bird (whilst both were in the air) resume his position on the back of the female, and complete the act of copulation. They did not appear to take the least notice of my presence.—W. BARRETT ROUÉ (Clifton, Bristol).

Parasites in Birds.—A most interesting although serious epidemic in the form of Tape and Round Worms infests every Thrush and Blackbird in this immediate neighbourhood. All through last year it was prevalent, and at present seems to be on the increase. During the last two months I have examined some forty to fifty examples of *Turdus musicus* and *T. merula*, also two of *T. viscivorus*, that have been netted or shot from the fruit. In every case the intestine, and in a few the entire length of the alimentary canal, was full of a small Tapeworm, of about an inch in length,

intermixed with a few Round Worms. I cannot understand why every bird should be thus infested. One young Blackbird, caught by my dog, which could only have been out of the nest some few hours, was equally full. There are great numbers of these birds about this year, and at present they are feeding out in the fields. This seems to be most injurious, as dogs, horses, and cattle are thus exposed to the parasites. I enclose specimens taken from various Blackbirds and Thrushes, and should be very interested to know to which family of the *Tæniæ* they belong.\* I have examined a few Starlings and small birds, but in no instance have found them infested. If any readers of 'The Zoologist' have come across a similar occurrence I should be glad to hear of it, also if there is any means of reducing it.—  
J. L. NEWMAN (Mill Hill, Middlesex).

\* We have not, as yet, had an opportunity of having the specimens identified.—ED.



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## NOTES ON THE SOUTH AFRICAN SOCIAL SPIDERS (*STEGODYPHUS*).

BY GUY A. K. MARSHALL, F.Z.S.

IN one of his interesting papers on the zoological features of the Transvaal (*Zool. ante*, 157), Mr. W. L. Distant makes reference to our curious little Social Spiders (*Stegodyphus gregarius*, Camb.), and perhaps a few further remarks on them may not be out of place. Mr. Distant has raised the question as to the size of the nests constructed by this species. This is of course largely dependent on the age of the colony, the structure being gradually enlarged to accommodate the increasing progeny. In the spring months I have often found single chambers, about the size of a shilling, containing a solitary female, the snare consisting of two small, irregular but closely woven screens diverging on either side of the chamber. From this simple structure a graduated series may be traced up to the fully developed nest. I have seen many hundreds of these nests both in Natal and Mashonaland, and, so far as my experience goes, I should say that the one reproduced in Mr. Distant's excellent photograph is well below the average of a fully developed nest, which I should estimate to be at least twice the size, though they are sometimes notably larger. In this country there is a larger and paler species of the same genus, which I do not remember to have met with in Natal, and its nests are often built on a still larger scale, attaining the size of a man's head.

The nest itself is composed of a compact mass of closely felted glutinous silk traversed irregularly throughout with tubular passages, sometimes terminating in small chambers. In these latter the egg cocoons are often placed, but by no means always, for there seems to be no organised nursery, as with the social Hymenoptera. The surrounding foliage is worked in with the nest (but I doubt whether this is for protective purposes), the exterior being overlaid with a coating of very adhesive silk, which is likewise used for making the snares, these being highly irregular both in size and shape, but usually taking the form of vertical screens.

I may here digress to express my belief that the nests of some of our Sunbirds, viz. *Cinnyris gutturalis*, L., *C. chalybæus*, L., *Anthodiæta collaris*, V., &c., are built expressly to resemble the nests of *Stegodyphus* for protective purposes. I have watched the construction in the case of these three species, and the nests are all built in a practically similar manner. No attempt is made at concealment, and they hang suspended from the outermost twigs of bushes or low trees at no great distance from the ground—positions which are equally affected by the Social Spider. The ground work of the dome-shaped nest with its small porch is composed of interwoven grass, and the exterior is covered with leaves, twigs, &c., bound on with cobwebs, the structure when finished having a generally unkempt appearance eminently suggestive of the abode of *Stegodyphus*; and indeed I have been deceived myself in this respect more than once. I have observed *A. collaris* and *C. chalybæus* collecting web from the snares of the large *Nephile* Spiders in Natal; but a pair of *C. gutturalis*, which built within a few feet of the door of one of my huts on the Umfali river, used only the web of *Stegodyphus*.

The food of the Social Spiders consists principally of Coleoptera, for the capture of which their strong glutinous snares are admirably adapted. Their chief victims are the Melolonthidæ, such as *Anomala*, *Trochalus*, *Adoretus*, &c., which positively swarm round trees and bushes on the warm spring evenings after the early rains. Among the larger diurnal beetles, the handsome Buprestids of the genus *Psiloptera* fall a frequent prey to their wiles, and it seems strange how such securely armour-plated insects can afford sustenance to the weak little Spiders; especially

when one thinks that an intelligent insect like the Bee is apparently unable to find a weak spot in the less efficient armour of the Cetoniid *Hoplostomus fuliginus*, Ol., when it enters her hive to rifle the honey. But it would take quite a long list to enumerate all the species of Coleoptera which I have found dead in the nests of these rapacious creatures, for in truth "all is fish that comes to their net," even though it be the evil-smelling *Lycus* or the caustic *Mylabris*. To illustrate the strength of the silk, I might mention the capture of such powerful Beetles as *Copris*, *Catharsius*, and the large *Bolboceras panza*, Pér.; moreover, our large Migratory Locust (*Acridium purpuriferum*, Walk.) is, I am pleased to say, occasionally to be found in the larder, and anyone who has received a kick on the finger from the spiny leg of this objectionable insect will realise that it would take something pretty strong in the way of Spider's silk to secure him.

At one time I had thought these Spiders never entirely nocturnal in their habits, and so far as the construction of their snares is concerned they are no doubt crepuscular, like most Spiders of procryptic colouring. But I find they are by no means loth to emerge in broad daylight to capture their prey; and when a luckless Beetle becomes enmeshed, two or three rapidly rush out and tackle it, keeping as much beneath it as possible, apparently to prevent any attack from above. Should the insect be too large for them, other Spiders come out to assist, and it is hauled off with all speed under shelter, no attempt being made to bind it up in any way as the geometric Spiders do. Judging by the position of the dead bodies of their prey, it is probable that at night many are devoured *in situ*, but even then the majority must be carried inside the nest.

The eggs are usually laid about February or March, being placed in small flat circular cocoons of a yellow colour. The young Spiders are much more rotund in appearance than their parents, and of a yellow colour. In the early winter the nests may be noticed to fall considerably into disrepair, and the damaged snares are no longer mended, and eventually disappear. On investigation I found this to be due to the fact that about this time the older generation dies off entirely, the nests then being found to contain only young Spiders. The dead bodies of

the parents may be seen lying about in the passages amidst the *débris* of deceased Beetles. Whether the older Spiders are actually killed and devoured by their own progeny, I have not so far sufficient evidence to decide. For the present, however, I incline to this view, for otherwise I can see no reason why the parents should suddenly die off as they appear to do. It is true that at this period their food supply almost comes to a standstill, for during the winter months Coleoptera cease almost entirely to venture out on the wing; but this would affect the young ones equally, if not more. Even if this supposition be correct, it is difficult to understand how the young subsist through the winter, for, so far as I have seen, they do not emerge at all from the nest, and they certainly construct no snares during that season for the capture of insects.

One of the most interesting features in the economy of these creatures has yet to be dealt with. In the winter of 1895 I examined a number of deserted nests along the Umfali river in hopes of finding Coleoptera harbouring therein, and I was surprised to find in several instances large balls of grass, wild cotton, or even feathers, right in the middle of the nest. I was quite at a loss to understand how or why the Spiders should accumulate these materials, and I did not find the solution until early in the present year.

It happened thus. On one of my entomological rambles some miles from Salisbury, I found myself suddenly enveloped in a regular winding-sheet of sticky Spiders' silk, which was evidently that of my friend *Stegodyphus*. I therefore walked a short distance up wind to find whence it came, and soon descried a bush on a termite heap, on the summit of which were some hundreds of these Spiders, apparently engaged in constructing a new nest, and evidently in a great state of perturbation. It at once struck me as very curious that these wary creatures should be thus exposing themselves wholesale in broad daylight, and I therefore proceeded to search for the disturbing element. The bush was placed on the side of the termite heap, and was connected by several strands of about four feet long with a bush on the top, on which was a smaller lot of some fifty Spiders. These were again connected with another shrub about six feet away on the far side of the ant heap. Here was found the original nest, and there

were still one or two Spiders on the outside of it. Within a foot of the nest was an open bird's nest, apparently that of a finch, containing two eggs, with which, however, I was unacquainted, they being very similar in appearance to those of the European Bullfinch. It seemed hardly probable that this could be the cause of the commotion, and so it proved, for the eggs were clearly deserted, being quite cold and hard set. I then examined the Spiders' nest, and was surprised to hear sundry squeaks inside, so, placing my butterfly-net beneath it, I tore the nest open, and out dropped four little Dormice (*Myoxus nanus*, De Wint.). Here, then, was the cause of this twofold domestic tragedy! Here, too, was the explanation of the facts I had observed on the Umfali, for in the centre of the nest was a chamber lined with soft grassheads, feathery flower-seeds, and one or two feathers. Subsequent observation has convinced me that this is a normal habit on the part of the Mashona Dormouse, for I have since found two full-grown specimens in similar positions, and, besides, a large proportion of disused nests show clear signs of having been thus occupied. I expect the primary attraction will be found to be the Beetles caught in the Spiders' web, the Dormice having gradually learnt to utilise these snares for their own purposes, and finally evicting the inhabitants. Whether they usually occupy deserted nests, or themselves oust the lawful proprietors, cannot yet be decided for certain; but the above instance clearly demonstrates that the latter method is sometimes employed, and from the evidence before me I am inclined to believe that this is the usual course. It is pretty clear that in this case the mother Dormouse must have brought her young to the nest, for they were fully a week old, and perhaps more, and the condition of the nest showed that it had been occupied only for a short time. Likewise it seems probable that the Spiders resisted the invasion for some time, as it was evident that they could only have evacuated a few hours before, whereas it must have taken the Dormouse some little time to construct her nest and bring her young there.

To return to the victims—they were busying themselves all this while in setting their house in order, though a large proportion were apparently of opinion that it was desirable to put a still greater distance between them and their persecutors; for

some fifty of them were standing together with abdomen in air pouring forth a regular stream of silk in hopes of connecting with another tree. In one case a few threads caught on to a tree fully twelve feet away; the near ends were then promptly fastened down, and a Spider would advance cautiously along, strengthening the thread and hauling in the slack as she went, but in every case the thread broke. After many attempts to thus retreat further they gave it up, and went on with the work of making a new nest. The foundations of this were made by forming a dome-shaped canopy some eighteen inches in diameter over the top of the bush, the Spiders running backwards and forwards in all directions laying down the silk. I presume that eventually the edges of this canopy would be drawn together to form the outer shell of the nest, but unfortunately I was unable to remain longer to watch the process, and as I never found an opportunity to revisit the spot, I never learnt the sequel of this interesting chapter in the life-history of *Stegodyphus*.

In conclusion, I may mention that I have recently discovered a singular messmate of the Social Spiders. This is none other than one of the Micro-Lepidoptera! The larvæ in their frass-covered cases reside among the *débris* of dead insects, on which I presume they feed. I have not yet reared the imago, but hope to do so before long. In a nest I opened yesterday I found six empty pupa-cases, from which the moths had evidently emerged; how they managed to escape right from the heart of the nest seems little short of a marvel. Truly these venturesome insects pass their lives in the very jaws of death, and the struggle for existence must be keen indeed to compel them to resort to such an abode.

## ZOOLOGICAL NOMENCLATURE.

## REMARKS ON THE PROPOSED INTERNATIONAL CODE.

BY REV. THOMAS R. R. STEBBING, M.A., F.R.S., F.L.S., F.Z.S.

MANY of the proposals of the International Commission\* on this subject are so admirably drawn that they have a fair chance of commanding universal acceptance. On some of them public opinion is authorized to differ, since the members of the Commission are themselves not unanimous. By a singular policy at Cambridge the Report was submitted to the Zoological Congress, and in the same breath withdrawn from discussion. Debate was closed before it had begun. This tantalizing course was due apparently to some dread of starting an interminable controversy. It is easy no doubt to have too much of a good thing, but nothing is an unintellectual alternative to too much.

The proposals are divided into rules and recommendations. Nevertheless several recommendations are interpolated among the rules.

On the eighth rule of section I. the members of the Commission are divided. Three of them say, "All grammatical errors must be corrected; at the same time hybrid names are to be retained without emendation." For example, they "correct" *Cuterebra* to *Cutiterebra*, *Glossiphonia* to *Glossosiphonia*. But two of the members propose the following form for this rule: "Barbarisms and solecisms shall be construed (under B. § 3 k) as arbitrary combinations of letters, and cannot be rejected or emended because of faulty construction. Hybrid names are to be avoided, but when once published are not to be rejected."

The minority, it will be seen, include in their rule a recommendation. Apart from that, theirs is by far the more desirable

\* See the 'Annals and Magazine of Natural History,' ser. 7, vol. ii. p. 181 (1898), and the Report submitted to the International Zoological Congress at Cambridge last August.

form. It should surely be the object of an International Code to interfere with individual liberty as little as possible, and to protect accepted names from any change that can be avoided. But in correcting names which may be considered to offend against grammar or philology, more inconvenience than advantage is likely to arise. A longer name, as in the examples quoted, will often have to be substituted for a shorter one. The practical nuisance of this will be well understood by those who have to write labels for small bottles and glass slips. It is also contrary to the tendency of language, which is constantly condensing instead of expanding its forms—reducing, for instance, the five syllables of "*Mea domina*" to the monosyllabic "Ma'am," or "Mum," or "M'm." The zoologist need not encourage the geographer to change back Brighton into Brighthelmstone. By correction a name will sometimes receive a different initial, as in the change of *Oplophorus* to *Hoplophorus* or of *Upogebia* to *Hypogebia*, which is apt to be very confusing when an index has to be consulted. The principle of priority is weakened when the original form of a name is relinquished not in the interests of science, but of scholarship. On the other hand, it is so easy to let the names alone, carrying with them their small but interesting touches of autobiography, and no possible harm is done if we do leave to the polished scholar some little occasion for chuckling over us untutored sons of science.

In section III., the second rule begins by declaring that "Specific names are of three kinds: a. Adjectives which must agree grammatically with the generic name." On this it may be diffidently asked whether it would not be simpler to regard all generic names in zoology as masculine? This would avoid any necessity for changing the termination of a specific name on its transfer from one genus to another. It would put an end to a frequent confusion arising between Latin feminine and Greek neuter forms which happen to have the same vowel-ending. The most sensitive ear need not be offended, since *Agricola*, *Aurelia*, *Cyphostoma*, under the present rule, require an adjective respectively in the masculine, the feminine, the neuter. An animal does not become more one gender than another because of its name, and the grammar of the Greeks has wisely recognized what is called "the construction according to the sense."



The third kind of specific names is said to be: "c. Substantives in the genitive, such as those given in dedication to persons or groups of persons." To this is appended the remark, "The genitive is formed by adding an *i* to the exact name of the person, if a man; an *æ* in case the person is a woman." Without further explanation, therefore, we might have two such species as *Felis Johnsoni* and *Felis Johnsonæ*. But this can scarcely be intended.

The third rule of this section, according to three members of the Commission, should read thus: "While it is desirable to avoid the repetition of the generic name as a specific name (*Perdix perdix*, *Trutta trutta*), such repetition is not sufficient grounds for rejecting or changing either the generic or the specific name. The same principle applies to the repetition of the specific name as subspecific or varietal name." The minority say, "Specific names, when used as generic, must be changed."

The following form is offered as an alternative: In future, specific names within a genus may not be used for naming its subdivisions; as regards the past, the name of the species which has supplied a generic name shall be that which was given to it by the author who placed it in the new genus to which its specific name was applied. For example, if *Tetrao perdix*, Linn., at the institution of the genus *Perdix* had been called *Perdix perdix*, that would be the name to be retained; but as it was in fact called *Perdix cinerea*, the very name used by Aldrovandi and other pre-Linnean authors, that name will happily prevail. This rule, if accepted, will keep us from tinkering at the work of our predecessors by *ex post facto* regulations.

In section IV., rule 3 finds the Commission once more divided, on the question of defining who is the author of a species. For the paragraph in dispute, the following form is suggested:—The author of a species shall be that person who—*a.* First publishes the description of the species, with names in conformity with Rule 1. Should the description and names be at first publication incorporated in the work of another writer, such writer will himself be deemed author of the species unless he attests that he is quoting the description as well as the names from another authority. Paragraphs *b*, *c*, *d* would follow as in the proposal of the majority.

On the one hand, the man who has had the trouble of examining and describing a species has much more right to be regarded as the "author" than one who has merely suggested a name. On the other hand, an author should not be deprived of his credit because his work happens to be incorporated in another man's publication. The majority of the Commission append a recommendation—for it can scarcely be intended for a rule—that the name of the author should follow the specific name "without the interposition of a comma." There is nothing to be said against this except that sometimes an author's name may come into a ludicrous combination with an uncomplimentary remark intended for the Snake, or the Cockroach, or some other low-minded species. Another recommendation, posing as a rule, prescribes the use of italics for distinguishing between the names of the species and the name of the author. It would be better to proscribe italics than to prescribe them. They are less legible than many other forms of type, and, as old books show, they are the worst in wear.

Coming now to the recommendations, specified as such, the third deals at great length with words which may be taken as generic names, and mentions first: "a. Greek substantives, for which the rules of Latin transcription should be followed." Many examples are given.

In regard to transcription, a word may be said in behalf of the English-speaking peoples. Our pronunciation vividly accentuates the difference between a long vowel and a short one, yet we have but one symbol for both sounds throughout our vowel system. There is nothing in the form of the letters to prevent a man's saying *Amphibōla*, *Hydrophilus*, or *Hippopotāmus*. How much the young have suffered through false quantities is an untold sum of human misery. But they harass not boys alone. Of university men who acted classical plays in his day, Milton says bluntly, "They mispronounced, and I disliked; and, to make up the atticism, they were out, and I hissed." The men he derided were victims to tortures of the tongue, which, as far as speakers are concerned, "The bad affright, afflict the best." Long ago an absurdly simple remedy was proposed for application to scientific names. It directed that the penultimate syllable of a name should be accented when that syllable is long,

and the ante-penultimate when the penultimate is short. The International Commission would do a thankworthy act by giving the sanction of their authority to this ancient but much neglected proposal.

In the transcription of Greek diphthongs it would, as many think, be far better to retain *ei*, *ai*, and *oi*; *ei* because there at least the quantity could no longer be doubtful, but *ai* and *oi* because the italic printing of *æ* and *œ* causes constant confusion. Thus, for example, *μαῖρα*, the bright sparkle, is confounded with *μοῖρα*, gloomy fate. *Pareiasaurus*, the lizard with a cheek, is a complete linguistic puzzle when written *Pariasaurus*. The ending *idæ*, in names of zoological families, is often pronounced with a long penultimate, as if from the Greek *εἰδης*, as in *Atreides*. But here a misconception has evidently crept in. The penultimate is only long in such words as *Atreides* because it is a contraction of two short syllables into one long one. In *Æacides* from *Æacus* and in similar forms the penultimate is short. But knowledge of what is right, and uniformity in usage can never become general until in these matters we are assisted by the art of the printer.

Among consonants the transcription of *k* into *c* appears very undesirable, as it inevitably results in mispronunciation, *καρκινος*, for instance, being changed vocally into *Carsinus*.

Some minor points of criticism may be left over to a future opportunity. But, before concluding, I shall venture to submit one or two questions to the learned authors of these recommendations. Is it quite fair to expect those whom they will concern in all parts of the world to be acquainted either with "the rules adopted by the Geographical Society of Paris," or with the geography of the Romans and of Latin writers of the Middle Ages? Why, too, should any notice be taken, in so important a document, of the trivial economy aimed at in abbreviations of authors' names? These absurd curtailments remind one of the time when the sayings and doings of Pitt and Fox were recorded as the words and deeds of Mr. P-tt and Mr. F-x, and when "the" was "y<sup>o</sup>," with other teasing stinginesses in printing. In the interests of this useless system the zoologist is invited to carry about a list of abbreviations proposed in one country, enlarged in another, imperfect at its birth, and with

every year of its existence bound to become more so, and this, forsooth, in order that the printer may make Lesson Less., make A. Müll. of Auguste Müller, turn Sowerby into Sow., and make Stingelin Sting.

As illustrating the difficulty of the whole subject, it is interesting to note that the five distinguished men on the Commission failed to come to an agreement on three topics, and that on each occasion the majority was differently composed.

## NOTES AND QUERIES.

## MAMMALIA.

The Mammalia of Hampshire.—I am collecting information concerning the Mammalia of Hampshire, and should be grateful to any of your correspondents who could help me, especially with regard to the Bats, of which we claim eleven species, and the Cetacea (eight species), the Polecat, Marten, Black Rat, and Roebuck.—J. E. KELSALL (Milton Rectory, Lymington).

## AVES.

Swallow v. Flycatcher's Peculiar Nesting Site.—Whilst searching a certain portion of the Mendip Hills for eggs of the Corn Bunting on June 20th last, I chanced to pass close to one of the well-like excavations which are numerous in this particular locality, and perhaps date back to 1500, when these hills were searched for lead, &c. On walking round this circular excavation in the earth, edged entirely with tall bracken, I was surprised to see a Swallow (*Hirundo rustica*) fly up from the depths below; so, having procured from the near woods a long stout fir-pole, I slid one end down, and firmly ledged it on an opposite rock. After half an hour's steady and laborious work in 100° Fahr., I found myself eighteen feet below the surface, and not altogether in an agreeable position or condition. After closely examining my landing stage, I commenced a hasty search for the nest of my little friend the Swallow; I found it close in reach, perhaps fourteen feet from the top, fixed against the rock, and built in the ordinary way of mud, and lined with hay and feathers, and containing five young ones. The nest appeared to be one of former years, only freshly lined. Personally, I have never found a Swallow's nest in such a queer situation before. On July 19th, having to visit a Greater Spotted Woodpecker's nest close by, I again walked to the gruff-hole; getting my pole once more into position, I was much quicker at the bottom of it than on the previous occasion. Now for the surprise: a little brown bird was sitting on the Swallow's nest. I reached my hand towards her, and she disappeared out of the hole above; I immediately recognized the Spotted Flycatcher. A pair of these birds had evidently taken possession of the Swallow's nest,

and built a compact little nest inside, containing four eggs of the ordinary colour. The young of this species have since flown.—STANLEY LEWIS (Mount Pleasant, Wells, Somerset).

**A Cuckoo's Economy in Question.**—Ornithologists of a speculative turn of mind may be interested to learn that during the last week of May, in 1896, I found a Meadow Pipit's (*Anthus pratensis*) nest on the lower slopes of Aran, a well-known mountain in North Wales. In addition to one solitary egg belonging to the lawful owners, the nest contained a Cuckoo's egg. The former I left *in situ*; the latter I appropriated for reasons which need not here be specified, despite the fact that egg-collecting then as a hobby was with me a thing of the past. On retracing my steps some six hours later, I turned aside to have another look at the nest in question, and was surprised to find that the Meadow Pipit's egg had been hatched in the interim, the callow youngster lying dead in the nest. I say "surprised" advisedly, for though I had not examined the commoner egg at all critically in the morning, I had nevertheless satisfied myself before abstracting it that the Cuckoo's egg was absolutely fresh, and such was subsequently proved to be the case.

Now the main points of interest are as follows: What agency had been instrumental in removing the other eggs, which it is quite legitimate to assume had been originally laid? A Meadow Pipit's almost invariable clutch, I may observe, is four to six; *not one odd egg*. Again, admitting for the sake of argument that sundry eggs had been removed, what was the motive underlying their removal, assuming the Cuckoo to have been the culprit? Oologists of experience will not need to be told that when Voles plunder little birds' nests, they usually make a clean sweep—in time and by degrees—of all the eggs; while there are but few birds which will allow themselves to be robbed of every egg but one, yet still continue sitting, and to this category, in my experience, Meadow Pipits do certainly not belong. Another interesting point, too, is this: a perfectly fresh Cuckoo's egg is found side by side with a Meadow Pipit's egg on the point of hatching; what then becomes of the alleged prescience, or intelligence, or instinct, or inherited memory on the part of the Cuckoo in always arranging things so adroitly that no hitch shall occur in the due incubation of its eggs if left unmolested by the foster-parents? For in this particular instance, had there been no interference on my part, the young Meadow Pipit, in the event of all having gone well with it, would have been fledged and away before the Cuckoo's egg was hatched, even supposing the foster-parent to have "sat" pretty assiduously—which I doubt—after its own young one had emerged from the shell!

Howsoever the facts are to be accounted for, I do not disguise my personal conviction that the Cuckoo herself abstracted the surplus eggs of the

Meadow Pipit, and that she had some excellent though recondite motive for so doing. To others I leave the responsibility of explaining away an apparently singular aberration on the part of a species which, according to some people, is "knowing" even to the extent of being able to diversify the colouring of its eggs to suit the exigencies of each recurring situation! But, apart from all speculation on the issues raised, it is impossible not to recognize that the discovery of a perfectly fresh Cuckoo's egg alongside a Meadow Pipit's egg on the very point of hatching must be a matter of no small interest to scientific ornithologists, since, so far as I am aware, nothing of the kind has ever been before recorded; while far from tending to elucidate anything in connection with the economy of the species, the incident, if not to be dismissed as a *lapsus* on the part of an undiscerning Cuckoo, seems to me to involve a most perplexing economy in still deeper mystery.—H. S. DAVENPORT (Melton Mowbray).

**Cuckoos in 1898.**—It seems clear that some peculiarity exists at the present time here connected with calls upon the services of the Mountain Linnet (*Linota flavirostris*) as foster-birds. Following up my observations since my last communication, I observed another young Cuckoo on an adjoining moor on July 30th. I was attracted to it by the peculiar "cheep" of this young bird, which of course was away from the nest. Its entreaties were evidently directed towards its foster-parents, and on changing its position from the sloping ground where it was when it first saw me to the branch of a willow bush, where it clung tenaciously, the Mountain Linnets were both promptly in attendance. We may assume that they were the foster-birds, and their interest in the young Cuckoo was equal to anything which I have observed by these birds in that direction when looking after their own young after these have left the nest. These three were seen near the same place in similar form on Aug. 8th. Another young one made its appearance on my hay-field on Aug. 6th; the peculiar "cheep" drew attention to it, and it seemed to have just recently taken to flight. It was not the rufous one mentioned in my last communication, being of a dark blue colour. This bird may be thus considered another of this year, and had the same species of birds for foster-parents. As hay-making operations were being executed at the time, ample opportunities occurred for observing the movements of this individual, which was seen daily up to Aug. 12th; sometimes being under cover, sometimes appearing in graceful flight, perching on an adjoining bush, the fences of the field, or on the implements. It seemed to become acquainted with our movements, and it occurred to me that the nature of the flies and such like was the attraction which kept this one so closely amongst us. We neither saw it taking food itself, nor being fed by the foster-parents, but the latter were always in attendance; and a

peculiar sight it was to see this pretty specimen of a bird courting care from the little Twites. One could not wish to see a better sight than the graceful form of its flight during the latter part of the time. It improved in flying during the week. A Kestrel soaring nearby caused some little hubbub on one occasion, the Cuckoo's cries, evidently showing that it wanted protection from its little guardians, drawing our attention to the matter, which was interesting to us. The last appearance of this bird was on Aug. 15th, by which time the peculiar "cheep" of its voice had changed to a sort of croak. It had become a beautiful specimen of its kind, and attained the power of a most graceful flight. The foster-birds were still in attendance. Three were seen on a moor in the neighbourhood on Aug. 12th. One being seemingly larger than the others, there were some grounds for supposing that the former was an old one, the latter young ones. That is all that I know as to the latest date of their presence or waygoing. The season being late, they would probably have been here at a later date than usual; their departure being a mystery to me. Whether the young have instinctive powers to lead them the proper course of themselves, or the old wait in whole or in part—that is, parents wait on offspring, or casual stragglers pick up young right and left—this year at least the old birds had generally disappeared before these young ones referred to were able to follow. How far they may go at first is also worthy of notice, as they may only remove in stages of a few miles at a time from this part, seeing that they appear much later in the milder parts of the kingdom. Then, as they do not pair, as is believed, would the males move away before the females? The latter might be kept waiting for or with their young, but—and as others who are polygamous have males which show more or less interest in the offspring of their species—we cannot conclude that the males do not equal in interest the females. In short, the point being debated whether the old take any interest after depositing the egg, it is just possible that the males would equal the females in showing attention, which latter has been proved to have been shown to young at various times. When the attachment continues so long towards the foster-birds, it would be interesting to know how they parted company. Would the youngster by a long flight leave behind such foster-birds as those we have been speaking of, who live in small space, or would the latter shake the former off in due time? There is also the point, would one of the old Cuckoos appear in due course, or is the whole thing a matter of mere accident?

Then I have to say about the clearing away of the eggs or young of the foster-birds. In the two cases this year it is pretty clear that neither was done by the young Cuckoos—one being impossible, the other most improbable. It must have been either the old Cuckoo or the foster birds that had cleared away the young in one case, the eggs in another, to make room



for the favoured one. I for one must lead myself on to the debatable ground, and say that the vigilant eye of the parent Cuckoo, in my opinion, must have led her to clear out the impediments to the proper care of her progeny. It being concluded that the Cuckoo about the time which she deposits an egg in a nest habitually does extract an egg of the bird's, but not always, we may reason that she may more or less habitually clear out the latter's offspring. Failing in the latter, the young Cuckoo can do so for itself in due course. Whether dead young birds would be carried away by her is more doubtful; probably, as in some cases at least where the young one expels, the foster-birds clear away.—WM. WILSON (Alford, Aberdeen).

