- c. The result of this incomplete separation of the sheaths is the formation of a composite sheath which would presumably go on increasing in length so long as new sheaths were formed from the horn-core.
- d. With the exception of the first, each newly-formed sheath is like its predecessor in shape and length, and differs from the fully and normally formed sheath of an adult animal in being subconical, with the point straight, and the prong either unrepresented or represented by a small wart-like tubercle.
- e. The composite sheath at first grows forwards, then downwards, then backwards, and is affected by a slight spiral twist, causing the posterior surface of its distal extremity to face the middle line.

2. Notes on the Mammals and Birds of Liberia. By Sir Harry H. Johnston, G.C.M.G., K.C.B., F.Z.S.

[Received March 21, 1905.]

Liberia, as seen on the map, is little more than the southernmost prolongation of the region which might be styled Northern Guinea. The southernmost point of Liberia, at the mouth of the Cavally River, is the most southerly extension of the true West Coast of Africa. At this point the West Coast reaches to within little more than 4 degrees of the Equator. Although this country is not marked off clearly by any natural features either from Sierra Leone on the one hand or the Ivory Coast on the other, it possesses a certain distinctness and a slight degree of peculiarity as regards its flora and fauna. The botanical collections that have been made by those who have been working with me recently in Liberia have brought to light several genera and a large number of new species of plants which appear to be restricted in their distribution more or less to the political limits of this Negro republic. I do not think that quite the same degree of peculiarity can be ascribed to the fauna even amongst vertebrates, which offer the greatest amount of specialisation or exclusive distribution. As regards mammals and birds, Liberia is to a great extent a meeting-place for the forms of Northern Guinea (Sierra Leone to the Gambia) and those of the Gold Coast, the Niger Delta, and the Cameroons. Some types find Liberia their northernmost or westernmost limit of range from the Congo Basin, the Victoria Nyanza, and the Bahr-el-Ghazal. Of such may be noted, besides various birds, the Bongo Antelope, which is found abundantly in Liberia, but which does not, I believe, extend its range much to the west of that country. Also the Red Congo Buffalo. I fancy I am correct in saying that this type, the horns of which I have seen in the interior of Liberia, does not differ from the Red Buffalo of the Congo, but that it scarcely

extends westwards into Sierra Leone, where the Senegalese type of buffalo is met with. This last may be distinguished from the Congo Buffalo by its slightly longer horns with less expanded bases, and by the tendency to black in the colour of the hair*. Liberia is also, I believe, the westernmost range of the Diana

Monkey.

This country is chiefly remarkable, as regards the possession of peculiar species of mammals, for the Liberian Hippopotamus, the Zebra Antelope (Cephalophus doriæ), Jentink's Duiker, and Büttikofer's Monkey. It is not to be supposed that these creatures carefully discriminate between the political boundaries of Sierra Leone, Liberia, and the Ivory Coast; and in all probability as a zoological district one may have to include within the limits of Liberia a portion of the eastern part of Sierra Leone and of the western part of the Ivory Coast, where the dense Liberian forests extend across the political frontiers. But, so far as present research goes, the creatures above named appear to be restricted in their distribution to the Liberian area. I do not think any trace of the Liberian Hippopotamus has been found in any other part of Africa. As regards the zebra-striped Duiker, it was thought at one time that its existence on the northern borders of the Congo watershed had been discovered by Dr. Junker; but the portions of the skin of this Zebra Antelope which he obtained were in all probability part of a young form or a dwarf species of Okapi.

It has been said that the Common Hippopotamus existed in the lower reaches of the Cavally River, and was formerly found in the St. Paul's River. I saw none of them on the latter stream, and all my European correspondents deny the existence in any Liberian river (entering the Gulf of Guinea) of the big Hippopotamus, which, however, is present in the larger streams flowing towards the Niger. As regards the Dwarf Hippopotamus, it is met with in most parts of Liberia, wherever European explorers have penetrated. I have little to add to Büttikofer's description of its habits, except that I think that he insists too strongly on its predilection for a terrestrial life. According to the statements of European and native observers, it lives a good deal

in the water.

The Zebra Antelope is not met with close to the coast, but is fairly abundant in the hilly regions of the interior. It would seem to be very common in the Kelipo country to the west of the upper Cavally, and also on either side of the upper St. Paul's River. The skins which I was able to exhibit came from the Kelipo country, and were collected by Mr. Maitland Pye-Smith.

