

decomposed condition from near the railway-station, where it was said to have flown against the telegraph-wires.

+ 24. *CYPSELUS PHÆNICOBIVS*.

(Cory, op. cit. p. 87.)

+ 25. *NEPHÆCETES NIGER*.

(Cory, op. cit. p. 88.)

There were two species of Swifts common at La Vega, but the larger one was by far the commonest and gathered in vast flocks towards the evening in wet weather to feed over the waste ground just outside the town.

I did not collect any specimens.

+ 26. *LAMPORNIS DOMINICUS*. Locally "Soombador."

(Cory, op. cit. p. 90.)

I observed this species only twice, although Cory says it is very abundant—once at Samaná, and again on the hills near La Vega. I failed to obtain a specimen.

+ 27. *SPORADINUS ELEGANS*. Locally "Soombador."

(Cory, op. cit. p. 93.)

This Humming-bird was fairly common both at Sanchez and La Vega. A pair frequented the garden almost every morning during March, sometimes probing the flowers of the magnificent scarlet hibiscus and sometimes hovering round the spikes of the large aloes in front of the veranda.

+ 28. *MELLISUGA MINIMA*. Locally "Soombador."

(Cory, op. cit. p. 92.)

This diminutive little Humming-bird, not much bigger than a bumble-bee, was common both at Sanchez and La Vega, and I found several of its nests. One, at the end of March, near Sanchez, containing two young ones, was a tiny cup-like structure placed between the fronds of a small fern on the bank of a stream, lined and chiefly made of wool and fine hair, and disguised outside with little pieces of green moss, lichens, and cobwebs. At the beginning of March I had a nest sent to me from La Vega containing two full-grown young ones.

The noise this little tiny creature can make is quite extra-

ordinary. Perched on a dead branch at the top of a big tree in the forest, turning his head from side to side, he sings, for 5 or 10 minutes at a stretch, a loud, high-pitched, discordant, disconnected little song, which can be heard a hundred yards or so away. This species was much more common among the larger forest growth, and I seldom observed it in the garden, like *Sporadinus elegans*. Although about the smallest of all the Humming-birds, it makes the most incredible humming noise with its wings when flying, or at least when hovering. Often one hears the humming overhead in the forest, much louder than any bee, but it is not so easy to catch a glimpse of the bird; in fact, its movements are often too quick for the eye to follow.

+ 29. TEMNOTROGON ROSEIGASTER.

(Cory, op. cit. p. 95.)

A bird peculiar to the island, and, although rare and local, well known to the natives at La Vega, not on account of its magnificently gaudy plumage, which they say has seven colours, but owing to some superstition connected with it. At the same timen one of them agreed as to the details of that superstition.

They say it is to be found only on the mountains above Harabajoa, some 20 miles or so south-west of La Vega. I was not fortunate enough to obtain a specimen. The Governor of La Vega kindly sent some men to shoot me one, but owing to a bad attack of fever I had to leave before they returned, and I heard afterwards that they came back empty-handed.

The natives round La Vega knew nothing specially of the note of this bird, nor did they seem to know anything of the "Musician" (*Myiadectes montanus*) mentioned by Mr. Cory as inhabiting the tops of the mountains, possessing a magnificent song, and as being looked upon by the natives with dread owing to the superstition that he who saw one would shortly die.

This was the only bird I heard of in San Domingo to which any superstition was attached.

+ 30. SAUROTHERA DOMINICENSIS.

(Cory, op. cit. p. 98.)

Locally "Pajaro bobo" or the "Silly bird," apparently because, when one stops to observe it, the bird, instead of flying away, remains in the bush or tree and can be easily killed.

It is another species peculiar to the island and common wherever I went. The natives say it feeds on lizards; but the stomachs of both specimens which I skinned (males, on April 4) were full of big green grasshoppers.

Its loud cry is easily confused at first with that of the "Boojaro" (*Ædicnemus dominicensis*); but sometimes in the mango-trees it makes a deep croaking noise.

+ 31. CROTOPHAGA ANI. Locally "Hoodēo," "Black Witch."

(Cory, op. cit. p. 100.)

