

(Petit). Captain Tuckey¹ noted that a few "Mother Carey's chickens (storm petterel)" were seen off Mayumba Bay at the end of June, so it would seem that they must have been *Oceanites*. On July 11, 1930, I watched four of these petrels flying about in the mouth of the Congo, just above Banana.

HABITS.—The ways of this Mother Carey's chicken are so well known as to need but little mention here. Their "walking" on the water, as Dr. Murphy notes, "is not strictly a walking or running—one foot after the other—but rather a two-footed hopping or pattering, both webs coming down together as they spring along the surface." They often "stand" on the water, and "Mr. Cleaves' photographs of Wilson's petrels, including a reel of cinematograph scenes, show the birds in every attitude of 'hop, skip and jump,' but never progressing foot after foot." More remarkable is the fact that it was found that "they dived most skilfully to a depth of several times their length, leaping forth dry and light-winged from the water into the air."

We were surprised to find that on the deck of the ship our bird did not stand up on its legs at all, but usually rested on the whole length of the metatarsus. In walking, however, the heels had of course to be raised a little.

FOOD.—Oil, grease, or small bits of fish readily attract these birds, and these substances, often in the form of blubber or scraps from whaling stations or sealing vessels, are greedily consumed. Aside from these supplies produced through the agency of man, they have been found to feed on putrescent fish and fly maggots washed out of it; on bits of carrion dropped by larger birds; and in the stomachs Dr. Murphy has found otoliths and crystalline lenses apparently from small fishes, traces of algæ and minute crustaceans, or even cinders of volcanic ash.

The stomach of the present specimen contained only a few bits of some hard cinder-like substance.

[FAMILY PROCELLARIIDÆ. PETRELS, SHEARWATERS]

KEY TO THE SPECIES OF PROCELLARIIDÆ TO BE EXPECTED OFF THE MOUTH OF THE CONGO

- 1.—Wing less than 280 mm.; lower back, secondaries, and upper tail-coverts largely white with distal spots of blackish; rectrices white with broad black tips; breast and abdomen white. *Daption capensis*.
 Wing usually more than 280 mm.; back and wings nearly uniform brown or sooty gray, with paler edgings at most; underparts sooty or whitish. 2.

¹1818, 'Narrative Exp. Expl. R. Zaire,' p. 57.

- 2.—Wing less than 310 mm.; no white in plumage save beneath wings; upperparts blackish brown, lower surface more grayish. *Puffinus griseus*.
 Wing more than 310 mm.; throat, breast, and flanks white, and longest upper tail-coverts whitish; under tail-coverts and mid-line of abdomen gray; back and rump brown, crown sooty, and an indication of a whitish collar around hind-neck. *Puffinus gravis*.

[*Daption capensis capensis* (Linnæus)]

Procellaria capensis LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 132 (type locality: Cape of Good Hope).

The Cape pigeon inhabits the whole of the southern ocean, though the form inhabiting the Australian seas has been claimed to be sub-specifically distinct. The typical race extends northward along the western coast of Africa regularly to Great Fish Bay. Specimens have been secured near St. Paul de Loanda and off the Gaboon coast, so there is reason to expect it occasionally at the mouth of the Congo.

[*Puffinus griseus* (Gmelin)]

Procellaria grisea Gmelin, 1789, 'Syst. Nat.,' I, part 2, p. 564 (type locality: S. hemisphere between 35° and 50° = New Zealand).

The sooty shearwater ranges from the southern ocean over both the Atlantic and Pacific, extending from the seas about the Cape of Good Hope to the northern Atlantic. It has been secured in the vicinity of Landana by Falkenstein and by Lucan and Petit, and must certainly occur near the Congo River mouth.

[*Puffinus gravis* (O'Reilly)]

Procellaria gravis O'REILLY, 1818, 'Voyage to Greenland,' p. 140 (type locality: Greenland to Newfoundland).

Breeding on the islands of the Tristan da Cunha group, the greater shearwater migrates northward in the Atlantic as far as Greenland. It has been collected near Fernand Vaz on the Gaboon coast by Marche and Compiègne,¹ and thus is to be looked for off the coast line of the Belgian Congo.

[FAMILY DIOMEDEIDÆ. ALBATROSSES]

Albatrosses are probably little more than accidental along the West African coast as far north as the Congo. Attention must, however, be called to an observation by Captain Tuckey²: "The day we made the land [Gaboon coast, lat. 3° 24' S.] a dead albatross (*Diomedea exulans*),

¹Bouvier, 1875, 'Cat. Géogr. Oiseaux Marche et Compiègne,' p. 40.

²1818, 'Narrative Exp. Expl. R. Zaire,' pp. 55, 260. Hartlaub, 1857, 'System der Ornithologie Westafrika's,' p. 251, "Congo coast."

was picked up floating in a putrid state; which seems to show that these birds wander farther towards the equator than is generally supposed." Tuckey's identification may be questioned, but he would hardly have mistaken a bird of another family for an albatross; and from our present knowledge the three species most apt to range northward in this region are: *Diomedea exulans* Linnæus, the Cape wandering albatross; *Thalassarche melanophrys* (Temminck), the black-browed mollymauk; and *Thalassarche chlororhynchos* (Gmelin), the Cape yellow-nosed mollymauk. The last-named has been reported from Great Fish Bay, Mossamedes.