Since I have mentioned the name of this collector (who has also sent me three Chimpanzee skulls and the skull and teeth of a Pygmy Hippopotamus), I might state that he forwarded me

^{*} According to Captain d'Ollone, the Senegambian (black) Buffalo is found in Northern Liberia, the Congo or Red Buffalo in the Southern forest-region.

from the same Kelipo country, near the upper Cavally, a curious statement regarding the existence in this forest of a large black pig. The natives gave him circumstantial accounts of this pig, which is said to be five or six feet long, and he was struck by the resemblance between this story and the description first given in the 'Field' newspaper of the Hylochærus meinertzhageni. At the time he wrote to me he knew nothing about the interest I had taken in the question of this giant pig of the Congo Forest, nor did he indeed know that the pig had been discovered by the Belgians in the north-eastern limits of that region. It was the first description given in the 'Field' of the discovery on the slopes of Mount Kenia which appeared to him to fit in so nearly with the stories of the natives of the Kelipo country of the pig in their country, which was of similar appearance and dimensions.

Mr. Pye-Smith also sent me native stories which he thought also indicated the existence in Eastern Liberia of a Gorilla. I mention this for what it may be worth; but the skull which was to support this theory never reached Mr. Pye-Smith, or at any rate never arrived in England. I think, myself, that some of the gorilla stories which reach the coast from the interior of Liberia are referable either to big Chimpanzees or possibly to big specimens Nowhere, as yet, in Liberia of the Drill or Mandrill baboon. have either the Drill or Mandrill baboons been found, but I should think it not improbable that they would make their appearance in the mountainous country of the far interior. I have seen only one species of baboon in this country myself. It is the common Guinea Baboon of Sierra Leone and the Gold Coast. common type of monkey in this country is the Sooty Mangabey, the manners and habits of which are very reminiscent of the baboons. I would point out one trick that Baboons and Mangabeys have in common, and that is the friendly greeting which they make by smacking the lips. I have never noticed this trait in any other monkey.

The Potto and at least one species of Galago are sufficiently common to have attracted the notice of the Americo-Liberians on the coast. Colobus monkeys apparently of four species are indigenous in this country; but I myself, and those who have been collecting information for me, have hitherto been able to obtain only two species—Colobus ursinus and C. ferrugineus. Büttikofer, however, seems to have obtained specimens of Colobus polycomus and C. verus. The Bay-thighed Monkey (Cercopi-

thecus diana ignita) is very common.

Bats are well represented, and amongst them are prominent as regards frequency of appearance the monstrous-looking Fruit-Bats

of the genus Epomophorus.

Among carnivorous mammals, the most interesting perhaps, from its relative rarity and its restriction to the West-African forest-region, is the Golden Cat (Felis celidogaster). The range of this cat has not yet been sufficiently determined, nor has a decisive opinion been passed as to the marked variations in type

which apparently can be derived from one and the same district. But for the assertions of the German authorities who have described specimens of this cat from Togoland, one would be led to suppose that the reddish-grey form with very small and faint spots on the upper parts and a somewhat small head was restricted to Senegambia, Sierra Leone, and the northern parts of Liberia; while the smoother, shorter-haired, larger-headed form, with very distinct spots and a greyer coat, extended from Eastern Liberia to the Niger Delta. (I am not aware that the existence of this cat has yet been traced to the east of the Niger, but I expect it will be found to extend to the limits of the Congo Basin.) But the Germans assert that both varieties are found concurrently. It is presumably called the Golden Cat because on the flanks, between the white of the belly and the reddish-grey of the upper parts, are bands of golden-yellow. This cat has a very savage disposition, and the closer-haired, more distinctly spotted form grows nearly to the size of a Caracal. The Serval is fairly common in the interior of Liberia. The Leopard is everywhere common, and is often much dreaded by the natives. The Lion appears to be known in the Mandingo hill-country to the north of the forest. The Spotted Hyæna is known to the Mandingos, though it is never heard of in the forest-region. The Mandingos from the interior of Liberia call the Hyæna "Djawa" or "Djani." The two words seem to exist side by side, and it is possible from the somewhat varying descriptions that both the Striped and Spotted forms may be known in the northern part of Liberia on the verge of the Niger Basin. The big Civet Cat is very abundant, so also are the Genets and the Palm-Civet (Nandinia binotata).