**Date of Arrival of the House Martin.**—I am glad that Mr. Warde Fowler has called attention (*ante*, p. 267) to the apparent alteration in the date of arrival of the House Martin (*Chelidon urbica*), as it has much puzzled me to account for its having been so late in its spring appearance in South Devon since 1891. Previous to that year I had always seen the first House Martin in April, and in the year before that (1890) as early as the 9th of that month. Since then I have never observed it before May, except in 1894, when April 20th was the date of its arrival at Exmouth. Although in 1891 I did not see any in Exeter till May 14th (when there were a few only to be seen), it was observed at Swanage, in Dorset, on April 11th, and at Kingsbridge, in South Devon, on April 24th. Again, in 1897 I did not notice any at Chagford, Devon, till May 3rd; but House Martins had been seen by the Rev. Murray A. Mathew at Buckland Dinham, Somerset, on April 6th. This year I saw none till June 19th at Topsham, and at Chagford, at the end of the month, there were very few in the streets, though it is usually a very abundant species there. One, however, was seen by Mr. Mathew at Buckland Dinham on April 26th, and it appears to have been as numerous as usual there. In this neighbourhood it has been very scarce all the summer. It would appear from the late Mr. T. R. Archer Briggs's notes that the House Martin is always later in arriving in the Plymouth district than about Exeter, and the late Mr. J. Gatcombe observed some arriving with a northerly wind on May 3rd, 1873, although near Topsham it arrived in large numbers from the south on April 16th. In 'The Zoologist' for 1845, pp. 1189 and 1890, are some observations on the arrival of spring migrants at Devonport by W. Harris Row, who gives the following dates of arrival for the House Martin:—1841, May 3rd; 1842, May 9th; 1844, May 2nd; 1845, May 5th. In 1895 I observed House Martins at Bovey Tracey, Devon, on May 1st; and when Mr. Mathew and myself were at Slapton Ley, on the south coast, on May 9th, House Martins were in great numbers perched on the

telegraph-wires which run along the sands, and had evidently just arrived from seaward; but none were seen at Exmouth till May 12th.

The observations in 'Birds of Devon,' alluded to by Mr. Warde Fowler, were made by myself, and I append records for thirty-four out of the forty-six years between 1852 and 1897 from my own note-books (made principally in Exeter or its neighbourhood, and at Exmouth); and also notes made by the late Mr. T. R. Archer Briggs at Fursdon, Egg Buckland, Devon, which were very kindly put into my hands by his brother, Colonel Briggs. My observations were unfortunately not continuous, as I was absent from England between 1856 and 1862, and between 1884 and 1888, and from 1867 to 1870, and in a few other years I was too much occupied to record any observations. It is curious to notice that whereas the dates of arrival in this neighbourhood used to be much earlier than those recorded by Mr. O. V. Aplin near Banbury, of late years they are later.

1852, April 7th .....	
1853, April 12th.....	April 20th, T. R. A. B.
1854, ——— .....	
1855, April 25th.....	April 27th, T. R. A. B.
1856, April 14th.....	
1857, ——— .....	
1858, ——— .....	April 22nd, T. R. A. B.
1862, April 23rd.....	April 24th, T. R. A. B.
1863, April 28th.....	
1864, April 24th.....	
1865, ——— .....	April 27th, T. R. A. B.
1866, April 16th.....	
1867, April 14th.....	April 27th, T. R. A. B.
1868, ——— .....	
1869, ——— .....	
1870, ——— .....	
1871, April 19th.....	April 28th, T. R. A. B.; April 17th, Totnes, J. H. G.
1872, April 21st (April 23rd, Tor- quay, J. H. G.) .....	
1873, April 16th (in large numbers)	April 30th, T. R. A. B.; May 3rd, J. G.
1874, April 2nd and 5th .....	April 27th, T. R. A. B.
1875, April 10th and 18th .....	
1876, April 9th (many).....	
1877, April 26th.....	May 4th (Plympton).
1878, April 25th.....	
1879, ——— .....	April 25th, T. R. A. B.
1880, April 24th.....	
1881, ——— .....	
1882, April 6th .....	
1883, April 29th.....	
1884, April 13th.....	
1885, ——— .....	
1886, ——— .....	
1887, ——— .....	May 4th, T. R. A. B.
1888, ——— .....	April 25th, T. R. A. B.
1889, ——— .....	

1890, April 9th (Exmouth) .....	
1891, May 14th (Exeter) .....	April 24th (Kingsbridge).
1892, May 5th (Exmouth) .....	
1893, ——— .....	
1894, April 20th (Exmouth) .....	
1895, May 1st (Bovey); May 9th (Slapton, in large numbers); May 12th (Exmouth) .....	
1896, May 8th (Exmouth) .....	
1897, May 3rd (Chagford) .....	
1898, June 19th (Topsham).....	

—W. S. M. D'URBAN (Newport House, near Exeter).

Dr. Saxby and the Breeding of the Turnstone.—The *locus standi* of the Turnstone (*Streptilas interpres*), in relation to the question as to whether the species has ever been known to breed in the British Islands, has long perplexed me. No authenticated nests and eggs have ever been found, write, in effect, most of the more modern authorities in the ornithological world. And yet Saxby's account of the discovery of a nest and eggs in Shetland is so circumstantial as to make one wonder whether there is anything "behind the scenes" which causes such almost universal scepticism on the point. That indefatigable and intelligent ornithologist observed a female Turnstone on the evening of June 16th "behaving very suspiciously"; he ultimately, after a search extending over two hours, stumbled on the eggs, three in number, which were lying "in a hollow among the stones," the same hollow being "scantily lined with dry grass." That the eggs were fresh is to be inferred from the context at the top of p. 172 in 'The Birds of Shetland,' a copy of which work I have before me. Further, Saxby writes that he "had not the smallest doubt that the eggs were Turnstone's—indeed, *they could have been nothing else.*" On the following morning a man arrived with the two eggs which Saxby had left in the nest overnight to claim the reward offered by the latter—an incident which tends to prove that the Shetlander had no misgivings as to the correct identity of the species. While yet again, after having specifically referred to the fact that he had for years seen Turnstones *in pairs* about the shores of Unst during the *breeding season*, Saxby writes:—"Two of the eggs were a good deal like the figure in Mr. Hewitson's work." Now it seems to me that for writers with almost one accord to declare that it is highly probable that the Turnstone breeds in Shetland and on some of the northern islands, and then summarily to reject Saxby's positive and very explicit account of the discovery of a nest and eggs in Shetland with the remark, "There is no authentic instance of the breeding of the Turnstone in Great Britain" (vol. iii. p. 178, 'British Birds,' Bowdler Sharpe), is a capricious, not to say arbitrary and illogical way of treating the matter. I have nowhere seen it stated that Saxby was not competent to identify a

Turnstone when he saw one, or its eggs; while Seebohm, with whom I entirely agree, has asserted that "the eggs of the Turnstone cannot be confused with those of any British Plover, nor easily with those of any of the Sandpipers." To my eye, indeed, they have a character peculiarly their own. Edward Newman, by the bye, reviewed 'The Birds of Shetland'—a second notice—in 'The Zoologist' (of which he was then the talented Editor) of November, 1874; but, far from raising a warning voice on the point at issue, he quoted the author's passage dealing with it in full, eulogistically remarking:—"The breeding habits of the Turnstone are admirably described in the paragraph which follows, and leaves nothing to be desired." What I want to know is this: why is Saxby continually quoted with evident approval in this, that, and the other work on British Birds, and yet the same author's detailed version of a question of considerable scientific interest discarded as unworthy of credit? Surely the mere presumptive evidence surrounding the issue strongly favours the complete reliability of the story as Saxby gave it to the world, let alone the personal testimony he adduced in substantial support of it. Permit me to add that I write in no carping spirit; my sole object is quest for information, being unable to account for the *non possumus* attitude adopted by comparatively recent authors in face of some apparently convincing statements on the part of a man who was so punctilious on the score of ornithological accuracy that, though in his own mind he was perfectly satisfied that a couple of eggs brought to him by a boy in 1859 were Turnstone's, he abstained from labelling them as such owing to the inability of the finder to furnish any account either of the bird or nest.—H. S. DAVENPORT (Melton Mowbray).

**Late Stay of Swift.**—While taking a walk on Lansdown, on Oct. 1st, I saw a Swift amongst a large flock of Swallows and House Martins. I see in the 'Field,' Sept. 24th, that a correspondent noticed a Swift at Wainfleet, Lincolnshire, on Sept. 18th. I do not remember having noticed this migrant prolonging its stay so late as October.—C. B. HORSBRUGH (4, Richmond Hill, Bath).

#### REPTILIA.

**Notes on the Habits of Python molurus in Confinement.**—Twelve months ago I became the possessor of an Indian Python (*P. molurus*), which up to the present I have kept in excellent health. During this time I have noticed several things in connection with its habits which are new to me, and which perhaps may be of interest to readers of 'The Zoologist.'

In most accounts of these large reptiles in confinement they are described as being lethargic, and seldom moving. This idea must, I think, arise from their nocturnal habits, and my experience certainly does not

confirm the statement. During the daytime my snake lies quiet, apparently fast asleep. Whether or no he is so I cannot say, but I notice that the elliptic pupil of the eye is generally at this time almost invisible. On touching him, however, the black streak widens until the pupil is large and round, and this I presume means that he is waking up and opening his eyes. However, during the day he seldom moves or takes any notice of what is passing around him; at night he is quite a different animal. He generally wakes up about seven or eight o'clock in the evening, when I see his small head and pearly-white throat peering through the glass front of his case. His movements are restless, quick, and active, and he is rarely still for long together, moving at a fairly rapid pace round the case, and up and down a branch which is placed therein for the purpose of exercise. The pupil at this time is full and round, covering nearly all the eye. His great delight is to be allowed to leave the case and climb about my shoulders, or to have the free run of the room, where he goes on exploring expeditions over chairs, tables, &c., inquisitively examining everything by the aid of his constantly vibrating tongue. Dull-coloured articles which do not shine have not nearly the same attraction for him as those which are brightly polished. The Rev. G. C. Bateman, in his useful book, 'The Vivarium,' expresses the opinion that snakes possess little or no sense of hearing, and my observation certainly confirms this; for, while the Python is exceedingly quick at detecting vibration, he takes not the slightest notice of any sound which is unaccompanied by it, even at times when he is most "wide-awake."

The rate of growth is much more rapid than I should have expected. When I obtained him on Sept. 7th, 1897, he then measured 6 ft. 6 in. in length; on Nov. 29th he had increased to 6 ft. 10 in., and to-day (Sept. 2nd, 1898) he measures 8 ft. 1 in., an increase of nineteen inches for the twelve months. His girth has also considerably increased. During the year he has shed his skin four times. The first was only a few days after I got him, when I noticed him rubbing his head upon the felt at the bottom of the case in order to loosen the skin round his jaws. I have unfortunately lost my notes of the details of the operation, but I remember the time occupied from beginning to end of the proceedings was only twenty minutes, the skin being cast in one piece. Frequently I place in the case a zinc bath filled with water, and in this the Python spends a good deal of time, lying totally immersed, but with the nostrils just above the surface of the water. If disturbed he will withdraw even this, and my friend Mr. F. Grant and myself timed him on one occasion for  $5\frac{1}{4}$  minutes before he raised his head to take breath. To this bath he always repairs before casting his skin, and usually passes a considerable time therein on such occasions. On Nov. 20th, noticing that the reptile was listless and

sluggish, and the skin very dry and rough—signs denoting that it was nearly ready to shed—I placed the bath in the case at seven o'clock in the evening. The snake at once entered the water, and did not again leave it until between seven and eleven o'clock in the evening of Nov. 26th, when it shed its skin in the water and left the bath. The skin this time was shed in two pieces. On Jan. 6th the Python again commenced to steep preparatory to casting another skin, and this time remained continuously in the water until Jan. 13th, when it shed its skin (in several pieces) in the water. I was not fortunate enough to see the operation of casting in either of these cases, but on Aug. 10th the snake again entered its bath with a view to softening its skin for casting. This time I kept him under close observation during the whole time. After he had been in the water a day or two the scales over his eyes became white and opaque, and the reptile was evidently blind. In about five days after this occurred they cleared again, and he was able to see, and two days later—on Aug. 19th, at 11.30 p.m.—he left the water. At 11.40 p.m. he commenced rubbing the sides of his jaws on the felt at the bottom of the case, gradually loosening the skin round the edges of the lips. When he had got as far as the nostrils he gave two sudden and forcible expirations of breath—not an ordinary hiss, but more like a sneeze—apparently to clear the skin from the inside of the nostrils, and then continued rubbing off the moist loose skin. At 11.48 p.m. he had the skin completely free from the head, both above and below. At 11.52 p.m., as the snake appeared not to have sufficient room in which to move about, I opened the case and removed the bath. On being thus disturbed he ceased rubbing off the skin, which was now turned back for about six inches behind the head, and lay quiet until 12.10 a.m., when he again commenced. By 12.27 a.m. he had fully two feet of skin removed, and at 1 a.m. three feet. At 1.30 a.m. the tip of his tail came away free from the old skin, which was shed all in one piece, but with one or two small rents in it. During the last half-hour I assisted the process by allowing the Python to crawl through my partially closed hands, as he appeared to feel the need of something against which to rub himself.

As a pet, the Indian Python has many qualifications to recommend him. He is clean in his habits, has no objectionable smell, is easy to feed and keep in good health, and (if my specimen may be taken as a fair example) is easily tamed. Mine is an exceedingly gentle animal, appearing to thoroughly enjoy being handled and petted; and, although his intelligence is not of a very high order, he can readily distinguish between myself and a stranger, from whom he shrinks with evident suspicion, whilst coming to me without hesitation.—W. J. CLARKE (44, Huntriss Row, Scarborough).

## PISCES.

Short Sunfish near Scarborough.—On the afternoon of Sept. 4th I was with a party of friends in a boat about two miles from land, off Cloughton Wyke, a small rocky cove five miles north of Scarborough. The day was very hot, with no wind and a calm sea. We saw coming along with the current, and perhaps a quarter of a mile distant, a tall black object showing above the surface of the water, moving somewhat rapidly from side to side, and never disappearing beneath. On gently paddling the boat towards it, we saw that it was a Short Sunfish, and, moving very carefully, it allowed us to bring the boat up within three feet of it, and drift alongside while we watched it. It was moving at the rate of about four miles an hour with the help of the current, at the same time steadily paddling with its large fins. Perhaps the fact that the uppermost of these was almost entirely out of water accounted for the fact that its position was lop-sided instead of straight, and at first it gave us the impression of an injured fish. The means of propulsion appeared to be entirely confined to the two large fins, with which it sculled itself along by alternate movements. So far as we noticed, the pectoral fins and tail were not used. The fish showed no signs of fear until we touched it, when it darted, at an astonishing speed for such an awkward-looking creature, across the bows of the boat. On striking it with a "gaff" it struggled powerfully, diving downwards, and was with difficulty secured. Out of the water it lived only a very short time, and changed its colour in a very remarkable manner as it died. While in the water, and immediately after being taken out, the general colour was very dark brown, almost black, with bright silver streaks and spots. The belly was silvery. After being out of the water about three or four minutes all the dark colour faded, leaving the fish a uniform bright silver. In a few minutes the dark colour gradually returned, until the fish was its normal colour, after which it slowly faded again to plain silver, and remained so. It groaned piteously as it lay in the bottom of the boat, much like a Gurnard, but not quite so loud. The fish weighed about 20 lb., and was 31 in. from tip to tip of the large fins, and 21 in. in length from nose to tail. It was infested with no fewer than three distinct varieties of parasites—*Lernæa branchialis* on the gills, a large round flat parasite about one inch in diameter on the belly and sides, and a smaller one with a long tail on the same part. On dissection the stomach contained a quantity of yellowish fluid, but nothing recognizable. A week later I saw a small specimen of the same species in a local fishmonger's shop, which the manager said had been taken at Scarborough, but I could get no details as to the exact locality and date.—W. J. CLARKE (44, Huntriss Row, Scarborough).

## ARACHNIDA.

*Asagena phalerata* at Grasmere.—It may interest your readers to hear of a recent capture of *Asagena phalerata*. This spider is certainly not common in the North-west of England; it was recorded by Blackwall as rare in Denbighshire, and by Mr. Cambridge as rare in Dorset. I found a mature male on Aug. 3rd or 4th, at the top of Redbank, above Grasmere. Its habitat is said to be amongst heather and stones, but this specimen was in a patch of grass beneath a rock, and close to a tiny fine sheet of web. The grass was glistening with dew in the early morning sun, and several of these small snares sparkling with specks of moisture attracted my attention, but the spiders were easily lost in the herbage, and only one rewarded my search. The species is a very distinct one, and seen upon the ground might be mistaken for a small beetle at a hasty glance. The length is just three-sixteenths of an inch. The cephalo-thorax is a dark red-brown colour, broad behind, and quite narrow at the caput; it is slightly overhung by the flattened oval abdomen. This is a very deep black-brown, somewhat glossy; on the fore part is a narrow yellowish white crescent mark, and half-way between this and the spinners on either side is a short vivid white line, slightly curving back, and in the centre just above the spinners is a longer bisected white line. The legs are short and strong, of the same colour as the cephalo-thorax, and are ringed with black at most of the joints. The palpi are short and thick, and the palpal organ a complicated knob.—HENRY W. FRESTON (Kersal, Manchester).

*Epeira diadema* Courtship.—On Sept. 5th I made a close observation of the courtship of a fine pair of *Epeira diadema*. Some days ago the female spun a large web in a corner by my front door here, and on two mornings I had watched the efforts of a male to win her good graces. She fiercely repelled, however, all his advances. But on the morning of the 5th her humour had changed. A male crept down the wall until he reached a radius of the web. He cautiously advanced along this while she hung motionless in the centre of the web. When he reached the orbicular lines he vibrated the web with his fore legs, and also waved these up and down several times; he then went back to the wall. This he repeated several times, till the female set off slowly towards him. He waited on the line by the wall till she came to the edge of the snare and poised herself upon the line on which he had travelled; she seemed to hang down attached by all her feet to the line. He then carefully approached on the upper side of the line, waving his fore legs slowly up and down; then he backed away, then advanced, always coming nearer at each repetition. At last he was actually waving his legs over her head, and still she did not move. It seemed as if he wished to mesmerize her. He ran back to the



wall, and waited a second or two ; then most resolutely he ran to her again without any precaution at all, grasped her with his fore feet, and appeared to press both palpal organs upon the region of her genital aperture. They remained motionless in this position fully half a minute. He then withdrew very slowly indeed towards the wall, and there suspended himself by a single line of about three inches. He seemed to be dying, and I thought she had bitten him. However, in five minutes he revived, and went off to the niche in the wall whence he had first come. She meanwhile awoke, and returned to her usual place in the centre of her web. I hope to record the date when the eggs thus fecundated are deposited. In the same connection, I may mention that in another part of my little garden I have just seen two males captured and devoured by females of this species ; but in neither instance did it seem to me that the male thus caught was on amorous purpose bent. Once certainly he had dropped from above into the web accidentally, and he was unable to extricate himself before he was attacked and swathed in silk.—HENRY W. FRESTON (Manchester).

## INSECTA.

Jumping Beans.—I do not know whether your pages are open to discussion, but if they should be, I should like to invite an explanation as to the method by which a perfect insect, imprisoned under certain conditions as a pupa, liberates itself on emerging from that state. At the World's Fair at Chicago, and subsequently last summer at Earl's Court, certain seeds of a Mexican Euphorbiaceous plant were sold under the designation of "Jumping Beans." These seeds, if placed in a warm hand, or subjected to sunshine or a higher temperature, would move, or jump with short jerks, and by some people who knew nothing of their nature were considered "wonders" and "uncanny." They were sold at a considerable price at Chicago, and at a fair and reasonable price at Earl's Court. Of course the solution was evident to anyone who knew anything about lepidopterous larvæ, namely, that they enclosed some internal feeding larva. I procured a few for observation in June, 1857 ; and in September, 1858, three Tortrix moths (*Carpocapsa*, I believe) emerged. The problem I want to solve is, how do these imago forms find their exit from the extremely hard and tough walls of the seed in which they have been enclosed, so tough and hard that it requires a very sharp knife to cut through them? The aperture through which the small moth escapes is a perfect cylindrical hole, as true as if bored by an instrument. In two of the cases in which the perfect insect came forth I found the empty pupa-case lying clear of the seed capsule. In a third case the pupa protruded about half its length through the aperture, and was dead, apparently wanting strength to effect its exit. Now how is this circular aperture, by which the moth escapes,

formed? Has the imago or the pupa the power of secreting some fluid that decomposes the wall of the seed; but if so, how is it that the aperture is so perfectly true in its circular form? This aperture is never visible until the imago or pupa has emerged. The seeds remain externally intact up to that time. It occurred to me that the larva, before going into the pupa state, might possibly prepare an exit for the imago by eating partly through the wall, but not so far as to break through altogether. With a view to ascertain this, I have just opened a seed, and find a perfect pupa, and no sign of the interior of the walls having been eaten away, as I conjectured above; and besides, if such preparatory boring, as I conjectured, had occurred, this would have involved intelligence on the part of the larva, which one can hardly suppose. The subject, I think, is an interesting one, and I hope that some of your entomological readers will throw some light upon it.—W. OXENDEN HAMMOND (St. Alban's Court, near Wingham, Kent).

[See 'Entomologist,' 1895, 1896, and 1897, and especially a paper by Dr. Sharp "On Jumping Cocoons from South Africa," Entom. November, 1896.—ED.]

## NOTICES OF NEW BOOKS.

*A Classification of Vertebrata, Recent and Extinct.* By HANS GADOW, M.A., Ph.D., F.R.S. Adam and Charles Black.

THIS volume, written by a well-known Cambridge zoologist, appeared opportunely a little before the meeting of the Zoological Congress at that University town. It is a classification of the Vertebrata based on the sound foundation of that which preceded as well as that which exists. It of course naturally follows that the osseous structure is all that we certainly know of the past vertebral life, though Dr. Gadow argues "it would be pedantic to exclude all soft perishable parts on the plea that they are unknown in the fossil forms. Here discretion is to be used. We do not 'know' that the palæozoic Fishes did possess an entirely venous heart, nor has it yet been shown that the embryos of Dinosaurs were surrounded by an amnion; but we feel nevertheless certain, because of the laws of correlation which comparative anatomy allows us to deduce from the study of recent creatures." This proposition will be generally accepted, and is distinct from the question of antecedent colouration, a subject still in the domain of probabilities. This method will perhaps be best exemplified by reference to our own relationships, which Dr. Gadow thus arranges:—

"ANTHROPOIDÆ.—Caudal vertebræ transformed into a coccyx. Walk erect or semi-erect.

*Hylobates*.—S.E. Asia. 'Gibbon.'

*Pliopithecus*.—Miocene of Europe.

*Simia satyrus*.—'Orang Utan.' Sumatra and Borneo.

*Troglodytes gorilla* and *T. niger*.—West Equatorial Africa.

*T. sivalensis*.—Pliocene, Punjab.

*Dryopithecus*.—Miocene, France.

*Pithecanthropus erectus*.—Pleistocene, Java.

*Homo sapiens*.—Cosmopolitan."

After the classification of the Vertebrata, a digest is given of their geographical distribution. Then follows an approximate number of recent species of vertebrates, giving a total of 24,241 species.

There is a concluding and original note which we reproduce. "Supposing the fauna of the world was reduced to the 250th part of living species, then the Primates would be represented by *one* species only, and this being of course Man, his available menagerie would consist of scarcely threescore species, half of which would be Teleostean Fishes. The rest would be composed of a dozen and a half of Singing-birds; half a dozen each of Lizards and Snakes; four Rodents; four non-singing Neotropical Passerine Birds; two species each of Woodpeckers, Humming-birds, and Bats; one or two each of Parrots, Pigeons, Fowls and some other Game-birds, Kingfishers, and Birds of Prey; and one species each of a Shark, Frog, Toad and Tree Frog, Gecko, Ruminant, and Carnivore."

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*The Trout.* By the MARQUESS OF GRANBY. With chapters on Breeding by Col. F. H. CUSTANCE; Cookery by ALEXANDER INNES SHAND. Longmans, Green & Co.

THE Trout has followed the Salmon as subject-matter for a new volume in the Fur, Feather, and (now) Fin Series; and although the capture of the fish occupies a large portion of the work, its natural history is not altogether neglected. It is indeed difficult to read any good book on angling without acquiring some knowledge as to the habits of fish; in fact, it is such knowledge that makes a successful angler. To many naturalists, again, the angler's description of Trout "tailing" and "bulging" will prove a most interesting narrative. "Tailing is a performance frequently witnessed in Hertfordshire and Buckinghamshire waters, and in South-county streams generally. As may be surmised, the phrase 'tailing Trout' means that the fish are plunging their heads into the weeds, or poking about on the bottom of the river, seeking their food amongst the freshwater shrimps, grubs, and similar appetizing morsels; and in comparatively shallow streams this downward operation causes the fishes' tails to appear above the surface of the water." "Bulging" is the explanation of what to the fisherman will sometimes seem

“innumerable rises.” “On closer inspection these will prove to be fish taking what I believe are called the *nymphæ* of the Duns or Mayflies just before they reach the surface, there to hatch out.”

Col. Custance deals somewhat exhaustively with Trout-breeding. “The three principal breeds of freshwater Trout raised by the British fish-culturist are the English Brook Trout (*Salmo fario*), the Loch Leven Trout (*S. levenensis*), and last, but not least, the Rainbow Trout (*S. irideus*). The first is the one used for general stocking purposes in this country; *S. levenensis*, although a lake Trout, will also thrive in rivers where there is a considerable depth of water; but Col. Custance gives his vote for the Rainbow Trout, which originally came from America. He describes it as almost satisfying “the Trout-breeder’s ideal of perfection.” “A splendid surface feeder, he will readily accommodate himself to new water, and will, under favourable conditions, grow with extraordinary rapidity and to a great size.” *S. irideus* has a common frailty of the Salmonidæ in a propensity to cannibalism, but he is considered to have less of that quality than *S. fario*, but this is owing to the Rainbow Trout having the smaller mouth.

We may say that the authors of this little volume are anglers among naturalists, and naturalists among anglers.

## EDITORIAL GLEANINGS.

WE have received the Report of the South African Museum for 1897. The principal event was the opening of the new museum building on April 6th, the old building having been closed to the public on January 19th. The number of additions to the collection is very satisfactory, as the following details prove :—

	SPECIMENS.			SPECIES NEW TO THE MUSEUM.		
	South African.	Exotic.	Total.	South African.	Exotic.	Total.
Mammals .....	64	8	72	6	4	10
Birds .....	89	0	89	7	0	7
Reptiles and Amphibia	335	2	337	8	1	9
Fishes .....	4	0	4	0	0	0
Tunicata .....	0	9	9	0	7	7
Mollusca .....	370	5	375	15	0	15
Insecta .....	2289	20	2309	122	0	122
Chilopoda .....	180	0	180	15	0	15
Diplopoda .....	245	0	245	29	0	29
Protracheata .....	2	0	2	0	0	0
Arachnida .....	1124	0	1124	11	0	11
Crustacea .....	1456	0	1456	51	0	51
Vermes .....	178	0	178	13	0	13
Total .....	6336	44	6380	277	12	289

The Director, Mr. W. L. Sclater, reports :—“ The general state of the collections is satisfactory. The new cases are completely dust-proof, and, as far as can be seen at present, seem to be quite insect proof ; any incipient attacks of museum pests can be easily dealt with by the introduction of a saucer of carbon bisulphide into the case, the fumes of which at once destroy any living matter.”

In Mr. L. Péringuey's report on the Department of Entomology we read :—“ The most interesting discoveries of the year have been the existence of a representative of the curious family Embiidæ of the order Neuroptera (gen. ? *Oligotoma*) not before recorded in South Africa ; and the curious parallelism of some coleopterous forms inhabiting the Cape and the Canary Islands, as exemplified by captures made by Mons. A. Raffray

in the immediate vicinity of Cape Town. He has lately discovered a species of *Metophthalmus* (family Lathrididæ), three species of which are represented in the Canary Islands; he has also discovered an eyeless species of weevil (nov. gen.) and another (gen. ? *Pentatemenus*), the eyes of which have only six facets. These insects belonging to the subfamily Cossoninæ are very closely allied to similar ones occurring in the Canary Islands, and which are also found in the extreme South of Europe. Wollaston, as far back as 1861, described a Colydid (gen. *Cossyphodes*) from the Cape belonging to a genus known at the time as occurring only at Madeira. Another species was later on discovered in Abyssinia. It is a singular coincidence that both *Cossyphodes* and *Metophthalmus* should be discovered in such opposite directions. The true explanation is that the minute insects of Africa have not yet been properly collected, and that the genera mentioned above will be found to have a larger area of distribution than at first imagined."

Another very interesting record is found in Mr. Gilchrist's report on Marine Invertebrates:—"The specimen identified as *Astacus capensis* is of special interest, particularly as it is the only known representative of the European Lobster in South Africa. It is described by Herbst as being found in the rivers of the Colony, and as having all five pairs of legs chelate. The specimen procured was, however, found in a salt-water rock pool (at Sea Point), and others in the museum collection are described as from Algoa Bay. Moreover, all the legs are not chelate in these specimens. These points will receive special attention, as there is evidently an error somewhere."