Seen once or twice at Sanchez, but very common at La Vega, usually in flocks of 10 or 12 in the clearings where cattle were feeding. There were no cattle at Sanchez. The peculiar knife-blade shape of the upper mandible in this bird, I think, must be to enable it to separate the small blades of grass and so hunt more easily for beetles and insects. The stomach of a female (length 14 inches, stretch $16\frac{1}{2}$) which I shot at La Vega on May 6 was full of insects, beetles, and grasshoppers. All the specimens I handled had a most abominable smell, both in life and even after the skin was prepared.

In two large trees standing in a small savanna near a railway station on the line to La Vega, I was shown two large nests built of sticks, which were said to have belonged to this species. The native who pointed them out to me said they were years old and had been forsaken on account of the railway being so near. He also assured me that each nest belonged to quite a number of birds, which I find now may have been the case.

Some eggs, said to have been those of the Black Witch, were sent to me early in July at La Vega. They were large, I thought, for the size of the bird, nearly round, of a greenish-

blue colour, and had a thin, rough, chalky shell. The habits and manner of this bird are very peculiar, and its cry is most distinctive, reminding one of the mew of a cat or a Common Buzzard (*Buteo vulgaris*).

- ⑤ + 32. CERYLE ALCYON. Locally "Rejongo."
(Cory, op. cit. p. 103.)

This was a familiar bird during June along the Yuna and in the creeks amongst the mangroves at the head of Samana Bay. When out shooting Ibis or Duck I was often startled by its loud rattling scream. The stomach of one (length $12\frac{1}{2}$ inches, stretch $20\frac{3}{4}$) shot on March 7th was full of the remains of small crabs.

- ⑤ + 33. TODUS SUBULATUS.
(Cory, op. cit. p. 105.)

A common and most grotesque-looking little bird, peculiar to the island, and locally called by the natives "Barrancoli," but by the negroes "Robin Redbreast."

At first sight it resembles a small European Kingfisher, and, in fact, in structure and mode of life it is almost identical with the Kingfishers, except that it feeds on insects instead of fish. I have often noticed that it is invariably seen or heard in the immediate vicinity of water, and, like the Kingfisher also, it breeds in a hole dug by its own energies in some soft bank at the side of a stream or roadway.

In walking through the forest I often stopped to identify this little creature, and to listen to its most extraordinary noises.

When first approached it makes a noise easily mistaken for the grunting of some pigs, which are common in the forest, and at intervals snapping its enormous ungainly bill, loud enough to be heard some distance off. Its commonest note is a loud chirping, not unlike the early spring note of our Chaffinch, with one or two variations, getting louder and more excited as one remains, and yet all the time sitting stock-still on a branch with its feathers puffed out, its head sunk between its shoulders, its beak stuck up in front looking far too heavy for it, and its back so exactly the colour of the surrounding foliage that it is most difficult at first to see it.

I examined several breeding-holes of this little Tody, one of which contained young. These excavations were not bored straight into the bank, but turned off to the right or left for about a foot or eighteen inches. I could not judge by any impressions left in the earth whether they were excavated by the feet or the bill or both; but it will be noticed that the feet are exactly like those of a Kingfisher.

Of several specimens shot, one (Sanchez, Feb. 10) measured $4\frac{1}{2}$ inches, another (Feb. 29) $4\frac{5}{8}$ inches in length.

+34. CENTURUS STRIATUS.

(Cory, op. cit. p. 111.)

Locally "Carpentéro," or the "Carpenter Bird," a species peculiar to San Domingo, and quite one of the commonest birds in the island.

It is most destructive, for in some districts it is difficult to find a palm-tree which is not riddled with holes, and yet the wood of these trees is so hard that it is not easy to make an impression on it with a penknife. They not only bore into the palm-trees but into the houses, and make great havoc with the telegraph-poles, besides destroying great quantities of cacao (chocolate) by boring into the half-ripe fruit. I do not remember to have seen a boring in a cocoanut palm, but always in the royal palms.

Governor Anderson, of Sanchez, told me quite seriously that twice he had received orders from the President of the Republic to have all the Carpenteros shot (the dirty ragged soldiers are sure to get into mischief if they are not shooting somebody or something), which orders he had executed; but they were still to be seen in hundreds, and their noisy cries resounded on all sides. Some of their holes are within three feet of the ground.