Amongst the Rodents I have noticed the African Brush-tailed Porcupine (Atherura africana); but Büttikofer also records the Common Porcupine as being a Liberian mammal. Mr. Whyte obtained specimens of the Graphiurus Dormouse (Graphiurus hueti), and also of Anomalurus beecroftii, the Scaly-tailed Flying Squirrel. The Black Rat is present in Liberia, and the Brown Rat has also reached that country, through the intercourse with foreign ships no doubt. The other Mice recorded are Mus alexandrinus, nigricauda, rufinus, barbarus, trivirgatus, dorsalis, and musculoides. The Octodont "Ground Rat," Thryonomys, is common. Most of the West-African Squirrels are represented, as

also the genera Cricetomys and Lophuromys.

The Elephant is fairly abundant all over the interior of Liberia but has not within recent times approached nearer than about twenty miles from the coast. Usually elephants are not met with till a journey of about forty miles inland has been accomplished, and then they are so abundant as to be very dangerous to caravans, which they often attack without provocation. I have seen at Monrovia tusks of fair size. The largest that was weighed in my presence was 75 lbs. The ivory is rather curved as a rule and fairly thick. I think it will be found as a rule that the elephant of the densely forested regions in Africa has somewhat smaller

tusks than those which are developed by the males in the more open regions, where perhaps digging for roots or the desire to uproot trees is more prevalent than in the dense forest, where the elephant can find abundant sustenance in the leaves and fruits of trees which he reaches with his trunk. Extremely little is known by Europeans about the West-African Elephant, as the animal is so rarely killed in that region. I hope that some of the foresters of the Rubber Company may be able to kill a Liberian Elephant, in order to ascertain by photography, or possibly even by preserving the skin, the shape of the ears. Some little while ago it was shown by a German zoologist that an elephant received from the interior of the Cameroons had ears that were smaller and much more rounded than those of the East African type.

The Rhinoceros undoubtedly exists—I cannot say in what type—in the northern parts of Liberia, as the Mandingos at once recognised pictures of it, and named it Kôwŭrŭ. I might mention that the Mandingos talk a great deal about a striped animal which they call Siruku. They recognised a picture of a zebra and called it Siruku, but at the same time described the animal as being extremely ferocious and dangerous to life. As it is impossible to recognise this description as applying to the zebra, I thought from their gestures that they might mean the leopard; but to the leopard they gave a totally different name—Soli. Moreover, they were particular that this animal had stripes. It may be the Striped Hyæna. At the same time, on every occasion when they were shown the picture of a zebra they declared that this was the creature they called Siruku, but that in their country it was ferocious *.

As regards Antelopes, they are divisible into two groups, so far as distribution in Liberia is concerned—those that inhabit the forest and those that are confined more or less to the open, park-like country. Cephalophus sylvicultrix and C. jentinki are found in the dense forest. Most of the other Liberian Duikers, including the beautiful Zebra Antelope, are more associated with the forested hills than the lowlands; in fact, they are usually called "Mountain Deer" by the Americo-Liberians. The magnificent Bongo is fairly common. It is called the "Elk" by the Americo-Liberians, who have followed the Americans in their maddening habit of misnaming every living creature they come across; so that the Bushbuck or rather Harnessed Antelope is called the "Red-Deer," while the splendid Blue Plantain-eater is termed the "Peacock," and the Turaco, the "Redwing." Outside the forest, or on the northern verge of it, there are Hartebeests—Bubalis major †—

† Horns of this species were brought home by Col. Powney.

^{* [}Note.—By a curious coincidence, after these lines were written I noticed the following statement on p. 293 of 'De la Côte d'Ivoire au Soudan,' by Capt. d'Ollone:—"Il me faut mentionnes l'existence de deux sortes d'hyènes beaucoup plus grandes plus fortes et plus hardies que celles d'Algérie ou d'Orient. Mais l'une surtout, que les indigènes appellent 'Sowara' (Cheval-panthère), serait formidable et inspire une très grande terreur. Un Sowara avait tué un sergent français dans une case peu avant notre passage. Cette hyène serait, paraîtit, tachetée."]