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THE following extracts are taken from an article "By a South Sea Trader" in the 'Pall Mall Gazette' of July 12th:—

Twofold Bay, a magnificent deep-water harbour on the southern coast of New South Wales, is a fisherman's paradise, though its fame is but local, or known only to outsiders who may have spent a day there when travelling from Sydney to Tasmania in the fine steamers of the Union Company, which occasionally put in there to ship cattle from the little township of Eden. But the chief point of interest about Twofold Bay is that it is the rendezvous of the famous "Killers" (*Orca gladiator*), the deadly foes of the whole race of Cetaceans other than themselves, and the most extraordinary and sagacious creatures that inhabit the ocean's depths. From July to November two "schools" of Killers may be seen every day, either cruising to and fro across the entrance of the bay, or engaged in a Titanic combat with a Whale—a "Right" Whale, a "Humpback," or the long, swift "Finback." But they have never been known to tackle the great Sperm Whale, except when the great creature has been wounded by

his human enemies. And to witness one of these mighty struggles is worth travelling many a thousand miles to see; it is terrible, awe-inspiring, and wonderful.

The Killer ranges in length from 10 ft. to 25 ft. (whalemen have told me that one was seen stranded on the Great Barrier Reef in 1862 which measured 37 ft.). They spout, "breach," and "sound" like other Cetaceans, and are of the same migratory habits as the two "schools" which haunt Twofold Bay, always leave there about November 28th to cruise in other seas, returning to their headquarters early in July, when the Humpback and Finback Whales make their appearance on the coast of New South Wales, travelling northwards to the breeding-grounds on the Brampton Shoals, the coast of New Guinea, and the Moluccas.

The whaling station at Twofold Bay is the only one in the Colony—the last remnant of a once great and thriving industry. It is carried on by a family named Davidson, father and sons, in conjunction with the Killers. And for more than twenty years this business partnership has existed between the humans and the Cetaceans, and the utmost rectitude and solicitude for each other's interests has always been maintained—*Orca gladiator* seizes the Whale for Davidson, and holds him until the deadly lance is plunged into his "life," and Davidson lets *Orca* carry the carcass to the bottom, and take his tithes of luscious blubber. This is the literal truth; and grizzled old Davidson or any one of the stalwart sons who man his two boats will tell you that but for the Killers, who do half of the work, whaling would not pay with oil only worth from £18 to £24 a tun.

When the men have done their part, comes the curious and yet absolutely truly described part that the Killers play in this ocean tragedy. The Killers, the moment the Whale is dead, close round him, and fastening their teeth into his body, bear him to the bottom. Here they tear out his tongue, and eat about one-third of his blubber. In about thirty-six to forty hours the carcass will rise again to the surface, and as the spot where he was taken down has been marked by a buoy, the boats are ready waiting to tow him ashore to the trying-out works. The Killers accompany the boats to the heads of the bay, and keep off the Sharks, which otherwise would strip off all the remaining blubber before the body had reached the shore.

The Killers never hurt a man. Time after time have boats been stove in or smashed into splinters by a Whale and the crew left struggling in the water to be rescued by the "pick-up" boat; and the Killers swim up to them, look at—ay, and *smell* them—but never touch them. And wherever the Killers are, the Sharks are not, for Jack Shark dreads a Killer as the devil dreads holy water. "Jack" will rush in and rip off a piece of blubber if he can, but he will watch his chance to do so.



Sometimes when a pack of Killers set out Whale-hunting they will be joined by a Thresher—the Fox Shark (*Alopias vulpes*), and then while the Killers bite and tear the unfortunate Cetacean, the Thresher deals him fearful blows with his scythe-like tail. The master of a whaling vessel told me that off the north end of New Caledonia there was a pack of nine Killers which were always attended by two Threshers and a Swordfish. Not only he but many other whaling skippers had seen this particular Swordfish year after year joining in attacks upon Whales. The cruising ground of this pack extended for thirty miles, and the nine creatures and their associates were individually known to hundreds of whalers. And no doubt these combats, witnessed from a merchant ship, have led to many Sea Serpent stories; for when a Thresher stands his long twenty feet of slender body straight up on end like a pole, he presents a strange sight. But any American sperm-whaling captain will wink the other eye when you say “Sea Serpent.”

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SOME Smelts have been caught in the Thames at Kew and Richmond. They were taken by anglers fishing with gentles for Roach and Dace. Last year Smelts worked as high up the Thames, and their presence there is of considerable interest, as it testifies to the increasing purity of the river.—*Westminster Gazette*, August 15th.

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A SOCIETY with the title of the Zoological Society of Edinburgh is being formed for the purpose of establishing a zoological garden. A public meeting was to be held early in October.

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To protect the water-fowl and wild birds at Hampstead Heath some very pretty plantations have been made by the County Council near the ponds, and fenced in so as to keep the public from them. One result of this additional security is that there are now several broods of Cygnets, Wild Ducks, and Moorhens in the ponds. According to the keepers the wild fowl have trebled in number during the present year.

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MR. LIONEL E. ADAMS has contributed “A Plea for Owls and Kestrels” in the ‘*Journ. Northamptonshire Nat. Hist. Soc.*’ for June last. The author rightly observes:—

The simple and direct test is the analysis of the “pellets” which these birds cast up. Many people (including a keeper that a friend of mine recently interviewed) are not aware that Owls, Hawks, and many other

birds swallow their prey whole if small enough, or in lumps—fur, bones, feathers, everything together ; and that after the flesh and nutritious juices have passed into the system, the indigestible bones, &c., are disgorged in masses usually known as “pellets.” In Northamptonshire they are termed “quids,” in Staffordshire, Derbyshire, and Cheshire “cuds,” in Cambridgeshire “plugs,” and in Lancashire and Cheshire they sometimes go by the suggestive name “boggart muck.” This curious term doubtless originated from the fact that pellets are sometimes found in church towers and churchyards, and the mysterious hootings and screechings heard at night in these places give colour to the notion that “boggarts” (ghosts) are engaged upon their unhallowed feast !

These pellets contain, as stated, the bones of the animals preyed upon, usually in an almost perfect condition, the little skulls being perfectly easy to identify by a competent osteologist. It is still less generally known that many other birds eject similar pellets, *e. g.* the Swallow tribe, Herons, Gulls (and probably most sea-birds), Flycatchers, and Rooks. Rooks' pellets, by the way, may be found beneath the nests while the young are being fed, and never, I think, at other times, and I fancy they are composed of the indigestible portions of the food which the parent Rooks prepare for their young in a way similar to that peculiar to Pigeons.

I have carefully analysed and kept a record of many hundreds of Owls' pellets from or close to estates where game is reared, and from many parts of England and Ireland, at the time of year when Pheasants and Partridges are young and least able to take care of themselves ; and I can positively assert that *in no case have I ever found the remains of any game bird, chicken, or duckling.* I once mentioned my experience to the late Lord Lilford, and that great authority informed me that his experience entirely tallied with mine.

It is impossible for us with due regard to our space to give the whole of Mr. Adams's statistics ; the following are examples :—

If not molested, Owls will take up their abode near a farm and keep the Rats and Mice under much more effectively and cheaply than a professional Rat-catcher. Only last spring, close to a Derbyshire farm, I found within a fortnight fresh pellets containing :—Brown Rats, 62 ; Long-tailed Field Mice, 38 ; Common Shrews, 16 ; Short-tailed Field Mice, 5 ; Bank Voles, 10 ; Water Voles, 2 ; Frogs, 6 ; Toads, 2 ; Beetles, several : total, 141. And all this was due to (I think) a single pair of Long-eared Owls.

The first two of the following analyses are from pellets in old deserted Pigeon cotes in farm buildings near Stafford. In both cases the farmers protected and encouraged the birds. The third is from a nest in a hollow oak in Rockingham Park, Northants :—

Locality.	No. of Pellets.	Mole.	Common Shrew.	Lesser Shrew.	Water Shrew.	Long-tailed Field Mouse.	House Mouse.	Brown Rat.	Short-tailed Field Mouse (Field Vole)	Bank Vole.	Water Vole.	Rabbit.	Frog.	Sparrow.	Thrush or Blackbird.	Starling.	Other small Birds.	Total No. of Animals.
Kinvaston Hall ..	260	—	113	4	5	219	7	41	241	63	1	—	1	13	—	—	12	720
St. Thomas' Farm	520	1	87	12	12	252	8	100	259	9	7	—	2	35	18	4	33	839
Rockingham Park	135	1	77	10	4	100	5	40	190	32	2	1	1	4	1	—	3	472
Rockingham Park	82	1	67	1	—	57	1	18	94	23	—	—	3	7	1	—	2	275

The analysis of the Kestrels' pellets likewise determines its usual food, though, as these pellets are not found in quantities together, like those of Owls, but here and there sparingly, the same amount of certainty cannot be guaranteed. Most of those that have come under my personal notice have been composed entirely of the wing-cases of all sorts of beetles and the wings of flies, and sometimes the remains of a small Vole or Mouse, but I have never discovered the remains of birds or Rabbits. Indeed the bird is hardly large enough to attack the latter successfully, though a gamekeeper giving evidence before the Vole Plague Committee says:—"I have also seen one lift a young Rabbit." Whether "lift" is used in the Scotch sense of "carry off," or merely to "raise from the ground," does not appear; but the fact is unimportant in any case, and the Committee rightly came to the conclusion that "the food of this bird is known to consist almost exclusively of Mice, Grasshoppers, coleopterous insects and their larvæ."

PROF. ALEXANDER AGASSIZ, after serving the Museum of Comparative Zoology at Cambridge, Massachusetts, for thirty-five years, has resigned his position as Director and Curator. Dr. W. McM. Woodworth has been appointed Assistant in charge of the Museum.—*Athenæum*.

THE Society for the Biological Exploration of the Dutch Colonies has organized a scientific expedition to Java, which is to start next October under the direction of Dr. Max Weber, Professor of Zoology at Amsterdam. The object of the expedition, which is to last about a year, is the zoological, botanical, and oceanographical exploration of the seas of the Indian Archipelago.

MR. F. G. AFLALO, writing to the 'Times' from Mevagissey, Cornwall (August), states:—

Sharks positively swarm just now in the 20-fathom water between Plymouth and the Land's End. I have been catching both the Blue and

Por-beagle up to 40-lb. weight, and have lately had the former species round my boat to a length of close on 5 ft., a dangerous size. I am, however, induced to publish this warning by the fact that on Wednesday a young fisherman of this place, dangling his hand over the side in manipulating his Mackerel lines, had the sleeve of his shirt torn to the elbow by one of these surface prowlers. Folk who acquire most of their knowledge of sea-fish in the metropolis are given to doubt the presence of true Sharks in the Channel, preferring to regard them as Dog-fish. May I give them my assurance, for what it is worth, that these are but two of several true British Sharks; that they are, as proved by the aforementioned episodes, both large and aggressive, and that they are most in evidence on those calm hot days that chiefly attract the bather.

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FEW zoologists are unfamiliar with the name of the publisher, John Van Voorst, who died on the 24th July, after a long and successful life, having been born as early as February 15th, 1804. He belonged to an ancient Dutch family which had settled in England several generations ago. He was apprenticed to Richard Nicholls, of Wakefield, somewhere about 1820, and, after passing some years with the Longmans, began business on his own account in 1835, in Paternoster Row. After publishing fine illustrated editions of such works as Gray's 'Elegy,' Goldsmith's 'Vicar of Wakefield,' &c., he turned his attention to the union of artistic execution with scientific publications, and 1835 saw the commencement of Yarrell's 'British Fishes,' followed by Bell's 'British Quadrupeds' in 1836, Yarrell's 'British Birds' in 1837, and a series of recognized classics on British Crustaceans, Zoophytes, Starfishes, &c. As specimens of wood-engraving, the cuts by Sam Williams and John Thompson in Selby's 'British Forest Trees' (1842) show the perfection attained in an art now less practised; while the illustrations to Yarrell's 'British Birds,' including the vignettes, show how nearly black-and-white can indicate colour. After a long and prosperous career, Van Voorst retired from business in favour of his assistants, Messrs. Gurney & Jackson, in 1886; but his genial interest in old friends and a younger generation of naturalists never flagged until, on the completion of his ninety-fourth year, the exhaustion of natural forces began to make itself apparent. For many of the above facts we are indebted to the obituary notice which appeared in the 'Athenæum.'

# THE ZOOLOGIST

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No. 689.—November, 1898.

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## BIOLOGICAL SUGGESTIONS.

### ASSIMILATIVE COLOURATION.

By W. L. DISTANT.

(Continued from p. 409.)

#### PART II.

FISH appear to vary in colour and in an assimilative manner to the hue of the water in which they are confined.\* According to Frank Buckland, "this is the case particularly with Minnows, Sticklebats, and Trout. Mr. Grove, the fishmonger at Charing Cross, will tell you where a Trout comes from by its colour. The Trout which live in peat-coloured water are sometimes nearly black; those from fine running streams, such as the clear chalk

\* The action of the environment on fishes does not appear to be confined to colour alone. According to Prof. Seeley, "there are local races of many fishes which, under the changed conditions of physical geography, which from time to time affect the distribution of life on the earth, have become isolated from the rest of the race, so as to live on table-lands or low plains, in cold mountain lakes or in shallow swamps, in sluggish waters or rapid torrents, and thus, differently circumstanced, have developed into varieties distinguished by size, form, colour, and certain internal and external differences in the organs and proportions of the body" ('The Fresh-water Fishes of Europe,' p. 3). *Leuciscus muticellus* has all the fins "transparent and unspotted in Austrian specimens, but in examples from the Neckar the fins of the lower part of the body are yellow at the base, and this colour is occasionally seen in the dorsal and caudal. Bavarian fish have much black pigment in spots on the dorsal and caudal fins" (*ibid.* p. 173).

streams about Winchester, are of a beautiful silvery colour. Gudgeons placed in a glass bowl will become very white, and lose the beautiful brown colour on their backs." "A fishmonger at Billingsgate Market told me he generally knew from what part of the coast fish came by the colour of them. This observation was *à propos* to a quantity of Dutch Jack that were displayed on his slab; and which looked very dingy and dark-coloured, as though they had lived in stagnant and dirty water; very different from a clean and bright-coloured Thames Jack." "Sticklebacks are wonderful fish to change their colour. I have seen Sticklebacks at the tail of a mill pond at Islip of the most beautiful iridescent colour; the bottom was composed of clean white gravel stones. Again, there is a ditch running round Christchurch meadow at Oxford; here the water is black and dirty, and the Sticklebacks are of a brown and almost black colour."\* The same author considers that "the Black-backed Salmon" of the Galway river "are fish which have spent most of their lives in dark bog-coloured water, and hence they have assumed the peculiar dark appearance they present, for, as we all know, the colour of the fish is wonderfully influenced by the colour of the water in which it lives."† There is a well-known rock on the coast of Cornwall, about five leagues from the land, and standing up from the plain ground which spreads to a large distance round it. The top of the rock is full of gullies shaded with weeds, and Congers which are caught on it are always black, while close to its base these fish are always white.‡ From Great Yarmouth it is reported that Flounders (*Pleuronectes flesus*) when sea-caught are lighter hued than those taken on a muddy bottom.§ "The Sunfish (*Labrus auritus*, Linn.) caught in the deep waters of Green River in Kentucky exhibit a depth of olive brown quite different from the general tint of those caught in the colourless waters of the

\* 'Curiosities Nat. Hist.,' pop. edit., 1st ser., pp. 235-7, 239.

† *Ibid.* 4th ser., p. 271. This last conclusion seems scarcely borne out in a previous remark by the same naturalist that "white Trout prefer streams which contain bog water." . . . "On the east side of Lough Corrib no white Trout are found—there is but very little bog water; but they are found on the west side, where the feeders of the lake run through a country abounding with bogs" (*ibid.* 4th ser., p. 253).

‡ Jon. Couch, 'Hist. Fishes Brit. Islands,' vol. iv. p. 342.

§ A. Patterson, 'Zoologist,' 4th ser. vol. i. p. 557.

Ohio or Schuylkill; those of the reddish-coloured waters of the bayous of the Louisiana swamps look as if covered with a coppery tarnish; and, lastly, those met with in streams that glide beneath cedars or other firs have a pale and sallow complexion.”\* A no less authority than Dr. Günther states: “Trout with intense ocellated spots are generally found in clear rapid rivers, and in small open alpine pools; in the large lakes with pebbly bottom the fish are bright silvery, and the ocellated spots are mixed with or replaced by X-shaped black spots; in pools or parts of lakes with muddy or peaty bottom the Trout are of a darker colour generally, and when enclosed in caves or holes they may assume an almost uniform blackish colouration.”† “Minnows have the power common to most fishes of rapidly assimilating to the varying colour of the stream. They change from brown to gold, from gold to brown.”‡ The Paradise-fish (*Polyacanthus* sp.), a pet kept in confinement throughout China, has a colour in dark or muddy waters of a “dull uniform brown; and it is only when living in clear water, exposed to the sunlight, that the golden hue and red transverse bands make their appearance.” “Cod from the British seas and German Ocean are usually greenish or brownish olive in colour, with a number of yellowish or brown spots; but more to the north darker, and often uniformly coloured specimens are more common; while in the race from Greenland, Scandinavia, and northern Norway, there is frequently a large irregular black patch on each side of the body.”§ In the South Atlantic Mr. Cunningham secured by the aid of the towing-net a bright blue Isopodous crustacean (*Idotea annulata*), and states that, according to Spence Bate, “the blue colour appears to be a peculiarity of pelagic species.”||

Entomologists have long noticed the effects of assimilative colouration, even in our own country. Mr. Dale, of Glanvilles Wootton, has truly remarked: “Where do we find whitish or brilliant-coloured species of Lepidoptera, such as *Melanargia galatea*, *Lycena corydon*, *L. adonis*, *Eubolia bipunctaria*, *Mela-*

\* ‘Audubon and his Journals,’ vol. ii. p. 519.

† ‘Introduct. Study Fishes,’ p. 632.

‡ Watson, ‘Sketches of Brit. Sport. Fishes,’ p. 77.

§ Lydekker, ‘Roy. Nat. Hist.,’ vol. v. pp. 412, 433.

|| ‘Notes Nat. Hist. Strait of Magellan,’ p. 42.

*nippe procellata*, and the light variety of *Gnophos obscuraria*, &c.? Why, on the white and light-coloured soils of the south of England, *i. e.* chalk and limestone. On the other hand, we find the dark variety of *G. obscuraria*, and various dark-coloured species, on black peaty soils."\* A noctuid moth, *Agrotis lucernea*, not uncommon in Britain, when found on the chalk downs in the Isle of Wight has been thus described: "It rests in chinks on the ground, and is of a soft silky grey colour, and covered with such thick and long scales as to give it a furry appearance. Although abundant enough by night, it requires a long search to find a single specimen by day, so difficult is it to distinguish in its native haunts, the long pale silky hairs resembling exactly the rough surface of the chalk dusted with the darker atoms of the soil above." This moth has also been caught by the same entomologist on the east coast of Scotland, and then thus differently described: "On black rocks, sometimes reeking with moisture, and which were as black as the rocks on which they rested." Mr. Tutt, to whom we are indebted for these notes and observations, ascribes the colouration in each case as due to the action of natural selection. We may at least say in respect to other instances he has adduced that this explanation is not so apparent. *Noctua glareosa* "is of a pale dove-coloured grey, sometimes tinged with rosy," and with three dark spots. "The Sligo specimens are very white,—Scotch specimens more slaty; the Shetland specimens are of a rich blackish brown colour." *Epunda lichenea* "is a mottled greenish grey or greenish ochreous species, which is confined to a few coast districts. The Portland specimens are greenish white; the Teignmouth specimens dark greenish ochreous, mottled with red. The moths from these two localities have quite a different appearance, owing to the different kind of rocks on which they rest at these places." *Amphidasys betularia*, a Geometrid moth, "as it rests on a trunk in our southern woods, is not at all conspicuous, and looks like a natural splash or scar, or a piece of lichen"; but near our large towns, where there are factories, and where vast quantities of soot are

\* 'Entomologist,' vol. xxvi. p. 355. Mr. Wallace considers that the original colour of butterflies was a greyish or brownish neutral tint ('Darwinism,' p. 274); and the same opinion is held by Dr. Dixey in his study of the phylogeny of the Pierinæ ('Trans. Ent. Soc. Lond.,' 1894, p. 290).



day by day poured out from countless chimneys, this moth "has during the last fifty years undergone a remarkable change. The white has entirely disappeared, and the wings have become totally black, so black that it has obtained the cognomen 'negro' from naturalists."\* The dipterous insect *Cælopa frigida* undergoes its transformations in the black sea-weed cast up by the spring tides. The flies and also the pupæ are black.† In a revision of the American orthopterous genus *Spharageomon*, Mr. Morse states: "Variation in colour in this genus, in common with other *Ædipodinæ*, counts for very little; the same species or race may be of all shades from a general dark fuscous to a pale buff or even a bright reddish brown, even in specimens from the same spot, yet it is probable that the general tint of a large series will be found to agree with the colour of the soil of the locality, or other peculiarity of environment. Specimens of different species from different localities in Colorado show a striking reddish almost rosaceous colouration due to some such cause."‡ Of course this can only apply to the insects when at rest, otherwise their more gaily-coloured under wings would contradict the view advocated. A previous American writer, Mr. Brunner, had proposed that climatic differences had accounted for the varied colouration of the wings of some North American Locusts.§ Eimer has some excellent observations on this point, and with these insects:—"The Grasshopper with red hinder wings banded with black, which is so common with us (in Germany) in summer, *Acridium germanicum* (*Ædipodea germanica*), when it occurs on the reddish brown Triassic clay of Tübingen, resembles this ground so closely with its wings folded that it cannot be distinguished from it. A little above the clay on the hills of this neighbourhood there occurs a whitish sandstone, sometimes only for the breadth of a path or in somewhat larger surfaces, frequently surrounded by the former. On these small patches of lighter ground I find regularly only Grasshoppers with quite light upper wings, so that they can scarcely be distinguished from the soil. And I have elsewhere observed the same remarkable

\* Tutt, 'British Moths,' pp. 144, 149, 179, 305.

† Miall, 'Nat. Hist. Aquat. Ins.,' p. 373.

‡ 'Psyche,' vol. vii. p. 288.

§ 'Science,' 1893, p. 133.

adaptation. One of my friends who is not usually accustomed to pay special attention to such animals, told me that he had been much surprised to notice that on the two banks of a brook on which the soil was of different colours, the Grasshoppers were in each case exceedingly like the ground in colour. Without doubt these were *Acridium germanicum* or *A. cœrulescens*,—the latter species appears to show the same adaptation.”\* Canon Tristram in his North African travels met with an area of the limestone conglomerate with earlier pebbles, in which a fine white flint, not previously observed, predominated. Here, to use his own words, “we found only two living things through the whole day—a curious white Scorpion, and a Desert Lark (*Annomanes regulus*, Bp.).”† In Kamschatka, where the ground is so long covered with snow, Mr. Guillemard, in comparing the Great and Lesser Spotted Woodpeckers, the Capercailzie, and the Marsh Tit, with the forms found in Europe, remarks: “In all these the differences consist for the most part in the greater predominance of white in the plumage, and this tendency to albidism is noticeable, as I have already mentioned, in other animals besides the birds; the Dogs and Horses likewise showing it in a marked degree.”‡ Sometimes the effect may be very sudden and of an artificial character. It is difficult to explain the process as described by C. J. Andersson in South Africa:—“In the course of the first day’s journey, we traversed an immense hollow, called Etosha, covered with saline incrustations, and having wooded and well-defined borders. Such places are in Africa designated ‘salt-pans.’ The surface consisted of a soft greenish yellow

\* ‘Organic Evolution,’ Eng. transl., p. 146. Sometimes we have records of environmental changes in the colours of insects without corresponding particulars being given. These are still suggestive. Thus Gerard states in the ‘Dictionnaire d’Histoire naturelle’ of D’Orbigny (article “Esq̄èce”), “that when the small brown Honey-bees from High Burgundy are transported into Bresse—although not very distant—they soon become larger, and assume a yellow colour; this happens even in the second generation” (cf. Varigny, *ibid.* p. 53). Again, M. d’Aphier de Pruns (‘Revue Horticole,’ 1883, p. 316) has recorded that “at Brasse les Mines, in Central France, white Oxen become of lighter hue, and Pheasants, Pigeons, Ducks, &c., have more or less white feathers; plants with variegated leaves soon become uniformly green” (cf. Varigny, *ibid.* p. 54).

† ‘The Great Sahara,’ p. 214.

‡ ‘Cruise of the Marchesa,’ 2nd edit., p. 84.

clay soil, strewed with fragments of small sandstone, of a purple tint. Strange to relate, we had scarcely been ten minutes on this ground when the lower extremities of ourselves and cattle became of the same purple colour.”\*

One of the most explicit observations bearing on this phase of animal colouration has been contributed by the late Mr. J. J. Monteiro. In Angola he found that in the districts where indications of copper were found, “the ‘Plantain-eaters’ are also most abundant, more so than in any other part of Angola I have been in”; . . . “the most singular circumstance connected with this bird is the fact that the gorgeous blood-red colour of its wing feathers is soluble, especially in weak solution of ammonia, and that this soluble colouring matter contains a considerable quantity of copper, to which its colour may very probably be due. My attention was first called to this extremely curious and unexpected fact by Prof. Church’s paper in the ‘Phil. Trans.’ for 1869; and on my last voyage home from the coast, I purchased a large bunch of the red wing feathers in the market at Sierra Leone, with which my brother-in-law, Mr. Hy. Bassett, F.C.S., has verified Prof. Church’s results conclusively, and has found even a larger proportion of copper in the colouring matter extracted from these feathers.”† This colour, however, as we might surmise, was sufficiently independent of the copper to have become constant, for Mr. Monteiro kept two birds in confinement in England, during which time they moulted regularly every year, “and reproduced the splendidly coloured feathers, of the same brightness, without the possibility of getting any copper, except what might have entered into the composition of their food, which was most varied, consisting of every ripe fruit in season, cooked vegetables and roots, rice, bread, biscuits, dried fruit, &c.” On the other hand, Dr. Bowdler Sharpe was informed by the late African traveller, Jules Verreaux, “that the bird often gets caught in violent showers during the rainy season, when the whole of this brilliant red colour in the wing feathers gets washed out, and the quills become pinky white, and after two or three days the colour is renewed, and the wing resumes its former

\* ‘Lake Ngami,’ p. 187.

† ‘Angola,’ vol. ii. p. 75.

beauty.”\* This cannot be taken as an instance of pure but only partial assimilative colouration, but is sufficient to prove that colour may be largely derived from the mineral constituents of the earth’s surface, and in this way can scarcely be altogether ascribed to the action of “natural selection.” These bright wing feathers may have subsequently served the purpose of “recognition markings”?, but seem certainly not derived directly for that purpose.

A better example may be found in the Red Hartebeest (*Alcelaphus cokei*). Sir H. H. Johnston narrates of this species: “Being a deep red-brown in colour, and standing one by one stock-still at the approach of the caravan, it was really most difficult and puzzling sometimes to know which was Hartebeest and which was ant-hill; for the long grass hiding the Antelope’s legs left merely a red-humped mass, which, until it moved, might well be the mound of red earth constructed by the white termites. The unconscious mimicry was rendered the more ludicrously exact sometimes by the sharply-pointed flag-like leaves of a kind of squill—a liliaceous plant—which frequently crowned the summit of the ant-hill or grew at its base, thus suggesting the horns of an Antelope, rather with the head erect, or browsing low down. The assimilation cannot have been fancied on my part, for it deceived even the sharp eyes of my men; and again and again a Hartebeest would start into motion at twenty yards distance, and gallop off, while I was patiently stalking an ant-hill, and crawling on my stomach through thorns and aloes, only to find the supposed Antelope an irregular mass of red clay.”† This would seem to be almost an instance of acquired or active mimicry on the part of this animal. Here the whole question to be considered is what was the original home of this Red Hartebeest? Is it a creature of these red-earthed plains, the character of which is so prominently shown in these gigantic ant-hills?

\* ‘Cassell’s Nat. Hist.,’ vol. iii. p. 330. Dr. Sharpe has subsequently expressed further doubt on the suggested cause of this colouration: “The Touracous are birds which live in trees, and do not apparently descend to the ground, while the red feathers have been assumed by specimens in captivity, some of which moulted more than once” (‘Roy. Nat. Hist.,’ vol. iv. p. 13).

† ‘The Kilima-Njaro Expedition,’ p. 65.

Dr. Hans Meyer remarks that "every observer must be struck with the general similarity in colour and partly also in form of the larger African mammals to the prevailing colours and features of the regions they frequent. At a distance it is scarcely possible to tell a Hartebeest at rest from one of the reddish ant-heaps which everywhere abound; the long-legged, long-necked Giraffe might easily pass for a dead mimosa, the Rhinoceros for a fallen trunk, the grey-brown Zebra for a clump of grass or thorn scrub. It is only their movements that betray their real character."\* The Lichtenstein Hartebeest (*Bubalis lichtensteini*) is also of a more or less uniform colour, "saffron, with a golden tinge throughout"; while the more common Hartebeest (*Bubalis caama*), which has a wider distribution, is also in general colour of a "reddish brown, with violet tinge throughout"; and Messrs. Nicolls and Eglington, who have been quoted as to the colour of both these animals, describing the habits of the last, write:—"The Hartebeest is never met with in very thick bush, or hilly country, but frequents either the bare open flats or plains sparsely covered with camel-thorn trees (*Acacia giraffæ*), and where there are treeless glades to be met with."†

It may have possibly struck the reader by this time that the surmise of the writer is that, in the first instance, and in the long past, animals were uniformly and assimilatively coloured in connection with their principal surroundings, and that as they migrated through scarcity of food owing to excessive multiplication or other causes, or through the alteration of climatic condition, their changed environment placed them under altogether different conditions, and the modifying influence of natural selection then became a magician's wand in the evolution of diverse colours and markings, but it was not the sole agency. The tendency to explain all problems by the theory of natural selection is to-day greatly retarding the study of bionomics. It is not one whit removed from the proffered explanation of the old teleologists, and represents as little

\* 'Across East African Glaciers,' p. 79.—Other travellers in South Africa have noticed an absence of game among ant-hills. Thus Andrew Steedman states: "We remarked that, where they most abounded, Antelopes and other species of gregarious animals were seldom to be met with" ('Wand. and Advent. in Int. S. Africa,' vol. i. p. 172).