At Sanchez, on Feb. 27, I took a clutch of four slightly-incubated eggs of this Woodpecker from a hole eighteen inches deep, about eight feet from the ground. The four eggs varied a good deal in size, measuring $24\cdot5$ – $26\cdot5 \times 18\cdot0$ – $19\cdot0$ mm.; their colour is porcelain-white, but they were plastered with dirt from the bottom of the wet hole.

An adult female (length $8\frac{1}{2}$ inches, stretch 14), shot at

La Vega on April 4, had a large quantity of long, stiff, thin, round worms in the peritoneal cavity, and also in the cellular tissue on each side of the neck, reaching with the backward prolongations of the hyoid right up as far as the forehead.

① + 35. CONURUS CHLOROPTERUS.

(Cory, op. cit. p. 113.)

I saw several small parties of this Paroquet, making a great squeaking as they flew overhead as I returned from shooting up the river Yuna; but I was never able to obtain a specimen. It is, I believe, very local. This and the following species are both peculiar to the island.

② + 36. CHRYSOTIS SALLÆI. Locally "Cotōro."

(Cory, op. cit. p. 115.)

This Parrot is common in San Domingo. Round Sanchez it was to be met with at every turn, flying out of its nesting-hole in some old palm-tree or in small parties overhead, waking the echoes with their screeches.

I can testify from personal experience that the flesh of this Parrot is very good eating, and it is much esteemed by the natives, whom I often met coming home with a string of half a dozen or more shot with their old muzzle-loaders.

At times at Sanchez these birds afforded first-rate sport, for they flew with the greatest regularity from their breeding-haunts among the palm-trees in the swamp to the rice-fields and other feeding-grounds eastward, and back again in the evening, making all the way more noise than a flock of geese. When in returning they found a strong wind against them they were obliged to fly directly over the town, and low down to get the shelter of the hills, so that one only had to take one's stand on the veranda, or behind a palm-tree, or, better still, between two houses, and shoot as they passed over. But shooting was extremely difficult, owing to the high wind, the speed at which the birds flew, and the suddenness with which they rose to a higher level the instant they caught sight of a man.

+37. *RUPORNIS RIDGWAYI*.

(Cory, op. cit. p. 121.)

Several times while shooting up the Yuna river I saw what I took to be this bird, but I was unable to procure a specimen.

+38. *FALCO COLUMBARIUS*.

(Cory, op. cit. p. 123.)

One afternoon while sitting in a mangrove-swamp at the head of Samaná Bay trying to endure the torture of the sandflies and mosquitoes, in the hope of getting a shot at some Ibises, I had the pleasure of watching for some time through my glasses one of these little Falcons, a male and the only one I met with, flying off and returning several times to the dead branch of a tree some 80 yards away.

+39. *CHAMÆPELIA PASSERINA*. Locally "Rollita."

(Cory, op. cit. p. 127.)

This little Ground-Dove was very common at La Vega. I found several nests with eggs or young towards the end of June, beneath tufts of grass in the clearings. When feeding on the ground they are very tame and it is easy to approach within a few feet of them. They get very fat and are good eating. I found it most difficult to make a good specimen owing to the thinness of the skin and the loose attachment of the feathers.

The crop of a male (length 6 inches and stretch $9\frac{1}{2}$) which I shot at La Vega on April 9 was full of dry, round, flattish, brown seeds. Two ova in a female (length $6\frac{3}{4}$ inches and stretch $9\frac{1}{2}$), shot on May 7 at La Vega, were larger than peas.

+40. *ZENAIDURA CAROLINENSIS*.

(Cory, op. cit. p. 129.)

I met with this bird at only one place, where the railway crosses the Camoo river, about 3 miles east of La Vega. There, on May 10, I saw a dozen or more feeding about the line, and I shot two specimens, a male and a female, both immature.

41. GEOTRYGON, sp. inc.

Abundant in the forest on the hills at Sanchez. Generally to be met with by twos or threes feeding on the ground; but difficult to shoot, as one catches only a momentary glimpse of the birds as they fly silently and quickly through the undergrowth. I never saw them fly up into trees. I was shown several old nests placed on stumps of trees or matted creepers near the ground.