(which the Mandingos call Gusu), the Roan Antelope (Mandingo: Mina), and Cobus singsing. The Mandingos know of the Giraffe, which is no doubt present in the extreme northern part of Liberia. The Red Bush-Pig (Potamochærus penicillatus) is abundant throughout Liberia. It is occasionally tamed by the natives, and is said to interbreed freely with the domestic swine. I noticed one very curious point regarding the domestic pigs which were so common an object in the streets of Americo-Liberian towns on the These pigs seem to be the degenerate descendants of European breeds, introduced originally no doubt by the Portuguese, the Dutch, and the English. It occurs very frequently in the litters of these pigs that the young are striped and spotted with white, exactly like the young of the Wild Boar. I have seen it stated generally that the Domestic Pig was never marked with white like the young of the wild species of the genera Sus and Potamochærus. Whether this feature in the domestic pigs of Liberia is caused by their reverting to the condition of the wild stock of Europe from which they sprang, or whether it is in any way due to mixture with the Red Pig, I cannot say positively; but the parents of these spotted young were emphatically European domestic pigs in origin, and did not betray in themselves the slightest intermixture with the Red Bush-Pig. But I know that on the Congo and in the Niger Delta cases of interbreeding between the Red Bush-Pig and the domestic swine are occasionally reported.

Liberia, in common with Sierra Leone and perhaps the Ivory Coast and Gold Coast, boasts of one of the most interesting of African mammals, the Dorcatherium aquaticum, the Water-Chevrotain. The eastern range of this animal has not yet been determined. I never remember hearing that it had been found to the east of the Gold Coast, but perhaps this is simply due to oversight. The Dorcatherium is fairly common in the interior of Sierra Leone, and I believe is occasionally found in Portuguese Guinea and the adjoining regions of French Senegambia. It is fairly common in Liberia, though excessively difficult to capture. It lives a good deal in the water, in which its body is often immersed. It is said by the natives to conceal itself most cleverly amongst the water vegetation. It is regarded by the people of Liberia and Sierra Leone as the embodiment of kindly wisdom. It takes the place which the hare—otherwise "Brer Rabbit" fills in the legends of Southern and Central Africa. The natives

state that three or four young are produced at a birth.

The Manatee is common in most of the big rivers; and in the forests three species of *Manis* are met with, including *Manis* gigantea. Two species of Tree-Hyrax are found in the forest, and the woodland often echoes to their weird cries.

It should be stated in a general way that the coast-regions of Liberia are exceedingly disappointing to the collector because of the remarkable absence of any form of bird or beast or even reptile. It is difficult to understand why there should be this extreme dearth, because the Americo-Liberians are not very keen about sport, nor have they any reason for desiring to

destroy birds and beasts around them. They are, on the other hand, rather kindly disposed towards these creatures. In the interior the indigenous natives have an extraordinary craving for meat, which they satisfy partly by cannibalism, but also by devouring even the skin of the creatures that they snare or shoot. On the lower part of the St. Paul's River, I have sometimes seen only one bird in the course of a whole day, and that is the very common Angola Vulture. As soon as you get into the forest the beautiful Blue Plantain-eaters (Corythwola cristata) become fairly common, and enliven the woods with their strange cries. Although this bird is so abundant in Liberia, very little seems to be known by the natives regarding its nesting-habits. I have received the young of Turacus and Gallirex from the nest in other parts of Africa, when the nestlings were at most four days old, and I have noticed that they were fairly well covered, except on the head, with long, fleecy, purplish-grey down. It would be very interesting to ascertain the condition of the young in Corythæola, as to whether they are born absolutely naked or partially covered with down. It is interesting to note that this bird alone amongst the family of the Turacos offers a marked difference in size and coloration between the male and the female. The male of Corythwola is at least a fourth larger than the female, and the coloration is much brighter and the crest larger. In the other members of this family there is apparently little or no difference in size or coloration between the male and female. The fine examples of Corythwola which have been collected by Mr. Harold Reynolds in Liberia only differ from those I have obtained in the western parts of Uganda by the blue in the male being slightly more ultramarine than the blue verditer of the Uganda specimens. Young specimens in their first year are much paler and greyer than the adults. I believe the specimens which I sent back from Uganda will establish this point. The Violaceous Plantain-eater is found in Liberia, though it is very scarce. I saw a specimen twenty-two miles inland from Monrovia, at the house of a German planter. The Turacos of Liberia seem to be Turacus persa and Turacus macrorhynchus. T. macrorhynchus is the common form in Liberia. The only two Guinea-fowls appear to be the rare White-necked (Agelastes meleagrides), and the Crested (Guttera cristata). The Agelastes is rather a small bird, with an absolutely bare red head in the male. The female or the young bird has short brownish feathers on the head, and the breast and neck seem to be only patched with white, and not wholly of that colour. The Francolins as yet recorded are Francolinus ahantenis (which is usually miscalled the Guinea-fowl by the Americo-Liberians) and Francolinus lathami. I saw no true Vultures anywhere in Liberia, the scavenging being done chiefly by the black and white Scapulated Crows. As already mentioned, the so-called Fishing-Vulture, Gypohierax angolensis, is common. Vultures always seem to shun the thickly forested regions of Africa, the only member of the group which in any way enters the forest-region being the Necrosyrtes monacus. But although this small brown vulture is extremely common and abundant in most parts of Sierra Leone, I have never seen it anywhere on the