† 'The Sportsman in South Africa,' p. 46.

thinking. This has naturally not escaped the thoughtful consideration of Mr. Wallace, though he seems inclined to ascribe the early uniform colouration to a protective origin,\* whereas it is difficult to see that the same hue was equally protective to friend and foe, to the devourer and devoured.

A fact, however, which very strongly stands against the view of original assimilative colouration here assumed is found in the markings of the young of all the unicolorous cats,—Lion, Puma, &c.,—which are more or less indistinctly spotted or striped, and as many allied species, both young and old, are similarly marked, Darwin has observed that “no believer in evolution will doubt that the progenitor of the Lion and Puma was a striped animal, and that the young have retained vestiges of the stripes, like the kittens of black Cats, which are not in the least striped when grown up. Many species of Deer, which when mature are not spotted, are whilst young covered with white spots, as are likewise some few species in the adult state.”† If this was a concrete fact, it would be fatal to the suggestion here made, but the evidence is not all one way, for, according to the late Prof. Kitchen Parker, in the Hunting Leopard (*Cynælurus jubatus*) the young “are covered with soft brown hair, without spots, quite reversing the usual order of things”‡; and Col. Pollok states the same thing.§ However, *per contra*, Mr. Lydekker observes: “It is stated that if a cub in this state be clipped, the under fur will exhibit distinct spotting.”|| In the Lion the markings are also foetal, for Steedman, quoting the particulars of a Lion hunt from the pages of the ‘United Service Journal’ (August, 1834),

\* “The fundamental or ground colours of animals are, as has been shown in preceding chapters, very largely protective, and it is not improbable that the primitive colours of all animals were so. During the long course of animal development other modes of protection than concealment by harmony of colour arose, and thenceforth the normal development of colour due to the complex chemical and structural changes ever going on in the organism had full play; and the colours thus produced were again and again modified by natural selection for purposes of warning, recognition, mimicry, or special protection” (‘Darwinism,’ p. 288).

† ‘The Descent of Man,’ 2nd edit., p. 464.

‡ ‘Cassell’s Nat. Hist.,’ vol. ii. p. 78.

§ ‘Zoologist,’ 4th ser. vol. ii. p. 163.

|| ‘Roy. Nat. Hist.,’ vol. i. pp. 443–4.

relates of a Lioness that was killed, "she had four unborn whelps, with downy skins, striped like the Tiger."\* It still appears that the young of many unicolorous animals are spotted. "Pigs and Tapirs are banded and spotted when young; an imported young specimen of *Tapirus bairdi* was covered with white spots in longitudinal rows, here and there forming short stripes. Even the Horse, which Darwin supposes to be descended from a striped animal, is often spotted, as in dappled Horses; and great numbers show a tendency to spottiness, especially on the haunches."†

Similar markings are to be found in the young of many fishes. Larval Cod have black transverse bars, "the stellate black chromatophores arranged in bands are clearly indicated."‡ Young Ling (*Molva molva*), when grown to a length of seven inches, pass through a very distinct barred stage.§ The young of all the Salmonidæ are barred; "and this is so constantly the case that it may be used as a generic, or even as a family character, not being peculiar to *Salmo* alone, but also common to *Thymallus*, and probably to *Coregonus*."|| When the fry have attained a length of some four inches, they are known by the name of "parr," and "bear conspicuously on their bodies transverse marks or bars, which are common to the young of every member of the Salmon family."¶ Even as regards the colouring of British land and freshwater Mollusca, the view has been held that *Helix cantiana*, *H. cartusiana*, &c., were once banded species.\*\*

Taking the cases of the Lion, Puma, and Cheetah, we see that the two first, unicolorous in their adult stage, apparently show by their spotted young a derivation from a similarly coloured ancestor, whilst the spotted Cheetah, from the apparent evidence of its unicolorous young, would point to a totally different conclusion. But the cumulative opinion of evolutionists is that all

\* 'Wand. and Advent. in Int. S. Africa,' vol. i. p. 220.

† A. R. Wallace, 'Darwinism,' p. 290.

‡ McIntosh and Masterman, 'Life-histories Brit. Marine Food Fishes,' p. 238.

§ *Ibid.* p. 33, fig. 8, and p. 281.

|| 'Roy. Nat. Hist.,' vol. v. p. 494.

¶ *Ibid.* p. 497.

\*\* Cf. "Val. Address," 'Journ. Conch.,' April, 1888; and Boycott, 'Zoologist,' 3rd ser, vol. xx. p. 62.

spots, stripes, and other prominent markings, have been intensified, preserved, or made permanent by a selective process, and have become, and are, of the greatest utility to the animals which possess them. Eimer, on the contrary, from the evidence of the markings on Cats and Dogs, is inclined to ascribe such markings as "due to external conditions and an internal direction of evolution, and can be acquired and inherited in spite of all panmixes"\*—cessation of selection, or the present non-importance of such characters in the struggle for existence. Mr. A. Tylor's views ('Colouration of Animals and Plants'), as summarized by Mr. Wallace, were that the primitive form of ornamentation consisted of spots, the confluence of these in certain directions forming lines or bands; and these again sometimes coalescing into blotches, or into more or less uniform tints covering a large portion of the surface of the body.† It seems, however, more in consonance with present knowledge and opinion to consider that spots, though primitive, were not original, and succeeded, not preceded, unicolorous ornamentation, which has survived only where it has been more or less in unison with the creature's environment, and so afforded "aggressive protection," as in the case of the Lion. Some of the best observations on this point are often made by travellers who know little of the subject, are not zoologists, have no preconceived ideas, but possess a clear mind with which to observe common facts. Such an observation on the colour of the Lion is to be found in a recent book written by two ladies recounting their experiences in Mashonaland:—"His coat was soft and bright, and of a tawny colour—not unlike that of a mastiff—with black points. 'This colour is so like that of the sun-dried grass, that it can with difficulty be distinguished from it.'"‡ If, however, it may be considered as rash to speculate on an original unicolorous or

\* 'Organic Evolution,' pp. 115-16.

† 'Darwinism,' p. 289. Among the Weasels (Mustelidæ), "there is a tendency for the different colours to arrange themselves in longitudinal lines or patches, so as to make the whole of the upper surface of the body light, and its under surface dark; and in no case are there either spots or transverse bands of colour, while equally noteworthy is the entire absence of alternating dark and light rings of colour in the tail" (Lydekker, 'Roy. Nat. Hist.,' vol. ii. p. 47).

‡ 'Advent. in Mashonaland by two Hospital Nurses' (Col. Edit.), p. 277.



assimilative colouration, it seems even more opposed to evolutionary ideas to predicate that because a mammal, as we know it at the present time, has a striped coat, it had also the same appearance in past geological epochs. Yet this seems to have been the method of Prof. Heilprin, who has written so excellently on the distribution of animals, considered geologically as well as geographically. Thus we read:—"The striped Hyena may be traced back to the older (Pliocene) *H. arvennensis* of Central France, and the brown form not improbably to the Miocene (or Pliocene) *H. exima* of Pikermi, Greece."\* At the present day we have brown, spotted, and striped Hyenas (*H. brunnea*, *H. crocuta*, and *H. striata*) all found in, though not confined to, the continent of Africa, and however they may differ osteologically, and however distinctly these differences may be detected in fossil forms, yet surely we are not warranted in concluding that identity of colouration has survived from the geological past. But speculating on the generally accepted conclusion that spots and stripes succeeded a uniform or concolorous decoration, and remembering that the three forms of markings referred to can almost be found at the present time, it seems we ought to be very cautious, as evolutionists, in concluding that the Hyena had developed either spots, or stripes, in Miocene or Pliocene times. Remembering the numerous remains of the genus found in the Pleistocene deposits of Europe, and that, as Prof. Heilprin remarks, it was from these north temperate regions "the Ethiopian realm has drawn much of its existing distinctive fauna," and that the widely distributed Cave Hyena (*H. spelæa*), if not identical with the present spotted form (*H. crocuta*), was "without doubt its direct ancestor," it remains a suggestion as to what the original colouration was, altogether apart from structural specific distinction. Among the fossils of Pikermi, Gaudry found the successive stages by which the ancient Civets passed into the more modern Hyenas. †

\* 'Geograph. and Geolog. Distrib. Animals,' p. 386. Prof. Boyd Dawkins likewise includes the "Spotted Hyena" (*H. spelæa*) in his list of mammalia occurring in Great Britain in association with Palæolithic implements in the Pleistocene river deposits and the caves" ('Journ. Anthropol. Instit.,' vol. xviii. p. 243).

† Huxley, 'Collected Essays,' vol. ii. p. 241.

If the view of original assimilative colouration is reasonable and probable, then it should receive support from the generally understood derivation of spots and stripes by a process of "natural selection," though, as we suggest, and as will be explained later on, natural selection must be regarded as a permitting and perpetuating force, rather than as a creative agency.\* Two instances will here suffice for a consideration of this point in colouration, and are both based on the observations of two competent and excellent observers. The first relates to that prominently striped animal the Zebra, and was made by Mr. F. Galton:—"No more conspicuous animal can well be conceived, according to common idea, than a Zebra; but on a bright starlight night the breathing of one may be heard close by you, and yet you will be positively unable to see the animal. If the black stripes were more numerous he would be seen as a black mass; if the white, as a white one; but their proportion is such as exactly to match the pale tint which arid ground possesses when seen by moon-light." † The second observation was made by that renowned sportsman, General Douglas Hamilton, and relates to the Spotted Deer and Tiger in India:—"For example, the Axis, or Spotted Deer as it is generally called, is something like the Fallow Deer in colour, only the white spots and markings are more distinct, and the body is a brighter red; one would imagine such a conspicuous animal could be easily distinguished in the forest, but the spots and colour so amalgamate with the broken lights and shades that I have often taken a shot at which I thought was a solitary Spotted Deer, and have been astonished to see ten or twelve dash away. The Tiger, again, with his bright body, black stripes, and white markings, is most difficult to see in the forest, and even on the open hill side; at three hundred or four hundred yards distant not a stripe is distinguishable. More than once I have mistaken a Tiger for a light-coloured hind Sambur, until I have brought the telescope to bear and seen my mistake." ‡ General Kinloch, as quoted by Lydekker, referring

\* "The origin of protective colours is to be sought in fortuitous variation preserved by selection" (Dr. Hart Merriam,—Balt. Meet. Am. Soc. Nat.,—*vide* 'Science,' new ser. vol. i. p. 38).

† 'Narr. Explor. in Trop. S. Africa' (Minerva Lib. Edit.), p. 187.

‡ 'Records of Sport in Southern India,' p. 41.

to the Spotted Deer, says, "unless it moves, few beasts are more difficult to see; the colour of the skin harmonizes with the dead leaves and grass, while the white spots are indistinguishable from the little flecks of light caused by the sunshine passing through the leafy branches."\* These observations have the great merit of being neither the result of preconceived opinion, nor the effort to support a theory. Mr. Galton's journey was made during the years 1850-2, before the advent of that epoch-making work the 'Origin of Species,' which at once rivetted attention on all these phenomena. General Douglas Hamilton simply recorded the impressions of a sportsman with thirty-five years' experience in India. Such testimony cannot be gainsaid, and though numerous other illustrations could readily be compiled, and from the pens of capable observers, those here given will suffice as regards the standard of competence and accuracy. On the other hand, I was surprised, in reading the 'Travels and Adventures in South East Africa' of that celebrated and experienced hunter, Mr. P. C. Selous, that he seemed to have no similar observations to record.

In reference to the above instances of spots and stripes affording concealment, the explanation of "active mimicry," as I hope to advocate subsequently, might be applied; but then it must be remembered that the same phenomenon is found in other animals who live under very different conditions. Thus the Zebra Shark (*Stegostoma tigrinum*) is marked with black or brown transverse bars or round spots. Again, in Australia, according to Prof. Strong, the Rabbit is not only often parti-coloured, but numerous instances occur not only of white and black Rabbits, but of Rabbits "with beautifully striped skins."†

The origin of spots and stripes is shrouded in obscurity. In domesticated animals, such as Dogs, Cats, cattle, and Horses, unsymmetrical markings constantly occur. According to Mr. Wallace, "Such markings never occur in wild races, or if they occur in individual cases they never increase; and I have given

\* 'Roy. Nat. Hist.,' vol. ii. p. 355.—Livingstone seems inclined to the opinion that such animals take refuge in the forest to escape from the hunters: "But here, where they are killed by the arrows of the Balonda, they select for safety the densest forest, where the arrow cannot be easily shot" ('Missionary Travels and Researches in South Africa,' p. 280).

† 'Zoologist,' 3rd ser., vol. xviii. p. 406.

reasons for thinking that symmetrical colour and marking is kept up in nature for facility of recognition, a factor essential to preservation and to the formation of new species."\* Mr. Bateson combats the view that variability of domestic animals is markedly in excess of that seen in wild forms. He adduces the great variability of the teeth of the large Anthropoids compared with the rarity of variations in the teeth of other Old World Monkeys, and the *comparative* rarity of great variations even in man:—"If the Seals or Anthropoids had been domesticated animals, it is possible that some persons would have seen in their variability a consequence of domestication." † As regards colour, the same author is more emphatic. To use his own example:—"I go into the fields of the north of Kent in early August, and sweep the Ladybirds off the thistles and nettles of waste places. Hundreds, sometimes thousands, may be taken in a few hours. They are mostly of two species, the small *Coccinella decempunctata* or *variabilis* and the larger *C. septempunctata*. Both are exceedingly common, feeding on Aphides on the same plants in the same places at the same time. The former—*C. decempunctata*—shows an excessive variation both in colours and in pattern of colours, red-brown, yellow-brown, orange, red, yellowish white, and black in countless shades, mottled or dotted upon each other in various ways. The colours of Pigeons or of cattle are scarcely more variable. Yet the colour of the larger *C. septempunctata* is almost absolutely constant, having the same black spots on the same red ground. The slightest difference in the size of the black spots is all the variation to be seen. (It has not even that dark form in which the black spreads over the elytra until only two red spots remain, which is to be seen in *C. bipunctata*.) To be asked to believe that the colour of *C. septempunctata* is constant because it matters to the species, and that the colour of *C. decempunctata* is variable because it does not matter, is to be asked to abrogate reason." ‡

If we consult Mr. Gladstone's 'Impregnable Rock of Holy Scripture,' we shall be induced to believe that such markings may have arisen by a partial or further process of assimilative

\* 'Nature,' vol. L. p. 197.

† 'Materials for the Study of Variation,' p. 266.

‡ *Ibid.* p. 572.

colouration. According to the Biblical narrative, the astute Jacob in his negotiations with Laban increased the number of "ringstraked, speckled, and spotted" cattle by the following ingenious method. He "took him rods of green poplar, and of the hazel and chestnut tree; and pitted white strakes in them, and made the white appear which *was* in the rods. And he set the rods which he had pitted before the flocks in the gutters in the watering troughs when the flocks came to drink, that they should conceive when they came to drink. And the flocks conceived before the rods, and brought forth cattle ringstraked, speckled, and spotted."\* This narrative might be used as a theological argument for the theory that wild animals may have acquired their spots and stripes in a similar manner, as the Tiger in his bamboo jungle, &c., and it seems strange in these plentiful days of theory that no clerical evolutionist has advanced such a view. Canon Tristram, however, by his observations in the Sahara, does not advocate this suggestion, for in these desert plains he described sheep in which "Jacob's ringstraked and speckled, dappled with white, and especially light brown predominated." †

Another suggestion, to which allusion has already been made, is that of the late Alfred Tylor, who starts with the premiss that it "seems most probable that the fundamental or primitive colouration is arranged in spots," ‡ and that these are capable of being coalesced into bands, stripes, and blotches, and are structural in affinity. "If we take highly decorated species, that is, animals marked by alternate light and dark bands, or spots, such as the Zebra, some Deer, or the carnivora, we find first that the region of the spinal column is marked by a dark stripe; secondly, that the regions of the appendages, or limbs, are differently marked; thirdly, that the flanks are striped or spotted along or between the regions of the lines of the ribs; fourthly, that the shoulder and hip regions are marked by curved lines; fifthly, that the pattern changes, and the direction of the lines, or spots, at the head, neck, and every joint of the limbs; and lastly, that the tips of the ears, nose, tail, and feet, and the eye

\* Genesis, chap. xxx. verses 37-9. In the following chapter—xxx. verses 10-13—this is altogether attributed to the favour of the God of Bethel.

† 'The Great Sahara,' p. 61.

‡ 'Colouration in Animals and Plants,' p. 23.

are emphasized in colour. In spotted animals the greatest length of the spot is generally in the direction of the largest development of the skeleton."\* Mr. Tylor had assuredly not read an African observation made by the late Dr. Livingstone, or he would have as certainly incorporated it in his essay as evidence for his theory, and which it may be almost said to have partly anticipated. Dr. Livingstone writes:—"The Poodle Dog Chitané is rapidly changing the colour of its hair. All the parts corresponding to the ribs and neck are rapidly becoming red; the majority of country Dogs are of this colour."† Emin Pasha does not corroborate this statement of Livingstone respecting the markings of Central African Dogs. He describes them as "usually of a buff colour."‡ As regards the reddish colour of the Central African Dogs as described by Livingstone, it must be remembered that many domesticated Dogs are considered to have been the result of taming different wild species of *Canidæ*, and that the Black-backed Jackal (*Canis mesomelas*), which is found from Nubia to the Cape, has a light red skin with a black dorsal stripe. According to Lydekker, in the Prairie Wolf of North America (*Canis latrans*), "the colour varies considerably at different seasons of the year, being of a bright fulvous-brown in summer, and grey or greyish in winter; this ground colour at both seasons being overlaid with a shading of black, which tends to form stripes along the back and across the shoulders and loins."§ Another peculiarity in African Dogs has been recorded by Blumenbach:—"The Guinea Dog (which Linnæus calls *C. ægyptius*—I do not know why) is, like the men of that climate, distinguished for the velvety softness of his smooth skin, and the great and nearly specific cutaneous perspiration."|| Darwin, discussing the animals under consideration, is inclined to ascribe spots and stripes as due to his theory of "sexual selection," the ornamentation having firstly been acquired by the males, and then transmitted equally, or almost equally, to both sexes. He adds: "After having studied to the best of my ability the sexual differences of animals

\* 'Colouration in Animals and Plants,' p. 92.

† 'Livingstone's Last Journals,' vol. i. p. 95.

‡ 'Emin Pasha in Central Africa,' p. 80.

§ 'Roy. Nat. Hist.,' vol. i. p. 501.

|| 'Anthropological Treatises,' Eng. transl. p. 191.

belonging to all classes, I cannot avoid the conclusion that the curiously-arranged colours of many Antelopes, though common to both sexes, are the result of sexual selection primarily applied to the male.\* And he subsequently remarks: "Nevertheless, he who attributes the white and dark vertical stripes on the flanks of various Antelopes to this process will probably extend the same view to the royal Tiger and beautiful Zebra."† Mr. Wallace estimates the derivative process of spots and stripes as a purely protective one:—"In mammalia we notice the frequency of rounded spots on forest or tree-haunting animals of large size, as the forest Deer and the forest Cats; while those that frequent reedy or grassy places are striped vertically, as the Marsh Antelopes and the Tiger." And again: "It is the black shadows of the vegetation that assimilate with the black stripes of the Tiger; and in like manner, the spotted shadows of leaves in the forest so harmonize with the spots of Ocelots, Jaguars, Tiger-cats, and Spotted Deer, as to afford them a very perfect concealment."‡ This last view seems borne out by all the facts at our disposal, and as adaptation implies a previous state of variation, which again predicates a more or less stable condition from which variation arose, we come to the conclusion that the pre-variable condition was a unicolorous one, and from the data—scanty indeed—at our disposal, are inclined to suggest that the unicolorous hue was originally due to assimilative colouration. The wild Horse of Asia is said to be of a dun colour, while those of South America are described as commonly chestnut or bay coloured.§ Why is this?—the question bristles with present difficulties. In the writings of pre- and anti-Darwinian naturalists are often found remarks and statements unconsciously supportive of the future theory. Thus Charles Waterton, in describing the faunistic features of the Demerara forest, writes: "The naturalist may exclaim that nature has not known where to stop in forming new species, and painting her requisite shades" ||; while Frank Buckland from a teleological point of view had pointed out that the striped coat of the Tiger was "most suited" to his environ-

\* 'Descent of Man,' 2nd edit. p. 544.

† *Ibid.* p. 546.

‡ 'Darwinism,' pp. 199, 200.

§ Huxley, 'Collected Essays,' vol. ii. p. 426.

|| 'Wanderings,' Wood's edit. p. 94.

ment, and "when skulking through the dark shade, either of corinda or jungle, it would be almost impossible to make out his huge cat-like carcass creeping along like a silent shadow."\* Eimer also observes:—"I have permitted myself to express the supposition (Varüren, &c.) that the fact of the original prevalence of longitudinal striping might be connected with the original predominance of the monocotyledonous plants whose linear organs and linear shadows would have corresponded with the linear stripes of the animals; and further, that the conversion of the striping into a spot-marking might be connected with the development of a vegetation which cast spotted shadows. It is a fact that several indications exist that in earlier periods the animal kingdom contained many more striped forms than is the case to-day."† To even fancy the appearance of animal and plant life in past geologic epochs, apart from structure as revealed by palæontology, is left to sober scientific imagination. We know there was a flowerless age, but even then animal life existed. Is it to be argued that such animal life had reached its development in colouration? Can we not more easily imagine that animals assimilated in colour with the monotonous and semi-sombre hues of their then environment; but as they multiplied and the struggle for existence caused migration, the same inherent tendency to assimilative colouration prompted assimilative variation in response to the difference in surrounding conditions, and when this variation became adaptive and protective, the process of natural selection accentuated and perpetuated whatever was advantageous to the creature's existence.

The late Andrew Murray, in a paper read before the British Association in 1859, and just before or coincident with the appearance of Darwin's 'Origin of Species,' appears to have held a similar impression, though not reaching the explanation of "natural selection." His words well serve to conclude this discursive suggestion of original and universal assimilative colouration:—"We have seen that in all the instances to which I have referred, the external appearance of the animal bears definite relation to the appearance of the soil on which it lives, or the objects which surround it. It would appear as if there

\* 'Curiosities of Natural History,' Pop. Edit., 3rd ser., p. 256.

† 'Organic Evolution,' Eng. transl. p. 57.



were a *genius loci*, whose subtle and pervading essence spread itself around, penetrating and impregnating the denizens of the place with its *facies*,—possibly only affecting some, the conditions of whose entry on existence render them more liable to receive its impression than others; more probably affecting all, some more and some less," &c.\* It may, however, be suggested that this adaptive colouration was due to an assimilative process in early times,† and that the "*genius loci*" is a pseudonym of that operation. It is at least probable that where we have protective resemblance in a unicolorous condition, it is a survival of original assimilative colouration, and is not a direct product of "natural selection"; but is ratified and perpetuated by that agency as agreeing altogether with its conditions. Unchanged it has survived as the fittest.‡ It must have been in the original head-quarters or centre of evolution before migration took place, and a uni- or concolorous hue prevailed. Such a centre for Anthropoids, palæontology proves to have once existed in India. In the words of Mr. Lydekker:—"We have decisive proof that at a former epoch of the earth's history such an assembly of Primates was gathered together on the plains of India at a time when the Himalaya did not exist as has been seen nowhere else beyond the walls of a menagerie. Side by side with Langurs and Macaques closely resembling those now found in that region were Chimpanzees and Baboons as nearly related to those of modern Africa, whilst the extinct Indian Orang recalls the existing species of Borneo and Sumatra. India, therefore, in the Pliocene period, seems to have been the central point whence the main groups of Old World Primates dispersed themselves to their far distant homes."

\* "Disguises in Nature," *vide* 'Edinburgh New Philosoph. Journ.,' January, 1860.

† Eimer proposes a theory of colour-photography: "The colours of the environment of an animal may be reflected in the colours of its skin" ('Organic Evolution,' Eng. transl. p. 145).

‡ A different argument, propounded on somewhat similar grounds, was advanced by Agassiz in his "Natural Relations between Animals and the Elements in which they live," to prove that marine animals were less specialised in structure than those inhabiting the land areas (*vide* Silliman's 'Amer. Journ. Sci. and Arts,' May, 1850).

THE BIRDS OF THE RIFFELALP, CANTON  
VALAIS, SWITZERLAND.

BY P. L. SCLATER, M.A., Ph.D., F.R.S.

LAST September I passed eight very pleasant days, in splendid weather, at the excellent hotel on the Riffelalp, Zermatt, at a height of 7300 ft. above the sea-level. The hotel is situated close to a large grove of mixed larches and arolla pines (*Pinus cembra*), and just opposite the Matterhorn. It is well known as one of the most popular mountain resorts in Switzerland, and has been now rendered very accessible by the new electric railway, which puts you down at its door. I cannot truly say that bird-life is abundant on the Riffelalp, or, in fact, in any other part of the Swiss Alps that I know of. But there are several birds there not to be seen in life in the British Islands, and of special interest to the student of European ornithology.

You cannot go very far into the pine forest adjoining the hotel without meeting with the Nutcracker (*Nucifraga caryocatactes*). A harsh croak is heard, and a blackish brown Jay-like bird with a conspicuous white tail-end tumbles out of a tree and flies hurriedly into another, often followed by one or more companions. They seem specially fond of the arollas or arvens (*Pinus cembra*), upon the seeds of which they habitually feed, picking the cones into fragments in search of them. I have also seen them on the larch and on the spruce, and occasionally on the open moor. The Nutcracker is certainly the most characteristic bird of the higher forests in Switzerland—that is, from 8000 to 10,000 ft.—and seems to be met with in nearly all the pine forests of that elevation.

Another attractive bird of the Alps is the Alpine Chough (*Pyrrhocorax alpinus*), which may be seen in flocks in many of the precipitous cliffs of the higher mountains. There is a large company of them on the Görnergrat above the Riffelalp (alt. 10,200 ft.), where they inhabit the southern face of the jagged

rocks overlooking the Görner Glacier. They are continually on the move, uttering as they fly about a sort of subdued cackle, and making elegant evolutions in the air. At times they retreat into the ragged rocks, in the holes of which they no doubt build their nests. Another smaller company of this Chough inhabits the steep cliff between the Riffelalp inn and the Riffelhaus.

There was a pair of Ravens on the Görnergrat during one of my visits, which seemed to be on the best of terms with the Choughs, and headed them in their evolutions as they flew about.

A third delightful little bird of the Riffelalp is the Alpine Accentor (*Accentor alpinus*), which is hardly known as a "British bird," but may be easily recognized by those who trouble to look for it among the highest ranges in Switzerland. Although it is unquestionably allied to our so-called "Hedge-sparrow," its habits are quite different, and are more like those of the Pipits or Stonechats. I have always seen it in pairs or small flocks, or sometimes singly, picking about on the ground amongst large stones, or perching on rocks and running over their surfaces. On one occasion I found a family party of six or seven within two hundred yards of the Riffelalp hotel. They are usually rather shy, and it is difficult to get one's glasses well fixed on them, so lively are their movements; but when you get a good side light on them the spotted throat and rufous tinge on the flanks render them easily distinguishable.

The Snow-finch (*Montifringilla nivalis*) is also a characteristic bird of the high Alps from 8000 to 10,000 ft. I have seen small flocks of them on the Furka Pass and elsewhere. On the Riffelalp this year I only identified a single bird with certainty; this was on the outskirts of the pine wood near the hotel. But another flock of finches which I saw in the same neighbourhood near Findelen Glacier was, I believe, of this species.

In the open parts of the highest pastures on the Riffelalp the Water Pipit (*Anthus spinoletta*) is by no means rare. They are always seen on the ground, taking a short flight when disturbed, and then settling again in the herbage. Their habits appeared to me to be much the same as those of our Meadow Pipit (*A. pratensis*).

The Black Redstart (*Ruticilla tithys*), common all over Switzerland, is also to be found on the Riffelalp, but does not

seem to range quite so high as the five species previously mentioned. It is usually met with in the vicinity of the huts and hay-barns, under the eaves of which it often breeds.

Thus it will be observed that there are at least six most interesting alpine birds to be met with on the Riffelalp, even by one who pays merely a few days' visit to that most inviting health resort in one of the worst months of the year as regards bird-life. I have no doubt that all these species would be found breeding there in the spring. Besides these, I noticed Chaffinches, flocks of Tits in the pine woods (*Parus lugubris* and *P. cristatus*), and other well-known birds which it is not necessary to mention. Birds of prey, however, seemed to be unusually scarce. I heard rumours of an Eagle (?), but only saw a single Sparrowhawk.

## NOTES AND QUERIES.

## MAMMALIA.

## RODENTIA.

Large Bank Vole in Kent.—On Oct. 5th, Mr. Oxenden Hammond, of St. Alban's Court, Wingham, very kindly sent me the largest specimen of *Microtus glareolus* that I have ever seen. It was a female, and without any undue stretching measured  $6\frac{1}{2}$  in. from tip of nose to tip of tail; length of head and body,  $4\frac{1}{2}$  in.; length of tail, 2 in. Bell gives the length of the head and body of the female as 3.40 in., and of the tail 1.50 in. Unfortunately when it reached me it was much too far gone for preservation; it was evidently suckling young, and this would hasten on decomposition.—OXLEY GRABHAM (Heworth, York).