Although I shot several of these Pigeons, I omitted to preserve a specimen, owing to want of time; hence I am uncertain whether they were *Geotrygon montana* or *G. martinica*.

+42. COLUMBA INORNATA. Locally "Palōma."

(Cory, op. cit. p. 136.)

At the head of Samaná Bay there are well-recognized Pigeon months, June, July, and August, and during these months the natives make almost daily excursions from Sanchez to the mangrove-swamps, where the Pigeons are in tens of thousands. They load and fire as fast as their antiquated muzzle-loading appliances will permit, and come home sometimes with their boat literally laden with Pigeons, which they sell for 10 cents per couple. These are delicious eating at this season if properly cooked.

I made several excursions into the swamp after Pigeons, and one day, June 25, I shot as many as 120, mostly on the wing, in about three hours. It is only necessary to put on a pair of waders or top-boots and take one's stand in the best open space one can find among the tallest mangrove-trees. After a dozen or so have fallen, some shot as they fly over and others as they settle for a moment on the tops of the trees, the most difficult work of the day begins, that of wading round to look for them. Unless a native is employed to retrieve them, one has to climb through the network of wet and slippery aerial mangrove-roots, sometimes sinking into the black mud and water up to one's middle, while legions of small crabs, and some big ones with legs a foot long, recede and disappear behind each root or up each stem

as one approaches, to say nothing of the clouds of sandflies and mosquitoes.

When all that can be found are picked up one returns to one's post, and the shooting goes on once more, till sufficient are shot again to make it worth while to collect them.

— 43. *ÆDICNEMUS DOMINICENSIS*. Locally "Boojaro."

(Cory, op. cit. p. 140.)

This bird I only saw once in the wild state as I was riding across the Savana Grande near Almacen; but I believe it is pretty common. Many natives and others keep them in their houses or enclosures to feed upon the cockroaches &c. They much resemble at first sight the Stone Curlew (*Ædicnemus crepitans*). Their cry is very loud and often uttered at night; it is a series of quickly repeated notes, running down the scale, the last notes lower and slower than the first.

+ 44. *TRINGOIDES MACULARIUS*. Locally "Fleidicito."

(Cory, op. cit. p. 148.)

Very common; I observed it many times round Sanchez, on the beach, in the mangrove-swamps, and up the river Yuna.

A male I skinned Feb. 28 measured $7\frac{1}{2}$ inches in length.

+ 45. *ÆGIALITIS VOCIFERA*.

(Cory, op. cit. p. 141.)

Three times at La Vega, and once at Puerto Plata in July, while riding across small savannas, I met with a pair of beautiful Plovers which I took to be *Æ. vocifera*; but, as I obtained no specimens, I never was quite sure of their identity.

In two instances they evidently had eggs or young. They acted much like a pair of noisy Golden Plovers (*Charadrius pluvialis*), calling from hummocks, or running along the ground, or getting up and flying round excitedly, making a deal of noise.

+ 46. *EUDOCIMUS ALBUS*.

(Cory, op. cit. p. 150.)

This bird, locally named "Koko," on account of its arti-

culating these syllables in a sepulchral voice when surprised while feeding in the dark and silent mangrove-swamps, was very common up the rivers Yuna and Baracota, at the head of Samaná Bay. The natives shoot them to eat, but the flesh to my mind has a disagreeable flavour.

Of all flight-shooting that I have experienced I think the White Ibis affords the best. Several times while at Sanchez I rowed over with two companions, and a native boy to act as retriever, to one of the mouths of the Yuna, reaching there just before dusk. As soon as we had chosen a partly-concealed place for the boat, where we could command a view of open water on both sides of us, so as not to lose any birds in the mangrove-bushes, the Kokos and Ducks began to come over in small parties to feed on the mud, affording us some splendid shooting, the Kokos flying slowly and silently, the Ducks swiftly and whistling. In the half-hour before darkness set in we often had secured 10 or 15 Ducks and perhaps 30 or 40 Ibises, besides other birds.