coast of Liberia between Monrovia and Cape Palmas.

The Grey Parrot with a red tail is not indigenous to any part of Liberia. It is frequently to be met with in the houses of the natives on the coast, because it is brought there from the Gold Coast or the Congo by steamers. But the indigenous Psittacus is P. timneh, which is without the red tail, and is said not to be able to learn to talk. The grey of its plumage is browner. The tail sometimes seems to be a purple or an almost violet colour. The true Grey Parrot does not seem to make its appearance as a wild bird in West Africa until the Gold Coast is reached. This tendency towards a purple tail reappears in the variety of the true Grey Parrot which is found on the Portuguese island of Principe, in the Gulf of Guinea. Here also the plumage of the body is tending towards purple-grey, and is much darker in tone than the pale ash-grey of the ordinary type. In the western Congo and Angola, the Grey Parrot is gradually developing into a type which will be in time scarlet all over. On the island of Principe it seems to be evolving a purple form; while in the Timneh Parrot we seem to have a connecting-link between the genus Psittacus and the brown- grey- yellow- and green parrots of

the genus Pæocephalus.

The Liberian Hornbills belong to the genera Bycanistes, Ceratogymna, Lophoceros, and Ortholophus. This selection includes the smallest of all the Hornbills, Lophoceros camurus, and the very eccentric-looking Black Hornbill and Elate Hornbill, the females of which have a bright chestnut head and neck, whilst the plumage in the same part of the males is black. Apparently the only form of Ortholophus which has been collected in Liberia is the smaller of the two species—leucolophus—in which the tips of the secondaries and primaries are not white, while there is a slight difference in the distribution of greyish-white about the cheeks. The larger and handsomer Ortholophus albocristatus is stated by Elliot (on, apparently, the authority of the typespecimens, supposed to have been collected by Cassin at Sierra Leone) to inhabit North-West as well as West and Central Africa (Niger, Cameroons, Congo, and Angola). Elliot remarks on the curious occurrence of Ortholophus leucolophus in the middle of this range, as it were, in the countries of Liberia and the Gold So far as I can ascertain, however, no specimens of O. albocristatus have been obtained from regions west of Lagos since Elliot's monograph on the Hornbills was written. Is it not possible, therefore, that Cassin or his collector may have made a mistake in ascribing their specimens of albocristatus to Sierra Leone? May they not really have been brought from much further east on the West Coast of Africa? It would be a very curious point in distribution if albocristatus should be found in Sierra Leone, and not re-occur again in Western Africa till the Niger was reached.

Amongst the birds collected by Mr. Reynolds on the St. Paul's

River is a little Waxbill or Weaver-bird (Sporæginthus melpodus), about which Mr. Reynolds makes a curious statement.
He remarks that this is a very pugnacious and spiteful little bird,
which does not hesitate in small flocks to attack and kill small
snakes and lizards. The birds endeavour to pick out the eyes of the
creature they are attacking and then to tear off its flesh in small
pieces. They carry these fragments to their nests, and whilst
they are rotting flies settle on them. These flies form the food,
or an addition to the food, of the nestlings.

I append to this paper lists of the mammals and birds collected recently in Liberia by Mr. Alexander Whyte, Lt.-Col. Powney,

Mr. Maitland Pye-Smith, and Mr. Harold Reynolds.