## AVES.

Economy of the Cuckoo.—There are one or two points in Mr. H. S. Davenport's interesting notes on the economy of the Cuckoo on which I should like to make a few remarks. During the last eight seasons I have myself taken from the nests in which they were deposited thirty eggs of the Cuckoo, but in no case was there any material difference in the period of incubation of the Cuckoo's egg and those of the foster-parent. I never found more than one Cuckoo's egg in a nest; three were with five eggs of the owner, ten with four, six with three, five with two, and four with one. One was in a nest with two flourishing young Hedge-sparrows, the young Cuckoo being dead and partly decomposed in the shell, and one was found with no other egg under somewhat exceptional circumstances. About the middle of June, 1895, I saw a Cuckoo very near an ivy wall in our garden, from which an egg had been taken with a clutch of Pied Wagtail about a fortnight before, and, happening to have a Greenfinch's nest with fresh eggs by me, I carefully placed this nest with three eggs in it in the ivy. About two days after I found two of the eggs were gone, one of which lay broken on the ground below; and on the following day the last egg had been removed, a Cuckoo's egg being left in its stead. I have tried the same experiment since, but without success. Of the thirty eggs referred to above, nine were from nests of the Sedge Warbler, seven from Pied Wagtail, six from Hedge-sparrow, one each from Thrush, Robin, Blackcap, White-

throat, Spotted Flycatcher, Reed Bunting, and Greenfinch, the thirtieth being the one from the nest put up. We have no Meadow Pipits here, and though I have seen *in situ* more than twenty nests of its congener, the Tree Pipit, not one has contained a Cuckoo's egg or young. Last year, on July 8th, a farm-lad brought me a Cuckoo's egg, and, on asking him where the other eggs in the nest were, he told me there were two lately-hatched young Hedge-sparrows in the nest, which he had not disturbed. If his story were true (and I have no reason to doubt it), this Cuckoo's egg was deposited after the incubation of the other eggs had begun. It was within two or three days of hatching. An inspection of our series of Cuckoo's eggs here would, I think, go some way to prove that the same hen Cuckoo does not always lay in the nests of the same species, as we have eggs apparently of the same bird from the nests of the Hedge-sparrow and the Thrush; of another from the Hedge-sparrow and the Sedge Warbler; of another from the Hedge-sparrow and the Whitethroat, taken from the same ditch on the same day; and of another from the Sedge Warbler and the Reed Bunting. In each instance the resemblance of the eggs is very close, the date approximate, and the locality the same. I have recently met with an undoubted case of removal of one or more eggs while watching a Sedge Warbler's nest in a locality where Cuckoos abound. When I found the nest it was empty; on June 22nd it contained two eggs of the owner, and on June 25th only one egg of the owner and one of the Cuckoo. In conclusion, I may add that it seems to me impossible to ascertain the number of eggs laid by one of these erratic birds in the course of a season; but this year I have had five saved for me, all from nests of the Hedge-sparrow, and all undoubtedly laid by the same bird within an area of two square miles. The first was taken quite fresh on May 11th or 12th, and the last (also fresh) on June 5th.—JULIAN G. TUCK (Tostock Rectory, Suffolk).

**Economy of the Cuckoo.**—Mr. H. S. Davenport may be interested to hear, in connection with the above, that I had brought to me a Meadow Pipit's nest taken on June 30th on one of our Yorkshire moors, where Cuckoos and Meadow Pipits swarm, and that the nest contained a perfectly fresh egg of the Cuckoo; but the Pipit's eggs were so much incubated that I only succeeded in blowing one of them.—OXLEY GRABHAM.

**The Cirl Bunting in Breconshire.**—At the present time the Cirl Bunting (*Emberiza cirulus*) is a firmly established resident in this county, and is to be found in at least five or six localities. Mr. Howard Saunders, in his 'Manual of British Birds,' states that this species, he believes, was unknown in Wales until Mr. E. C. Phillips obtained one on March 15th, 1888, near Brecon; and, as most of our bird books describe it as being rare except in the South of England, perhaps a few notes as to its status in this county may be

of interest. I first observed it on a hill-side named Sunnybank, which rises from the back of my house, on June 4th, 1890, when I found a nest containing four eggs, at the same time identifying the sitting bird as a Cirl Bunting. A few days afterwards I heard two male birds of the same species in song near the site of the nest. One of these I shot, and it is now in my collection. Since that date it has become resident on the above-named bank, where it nests yearly, and where I hear its song almost daily during the summer. Since that year it has also been gradually spreading over the county, and nearly every summer its song is to be heard in some fresh locality. It seems partial to hill-sides furnished with gorse and isolated elm and oak trees. The following are some of the places where it occurs, and probably nests: High Grove, Tallylyn, Sennybridge, and Glanus. I have obtained several specimens for myself and friends; a pair in my collection are in full adult plumage, and a bird which I obtained for the Hereford Museum is an immature male with breast colour bands not well marked. Of four Cirl Buntings' nests I have found here two were in gorse bushes, one on a bank among coarse herbage, and one in a bramble. The eggs in my collection, which I took here from three nests, are all of the same type, and have a greenish white ground, boldly marked with blackish streaks and spots. They are distinct, and could not well be mistaken for eggs of any other of our birds. The Cirl Bunting is one of our most persistent songsters; its monotonous metallic trill is to be heard from about the first week in April to the middle of August. When I first heard it the trill seemed to me rather like that of the Lesser Whitethroat; I am of the opinion now, however, that the song of the latter is more musical and softer. Singing as it does generally near the top of a tree and often out of sight, it is much more easily recognized by the ear than the eye.—E. A. SWAINSON (Woodlands, Brecon).

**Spotted Crane in Furness.**—The Spotted Crane (*Porzana maruetta*) is perhaps sufficiently rare in that portion of Lakeland known as Furness to make the occurrence of a couple in the Rusland Valley worthy of record in 'The Zoologist.' I have searched for this species for a dozen years or more here, where Water Rails may frequently be seen, in the confident expectation of finding the rarer bird sooner or later. On Sept. 8th I saw two, which were shot. They proved on dissection to be male and female, and from the orange-red on the bills are no doubt old birds (*cf.* Stevenson, 'Birds of Norfolk,' vol. ii. p. 395). Both birds, flushed separately from aquatic herbage, took short flights, and were shot as they were just dropping into thick cover. The food consisted of several small seeds and finely divided vegetable matter. On the wing they do not resemble Water Rails, but are much more like tiny Moorhens, and they fly rather fast. Since writing the above, another Spotted Crane has been shot, on Oct. 10th, in exactly the same place. It

is a young bird, readily distinguished from the adults by the absence of bright orange-red on the beak. It is thus not beyond the bounds of possibility that a brood was reared in the immediate vicinity.—CHARLES F. ARCHIBALD (Rusland Hall, Ulverston).

**Pectoral Sandpiper in Kent.**—I had the pleasure of exhibiting, at the last meeting of the British Ornithologists' Club, the first Kentish specimen of the Pectoral Sandpiper (*Tringa maculata*). The bird was shot, from a flock of Dunlin, on Aug. 2nd last, along the seashore between Lydd and Rye Harbour; it is an adult male, and its dimensions agree almost exactly with those of Mr. Gurney's Norfolk specimen given in Stevenson's 'Birds of Norfolk,' vol. ii. p. 370. The bird is the property of Mr. Whiteman, of Rye, to whom I am indebted for allowing me to examine and exhibit it.—N. F. TICEHURST (Winstowe, St. Leonards-on-Sea).

**Notes on the Nesting of the Nuthatch.**—In this district at all seasons of the year the Nuthatch (*Sitta casia*) is tolerably abundant, and for years past I have annually, and in some instances accidentally, discovered the nests of from twelve (minimum) to twenty or more of this species; the past breeding season I paid more attention to the loud "twit twit" of this bird as it darted rapidly from branch to branch, resting occasionally to peep at the bold intruder who ventured so near the favoured breeding place. By remaining perfectly still for a short time, the nest was in most cases easily discovered, and I can safely and unmistakably assert that the Nuthatch (*Sitta casia*) does not in every instance, as is generally supposed, fill up the selected natural cavity, whether in tree or wall, with clay and stones; out of nineteen nests found by me this year, situated from three to twenty feet from the ground, only two possessed the clay; one of these had, in addition to the clay, a quantity of small particles of stone plastered against the bole surrounding the nesting hole. All the others had not the slightest sign of mud, clay, or stones. The eggs, removed by the aid of a specially constructed spoon, were again replaced upon the loose nesting material, and occasionally resembled boldly blotched specimens of *Parus major*. At every nest I identified one or the other of the parent birds. Sometimes by gently tapping near a suspicious-looking hole, the sitting bird would quickly leave its nest and call its mate, hitherto unheard, with that unmistakable and quickly repeated "twit twit" of the species. At one nest visited late in the evening, and containing young, both parent birds entered the nesting hole, and, after remaining quietly until long after the Nightjar had commenced his evening "churr," I retired from the spot, concluding that in this instance at least the Nuthatch had not gone to roost back downwards.—STANLEY LEWIS (Mount Pleasant, Wells).

**Irregular Nesting Sites.**—In corroboration of Mr. Stanley Lewis's



note in the October issue of 'The Zoologist,' there is at times an undoubted tendency on the part of sundry birds to appropriate for breeding purposes nests to which they have no rightful claim, though I do not say that such tendency is possessed by very many species, nor that it is illustrated with undue frequency. At p. 74 of 'The Vertebrate Animals of Leicestershire and Rutland' will be found a note having reference to a Spotted Flycatcher (*Muscicapa grisola*) which reared two successive broods in a Chaffinch's (*Fringilla cœlebs*) nest at Ashlands, in this county, in the spring of 1883; while in the same work, at p. 65, I have given a brief account of a Blue Tit's (*Parus cœruleus*) nest, found in June of the same year, which contained nine eggs, and was placed inside the ancient habitation of a Song Thrush (*Turdus musicus*). In the former instance the Spotted Flycatcher had merely usurped a forsaken nest, utilising it just as it came to hand. It was otherwise, however, in the case of the Blue Titmouse.

Perhaps the most unusual incident of the kind that ever came under my notice was in connection with a brand-new nest built by a pair of Magpies (*Pica rustica*), and on which, just when it was ready for eggs, a pair of Kestrels (*Falco tinnunculus*) set envious eyes. By sheer good fortune I chanced to arrive on the scene one morning just as it was light, and was an eye-witness of a regular pitched battle between the opposing species. The Magpies were eventually worsted, and some ten days later I scaled the tree, a tall larch in a secluded spinney near to Skeffington, and possessed myself of a truly lovely clutch of eggs belonging to the victors. The incident is chiefly interesting from the fact that Kestrels are popularly supposed to appropriate—when they have need so to do—old nests only.

May I be allowed to take this opportunity—of pen in hand—of informing many bird-loving correspondents who have written to me privately, as well as others who may be interested, that circumstances have necessitated my abandoning—at any rate for the present—all hope of publishing my 'Original Sketches of British Birds'? The work, dealing with the experiences of half a life-time spent, I may say, uninterruptedly amidst birds in their native and varying haunts, and completed so long ago as 1895, has been found altogether too costly to produce at the author's private expense. I am emboldened to seek the privilege of giving the foregoing statement publicity through the medium of 'The Zoologist' in the hope that any possible misunderstanding in the future will thereby be averted, seeing that extracts from the manuscript have already appeared, to wit, in the late Mr. F. Poynting's beautiful work entitled 'Eggs of British Birds'; while the author, in publicly acknowledging his indebtedness, alluded to the 'Sketches' as on the eve of publication—a statement which I had reason at the time to believe was eminently justifiable.—H. S. DAVENPORT (Melton Mowbray).

The So-called St. Kilda Wren.—After reading Mr. H. S. Davenport's note (*ante*, p. 413), I turned to Mr. C. Dixon's book, 'Lost and Vanishing Birds,' where I find the following statement:—"Perhaps we [*i. e.* Mr. C. Dixon] may be forgiven for taking exceptional interest in the fate of this bird; for we had the pleasure of ascertaining that it differed in certain respects from the Wren found in other parts of the British Islands. In 1884, when we brought the first known specimen from St. Kilda, the bird was common enough on all the islands of the group, and its cheery song could be heard everywhere." In the face of this distinct assertion the writer in the 'Spectator' may be excused for speaking of Mr. C. Dixon as the discoverer of the St. Kilda Wren. I will not enter upon the question whether *Troglodytes hirtensis* is entitled to specific or subspecific rank, though nearly all the authorities, I think, incline to the latter opinion. Mr. Davenport is doubtless right in saying that in 1698 Martin and many other writers since have recorded the existence of a Wren on St. Kilda. But the question is whether Seebohm (*Zool.* 1884, p. 333) and Mr. Dixon ('Ibis,' 1885, p. 80) were the first to point out that the Wren obtained by Mr. C. Dixon on St. Kilda differed from the Common Wren of the United Kingdom (*Troglodytes parvulus*). If Mr. C. Dixon was the first to discover this fact, would he not deserve the title of "the discoverer of the St. Kilda Wren," to which Mr. Davenport appears to take exception?—H. RUSSELL (Shere, Guildford).

Varieties of Green Plover, &c.—We have about here a white-green Plover, a cream Starling, and a grey Sparrow (House). Varieties are much scarcer, at any rate in Notts, than they used to be, and I only hear and see one now and again.—J. WHITAKER (Rainworth Lodge, Mansfield, Notts).

Scoters in Notts.—Five Scoters (Common) were seen on Lamb Close on Aug. 22nd last. There was one on one of the ponds here about same date.—J. WHITAKER (Rainworth Lodge, Mansfield, Notts).

Crossbills in South-western Hampshire in 1898. — Last year I recorded (*Zool.* 1897, p. 428) the occurrence of this peculiar species in July in the neighbourhood of Bournemouth. During August last I again visited the same locality, and, strange to say, I saw several of the birds not a hundred yards from the trees where I had detected them the previous season. Amongst the ornamental shrubs and trees planted in the grounds of many of the recently erected "villa" residences, the mountain ash was rather conspicuous from its pretty foliage and the fast ripening bunches of scarlet berries. One morning soon after daybreak I heard quite a "chattering" and apparent commotion with some birds not far from my bedroom, and, having got to the window, I saw that a number of Missel Thrushes, taking advantage of the quiet time and absence of man, were disputing in a

most vigorous manner the possession of the ripest berries with some smaller species of bird, which latter seemed quite capable and willing to offer battle to its more bulky antagonist. At first it was scarcely light enough to see what the smaller birds were, and the object of the Thrushes seemed to be to drive them from the neighbourhood, as they chased them from one tree to another, and by so doing they flew almost close to the window, when I saw they were Crossbills. I sat and watched them for some time, and eventually both Thrushes and Crossbills got their breakfast. This continued for several mornings, until the trees were stripped of their berries, and as long as the feast lasted both Thrushes and Crossbills were in evidence during the early hours of the day; but a curious fact connected with it is that, although a few Thrushes occasionally made a stealthy visit to the trees during the bright sunshine, I did not see a Crossbill anywhere in the neighbourhood at noontide, except one day when the cat belonging to the house brought in one, an immature bird in the yellow and red plumage; but it had been dead for some time. An elder tree, the fruit of which was also ripening, was a great attraction to a number of Starlings, but the right of appropriation of the berries was often a disputed point between them and the Thrushes. I did not see the Crossbills attempt to touch the berries, but I suppose it was only a natural sequence, as they prefer the seed-like kernels to the pulp, and is said sometimes to be destructive in orchards by splitting open the apples for the sake of the kernels. This, however, I have never been able to verify from personal observation. Referring to the occurrence of Crossbills in the neighbourhood of Ringwood, I may say that I am not prepared to establish the fact of the species nesting, but I can positively assert that the species put in an appearance from various places, and all points of the compass, from January to the present time (Nov. 8th); and now I understand there are numbers of them in the locality; but it must be borne in mind that their much-loved coniferous trees are comparatively common both east and west of the Avon valley. In the early part of the year I saw several, and heard of many others in and about the neighbourhood of the New Forest; I think they often frequent that locality in the winter, but in April they were still to be found there. During March numbers of them were observed at Parley, near Christchurch, and other places at no great distance, and in June one was sent me from Fordingbridge: it was in a pntrid condition, having been picked up; at the same time I heard of others in East Dorset. In connection with the occurrence of the species, I may relate an incident that occurred, I believe, in May or beginning of June, but I foolishly did not note the date. A labouring man asked me if the cock Greenfinch ever had any red about it, as he had seen a hen feeding two or three young ones on the branch of a fir tree not far from his house, and sometimes they were

accompanied by another bird which he was sure had red about its plumage. This occurred within two miles of Ringwood, on the west side of the Avon, and near some young fir woods. I paid very little attention to the man's story at the time, as I often have some extraordinary tales brought about birds; but, as the Crossbills have put in an appearance both before and since, there is a possibility it was that species the man had observed. I give the story for what it is worth; and I may further mention that, especially in September, the birds were comparatively common in the same locality, and the man brought me a very brightly coloured male, and said he believed it was the same sort of bird he had seen in the summer. As the female Crossbill is of a greenish yellow colour, there is a possibility—perhaps very vague, some would say—of the man being correct about the species nesting in the trees near his house. I regret I did not investigate the matter at the time. Several of the birds I have seen were very brightly plumaged—one in particular was almost uniformly of a very handsome orange-red from head to tail; others were in various stages of dull greenish yellow and pink, and a few were darkly streaked upon the breast. Many people who saw the birds noted the well-known characteristic of the species, in that they were so “tame” and comparatively unsuspecting of danger; in some instances they were caught and caged, and amused their captors by the odd antics and dexterous manner in which they secured the seeds of the fir-cones; within a very short time of their capture fearlessly feeding in sight of any person, and curiously twisting their incurved beaks in and out the wires of their prison. Some specimens fell to the catapults of the roving schoolboys, who took advantage of the docility of the species and their Tit-like habits as they hung and swayed upon the branches where food was to be obtained. With regard to the curvature of the beak, in the largest half of the birds I saw the upper mandible was curved to the right; but this only proves how indiscriminately this “crossing” occurs, for on a former occasion, on examination of a number of specimens, I observed just the reverse; but any person examining the head and neck cannot fail to note the apparent bulk of these parts, and on dissection of same must be struck with the strength of muscles which enables the mandibles to be worked with such extraordinary lateral power. The fleshy protuberances on the sides of the skull remind one of the head of the Hawfinch.—G. C. CORBIN (Ringwood, Hants).

**Heron Nest of Wire.**—Sir Harry Bromley has given me that wonderful Heron nest made the greater part of wire. There must be yards and yards of it. How the bird got it and where I do not know, and how it ever got it through the trees and twisted it into shape. Many naturalists have seen it, and all think it the most wonderful nest they ever saw.—J. WHITAKER (Rainworth Lodge, Mansfield, Notts).

Great Skua in Notts.—A Great Skua was flying over lake at Lamb Close for some time on Aug. 22nd. It made several dashes at Green Plovers, and also at a Heron. After a time it flew away north.—J. WHITAKER (Rainworth Lodge, Mansfield, Notts).

Late Nesting of the Corn Bunting.—This bird is notably a late breeder. Personally I never found eggs till the middle of June; but this year, when shooting down in Holderness, I was shown two nests that had been mown over in the corn-fields—one on Sept. 2nd, containing eggs which were slightly incubated, and the other on Sept. 5th, containing perfectly fresh eggs.—OXLEY GRAHAM.

Late Stay of Swift.—A Swift (*Cypselus apus*) was observed by me this afternoon (Oct. 12th) flying round this house for some time. I see by the 'Field' that Swifts are staying late this season, but perhaps you may consider my observation of sufficient interest to chronicle.—H. MARMADUKE LANGDALE (Royal Cliff, Sandown, Isle of Wight).

#### REPTILIA.

Adder Swallowing its Young.—I have had the pleasure of meeting here to-day (Aug. 15th, 1898) Mr. J. W. Kimber, of Tracey, Torquay, and formerly of Tracey Farm, Great Tew, Oxfordshire. He tells me that just about the date of the Crimean War, he, with his woodman, Richard Eccles, were walking down a woodland path in Minoten Woods, near Witney, on a warm morning about the end of May, when an Adder struck at the woodman's gaiter. The woodman called out to stop Mr. Kimber, saying, "She would not have done that unless she had got young ones." After waiting a short time, he called out again, "Now, sir, come on, and you will see something worth your notice." Mr. Kimber and the woodman then watched, and saw the young ones (four in number) crawl into the old Adder's mouth, she lying at full length with her mouth open to receive them. The woodman then struck the Adder with his stick, and killed her. In a few minutes the young ones crawled out through the wounded mouth of the mother, and of course met the same fate. At the time Mr. Kimber was not aware that the fact he and the woodman had together witnessed was a disputed one, or steps would at the time have been taken to inform naturalists of so well-authenticated an instance. Mrs. Kimber, who is here also with her husband, well remembers his relating the fact to her on his return home on the day on which it occurred. Mr. Kimber, being seventy-five years of age, is desirous that the above statement should be recorded, in the interests of natural history, while opportunity remains. The writer and Mr. and Mrs. Kimber append below their signatures to this

statement.— ADAM J. CORRIE, J. W. KIMBER, M. A. KIMBER (Lansdown Grove Hotel, Bath).

[We publish the foregoing as received. We are informed by Mr. Tegetmeier that the proprietors of the 'Field' have for very many years offered a reward of £1, and for the last three years of £5, for a Viper seen to swallow its young and received dead with the young inside; but the reward has not yet been claimed. The young Vipers burst from the egg with all their powers perfect, and escape rapidly into the grass directly they are disturbed, so rapidly that the bystander concludes they must have disappeared down the mother's throat. No case of Vipers swallowing young has ever been observed at the Zoological Gardens at Regent's Park.—ED.]

#### AMPHIBIA.

**Abnormal Eyes of *Hyla arborea* and *Bombinator igneus*.**—I recently purchased a small Tree Frog (*Hyla arborea*), and sent it to a friend who was interested in batrachians. A few days later he informed me that the Frog was blind in one eye. A strong light having been thrown into the eye, I carefully examined the interior of the diseased organ with a powerful lens. The iris was widely dilated, normal in colour. The whole of the interior of the eye was transparent like glass, and behind this was a greyish surface, showing no trace of blood-vessels. The affected eye was twice the size of the normal one, and the animal was continually closing the eyelid over it. The increase in size of the eye was most marked in the portion nearer the ear. I have similarly examined a normal Tree Frog, but merely obtained an image of the light reflected from the anterior surface of the cornea, the interior of the eye appearing black with no transparency. The nature of the disease in the Frog's eye is a puzzle to me. From a careful dissection of a Toad's eye it would seem that the greyish appearance seen in the diseased eye was the normal retina, so that the anterior portion of the eye seems to be at fault. The Frog is lively, and takes flies readily. As a contrast to the above, I may mention a specimen of *Bombinator igneus* which I kept for some time, in which one eye was curiously small, much smaller than the other. I attributed this to arrest in the normal development of the eye.—GRAHAM RENSHAW (Sale Bridge House, Sale, Manchester).

## EDITORIAL GLEANINGS.

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AMONG the more important acquisitions to the British Museum by purchase during the year special mention may be made of the Whitehead Collection of Birds and Mammals from the Philippines ; the second instalment of the Bates Collection of Heteromorous Coleoptera (13,798 specimens) ; a fine stuffed Lion from Machako's, British East Africa, shot by Mr. S. L. Hinde ; the Savin collection of fossil vertebrate remains from the Norfolk Forest-bed series of deposits ; a series of fossil remains from the Oxford Clay of Fletton, selected from the collection of Mr. A. N. Leeds ; and a fine set of specimens of American Palæozoic Bryozoa.

The number of separate presents reported as having been received during the year by the several Departments of the Museum amounted to 1622, as against 1518 in the preceding year. The following are of special interest :—From Messrs. F. Du Cane Godman and Osbert Salvin : Further portions of their collection of the Coleoptera of Central America, comprising 5468 specimens ; the first instalment of their collection of New World Lepidoptera of the family *Danainæ*, comprising 486 specimens ; and 2586 specimens of Heterocerous Lepidoptera of various orders from Central America. From Colonel John Biddulph : A fine collection of birds from Gilgit, consisting of 3386 skins of nearly 250 species. From Dr. John Anderson, F.R.S. : A large and valuable collection of Reptiles and Batrachians made by him in Egypt and Nubia between the years 1891 and 1895, and forming the basis of a large work, which he has now published. From Mr. F. C. Selous : An interesting series of South African Mammals, including a Springbok, and pairs each of Bontebok, Blesbok, Gnu, and Inyala Antelopes. From Mr. S. L. Hinde, Resident Medical Officer at Machako's, British East Africa : An interesting and valuable series of Natural History specimens (chiefly Mammals, Birds, and Insects) collected by him in British East Africa, and including specimens of species hitherto unrepresented in the Museum Collection. From Capt. F. O. Wathem : The skeleton and skin of a Gavial (*Gavialis gangeticus*) from near Muttra, in the North-west Provinces of India. From Miss A. M. R. Stevens : A very fine specimen of the same reptile from Behar. From the Canadian Department of Marine and Fisheries : A stuffed Seal (*Phoca grænlandica*) from the Gulf of St. Lawrence. From Mr. Thorpe, of St. Helena (through the Colonial Office) : The shell of a large Land Tortoise (*Testudo elephantina*), which died at St. Helena about twenty years ago. From the Hon.

Walter Rothschild: A life-size photograph of a very large Tortoise (*Testudo daudinii*). From the President of the American Museum of Natural History, New York: A series of thirteen large photographs of skeletons and restorations of extinct Tertiary Mammalia.

FOR the past two years Prof. Dendy, of Canterbury College, New Zealand, has been minutely investigating the development of the Tuatara Lizard (*Sphenodon punctatus*), declared to be the most remarkable reptile now living in New Zealand; and a detailed account of the results of his researches has just arrived in England, and will shortly be published. Although the Lizard in question is said to be the oldest existing type of reptile up to the present, little has been known of its life-history, as it is very rare, and shy and retiring in its habits. The Tuatara Lizard was first mentioned in a diary kept by Mr. Anderson, the companion of Captain Cook; but the first really detailed account of the reptile was given by Dieffenbach in 1843,\* when he said:—"I had been apprised of the existence of a large Lizard which the natives call Tuatéra, or Narara, and of which they are much afraid." Owing to the rarity of the Tuatara Lizard, the New Zealand Government passed an Act to prohibit the taking or slaying of the reptile, but, as usual, forgot one of the most important points, namely, the insertion of a clause forbidding the collecting of the eggs. Fortunately for the Tuatara, however, Mr. P. Henaghan, the principal keeper on Stephen's Island, appears at present to be the only man who knows where to look for them, although it is stated that two German collectors have been lately making vigorous but vain efforts to obtain specimens of the eggs. Prof. Dendy had permission granted him by the Government to collect both eggs and adults, and with the help of Mr. Henaghan has been so successful in his investigations of the life-history of the interesting reptile, that many new and important facts will now be made known to the scientific world. The adult animal has a spotted skin, and a crest of separate white flat sharp spines, and is possessed of three sets of teeth. On Stephen's Island the eggs of the Lizard are found to be laid in November, and the embryo pass the winter in a state of hybernation unknown to any other vertebrate embryo, and do not emerge from the egg until nearly thirteen months have elapsed. One curious fact that has come to light is that in the latter stages of its development the skin of the young animal has a strongly marked pattern of longitudinal and transverse stripes, which disappear before hatching, giving place to the spotted skin of the adult animal. This Lizard is particularly interesting, owing to the fact of its being allied to the extinct reptiles of the Triassic age.—*Daily Mail*.

\* Dieffenbach, 'Travels in New Zealand,' ii. p. 204.



It is interesting to hear that a specimen of *Scutigera coleoptrata*, a South European centipede, was recently captured at Colchester. This is the second time that its occurrence in Great Britain has been recorded. The first time it was introduced among a quantity of old rags into a paper-mill near Aberdeen, where, being protected by heat, it bred and has become established.

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A FISH discovered in the stomach of a Cachalot by the Prince of Monaco during one of his expeditions has been determined as indistinguishable from the common Eel, and this points with great emphasis to the fact that this form, whose habits are so obscure, must at times take to the open sea.

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THE nature of the water supply being of immense importance to the welfare of humanity, especially of that portion living in communities, it may be well to refer to a paper written by Mr. Geo. W. Rafter, "On Some Recent Advances in Water Analysis and the Use of the Microscope for the Detection of Sewage," though published as long ago as 1893 in the 'American Monthly Microscopical Journal,' and which was read before the Buffalo, N. Y., Microscopical Club:—

The complete details of these various studies are too extensive to be given at length, and we may merely refer to some of the results at Hemlock Lake, where plant forms have been identified as follows:—Chlorophyceæ, 20; Cyanophyceæ, 15; Desmidiæ, 14; and Diatomaceæ, 41—making a total of plant forms of 90. The maximum quantities of some of these minute plants per 100 cubic centimetres are—Protococcus, 2000; Anabæna, 20,000; Cœlosphærium, 34,000; Asterionella, 40,000; Cyclotella, 60,000; Fragillaria, 25,000; Stephanodiscus, 60,000. The total number of animal forms is 92, of which 3 are classed as Spongidæ, 10 as Rhizopoda, 29 as Infusoria, 2 as Hydroida, 14 as Rotifera, 3 as Polyzoa, 21 as Entomostraca, 1 as Malacostraca, and 10 as insect larvæ. As to maximum quantities of animal forms observed, we find among Infusoria—Dinobryon, 12,000; Glenodinium, 25,000; and Vorticella, 9600.