A young male I skinned on Jan. 28th measured—length $25\frac{1}{2}$ inches, stretch $30\frac{1}{2}$.

+ 47. TANTALUS LOCULATOR.

This species was not common; but I gathered from the natives and others that there were always a few to be seen in the morass at the mouth of the Yuna.

At the end of June, while on a shooting expedition in this morass, I saw five of these birds about half a mile off perched on a tree covered with matted creepers. They very soon rose, and rather to my surprise circled high up into the air. We several times during that day saw single birds, and once I obtained a long shot at one flying over, but without result. The boatmen called them the "Faisan." What the word meant they could not tell me; but it seemed to have some connection with the bare vulture-like head and neck of the bird.

+ 48. ARDEA CÆRULEA.

(Cory, op. cit. p. 154.)

This is by far the commonest of all the *Ardeæ* that I met

with. In the swamp at Sanchez it was to be found in hundreds. On my shooting-trips up the river it was a constant companion, flying up within shot at every few yards. Tame and confiding, it often let the boat pass within 20 feet of it. It gave sometimes a feeble heron-like squeal. When I first saw this bird I could hardly believe that the slaty-blue ones belonged to the same species as the white; but they were always together, sometimes in flocks of 15 or 20 feeding in the swamp, and their habits seemed similar, except that the white ones were certainly more confiding than the blue; but if the white ones are the young of the blue, this might be expected. It seemed easier to believe that they were male and female and not old and young, for I never once, out of many hundred birds, saw one with a distinctly intermediate plumage. It was far more common to see a pair of white and blue ones fly up together than it was to see two blue ones, and I counted to see whether the white or the blue were the commonest, and found them about equal. I was sorry not to have had more time in which to have studied them.

+ 49. ARDEA VIRESCENS.

(Cory, op. cit. p. 155.)

This species, though common, was far less so than the preceding. I seldom saw more than one at a time, and this one was generally sitting stock-still on a branch or a stump, near the water-level, with its head sunk deep between its shoulders, showing no signs of its long neck.

Suddenly, as the boat drew near, the bird's head appeared to be flying off without the body; but the wings opened and the bird followed, seemingly twice as long as it was before, and, waking the echoes with a loud, harsh, angry screech, would settle behind some bushes and peer over the top with its outstretched neck until the boat had passed.

A gentleman on the staff of the railway at Sanchez on the 18th June gave me a graphic description of a heronry belonging to this species which he had seen the day before, on a little island not 30 feet in diameter which I had visited more than once early in the year at the mouth of the Baracota

river. There were about 16 nests in the trees and on the mangrove-bushes, many of them with eggs, which he described as blue. Those which were destined for me got broken in transit.

⑤ +50. ARDEA EGRETTA. Locally "Galca-real" or "Royal Heron."

A common bird in the Yuna swamp, but observed nowhere else. It was not very easy to approach, but I shot several specimens with No. 4 shot at long distances. It is really easier to bring down than almost any other large bird, for if one single shot so much as touches the wing-bones they splinter at once, being large thin tubes of compact bone filled with air. Hence the graceful flight of the bird, its buoyancy enabling it to settle slowly and easily, and when rising one beat of its wings makes it bounce into the air like a toy-balloon.

The usual attitude of this bird is markedly rectangular, and has none of the beautiful curves of neck and body invariably shown in plates and stuffed specimens. It stands with its body almost upright, its long thin neck rising as straight as a stick perpendicularly from the shoulders, and its head and long beak exactly at right angles to its neck. It is impossible for it to bend its neck in graceful curves, for each individual cervical vertebra is 2 inches or more long. The pectoral skeleton is surprisingly small and fragile for the size of the bird. The anterior border of the sternum is very deeply notched to receive a coil of the trachea, and the furcula is jointed closely to the sternum, evidently so that it should not press upon the coil of trachea above. I do not remember to have heard this species make any noise.

It seemed always to feed alone, and not in company like *A. cærulea*.