APPENDIX I.

List of Mammals collected in Liberia in 1903–4 by Mr. Alexander Whyte, Lt.-Col. Powney, Mr. Maitland Pye-Smith, and others.

Anthropopithecus troglodytes. Colobus ursinus.

,, ferrugineus. Cercopithecus büttikoferi.

> diana biittikoferi. diana ignita.

Felis serval.

,, celidogaster.

Viverra civetta.

Crossarchus obscurus.

Nandinia binotata.

Lutra maculicollis.

Graphiurus hueti.

Anomalurus beecrofti. Cephalophus niger.

maxwelli.

doriæ.

Bubalis major.

Hippopotamus liberiensis.

APPENDIX II.

List of Birds collected in Liberia by Mr. Harold Reynolds. By Charles Chubb, Zoological Department, British Museum.

(Mr. Reynolds' notes are placed in square brackets.)

References are given to the following papers and works which treat of the Ornithology of Liberia:—

(1) BÜTTIKOFER, J.—Zoological Researches in Liberia. A List of Birds, collected by J. Büttikofer and C. F. Sala in Western Liberia, with biological observations. Notes from the Leyden Museum, vii. pp. 129–256 (1885).

(2) Büttikofer, J. Zoological Researches in Liberia. A List of Birds, collected by Mr. F. X. Stampfli near Monrovia on the Messurado River, and on the Junk River with its tributaries.

Op. cit. viii. pp. 243-268 (1886).

(3) ——. Zoological Researches in Liberia. A List of Birds, collected by the author and Mr. F. X. Stampfli during their last sojourn in Liberia. Op. cit. x. pp. 59-106, plate 5 (1888).

(4) —. Zoological Researches in Liberia. Fourth List of

Birds. Op. cit. xi. pp. 113-138 (1899).

(5) ——. Zoological Researches in Liberia. On a series of Birds, collected by Mr. A. T. Demery in the district of Grand

Cape Mount. Op. cit. xii. pp. 197–206 (1890).

(6) —. Reisebilder aus Liberia. Resultate geographischer, naturwissenchaftlicher und ethnographischer Untersuchungen während der Jahre 1879-1882 and 1886-1887. 2 vols. Leiden, 1890. 8vo. Vögel, ii. pp. 397-434, plates XXX., XXXI.

(7) —. On a Collection of Birds sent by the late A. T. Demery from the Sulyman River (West Africa). Notes from the

Leyden Museum, xiv. pp. 19-30 (1892).

AGELASTES MELEAGRIDES.

Agelastes meleagrides Temm.; Büttik. Notes Leyd. Mus. vii. p. 230 (Soforé Place, St. Paul's River), x. p. 98 (Schieffelinsville), xi. pp. 126, 136 (Gallilee Mountain); id. Reisebilder aus Liberia, ii. pp. 424, 425, cum fig.; Grant, Cat. B. Brit. Mus. xxii. p. 374 (1893).

One adult specimen of this rare bird from St. Paul's River. [Bare skin of neck red.]

2. Guttera cristata.

Numida cristata Pall.; Biittik. Notes Leyd. Mus. vii. p. 230 (Bavia and Buluma), x. p. 98 (Hill Town), xi. pp. 125, 136 (Mount Olive); id. Reisebilder Liberia, ii. pp. 424, 425, cum fig. Guttera cristata, Grant, Cat. B. Brit. Mus. xxii. p. 381 (1893).

No. 9. An adult bird. St. Paul's River, Dec. 27, 1904. Bare part of neck slate-blue.

3. GALACTOCHRYSEA LIBERIÆ.

Glareola megapoda Gray, nom. nud.; Büttik. Notes Leyd. Mus. vii. pp. 233, 256 (St. Paul's River, Fisherman Lake, Marfa River); id. op. cit. x. p. 99 (Fisherman Lake); id. op. cit. xi. pp. 127, 136 (Farmington River); id. Reisebilder Liberia, ii. p. 427, cum fig.

Glareola nuchalis liberiæ Schl. Notes Leyd. Mus. iii. p. 58

(1881: Liberia).

Galactochrysea liberice Sharpe, Cat. B. Brit. Mus. xxiv. p. 63, pl. v. fig. 1 (1894).