The quantities of minute life present in Hemlock Lake, while apparently large, are in reality quite small, as will be readily appreciated by reference to a statement of the number present in Ludlow reservoir, Springfield, Massachusetts, where the following maximum quantities per 100 cubic centimetres have been observed:—of the Diatoms, Asterionella and Melosira, 405,600 in April, 1890; Cœlosphærium, 157,600 in August, 1889; Chlorococcus, 322,400 in October, 1889: of animal forms the infusorian Dinobryon showed 364,400 per 100 cubic centimetres in February, 1890. But even the large quantities of minute life found at

Springfield are dwarfed into comparative insignificance by the results of a series of examinations of the water supply of Newport, R. I., as given by Dr. Drown in a recent report, from which it appears that on August 31st, 1891, there were present in Easton's Pond, one of the sources of supply for Newport, the large number of grass-green Algæ (*Chlorophyceæ*) of 677,750 per 100 cubic centimetres; on September 11th, 1891, there were found 927,400; on October 8th the number had fallen to 675,700, but subsequently again rose until the enormous maximum was attained on January 18th, 1892, of 1,428,600 per 100 cubic centimetres. Diatoms were present on the same date to the amount of 200,700 per 100 cubic centimetres, giving a total of Diatoms and grass-green Algæ of 1,629,300.

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IN the July number of the 'Home University' is an interesting note "On Temporary Museums," which we here reproduce:—

We desire strongly to recommend as a very efficient aid to education the formation of Temporary Museums. These are especially suitable for places of summer resort at the seaside, or elsewhere, but they might also be attempted with success in almost any town. A museum of this kind was organised last summer at the pleasant little town of Hunstanton on the Norfolk coast, and it is upon the experience there obtained that our suggestions and advice to others who may be encouraged to attempt the like will be based. At Hunstanton the Museum was open five weeks, that is, during almost the whole time that the Board-School-rooms were at liberty. The school-rooms were rented for a nominal sum, and were fitted up with boards laid across the desks, upon which objects were displayed. A Committee of Organisation and Management, composed partly of residents and partly of visitors, was, of course, extemporised, and appeals were made for the loan of objects of interest. It is scarcely to be doubted that in almost any town there would be found those who for such a purpose would be willing to lend pictures, cases of stuffed birds, insects, fossils, and miscellaneous curios. With objects of this kind to make the chief display, the members of Committee would easily supply the rest. A few books of reference should be borrowed—if possible a copy of the 'Encyclopædia Britannica'—and an energetic Sub-Committee to name and label the objects should commence its labours a week or two before the opening, and continue them throughout. Those thus engaged would find their reward in the acquisition of much knowledge, for more is to be learned in the act of making and arranging museums than can be got by visiting those already in good order.

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AT a recent meeting of the Linnean Society at Burlington House, a series of interesting photographs of a fine hen Buzzard, of the common

species, amicably, not to say affectionately, living with a largish chicken in Mr. Alan Crossman's aviary. The story of this strange companionship is not a long one. The Buzzard desired to sit, and hen's eggs were given it to brood over. On the first occasion a chicken was hatched and disappeared—ask not where; on the second, two left the eggs, but only one lived, and became the foster-child of the Buzzard, which brought it up, and still continues to treat it in the light of a relation, though now nearly full grown. In this case two instincts of the Buzzard came into collision—that of killing weaker birds to live upon, and a natural desire to bring up young. Taking into consideration that instincts do not always give rise to stereotyped actions, but are to a certain extent modified by circumstances, and again, that the raptorial bird had had no necessity for some time to seek its prey, it is not so surprising perhaps that the maternal instinct proved itself the stronger.—*Daily Mail*.

The above is by no means the first occasion that a Buzzard has been known to bring up chickens. Yarrell, in his first edition of his 'British Birds,' vol. i. p. 78 (1843), says:—"The extreme partiality of the Common Buzzard to the seasonal task of incubation and rearing young birds has been exemplified in various instances. A few years back a female Buzzard, kept in the garden of the 'Chequers Inn' at Uxbridge, showed an inclination to sit by collecting and bending all the loose sticks she could obtain possession of. Her owner, noticing her actions, supplied her with materials; she completed her nest, and sat on two hen's eggs, which she hatched, and afterwards reared the young. Since then she has hatched and brought up a brood of chickens every year."

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THE following particulars concerning the expedition which has left England for the purpose of visiting the almost unexplored island of Socotra, situated about one hundred and fifty miles east-north-east of Cape Guardafui, have been given in the 'Times.' The staff consists of Mr. W. R. Ogilvie Grant, of the department of Zoology in the British Museum; Dr. H. O. Forbes, the director of the Liverpool Museums; and Mr. Cutmore, taxidermist attached to the latter institutions. The Royal Society, the Royal Geographical Society, and the British Association have provided part of the funds for the undertaking. The expedition has sailed for Aden, proceeding thence to Socotra by the Indian Marine guardship 'Elphinstone,' which, in compliance with a request made by the authorities of the British Museum, has been placed at the disposal of Mr. Grant and Dr. Forbes for the purpose of conveying them to the island and back to Aden on the termination of their stay. The main object of the expedition is to investigate thoroughly the fauna of the island, and make large and complete collections in every branch of Zoology.

IN a special Antarctic number of the 'Scottish Geographical Magazine,' Sir John Murray urges the need of a British Antarctic Expedition. The importance of such an expedition has been insisted upon more than once, and we hope that Sir John Murray's efforts will assist in impressing the mind of the Government. Our maps are a feeble blank concerning Antarctica, and the information we possess as to its fauna and flora is inconspicuous. A few Cetacea, a few Seals, and a handful of birds are all that Mr. Chumley can record; while as to the Invertebrata, practically all we know was gained in a few dredgings by the 'Challenger' during the cruise from the Cape of Good Hope to Australia. Dr. Murray's plea is not for a dash to the South Pole, but for a "steady, continuous, laborious, hydrographical, and topographical examination of the whole South Polar Area during several successive years," . . . which "would enrich almost every branch of science, and would undoubtedly mark a great advance in the philosophy of terrestrial physics." He asks some of our wealthy citizens to come forward with £100,000, which might be placed in the hands of the President of the Royal Society.—*Natural Science.*

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SOME very interesting ornithological news has lately been received from New Zealand. A fourth specimen of *Notornis mantelli*, a large flightless Rail, has been captured. The last specimen of *Notornis* was captured some twenty years ago, and it has long been considered extinct by most people, although a few have clung to the idea that the species yet lived hidden in some of the great marshes of New Zealand. The name *Notornis* was originally given by Owen to some fossil bones discovered in the North Island, New Zealand. In 1849, a few years later, Mr. W. Mantell obtained, in the Middle Island, a freshly-killed specimen of a flightless Rail, which was declared to be of the same species as Owen's *Notornis*. A second specimen was obtained in 1851, and a third in 1879. The present specimen was killed by a dog in the bush adjoining Lake Te Anan. The skin and all parts of the bird have been carefully preserved, so that we may look forward to having some exceedingly valuable details concerning this interesting bird. The fact that this fourth specimen was a young female proves that the bird is by no means extinct, and also that it is not easy to find.—*Knowledge.*

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"BRUSHER MILLS," the well-known New Forest snake-charmer, has so far this year killed sixty Snakes and ninety Adders, and destroyed between eighty and ninety Wasps' nests.





*Vespertilio nattereri*, Desm.

# THE ZOOLOGIST

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No. 690.—December, 1898.

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## OCCURRENCE OF NATTERER'S BAT IN NORTH WALES.

BY J. BACKHOUSE, F.L.S.

(PLATE IV.)

DURING July of the present year the writer received a box containing thirty-six living specimens of Natterer's Bat (*Vespertilio nattereri*) from North Wales. These were all captured in an old ruin not far from the sea, and, along with a dozen or so more, were taken from a hole in the masonry formerly occupied by Jackdaws. The collection consisted of both old and young, and nearly all have been most carefully preserved.

The occurrence of this comparatively rare British Bat in such large numbers is most interesting, and especially so because the young are of almost all ages—some so very juvenile as to be hardly capable of spreading their membranes.

So little known are the young of this species that a few words by way of description, along with a photographic reproduction of a specimen taken after preservation, may not be out of place.

During life the young Natterer's Bat is darker above than the adult, and noticeably paler beneath—in fact, nearly pure white. The specifically characteristic long spur and hairy margin to the distal portion of the interfemoral membrane is equally observable in the young. Another recognizable point in both old and young

of *V. nattereri* appears to be the presence of hairs upon the feet, a point overlooked by Bell (1874), though pointed out by Lord Clermont in 1859. Some of the young in the "bunch" above referred to were more downy than hairy above, especially about the face.

Natterer's Bat, which is of somewhat local occurrence in our own country, is found distributed through Europe as far as its easternmost confines, but does not appear to range beyond Southern Sweden in the north, or beyond the Alps in the south.



## VARYING FECUNDITY IN BIRDS.

BY BASIL DAVIES.

MR. WARDE FOWLER, in one of his bird stories, describes the uneasiness of a youthful hen Wagtail when she began to ponder on the question, "Why do we wag our tails?"—the moral being, I suppose, that facts come before reasons for facts, and ought to suffice for most of us. Checked somewhat by this allegory, my ideas on the above subject received a fresh impetus when, in 'Summer Studies of Birds and Books,' I read that Mr. Warde Fowler actually felt it his duty to ask and to attempt to answer that very same question which used to trouble his little hen Wagtail. I have no apology of duty to offer for my poor attempts at explanation: I can only say that the subject is one to which very little attention has been given, and that it is one in which a really skilful ornithologist could probably make most successful researches.

The ordinary birdsnesting naturalist regards an abnormal clutch, whether large or small, only with a view of its suitability for his collection. He robs a Nightingale of five eggs and a Partridge of fifteen without attempting to explain why the offspring of the one species is numerically so superior. Some years ago, reviewing my season's "take" of eggs, I felt myself somewhat of a monster when I imagined the table on which my cases lay peopled with those birds whose embryos I had removed from every shell—six Nightingales, a dozen Bullfinches, and so on—though I never took more than one egg from a nest. Consequently, in abandoning collection, I sought for a new interest in eggs to take its place; and this chapter is an endeavour to explain the interest of a different sort that I now take in the nests I find.

There are certain general principles which it is well to keep in mind in this particular branch of bird-study. Such is the rule, that birds do not merely breed so many times a year in the course of nature, but that they feel it their duty not only to

produce a certain number of offspring each year, but also to bring a certain number to maturity. Take the case of a cat. A female may be perpetually running with a male. You drown her kittens; yet she does not again kitten for six months or so. Compare her with a Nightingale. Harry a Nightingale's nest when the fledglings are nearly ready to fly. The bird does not sit down and ejaculate "Kismet," and feebly await the period of migration. She feels desolate without her young ones around her; she knows she has a duty to fulfil, and that the time is short. She begins to bustle about, and in a week she will have started laying again in a safer spot. In a dell at Clifton there were two pairs of Nightingales. Some deadly person of the rabid collector type took each clutch as it was laid, and again he did the same with the second clutches; but the faithful birds each nested a third time, and met with success at last.

There are further a few rules which are useful, and which I must endeavour to state more briefly:—

- (1). The object of the breeding season is to maintain the numbers of each species at an equable level (not necessarily to increase them, though this is sometimes the case).
- (2). By August the numbers of each species are probably treble what they were in April.
- (3). These numbers are subsequently curtailed:—
  - (a). In the case of migratory species, many succumb to the hardships and dangers of the passage.
  - (b). In the case of resident species, many succumb to cold and lack of suitable food during the winter months.
  - (c). Every species alike is liable to losses through accident, from carnivorous birds, and at the hands of the collector, gamekeeper, and other misguided people. These losses, however, cannot compare with (a) and (b).

I will now attempt to treat of the various species more or less in detail.

1. FINCHES, PIPITS, BUNTINGS, and LARGER WARBLERS (such as the Nightingale, Blackcap, &c.).—Throughout the country five eggs is the usual number for all these birds to lay in a clutch. The migratory species in the majority of instances probably confine themselves to one brood, while nearly all the Finches

regularly have a second nest. It is not, I think, difficult to see why they respectively lay their five and ten eggs a season, and neither more nor less. These birds, resident and migratory alike, feed their young on various forms of insect-life—flies, grubs, aphides, the smaller kinds of caterpillars, and the ova of these insects. The two parent birds would be unequal to catering for the wants of a larger brood than five; neither could a hen of this size well produce more than five eggs. Indeed, four is not an uncommon clutch by any means in districts where insect-food is not specially abundant. On the other hand, a Blackcap Warbler must produce five young in a season to prevent her species diminishing; and as the breeding season is curtailed by migration, which the young must be old enough to undergo when the time arrives, we see that a smaller clutch would not be convenient. The resident small birds, however—Finches, Buntings, &c.—are not hampered by the approach of the period of migration, and they indulge in a second brood. It is necessary for them to produce eight or ten of their kind in a season to aid in killing off from the cultivated lands the vast swarms of insects to which the summer has given birth, and which the efforts of the parents when feeding have proved utterly inadequate to cope with. Although the Finches thus produce four or five times their own number, yet by the next spring each family of Finches will usually have dwindled down to a pair once more; for what the birdcatcher spares, God and the winter take.

2. THE TITS AND THE WREN.— These birds during the season feed on a very similar diet to those described under 1, and they lay from six to twelve eggs in each nest, though one cannot say definitely how often they have a second brood. Still, taking into consideration the number of Finches' nests that the small boys destroy, I should be inclined to say that the Tits rear more young than the Finches. They are not the prey of the birdcatcher, who annually robs our woods and fields of tens of thousands of Finches. Why then are they so prolific? Simply because they feed mainly on an insect diet all the year round, and in the depth of winter insect-food is scarce and difficult to obtain. I have found a score of Tits lying dead on the snow in a single walk in a winter that was not specially severe. All were dead from starvation, not from cold; their

bodies were thin and emaciated, the breast-bone often protruding almost through the skin. By training a terrier to find the dead bodies, one gets some slight idea what an ordeal a hard winter is to our birds. Another point is that eight young Tits would hardly require more food than five greedy little Robins, and so the labours of the parents in the two species would not differ appreciably.

3. SMALLER WARBLERS (Chiffchaffs, Willow Warbler, &c.).—Here again it is no more difficult to feed eight small Warblers than five large ones. A Wood Wren usually lays six or seven eggs; she can rear her family as easily as a Redstart can rear five; and these species succumb in greater numbers during migration than their more stalwart relations.

4. The NIGHTJAR lays but two eggs, probably because a huddled mass of half a dozen gaping youngsters could hardly fail to be distinguished, seeing that she incubates on the bare ground.

5. The WRYNECK lays nine eggs as a rule. This bird has a great advantage over the other insectivorous birds, because it feeds largely on ants. It is structurally adapted for searching tree-trunks, and if it finds the supply on the trees run short it has only to preserve a few ant-hills to obtain an unbounded quantity. I observed one pair very carefully when feeding their young, and they seemed to rely almost wholly on some neighbouring ant-hills. When I cut one open for them they had a joyous quarter of an hour, and did great execution.

6. DOVES AND PIGEONS.—I have only the old hackneyed explanation for the unvarying pair of eggs laid by these birds, *i.e.* that they are conspicuous among birds for their tender affection to their mates, and that the eggs always hatch out male and female in the same nest. I have had no opportunities of verifying this theory among the wild kinds, but it is undoubtedly true in most instances of the domestic Pigeon.

7. PLOVERS AND CERTAIN OTHER WADERS.—These are peculiarly interesting birds. They build in a very dangerous situation—on the ground in tolerably open and exposed places. This occasions three difficulties; for, to balance these dangers and the probable resulting losses,

- (1). The number of young must be passably large.
- (2). The young must be able to run when hatched.

(3). If (2) be necessary, the egg must be abnormally large for the size of the bird.

Everyone knows how wonderfully these three difficulties are surmounted.

8. **CRAKES AND RAILS.**—These birds lay from seven to nine eggs in well-concealed situations amongst the stems of standing grass or grain. Owing to the cover afforded by the stems, the young need not be so large when hatched as the young of the Plover; consequently the eggs are much smaller, and the hen can incubate a greater number. At the same time it is imperative that she should produce a good clutch, for very many nests are destroyed when the grass comes to be mown. The birds are also migratory, and encounter the usual dangers during passage.

9. **GAME BIRDS** lay a good many eggs, as the situation of their nests lays them open to many enemies—Stoats, Crows, &c. Further, I should not be surprised to learn that they were originally less prolific before they were persecuted under the name of sport. At any rate, the least persecuted species, the Ptarmigan, as a rule lays the fewest eggs.

10. Coming to the order of **NATATORES**, I plead guilty to a very small experience of these birds. It is obvious enough why Razorbills and Guillemots lay but one egg. It is well known that their single egg is of such a tapering form that a gust of wind, instead of sweeping it from the ledge of rock on which it is laid, merely causes it to twist round in a circle with the thin end as centre. If there were more than one egg in a clutch, these gyrations would result in disaster, and a Guillemot's breeding station in a high wind would indeed be a curious spectacle.

It may further be noticed that the largest clutches in this order are those laid by the Teal and Wild Duck, whose nests are accessible to many enemies, and who are not altogether free from the molestation of man.

“THE LEATHERY TURTLE” (*DERMOCHELYS  
CORIACEA*).

BY W. L. DISTANT.

(PLATE V.)

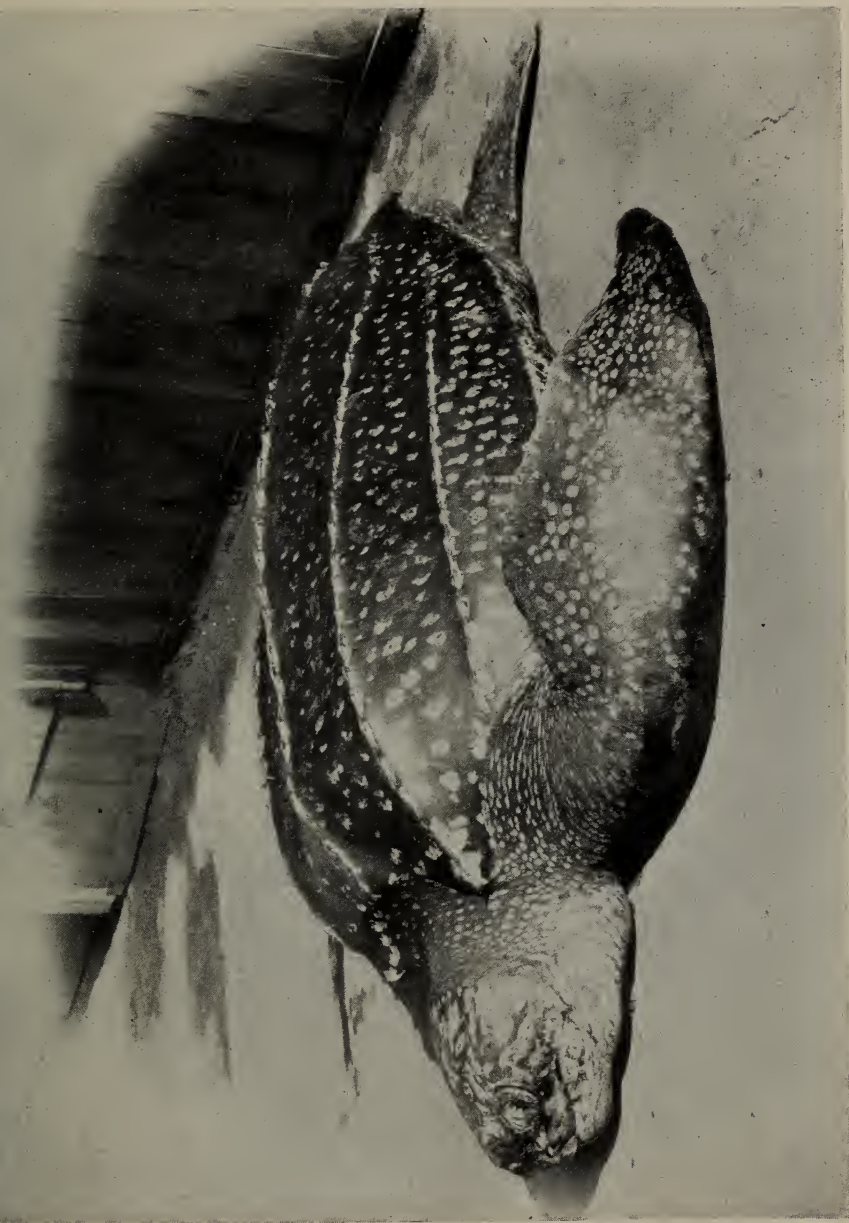
WHEN visiting the South African Museum at Cape Town last October, Mr. Peringuey directed my attention to the carapace of a fine specimen of this Turtle, which had been captured alive on the 20th April, 1896, in Table Bay, on Woodstock Beach, in about two feet of water. It was presented to the Museum by my friend Mr. Casper Keytel, of Cape Town, who had it photographed while in the living condition, and who presented me with a copy of the photograph, which is here reproduced (Plate V.). Such photographs of rare living animals are, zoologically, most important, and prevent misconceptions too often consequent on illustrations taken from Museum specimens. Of this Turtle few really good illustrations are to be found; most of the popular ones—even those in the ‘Boston Standard’ and ‘Royal’ Natural Histories—are taken from Brehm. Tickell took a drawing from life, but it is somewhat indifferent.

According to Dr. Günther the species is spread throughout almost all the seas of the tropical and temperate regions, having been found in the Mediterranean, on the South Coast of England, in the West Indies, at the Cape of Good Hope, on the coasts of the United States, in Chile, Japan, and the coast of British India.\* It appears to be scarce on the Australian coasts. McCoy figures a specimen which he describes as “the only one I have known to have occurred on the shores of the colony.”† Bell includes the species in his ‘British Reptiles’ on the authority of Borlase and Pennant.‡ The late Prof. Agassiz, however,

\* ‘Reptiles of Brit. India,’ p. 55.

† ‘Prodromus Zool. Victoria,’ Dec. xi. p. 1, pl. 101.

‡ A specimen was recorded as found in Bridlington Bay, Yorkshire, on Oct. 25th, 1871 (‘Zoologist,’ 1872, p. 2907).



LEATHERY TURTLE (*Dermochelys coriacea*).





expressed his doubts as to whether the specimens collected in these various parts of the world really belonged to one species.\* The same authority considered, from a critical examination of the localities where the species is found, and from its frequency in some parts of the Atlantic Ocean, whilst it is only met with accidentally in others, that "it is plain that the West Indies is its home, and that it is not indigenous to Europe, since in three centuries it has not been observed more than nine times in Europe, whereas it is seen at all seasons about the Bahamas." †

An interesting account is given by Major S. R. Tickell, which has been more than once reproduced, of a female captured on the coast of Tenasserim. "She was captured Feb. 1st, 1862, near the mouth of the Té River, on the sandy beach of which she had deposited about a hundred eggs, when she was surprised by a number of Burmese fishermen who had been lying in ambush near the spot (a favourite resort of the Common Turtle, *Chelonia virgata*), and, after a desperate struggle, was secured. Her entire length was six feet two and a half inches.

"The strength, aided of course by the enormous weight of the animal, was such that she dragged six men, endeavouring to stop her, down the slope of the beach, almost into the sea, when she was overpowered by increased numbers, lashed to some strong poles, and brought into the village by ten to twelve men at a time.

"The eggs were spherical, of  $1\frac{5}{8}$  in. diameter, and were as palatable as those of the River Tortoise are *nauseous*. Besides those the animal had laid in the sand, there must have been upwards of a thousand in her ovaria, in all stages of maturity. The flesh was dark and coarse, and very few of the crowds of Burmans assembled at Té to see the animal would eat any of it." ‡

According to the late Prof. Duncan, they make a roaring noise under certain circumstances, and hence have to be included in the genus *Sphargis*.§ Aflalo, describing a pair of these Leathery

\* 'Contr. Nat. Hist. U. S. Amer.' vol. i. p. 372.

† *Ibid.* p. 374.

‡ 'Journ. As. Soc. Beng.' 1862, p. 367.

§ As the construction of this generic term implies, the species is now included in the genus *Dermochelys*.

Sea-Turtles from Thursday Island, states that "the shell was not harder than a new saddle." \*

In compiling these few facts and opinions relating to this scarce and interesting animal, it is evident that much more is to be learned as to its habits; while the suggestion of Agassiz that there may be more than one species included under the same specific name is worthy of attention.

\* 'Sketch Nat. Hist. Australia,' p. 188.

## NOTES AND QUERIES.

## MAMMALIA.

## CARNIVORA.

**Polecats in Suffolk.**—I have to record the capture of three more specimens of *Mustela putorius* in North-west Suffolk, two of which I examined in the flesh at Bury St. Edmunds on Nov. 16th, and could have purchased. All three came from the headquarters of this species in the Mildenhall district.—JULIAN G. TUCK (Tostock Rectory, Suffolk).

## RODENTIA.

**Notes on the Bank Vole.**—The Bank Vole (*Microtus glareolus*) from Kent, referred to by Mr. Oxley Grabham (*ante*, p. 477), is undoubtedly a large one, exceeding in length by half an inch the longest specimen from East Suffolk, whose dimensions I have taken. For the purpose of comparison it may be worth while recording the dimensions of some of the largest examples, among a number of individuals from the parish of Blaxhall, in Suffolk, carefully measured at various times. All the specimens whose measurements are here given exceed the average size of this little animal.

	Head and body.			Tail.		Total length.	
	(Tip of nose to vent.)			(Vent to extremity of hair or tip.)			
	in.	lin.	...	in.	lin.	in.	lin.
Male.....	4	0	...	2	0	...	6 0
Do.....	3	10	...	1	10	...	5 8
Do.....	3	11	...	1	6½	...	5 5½
Female.....	4	0	...	1	9	...	5 9
Sex not noted ...	4	2	...	1	7	...	5 9

The delicate fawn or orange tint with which the under surface of the body of adults is at times found to be suffused appears to me to be most pronounced in the winter, when the fur is in its best condition; but to determine this point further observation is needed. Two females caught here in January had the fur upon the abdomen beautifully stained with bright fawn-colour, while a male also taken in January had very little of that tint. Another male, in the month of February, was only slightly tinted. A third male, caught in March, was also but faintly stained with

pale yellowish fawn in the middle of the abdomen; but another at the same season had all the under parts, excepting the inside of the thighs and fore legs, strongly tinged with yellow fawn. Of thirteen males and one female examined during the month of May and the latter part of April, not one showed much trace of this peculiar flush of warm colour; and in a female taken in July it was only slightly indicated. These animals are particularly fond of apples, and both Bank Voles and Long-tailed Field Mice often find their way into a fruit-house here, which is situated in the midst of a plantation, the former regaling themselves on the apples, while the latter confine their attention more particularly to the filberts and walnuts. During the winter Bank Voles often visit and even take up their abode in outbuildings where roots, bulbs, vegetable seeds, &c., are stored; yet those I have kept in cages would not touch carrots, parsnips, or crocus bulbs. In addition to the different kinds of food enumerated in Mr. Harting's article on this animal (Zool. 1887, pp. 369, 370), mine would also eat the berries of the holly, and of *Cotoneaster microphylla*, as well as the leaves of the dandelion.—G. T. ROPE (Blaxhall, Suffolk).

## CETACEA.

Porpoises at Great Yarmouth.—These animals (*Phocæna phocæna*) have fared badly here through some reason—perhaps having become entangled in the fishermen's nets, where they died. Twelve dead Porpoises have come on shore a few miles north of the town in the latter part of October and beginning of November.—A. PATTERSON (273, Southtown, Great Yarmouth).

## AVES.

Food of the Redwing.—I examined the other day the crops and gizzards of several Redwings (*Turdus iliacus*), which have been very numerous. They all contained a goodly number of caterpillars, and the larvæ of some beetle. I often think not half enough attention is paid to the food of birds by those who have the chance of dissecting them, for it is thus that we are enabled to judge of their usefulness or the reverse.—OXLEY GRABHAM (Heworth, York).

Barred Warbler in Lincolnshire.—I shot an example of the Barred Warbler (*Sylvia nisoria*) on Sept. 5th last from a bunch of brambles in a ditch not far from the coast at North Cotes. The bird was a young female, showing no trace of barring except on the tail-coverts, and having the irides brown. The weather at the time was fine and very hot, with a light east wind. With the exception of a single Willow Wren and a young Spotted Flycatcher, no other migrants were seen on that day. This bird is an addition to the Lincolnshire list, and is, I believe, the thirteenth British

example.—G. H. CATON HAIGH (Grainsby Hall, Great Grimsby, Lincolnshire).

**Crossbills in Hants.**—In connection with Mr. G. C. Corbin's interesting account of the occurrence of Crossbills (*Loxia curvirostra*) in South-west Hants (*ante*, p. 482), it may be worth noting that I saw a pair of these birds in the south-east part of the New Forest, close to a Scotch fir plantation, on May 19th of this year, a date that makes it probable that they had bred or were breeding in the neighbourhood. The male was in the orange-red plumage.—A. BANKES (Beaulieu, Hants).

**The Gird Bunting in Wales.**—In Capt. Swainson's interesting note on the increase of this species (*Emberiza cirrus*) in Breconshire (*ante*, p. 478), he quotes from the first edition of my 'Manual of British Birds,' completed in 1889. If he refers to the second edition (pt. vi. April, 1898, p. 211), he may be pleased to learn that "in Wales it has decidedly spread of late, and is known to have nested in Brecon, Glamorgan, Cardigan, and Denbighshire, while it has occurred in other parts of the Principality."—HOWARD SAUNDERS.

**Owls and Kestrels.**—Referring to Mr. L. E. Adams's "Plea for Owls and Kestrels" (*ante*, pp. 449, 450), it may be mentioned an order has been obtained by the West Suffolk County Council (a copy of which is enclosed) protecting these birds throughout the year, the taking of their eggs being also prohibited.—JULIAN G. TUCK (Tostock Rectory, Suffolk).