The Galca breeds early, for on Feb. 18 I made a trip to the Baracota, another river which falls into the head of Samaná Bay, on board the steam-tug belonging to the Railway Company. On coming out of the mouth of the river we had to hug the south shore of the bay, and passed

a picturesque, high, rocky coral island, covered with large trees thickly hung with luxuriant creepers. These trees were occupied by a heronry of some hundred or more birds of this species. Through my glasses I could make out many nests, some with the birds sitting upon them, while other birds were grouped about the trees, making altogether a picture not to be forgotten. I could not land, and did not get a chance of visiting the spot again. The long plumes of this Egret are occasionally sent by the merchants of Sanchez to New York for sale, and are said to realize a high price.

+ 51. NYCTIARDEA NÆVIA.

I met with this species many times in the Yuna morass. The only specimen I preserved was an immature bird, which I shot one evening as it flew over in the twilight while I was flight-shooting in the Yuna delta.

+ 52. NUMIDA MELEAGRIS. Locally "Guinëa."

The Guinea-hen is a common bird in San Domingo, both in the domesticated and wild state. Occasionally in the drier parts of the Yuna swamp a covey of these birds, very wild when on the wing, afforded me good sport. The wild birds seemed smaller and much blacker than the tame ones.

53. ERISMATURA, sp. inc. (?). Locally "Pato."

The chief aim of several of my never-to-be-forgotten excursions into the morass at the mouth of the Yuna was ducks, and ducks we found in hundreds.

It was easy to discover them, often long before we first sighted them on some open patch of water perhaps a quarter of a mile away, by the whistling that they kept up; and by all of us kneeling down in the boat, except the man whose duty it was to scull her along, we soon managed to get within shot. After packing together and swimming away for a while, the Ducks would begin to rise, those nearest first. Then was the orthodox moment, and we emptied our barrels into them. Well do I remember my astonishment, on the first of these trips, to see the greater part of the Ducks remaining on the water after we had fired, instead of rising in a body. They seemed to be dazed and demoralized,

swimming about for some minutes, and then getting up and flying in all directions, affording us, after partially sheltering the boat amongst the rushes, half an hour's excellent sport. They were, however, difficult to recover, and we lost a great number, for, if only a spark of life was left in them, they dived and we saw them no more. Our bag that first day was 74. They are very good eating. On these excursions I found a pair of long fishing-waders invaluable.

I did not meet with more than this species of Duck and the Garganey (*Querquedula discors*), although the natives told us there were several other sorts in this morass. Nearly all those I shot of the present sort were immature, and I was never quite satisfied as to the species. Owing to the loss of the only two skins which I made, from the ravages of white ants, in San Domingo, I am unable to establish its identity.

+ 54. QUERQUEDULA DISCORS.

(Cory, op. cit. p. 168.)

Seen and shot several times in the Yuna swamp, but not common.

55. PELECANUS FUSCUS.

(Cory, op. cit. p. 172.)

The first bird to be seen on entering Samaná Bay, and the last to be seen on leaving it. One morning I watched fully 600 of these great birds, after a gale from the east, diving for fish at the head of the Bay. They breed in a large colony on a rocky promontory and some islands, called the "Pelican cays," on the south side of the Bay, but I was never able to visit the place.

56. TACHYPETES AQUILUS.

(Cory, op. cit. p. 173.)

I observed this rakish-looking bird, with its enormous stretch of wing, several times in Samaná Bay, usually at a great height.

I do not think it breeds in the Bay.

57, 58. Of Gulls also I observed only one species, and only

one species also of Terns. They were neither of them common, and I did not succeed in obtaining specimens.

+59. *PODICIPES DOMINICUS*.

(Cory, op. cit. p. 185.)

In July, while shooting in the Yuna swamp, I several times obtained a good view of this little Grebe. It was very shy, and always dived or swam into the rushes on the first appearance of the boat.

XXVI.—*On some Fossil Remains of Carinate Birds from Central Madagascar.* By CHAS. W. ANDREWS, B.Sc., F.Z.S., Assistant in the British Museum (Natural History).

(Plates VIII. & IX.)