**Scoters in Hants and Isle of Wight.**—Respecting the note by Mr. J. Whitaker as to Scoters in Notts (*ante*, p. 482), I may state that during Aug. 6th and 20th of this year I saw daily from half a dozen to a dozen Common Scoters (*Edemia nigra*) lazily winging their way from Hayling Island (near Portsmouth) to the Isle of Wight, and when on the island, on one or two occasions, I saw them too. They are called in the south "Isle of Wight Parsons," and, I was informed, are found at Hayling Island and the Isle of Wight all the year round, so doubtless breed there. Whilst on an ornithological ramble at Hayling, I observed the Curlew Sandpiper and the Rock Pipit. This also between the dates already mentioned. I had always understood the Scoter was a rare bird to the south, excepting at certain seasons; but that it is not the case is evident from my own observations, and from what I learned as the result of careful enquiries.—W. PERCIVAL-WESTELL (5, Glenferrie Road, St. Albans, Herts).

**Phasianus colchicus in Yorkshire.**—The true old-English Pheasant is getting now so scarce that its occurrence is almost worthy of record. I do not think I have shot more than half a dozen in my life. On Nov. 8th Mr. Richard Hill, of Thornton, near Pickering, very kindly brought me a

fine young cock that had been shot in his covers. It was in beautiful plumage, without a white mark on the neck, it had a conspicuously short tail, and no spurs on either leg.—OXLEY GRABHAM (Heworth, York).

**Nesting Habits of the Moor-Hen.**—In that most interesting book, ‘Game Birds and Wild Fowl of the British Islands,’ by Charles Dixon, I notice, in the details of the nidification of the Waterhen (*Gallinula chloropus*, Linn.), Mr. Dixon states (p. 82), “When the sitting bird leaves the nest it covers the eggs with bits of vegetation.” Now, during the past twenty-six years, I have seen a large number of nests and eggs of this bird (principally in the neighbourhood of York, but also in various parts of the county), and I have never yet found the eggs covered; and my experience is confirmed by several practical field naturalists of my acquaintance to whom I have referred. I am of course quite aware that the habits of birds, like the colours of the plumage, are subject to variation, and perhaps this is a local instance; but that it is the rare exception (if it occurs) and not the rule in Yorkshire, I am firmly convinced. Perhaps other ornithologists will be good enough to inform us how far their experience confirms or refutes Mr. Dixon’s statement.—WILLIAM HEWETT (12, Howard Street, York).

**The Birds of the Riffelalp.**—I was much interested in reading Dr. Sclater’s paper on the Birds of the Riffelalp (*ante*, p. 474), as I was myself in quest of birds there in 1894, and again in 1896. Two of the birds he has specified I did not observe there—the Water Pipit and the Alpine Accentor—the latter being one of the very few alpine birds with which I am still unacquainted. I did, however, observe the Rock Thrush above the Riffelberg Hotel. The Nutcracker is, as Dr. Sclater observes, a very conspicuous bird of the higher forests of Switzerland, and when chaplain at Gimmelwald I was frequently asked by sojourners at the Pension Schilthorn, “What was the large black bird with the white tail” which they so frequently met in the woods? Until I had myself seen the Nutcracker I was unable to answer. I also observed near Murren that beautiful little song bird, the Citril Finch (*Chrysomitris citrinella*), which has a pleasing song frequently uttered when on the wing. It is much to be wished that some handbook of Swiss birds were available for visitors, as in all my chaplaincies I found that great interest was taken in ornithology by sojourners in the hotels.—CHARLES W. BENSON (Rathmines School, Dublin).

**Birds of Hertfordshire.**—As it is desired by the Hertfordshire Natural History Society to have as complete a list of birds of the county as possible, I should be glad, as Recorder of Birds to this Society, if anybody having notes on any species which have occurred in Hertfordshire would send me particulars of same.—ALAN FAIRFAX CROSSMAN (St. Cuthbert’s, Berkhamstead).

List of Birds observed in the District of Moffat, Dumfries-shire, from October, 1896, to February, 1897. — The following (fifty-five identifications) does not pretend to be a complete list of the birds of the district. My notes were made during a residence in Moffat extending over the period specified above, and in my walks for four or five miles around the town I simply made a note of what I saw. The town of Moffat is situated on the river Annan, and lies nineteen miles north-east from Dumfries. It is frequented for its mineral waters, which are saline and sulphurous, and are said to resemble those of Harrogate. The district is hilly and not much wooded.

Mistle-Thrush (*Turdus viscivorus*).—Common.

Song-Thrush (*T. musicus*).—Common, but not quite so plentiful as the former.

Redwing (*T. iliacus*).—Frequently seen in small parties.

Fieldfare (*T. pilaris*).—Very plentiful; hundreds seen feeding on the hawthorn trees close to the town.

Blackbird (*T. merula*).—Fairly plentiful.

Redbreast (*Erithacus rubecula*).—Common.

Golden-crested Wren (*Regulus cristatus*).—Very plentiful, perhaps the commonest bird in the district.

Hedgesparrow (*Accentor modularis*).—Occasionally met with.

Dipper (*Cinclus aquaticus*).—Plentiful.

Long-tailed Tit (*Acredula rosea*).—Parties of twelve or so met with on several occasions.

Great Tit (*Parus major*).—Fairly common.

Coal Tit (*P. ater*).—Also fairly common.

Marsh Tit (*P. palustris*).—Three or four birds only observed among the firs at Evan side.

Blue Tit (*P. cæruleus*).—Very common.

Wren (*Troglodytes parvulus*).—Somewhat plentiful.

Tree Creeper (*Certhia familiaris*).—Scarce; only two or three noticed.

Swallow (*Hirundo rustica*).—Saw a few about the middle of October.

Greenfinch (*Ligurinus chloris*).—Common.

Goldfinch (*Carduelis elegans*).—One or two only observed.

Siskin (*Chrysomitris spinus*).—Fairly common.

House Sparrow (*Passer domesticus*).—Always plentiful.

Chaffinch (*Fringilla cælebs*).—Plentiful.

Linnet (*Linota cannabina*).—Somewhat scarce.

Lesser Redpoll (*L. rufescens*).—A small party occasionally seen feeding on the alders at Annan side.

Bullfinch (*Pyrrhula europæa*).—Single birds occasionally noticed, and on one occasion a party of five.

Yellow Bunting (*Emberiza citrinella*).—Not uncommon.

Reed Bunting (*E. schæniclus*).—One pair only noticed.

Snow Bunting (*Plectrophenax nivalis*).—Small flocks often observed, principally near Hartfell.

Starling (*Sturnus vulgaris*).—Common.

Magpie (*Pica rustica*).—Scarce; three or four only noted.

Jackdaw (*Corvus monedula*).—Common.

Carrion Crow (*C. corone*).—Fairly plentiful.

Rook (*C. frugilegus*).—Plentiful.

Sky-Lark (*Alauda arvensis*).—Somewhat plentiful.

Kingfisher (*Alcedo ispida*).—Very scarce; a single bird observed on Annan.

Tawny Owl (*Syrnium aluco*).—Scarce.

Sparrow-Hawk (*Accipiter nisus*).—Very scarce; a single bird observed.

Kestrel (*Falco tinnunculus*).—Fairly common.

Common Heron (*Ardea cinerea*).—Very plentiful.

Mallard (*Anas boscas*).—Not very plentiful.

Teal (*Querquedula crecca*).—Not very plentiful.

Ring-Dove (*Columba palumbus*).—Fairly common.

Black Grouse (*Tetrao tetrix*).—Plentiful.

Red Grouse (*Lagopus scoticus*).—Very plentiful.

Pheasant (*Phasianus colchicus*).—Common.

Partridge (*Perdix cinerea*).—Very abundant, the district being well suited for Partridges.

Moor-Hen (*Gallinula chloropus*).—Very plentiful.

Coot (*Fulica atra*).—Scarce; only one observed.

Golden Plover (*Charadrius plumialis*).—Plentiful.

Green Plover (Lapwing) (*Vanellus vulgaris*).—Very plentiful.

Woodcock (*Scolopax rusticula*).—Scarce; only one observed.

Common Snipe (*Gallinago cælestis*).—Very plentiful.

Common Gull (*Larus canus*).—Plentiful.

Herring-Gull (*L. argentatus*).—Plentiful.

Lesser Black-backed Gull (*L. fuscus*).—Plentiful.

In the collection of a gentleman I saw specimens of the following birds, all of which were shot in the district:—Long-eared Owl, Short-eared Owl, Bittern, Spotted Crake, and Skua. — BRUCE CAMPBELL (Greenbank Place, Edinburgh).

#### PISCES.

Notes from Great Yarmouth.—Various species of Sharks have been unusually abundant in local waters during the past summer, judging from those seen at less recurrent intervals than formerly. On July 7th a Thresher Shark (*Alopias vulpes*), length 10 ft., turned up on the fish-wharf.



Another reported from Lowestoft on Nov. 7th; length, 14 ft. 4 in. A Sunfish, undoubtedly the Short Sunfish (*Orthogoriscus mola*), reported as taken into Lowestoft on Sept. 14th. A Porbeagle Shark (*Lamna cornubica*), length 7 ft., on the fish-wharf, Oct. 4th; one, 8 ft. long (which I did not see), was landed on Sept. 28th. This species is more often taken than its commoner relative, the Blue Shark (*Carcharias glaucus*), which was at one time the commoner species. Of *C. glaucus* I have not seen an example this season. The largest Mackerel of which I have any local record was brought in on Oct. 21st; length  $21\frac{1}{2}$  in., girth 12 in., weight 3 lb. 7 oz. This exceeds my previous record of one in November, 1881, measuring 20 in. long,  $10\frac{1}{2}$  in. in girth, and weighing  $2\frac{3}{4}$  lb.—A. PATTERSON (273, Southtown, Great Yarmouth).

#### DISTRIBUTION OF SPECIES.

**Involuntary Migration.**—During a recent visit to the Cape on board the mail steamship 'Norham Castle,' I witnessed an instance of this not uncommon, but too little recorded, occurrence. On Sept. 9th, when in about lat.  $22^{\circ}$  N., and at about a distance of ninety miles from the coast of North Africa, we encountered a wind blowing from the shore, and bringing fine sand, which afterwards blew from the opposite quarter, still charged with sand, as proved by the opposite sides of objects on deck being alike dusted. Numerous birds visited the ship, such as a couple of Hoopoes, two Yellow Wagtails, a Dove, Chat, Warblers, and other species. All these birds were weary, and frequently alighted on the booms, unalarmed by the presence of the many passengers on deck. They were likewise in a famished condition, as proved by a small moth which also flew on board being instantly seized by a Chat, who carried it to a boom and methodically devoured it. Again, in the evening, a Warbler was chased and struck down almost at my feet by another bird—unidentified—under the awnings of the upper deck, and in the full glare of the electric light; the attack and retreat of the bold marauder being almost instantaneous, but in the presence of the occupiers of many deck-chairs. In the evening I captured Dragonflies in the saloon, and a small bug belonging to the *Capsidæ*.

These birds must have been blown from the shore, and as we were only a spot on the area over which the wind blew, it may well be imagined that a considerable loss in avian life must have ensued. In the morning all had disappeared. On the voyage home, on board the 'Dunvegan Castle,' I saw a fine Coly which had been captured on board during a similar enforced exodus, and which had lived some considerable time in a cage, and was in splendid condition.—ED.

## NOTICES OF NEW BOOKS.

*The Structure and Classification of Birds.* By FRANK E. BEDDARD, M.A., F.R.S. Longmans, Green & Co.

THERE is an ornithology of the field—certainly the earliest form of the study, as proved by the traditions and languages of primitive races; a museum ornithology, which is the parent of most of our avian literature; and an anatomical ornithology, of which many of us have heard too little and studied less. This volume comes in the fulness of time; it supplies a real want to the general zoologist, as well as to the special ornithologist, and is a creation of the Prosector's department attached to the Gardens of our Zoological Society. To the late Prof. Garrod the inception of the work appears to be due—his successor, the late Mr. W. A. Forbes, did not live to carry it out as he intended; the third Prosector, Mr. Beddard, has now completed the task.

In discussing the affinities of birds, and the general belief as to their origin from some reptile stem, Mr. Beddard reviews the evidence which has led some of our highest authorities to detect a nearer kinship with the Dinosaurs than with any other group of reptiles.\* As is now fairly well known, the celebrated tridactyle footprints in the sandstone of the Triassic period which were ascribed to birds are now considered as certainly footprints of Dinosaurs; but Mr. Beddard is cautious in adopting a purely derivative hypothesis. As he writes:—"Still, with so specialized a form as *Archæopteryx* certainly was, and as *Laopteryx* probably was in the Jura, it would not be surprising to meet with genuine avian remains in the Trias. But even then there are undoubtedly Dinosaurs belonging to that period, so that the question of relationship would resolve itself into a common origin, not a derivation of birds from Dinosaurs." Of the relation between

\* Prof. Marsh's Memoir on the "Dinosaurs of North America" was noticed in our last volume (1897, p. 92).

birds and Pterosaurians, particularly Pterodactyles—and Prof. Newton has conclusively shown most interesting resemblances—Mr. Beddard considers the main difficulty “in the way of comparing Pterodactyles and birds is in the fact that both can fly, and that each has acquired the power of flight by a different method. Having acquired the power of flight, it seems clear that certain of the points of resemblance between them may easily be due to that mode of life, and may have been independently arrived at.”

The consideration of the affinities brings us to the much-vexed question of the classification of birds, and “in considering a scheme of classification it is clear that we must bear in mind indications of the descent of birds”; and, in sketching the main outlines of a scheme, “attention must be paid only, or chiefly, to those characters which birds have inherited from their reptilian ancestors.” But here a difficulty arises, if we seek the plane of low level in organization, by a plethora of undoubtedly reptilian characters. For “the few specially reptilian features in the organization of birds have, so to speak, been distributed with such exceeding fairness through the class that no type has any great advantage over its fellows.”

Such discussions and conclusions as the above show the philosophical questions which may be debated and considered by the anatomical details of this volume, with its wealth of illustration. It would no doubt be possible to criticize; fault-finding is a facile occupation, but to recognize the great merits of a book is a more instructive process, even for a reviewer, than the eager quest for an error. We hold with Prof. Nichol on a literary subject—and the same remark applies to science—some “criticism has for its aim to show off the critic; good criticism interprets the author.” This book is a standard contribution to ornithology.

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*Text-Book of Zoology.* By H. S. WELLS, B.Sc. Lond., &c.,  
and A. M. DAVIES, B.Sc. Lond. London: W. B. Clive,  
University Correspondence College Press.

THIS is a new edition, “almost completely” rewritten, of Wells’s ‘Text-Book of Biology,’ published some five years back.

We are, however, somewhat puzzled by the Preface as to the authorship of this volume. Thus we read:—"Only one chapter in the book (Chapter XIV.) remains practically unaltered from the first edition, so that while the credit for the general plan of the work belongs to Mr. H. S. Wells, no responsibility attaches to him for any part of the present work." Who then is the writer who has "almost completely rewritten the book"? for we are told Mrs. Davies has supplied the diagrams to this volume of "the University Tutorial Series."

The "type-system" is employed throughout, pages 1-134 being devoted to a very thorough exposition of the Rabbit. We cannot devote a space in these pages sufficient to adequately notice the anatomical and physiological treatment of the subject, but those of our readers, who do not pay much attention to those important aspects of zoology, will still find many interesting conclusions in the life-history of the animal. Many points, often overlooked, are brought out very clearly and in plain language. "Thus the Rabbit is dependent on the plant kingdom for the maintenance of its life. So, too, are all animals, directly or indirectly; for, though one animal may feed on another, and that in turn on another, this process cannot be carried on indefinitely: sooner or later we must come down to an animal which is a plant-feeder. In the long run all animals are dependent on plants for both the *material* and the *energy* of their bodies." Again, in rightly estimating a subject so often misunderstood as "variation," it is well to bear in mind that "it is probable that out of the enormous numbers of Rabbits that live or have lived no two have ever been *exactly* alike." Perhaps, however, a strong and excellent theory is made too much a fact, when we are told that the upturned white tail of the Rabbit "serves as a 'recognition mark' to guide the young when during feeding an alarm is given, and a bolt is made for the burrows." This is a *probability*; and even Wallace does not confine its efficacious protection to the young alone, but to those "more remote from home," as well as to the young and feeble.

Part II. is devoted to the "Lower Vertebrata," of which the Frog, Dogfish, and Lancelet are taken as types; Part III. treats of the "Development of Vertebrata"; and Part IV. deals with the "Invertebrata," the Slipper-Animalcule (*Paramecium aurelia*),

the Fresh-water Polype (*Hydra vulgaris*, *H. viridis*, *H. fusca*), Earthworm, Fresh-water Mussel, and Crayfish being used as types.

An Appendix pertains to "General Advice to the Student." The first advice to the student is on "the importance of some preliminary reading before dissection is undertaken." Against this may be instanced Scudder's historical narrative of his introduction to the study of a fish by Agassiz. An axiom, however, with which all will agree, which should be pondered by the young, and remembered by the old, is to avoid the common and easy delusion that one "really *understands* some statement, because he can *remember the words* of it."

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*The Wonderful Trout.* By J. A. HARVIE-BROWN. Edinburgh: David Douglas.

"THE Wonderful Trout" of Mr. Harvie-Brown has always had admirers; old Isaac Walton declared "he may be justly said, as the old poet said of wine, and we English say of venison, to be a generous fish, a fish that is so like the buck that he also has his seasons"; while in England at least the Trout stream and the cricket field are among our dearest experiences and reminiscences of country life. We quite recently (*ante*, p. 444) noticed another work on the same subject, but that referred principally to fish in British streams, while the present small volume is all Scotch,—fish, waters, author, publisher.

When a naturalist like Mr. Harvie-Brown writes on a subject of special interest to anglers, the zoologist may safely rely upon finding the record of many facts and observations which an ordinary fisherman would pass unheeded as almost outside the domain of sport. But to catch your fish you must know him, his food not alone, but his time and manner of eating it, his haunts, his habits, his idiosyncrasies; in fact, he who knows his Trout best should fill the largest basket. Thus we may leave the author's successful advocacy of "up-stream" angling, and the more startling disuse of the landing-net, as solely appertaining to the "gentle craft"; and as the angler fishes the stream for Trout, so must we search the book for natural history lore.

As regards the age of Trout, a personal experience is given of one which had passed nearly twenty years in confinement. Trout show decided preferences for colours; but our author does not consider, as many do, that a certain colour is more deadly because more readily seen, but rather "We believe, in most circumstances, the sky above and the water combined gives a better guide, and that the converse of Stewart's theory is the true one, *viz.* that 'a certain colour is more deadly because *less* readily seen,' and that movement is the more visible sensation to the eye of a fish." And further on we read that anglers of experience and with sufficient scientific interest in their practice believe in "a dark fly in a dark water and sky, and a light fly in a bright water and sky." We will only give another quotation: "If a large Trout is on the prowl, or has taken up his special feeding-lie in a stream, he commands the 'key of the situation,' and is not slow to repel all minor fry that come within many feet of his 'monarchical throne.' This we have often seen when looking down into the clear water from a height. Even before taking the bait himself he will chase away the small fry, *i. e.* if the bait is lying stationary at his very nose."

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*Faune de France, contenant la description des espèces indigènes disposées en tableaux analytiques et illustrée de figures représentant les types caractéristiques des genres.* Par A. ACLOQUE. Paris: J. B. Ballière et Fils.

THIS is the third volume of a series descriptive of the Fauna of France; those preceding were principally devoted to the Insecta. The present volume treats of the "Thysanoures, Myriopodes, Arachnides, Crustacés, Nematelminthes, Lophostomés, Vers, Mollusques, Polypes, Spongiaires, and Protozoaires."

The method pursued is a synoptical one. The structural characters are given from class to species, very many of the genera are figured,—in fact, there are 1664 figures in the volume now before us,—and the most salient characters are sought to differentiate throughout. The labour expended in this work must be prodigious; for what monographer does not remember the travail incidental to the formation of a synoptical key to

genera and species? Here a whole fauna is treated in the same manner. It is a purely technical work, embracing classification, differential enumeration, and nomenclature, and many a young English zoologist may find himself helped over several stiles by the possession of this small and not expensive book. The illustrations are very clear, while the course followed throughout reminds us of the method of a well-thumbed volume of our early days—Stephen's 'Manual of British Beetles.'

We sometimes meet with antedated books, but this bears the date of 1899.

### EDITORIAL GLEANINGS.

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THE following extract from the Address of the Chairman, Dr. P. L. Sclater, on opening the Seventh Session of the British Ornithologists' Club, refers to the successful completion of a great conception:—

“As the Editors of ‘The Ibis’ have already remarked in their preface to the volume for the present year, one of the leading ornithological events of 1898 is the completion of the ‘Catalogue of Birds.’ The twenty-sixth volume of this work, prepared by Dr. Bowdler Sharpe and Mr. Ogilvie Grant, the only one required to finish the series, will, I am assured, be laid before the Trustees at their meeting on the 22nd inst., and be ready for issue very shortly afterwards. Thus, after a period of twenty-five years, this most important piece of ornithological work has been brought to a conclusion. No human product is perfect, and the Catalogue has been, and will be, the subject of many criticisms. One obvious defect in it is its want of uniformity, the various authors having been permitted, owing to the wise discretion of the authorities, very liberal opportunities for the expression of their own views in their respective portions, although a general adherence to one plan has been rightly insisted upon. But when the enormous amount of labour required for this work and the absolute necessity of employing more than one author upon such a huge task are considered, it will be obvious that greater uniformity was practically unattainable. In the case of the ‘Catalogue of Reptiles and Batrachians,’ where the series of specimens and species was not so large, the herpetologists are fortunate in having had the whole of the work performed upon a uniform system by the indefatigable energy of a single naturalist. The ‘Catalogue of Birds,’ as complete in twenty-seven volumes, gives us an account of 11,614 species of this Class of Vertebrates, divided into 2255 genera and 124 families. It has been prepared by eleven authors, all Members of the British Ornithologists’ Union, and, with one exception, I believe (who is not a resident in England), now or formerly Members of this Club. I think it will be universally allowed that we have, in this case, a great and most useful undertaking brought to a successful conclusion.”

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WE have received the Report of Trustees for the year 1897 of the Australian Museum, Sydney. Commercial prosperity reacts in a beneficial manner on scientific institutions. There must be a revenue to make



grants possible, and if, as we know, the trader usually precedes the missionary, so commerce provides the funds for science. In that spirit we may well say "Advance Australia" when we read as follows:—

"No fully organised collecting expeditions have been despatched, as the Trustees had not sufficient available funds for this purpose, but a few short trips were made by members of the staff, partly at their own expense. The most important of these was made possible through the kindness of Mr. Septimus Robinson, who invited the Trustees to send a collector to Buckinguy Station for a fortnight, and gave him every assistance and generous hospitality, the only expense to the Trustees being the railway fares and the preserving material. A number of much-needed specimens were obtained in this way, and the thanks of the Trustees are due to Mr. Robinson for his assistance. A very great need on the Museum staff is that of a trained collector. The stock of duplicate specimens is very low, and it is difficult to replenish the exhibited collections as required, and impossible to deal fully with other Museums in the way of exchange. At present the funds at the disposal of the Trustees will not permit of such an appointment being made, and this is the more to be regretted when it is seen that Museums and Institutions in other countries are sending their collectors to Australia and taking the best specimens out of the country, so that Australian types are largely located in London, Norway, &c."

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A FRENCHMAN, M. Bourdarie by name, is agitating just now in the interests of the Elephant. He is appealing to the French Government and the King of the Belgians for support. Every year 40,000 Elephants are killed in Africa for the sake of their ivory, and M. Bourdarie fears that, like the Buffaloes in America, these useful animals will become exterminated if something is not done to limit the number killed. He considers that the Elephant instead of being destroyed should be protected to serve the future agriculturists of Central Africa, as the Elephant is the only animal that can work in these regions. In the meantime ivory is still an important article of commerce in Central Africa, and the problem is how to get the ivory without killing the Elephant.—*South Africa.*

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AN extraordinary catch of Sprats occurred on Thursday, Nov. 17th, just west of Shoreham Harbour, about fifteen boats being kept going throughout the morning and afternoon bringing the fish to the shore. In nearly every instance the boats were loaded to such an extent that had there been any sea on to speak of they would undoubtedly have been swamped. In one case a boat containing between fifty and sixty bushels burst. The Sprats were unusually large. The last catch of any similar magnitude off Shoreham occurred in 1878.—*The West Sussex Gazette.*

THE London steamer 'Oceana,' which was returning from an interesting scientific expedition off the west coast of Ireland, was driven into Cork Harbour for refuge during the recent gale. The object of the expedition, which was under the auspices of the British Museum, was to explore the ocean within 200 miles off the coast of Cork and Kerry for specimens of aquatic life, and whatever general knowledge could be obtained. Mr. Murray, who had charge of the operations, stated to a correspondent at Cork that the expedition had been most successful. Soundings were taken at various depths to a maximum of 2000 fathoms, as far as 200 miles west of the Fastnet, and several interesting and some curious specimens were procured. These will be arranged and classified, which must occupy a considerable time, and a report will then be written upon them for the British Museum.—*Daily Mail*.

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THE example of Mr. Rhodes is to be followed in Australia, the Victoria Government having determined to reserve 91,000 acres at Wilson's Promontory as a huge national Zoo wherein all the native animals, which will otherwise soon become extinct, will be able to live and breed. It is, by the way, an example which might well be followed nearer home. The English "fauna" is not very extensive, but it is exceedingly interesting, and is rapidly diminishing. There is plenty of land in the island which would answer the purpose admirably, and which is useless for almost everything else.—*Globe*.

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WE have already (*ante*, p. 449) called attention to a proposed Zoological Society of Edinburgh. We are now glad to learn that as the result of a meeting held last week a committee has been appointed to formulate a scheme for a zoological garden in Edinburgh. It was mentioned at the meeting that letters asking information had been addressed to the secretaries of various existing gardens, and it appeared to be the opinion that the two best suited to the requirements of Edinburgh were Dublin and Bristol, each of which has an income of about £3000 a year from an average of about 120,000 visitors. Prof. Cossar Ewart, in strongly commending the proposal, spoke of it as being painful to think that many children grew up in Scotland without having ever seen many of the animals they heard so much about. Forty years ago there was a zoological garden at Edinburgh, but it collapsed for lack of support from the public.

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MR. SYMINGTON GRIEVE has again published "Additional Notes on the Great Auk or Gare-fowl (*Alca impennis*, Linn.)," reprinted from the 'Transactions of the Edinburgh Field Naturalists' and Microscopical

Society.' These notes are written up to 31st July, 1898. We previously referred to his last census of twelve months ago ('Zoologist,' 1897, p. 533). He is now able to increase his enumeration of birds represented by the following remains:—

Skins	...	...	...	...	80 or 82.
Skeletons, more or less complete				23	„ 24.
Detached bones		...	...	862	„ 874.
Physiological preparations			...	2	„ 3.
Eggs	...	...	...	71	„ 72.

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SIR JOHN MURRAY has presented to the British Museum the first set of the Natural History Collections made by Mr. C. W. Andrews during his year's stay on Christmas Island, 200 miles south of Java.

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W. WESLEY & SON, 28, Essex Street, Strand, London, have just issued a new Catalogue, being No. 132 of their Natural History and Scientific Book Circular, which gives a descriptive and classified list of 1500 books and pamphlets on the Natural History of Great Britain and Ireland. We believe that it is the first catalogue of this character which has been published. The arrangement under the names of the English counties, Wales, Scotland, and Ireland, will be found of interest to collectors of local fauna and flora.

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WE regret to announce the death of Professor George J. Allman, M.D., F.R.S., formerly Regius Professor of Natural Science in the Edinburgh University, which took place at Ardmore, Parkstone, Dorset, on Nov. 24th. Professor Allman, who was born in Cork in 1812, was the eldest son of Mr. James Allman, of Bandon, County Cork. He was educated at Belfast Academical Institution, and resolved on studying for the Irish Bar. Before, however, he had completed his terms, the love of natural science caused him to abandon law for medicine, and he accordingly graduated in Arts and Medicine in the University of Dublin in 1844. In the same year he was appointed Regius Professor of Botany in the University, and gave up all idea of practising medicine as a profession. In 1854 he was elected a Fellow of the Royal Society, and in 1855 he resigned his professorship in the University of Dublin on being appointed Regius Professor of Natural History and Keeper of the Natural History Museum in the University of Edinburgh. This post he held until 1870, and shortly afterwards the honorary degree of LL.D. was conferred upon him by the Edinburgh University. Professor Allman devoted the greater part of his life to investigating the lower organisms of the animal kingdom. The large col-

lection of *Hydroida* made during the exploring voyage of the 'Challenger' was assigned to Professor Allman for determination and description. He has published the results of his original investigations in the Philosophical Transactions, the Transactions of the Royal Society of Edinburgh, of the Royal Irish Academy, and of the Linnean and Zoological Societies of London.

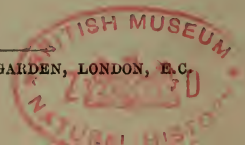
We take the above from an obituary notice in the 'Daily Chronicle.'

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At a meeting of the British Ornithologists' Club, on Oct. 19th, Mr. G. H. Caton Haigh exhibited and made remarks upon a Warbler (*Luscinia schwarzi*, Radde), which he had shot on the first of that month near North Cotes, Lincolnshire. The large bastard-primary easily distinguished the members of this genus (and those of *Herbivocula*) from the *Phylloscopi*. The summer home of *L. schwarzi* appeared to be in South-eastern Siberia, and reached about as far west as Tomsk, according to Godlewski, who had mentioned the powerful note of the bird; this was described by Mr. Haigh as 'disproportionately loud, and it led to the thorough beating-out of the hedge in which the bird was skulking. It would be remembered that easterly gales had prevailed for a considerable time. So far, *L. schwarzi* seemed not to have been previously recorded within the European area. A coloured figure of the specimen was to appear in the next number of the 'Ibis.'

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W. J. W., writing in the 'Westminster Gazette' on the consternation among lovers of animal life at the Report of the Select Committee of the House of Commons upon the Science and Art Department's Museums advising the abolition of the Frank Buckland Collection, observes:—It is common knowledge that Frank Buckland intended the museum as an educational centre, and left a sum of money to ultimately endow a Lectureship in connection with it, which has not yet been brought into existence. To this it may be added that no post is likely to be created according to the terms of the will, for the trustee decamped with the money. Unless, therefore, the Government wakes up to its responsibility with regard to the *direct* advancement of many industries dealing with food supplies, and consequently grafted upon natural history, and begins its work with establishing a proper economic museum bearing upon fisheries, and using the Buckland bequest as a nucleus, this interesting series of specimens, with their old associations—unless some private benefactor comes forward—must be for ever lost to the country and to the admirers of one of the last naturalists of the old school.



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The

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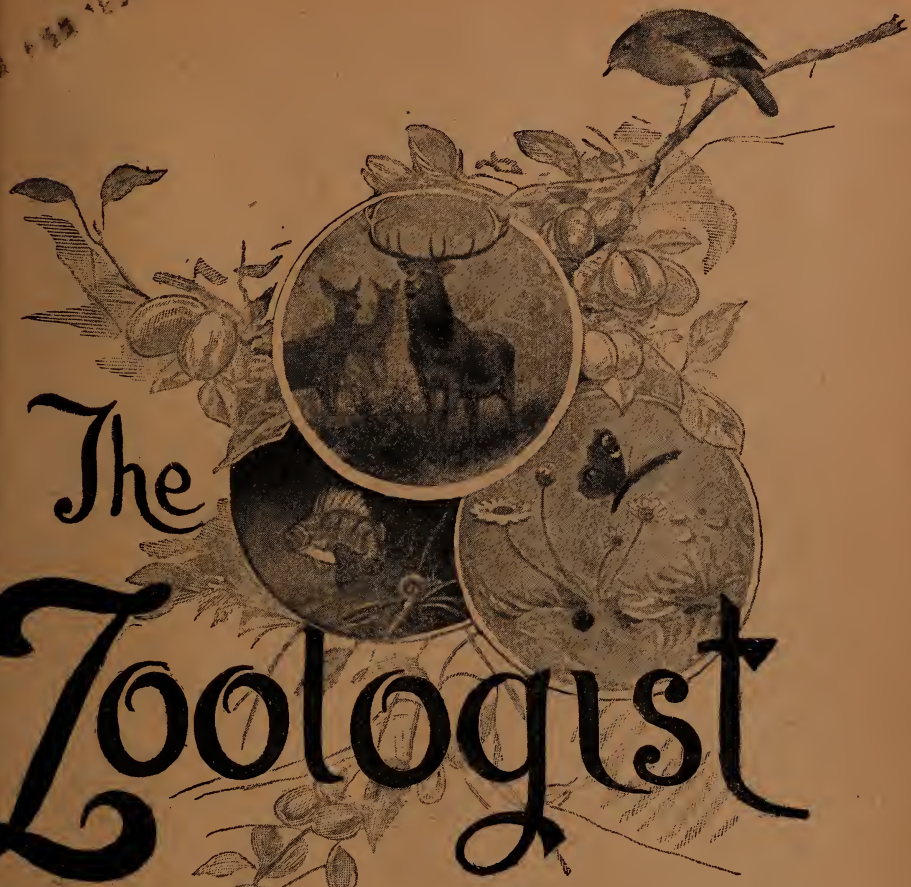
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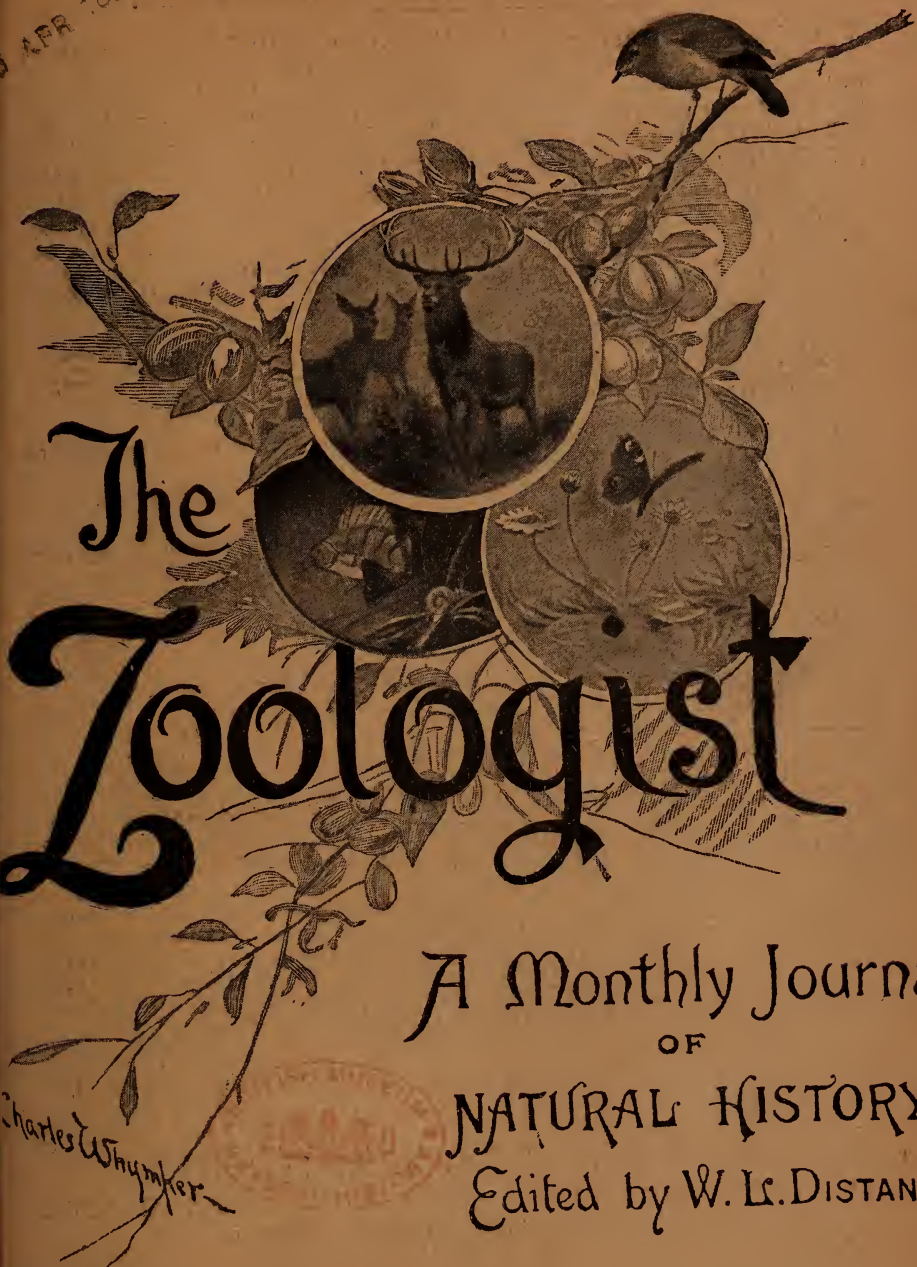
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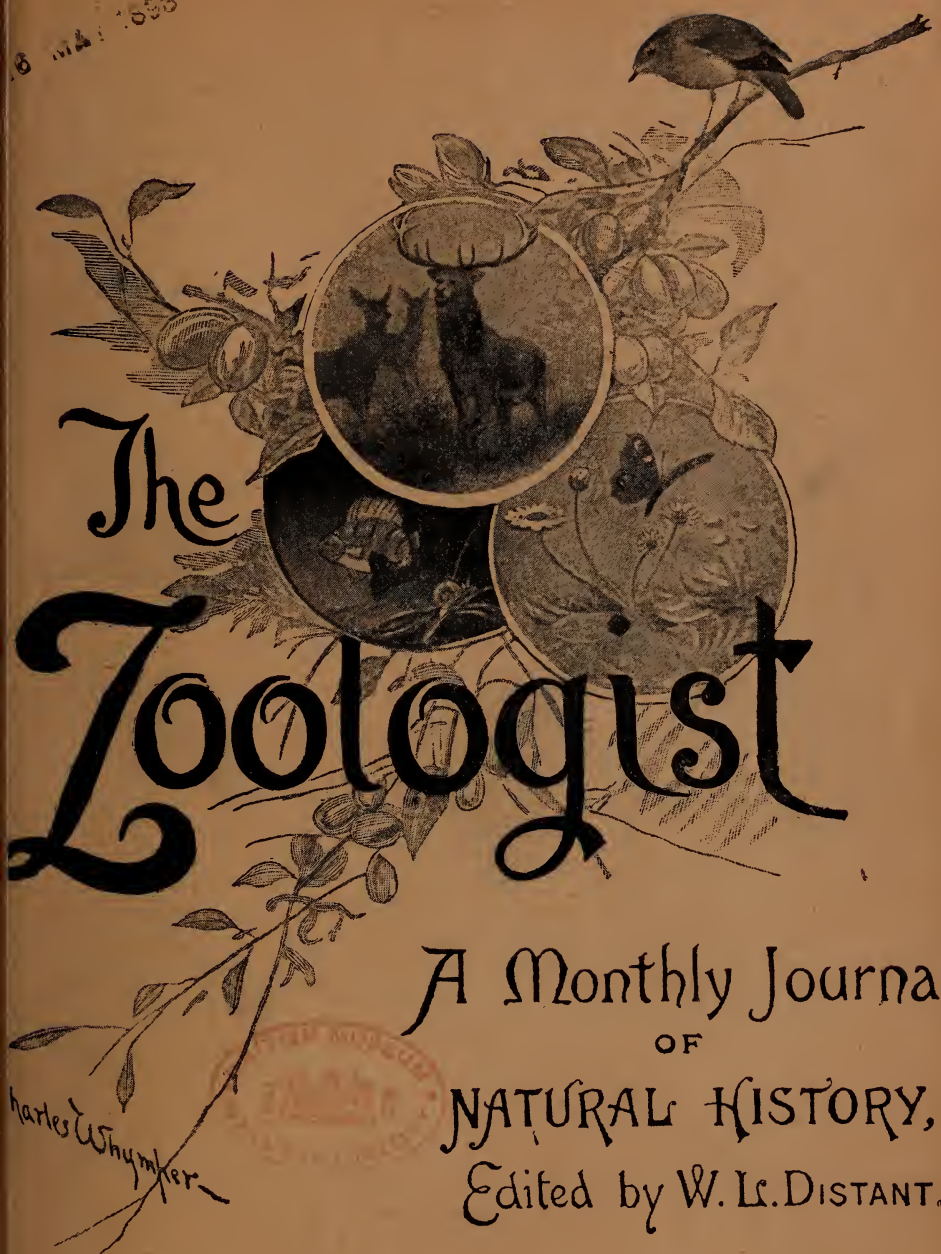
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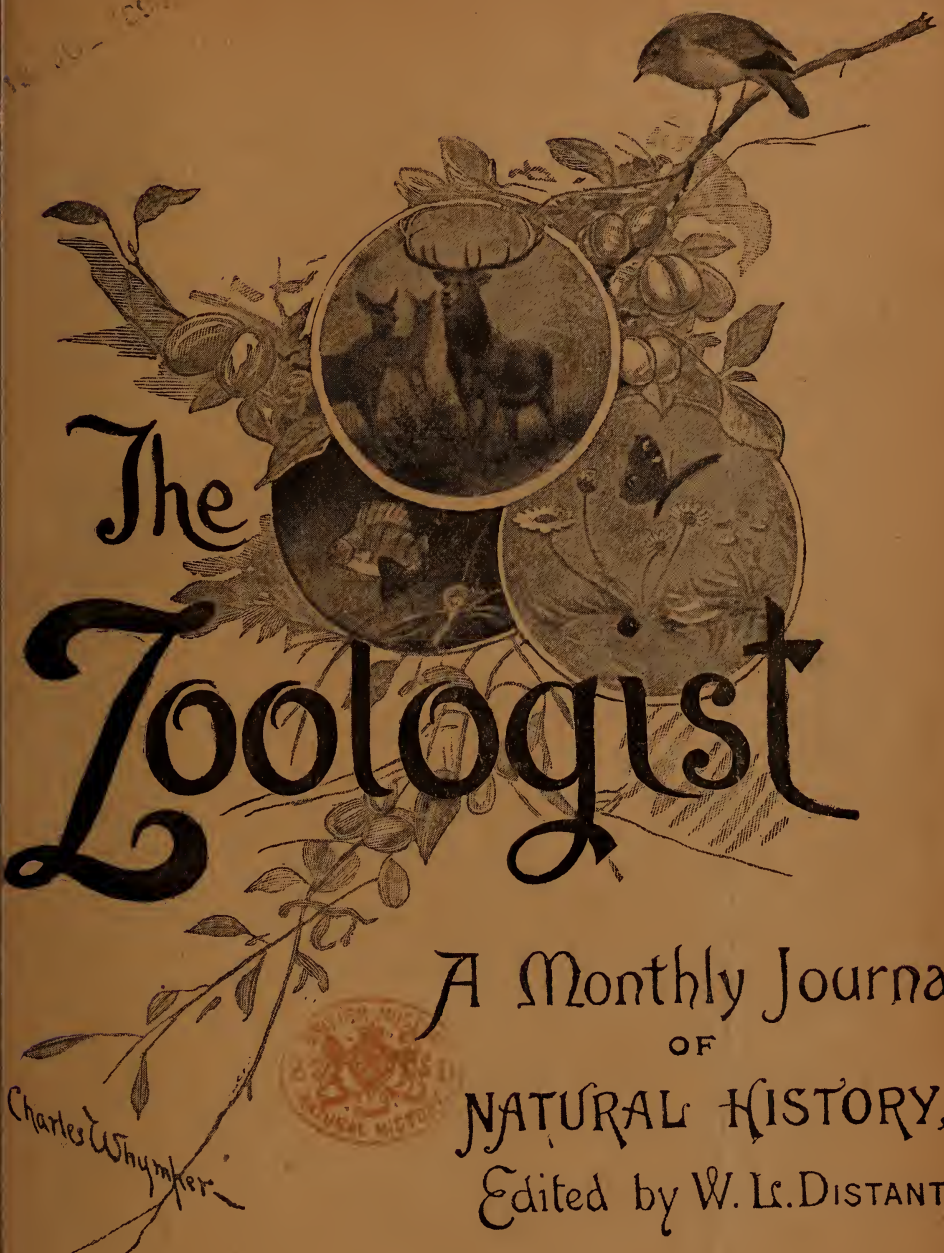
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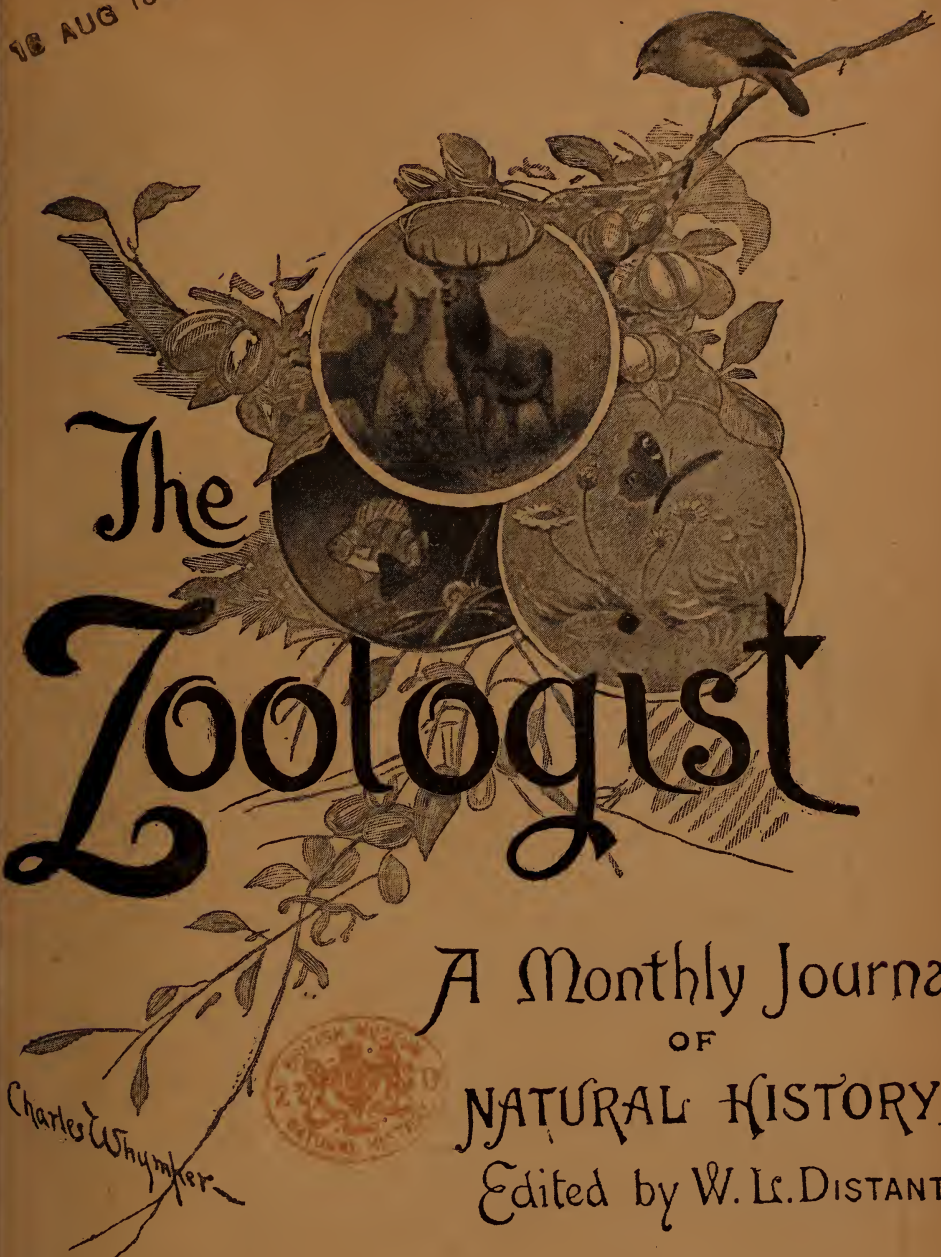
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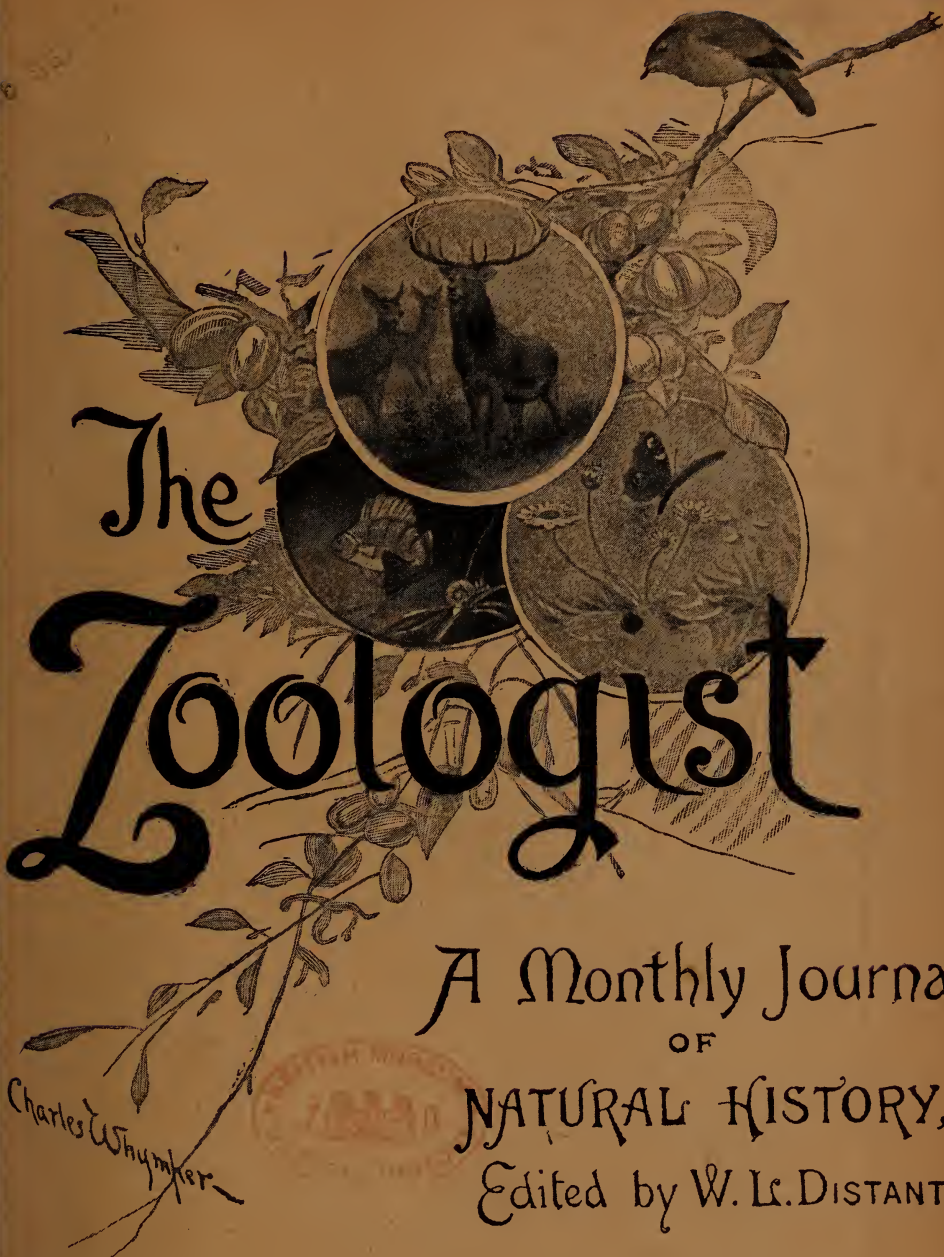
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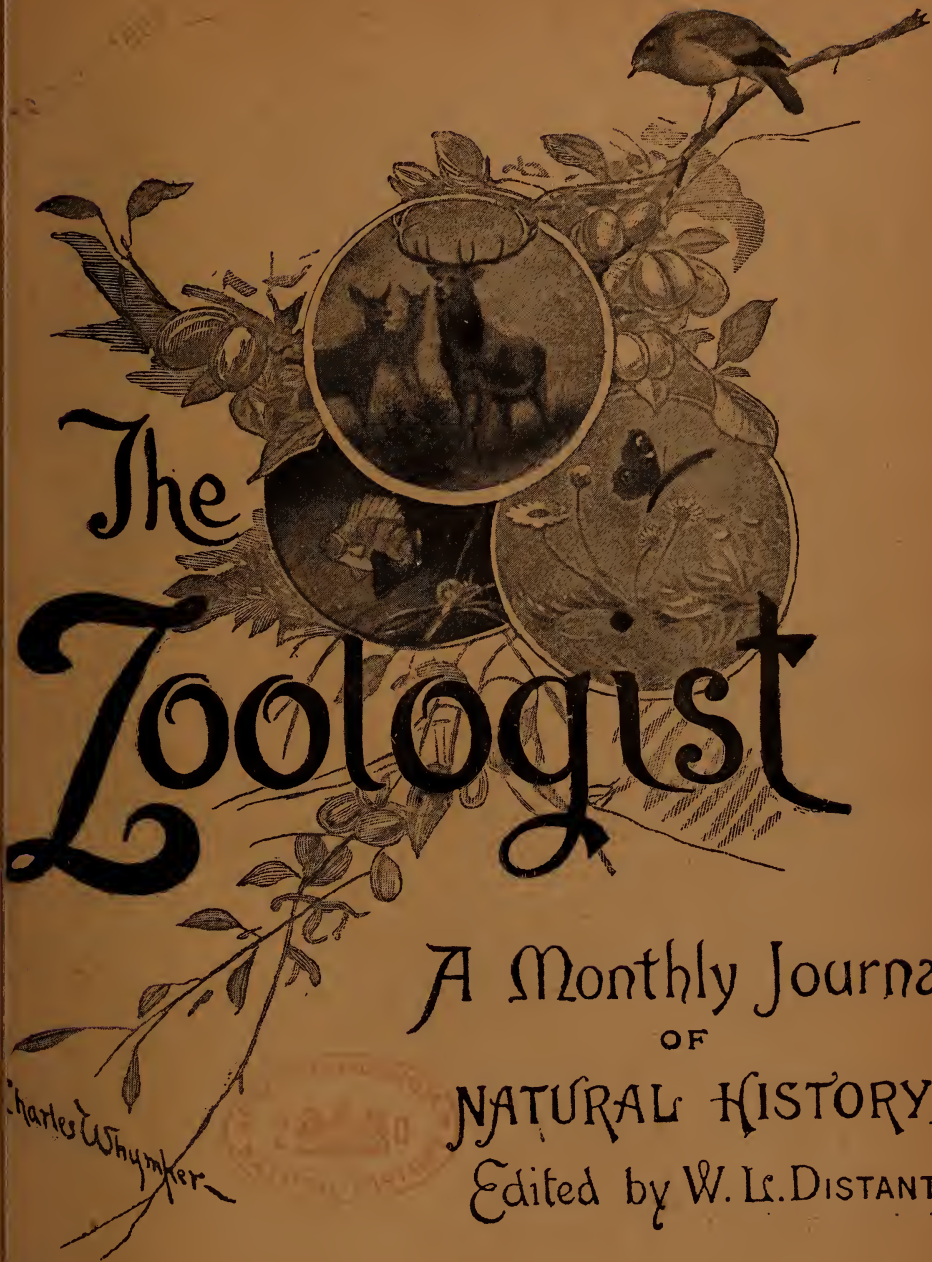
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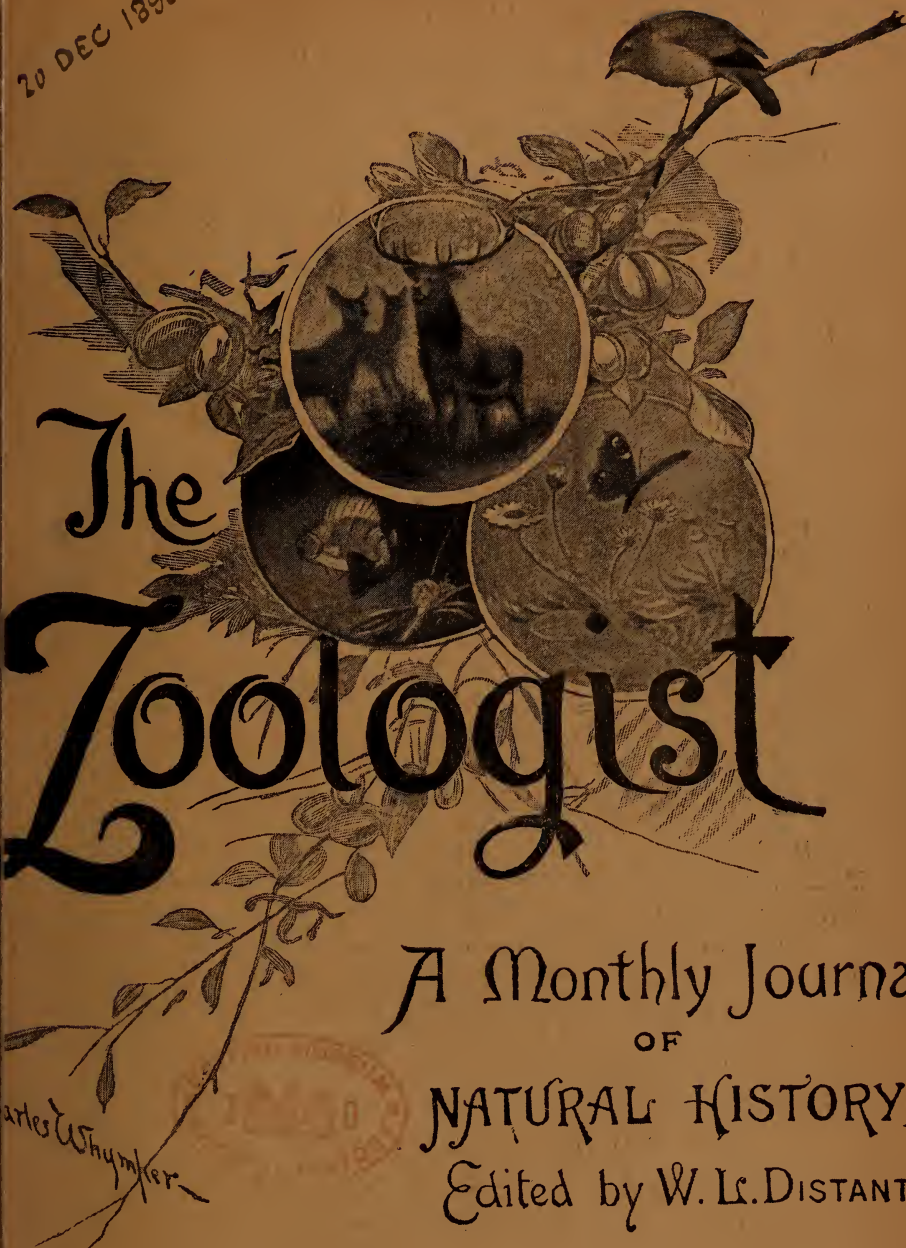
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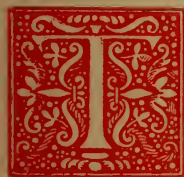
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