DURING his recent visit to Madagascar, Dr. Forsyth Major spent several months at Sirabé, in the centre of the island, a district well known for the abundance of fossil bones to be obtained there. A large number of excavations, most of them of considerable depth (12–15 ft.), were made, and a very fine collection of the remains of the extinct species of *Hippopotamus* and other mammals, of several species of *Æpyornis*, and also of numerous carinate birds was made. The present paper deals only with the last, which are mostly aquatic birds, though bones of a Rail and a Hawk also occur. By far the greater number of specimens were obtained from a depth of from twelve to fifteen feet in a marly layer, which Dr. Major believes to have been deposited on the bed of an old lake. Above this comes a layer of coarse gravelly character, consolidated with carbonate of lime and containing rolled and broken bones; this probably marks a volcanic outburst, accompanied by the breaking forth of numerous hot springs charged with carbonate of lime. Above this deposit there is another, about five or six feet in thickness, of black earth, in which also bird-bones occur, though comparatively rare.

In the marly layer the carinate remains are found in association with those of a rather small species of *Æpyornis*, the

Æ. hildebrandti of Burckhardt. In the black earth, on the other hand, this species does not occur, but remains of the somewhat larger *Æ. mulleri*, M.-Edw. & Grand., were found, as well as some well-preserved bones of the smaller and more slender Struthious bird, *Mullerornis agilis*, M.-Edw. & Grand. The difference between the species found in the deeper deposits and those in the more superficial black earth indicates that the former must be of considerable antiquity.

The most remarkable of the extinct types of Carinatae found by Dr. Major is a large Anserine bird (see Plate VIII.) which in those parts of the skeleton known presents many peculiar characters. The greater number of the specimens referred to this species were obtained from the marly layer, but the associated remains (here taken as the types) appear to have been found in the superficial deposit.

Remains of at least four or five individuals are included in the collection, and fortunately in one or two cases a number of bones are known to have belonged to the same skeleton. The best of these associated sets includes the right femur and tibio-tarsus, the proximal ends of the left coracoid and scapula and of the right metacarpus: these will be taken as the type specimens. Among the other more or less complete bones which can be referred with certainty to this species are an extremely well-preserved left tibia and femur, found in association, an imperfect metatarsus, and fragments of a sternum.

It may be stated at once that this bird is quite unlike any species now inhabiting Madagascar or, indeed, any other part of the world. Among fossil forms, as will be shown below, it resembles most nearly a large extinct Anserine bird, *Chenalopex pugil*, described by O. Winge* from remains found in the caverns of Lagoa Santa in Brazil. But even from that it differs so much in the form and proportions of its metatarsus that it is here regarded as representing a new genus, for which the name *Centrornis* is proposed; the specific name adopted for this form being *C. majori*, after its dis-

* Winge, Oluf, "Fugle fra Knoglehuler i Brasilien," E Museo Lundii, Bd. i., Copenhagen, 1888.

coverer. Examination of the distal extremity of the *tibio-tarsus* (Pl. VIII. figs. 1 & 2) shows at once that we are dealing with an Anserine bird; the very deep channel for the extensor tendons, spanned by a transverse bridge which stands in the middle line, together with the form of the articular condyles, are all perfectly characteristic of the group. There are, however, a number of notable peculiarities. The most striking of these are the extreme length and slenderness of the shaft and the relative shortness of the fibular crest. In its general proportions the tibia of *Chenopsis*, particularly of the extinct New Zealand species *C. sumnerensis*, Forbes, seems to approach our fossil most nearly; on the other hand, there are some important differences, *e.g.* in *Chenopsis* the fibular crest is much longer, and in other parts of the skeleton the two birds are very dissimilar.

The distal end resembles that of the tibia of *Cygnus* in the width of its articulation, but differs from it and approximates to the type characteristic of the more terrestrial Geese in the very slight degree to which it is bent inward. Comparison of the tibia with those of a number of Geese shows that, while differing from them in the great length and relative slenderness of the shaft, it in many respects approaches those of *Chenalopex*, *Plectropterus*, and *Sarcidiornis*. The similarity to the tibia of the first named is very great, both in the form of the articular condyles and of the tibial bridge, but the distal extremity is somewhat more inflexed and its articulation wider than in *Chenalopex pugil*. The tibia of *Sarcidiornis* differs from our fossil in the greater depth and narrowness of its intercondylar groove. *Cereopsis* is also different, the characters indicating a terrestrial mode of life being in that genus more highly developed than in any other Anserine bird.

The dimensions (in millimetres) of the tibia are given on p. 346, those of the tibiæ of some other species being appended for comparison.

In size, proportions, and general structure the *femur* (Pl. VIII. fig. 3) is almost identical with that of *Plectropterus*, being much less massive and having a more clearly-defined

three-fourths of one specimen from the right leg and part of the shaft of another from the left are preserved. These bones belonged to the same individual, and are associated with portions of the tibia, coracoid, and other fragments, so that there is no difficulty in referring them with certainty to the present species.

Although about the proximal fourth is wanting, the specimen figured could easily be determined as Anserine, the form and size of the middle trochlea and its relation to the lateral ones being characteristic. Unfortunately the inner trochlea is broken away, but the position of its neck shows that it was reflected backward to a great extent. In comparison with the metatarsus of the Swans and those of most of the Geese, the bone is very long and slender, and its shaft is of a uniform thickness for a much greater part of its length. The metatarsi of *Plectropterus* and *Chenalopex ægyptiacus* present similar characters; this is especially the case with the latter, which, except that it is relatively shorter and has a rather longer outer trochlea, is strikingly similar. *Chenalopex pugil* has a much shorter and stouter metatarsus, and seems to differ also in some points in the form of the distal trochlea. In *Sarcidiornis* the metatarsus is very much shorter and stouter, and the shaft thickens much more rapidly towards its upper end.

The actual length of the fragment is 110 mm.; the length of the complete bone may be estimated at approximately 130 mm. The width of the middle of the shaft is 8·5 mm., that of the middle trochlea 10 mm.

The dimensions (in millimetres) of the metatarsi of some other Anserine birds are given below for comparison:—

	<i>Sarcidiornis melanonotus.</i>	<i>Chenalopex pugil.</i>	<i>Chenalopex ægyptiacus.</i>	<i>Plectropterus gambensis.</i>
Length	71	120	86	130
Width of middle of shaft	7	? 8	6	10
Width of middle trochlea	6	? 8	6	11

The various grooves and muscle-attachments are rather better marked in the fossil than in the living form; this seems to be the case also in *Chenalopex pugil*. This specimen is 24 mm. in length. Compared with the radius of *Phænicopterus*, which in length it resembles, it is found to be much stouter and to differ in many other respects.

The proximal three-fourths of a right *ulna* wanting the olecranon process, and part of a left, correspond in size with the above-mentioned radius. They also agree closely in structure with the same bone in *Sarcidiornis* and *Chenalopex*, though, as might be expected, in the larger bird the muscle-impressions, particularly the insertion of the *brachialis anticus*, are more strongly marked. The largest diameter of the middle of the shaft is 10 mm.

Perhaps the most characteristic bone of this bird is the *metacarpus* (Pl. VIII. fig. 7), but unfortunately only the proximal half of that from the left side is preserved, and even from this the free portion of the third metacarpal is broken away. Its most striking character is the presence of a very long spur-like process formed by the production downward and forward of the fused first metacarpal. The terminal half of this process has an irregular roughened surface which indicates that it was not invested with a claw-like spur such as occurs in *Chauna* and some Plovers, but was most probably covered by rough hardened epidermis, like the similar processes in *Chenalopex* and *Sarcidiornis*. The resemblance of this bone to the metacarpus of *Chenalopex pugil* is remarkable, the only differences perceptible being that in this bird the spur is rather stouter and more curved forward; the size is nearly the same. The spur on the wing of *Plectropterus* is borne on a process of the radial carpal, and is therefore not comparable with that of *Chenalopex* and *Centronis*.

The dimensions of the imperfect metacarpal are :—

Greatest width of upper end.....	31 mm.
Length of spur measured from tip to middle point of articular surface for first phalangeal of digit I.....	26
Width of metacarpal II.	9



Andrews, Charles William. 1897. "On some Fossil Remains of Carinate Birds from Central Madagascar." *Ibis* 3(3), 343–359.

<https://doi.org/10.1111/j.1474-919x.1897.tb03281.x>.

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