These three birds, as well as *Daption capensis* and *Procellaria æquinoctialis* (the "Cape Hen"), are seen commonly in the wake of steamers plying in the cold waters off the western coast of South Africa, but they are immediately left behind when the temperature of the sea water rises a little above 60° F. As this happens about 20° S. latitude, it will readily be understood how slight is the chance of their straying to the Congo mouth.

ORDER PELECANIFORMES

[FAMILY PHAËTHONTIDÆ TROPIC-BIRDS]

KEY TO THE SPECIES OF *Phaëthon* INHABITING THE OCEAN ADJACENT TO THE CONGO COAST

- Beak yellow. Middle of back pure white in adult (only banded in the young): scapulars tipped with black, and a narrow black band extending from the black innermost secondaries across the lesser wing-coverts; tip of the outermost primary white for about 25 mm. *P. lepturus*.
- Beak red. Back, scapulars, and many of the wing-coverts white, rather narrowly barred with blackish; no pure black stripe across wing-coverts; the black patch on the outer primaries extends nearly to the tip of the outermost quill. . . *P. æthereus*

[*Phaëthon æthereus* Linnæus]

Phaëthon æthereus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 134 (type locality: tropical seas, Ascension, ex Osbeck).

The red-billed tropic-bird has been reported from the Congo by Hartlaub¹ and by Reichenow,² who attributed the record to Captain Tuckey. It is not among the birds listed by Leach in Cranch's collection, and on turning to Captain Tuckey's narrative, we discover on p. 32 that "*Phaeton ethereus*" was merely mentioned as breeding in the crevices of rocks near the shores of St. Jago, one of the Cape Verde Islands. Flocks of tropic-birds were noted by Tuckey off Cape Palmas, but the species not determined; and the occasional, solitary individuals he

¹1857, 'Syst. Orn. Westafr.,' p. 257.

²1900, 'Vögel Afrikas,' I, p. 79.

later encountered off the coast of Gaboon and the Bay of Mayumba¹ are perhaps more likely to have been *P. lepturus ascensionis*.

On our way to the Congo, Lang and I observed the red-billed tropic-bird only off the coast of Portuguese Guinea, on June 13, 1909; and we saw no species of the genus near the Congo mouth. *P. æthereus* is, however, recorded by Bouvier² from Fernand Vaz, and may occasionally reach the Congo. It inhabits the tropical parts of both the Atlantic and Pacific.

[*Phaethon lepturus ascensionis* (Mathews)]

Leptophaethon lepturus ascensionis MATHEWS, 1915, 'Birds of Australia,' IV, p. 311 (type locality: Ascension).

This species of white-tailed tropic-bird, occupying the warmer parts of the Atlantic, Pacific, and Indian oceans, is represented in the southern Atlantic by the above race. It breeds on Ascension Island and on islets in the vicinity of São Tomé and perhaps Annobon.³ Though not yet known from the Gaboon or Congo coasts, this is the tropic-bird most apt to occur there; and was perhaps the bird meant by Sir. H. H. Johnston,⁴ when he stated that "*Phaethon æthereus*" was of frequent occurrence off Banana Point, and bred on São Tomé.

FAMILY **SULIDÆ**. GANNETS, BOOBIES

KEY TO THE SPECIES OF SULIDÆ OCCURRING IN THE VICINITY OF THE MOUTH OF THE CONGO

The whole anterior part of the throat between the bases of the mandible naked; upperparts, head, and neck dark brown; belly white. *Sula leucogaster*.
Only a narrow naked strip extending down the throat; adults mostly white with blackish remiges and rectrices; young with upperparts brownish spotted with whitish, beneath dirty whitish. *Morus capensis*.

[*Sula leucogaster leucogaster* (Boddaert)]

Pelecanus leucogaster BODDAERT, 1783, 'Tabl. Planches Enluminées,' p. 57 (type locality: Cayenne, ex Daubenton).

The brown booby ranges across all the tropical oceans, breeding on many islands in the warmer parts of the Atlantic. It must certainly occur off the mouth of the Congo, and it has been secured at Landana by Lucan and Petit.⁵ We noted eight of these boobies between Dakar and Freetown (lat. 10° 20' N., long. 16° 14' W.) on June 13, 1909, but

¹Tuckey, 1818, 'Narrative Exp. Expl., R. Zaire,' pp. 53, 57.

²1875, 'Cat. Géogr. Oiseaux Marche et Compiègne,' p. 41.

³See Bannerman, 1915, *Ibis*, pp. 111, 232.

⁴1884, 'The River Congo,' pp. 353, 369.

⁵Sharpe and Bouvier, 1878, *Bull. Soc. Zool. France*, p. 80.

no others during the remainder of the voyage. They are known to occur, nevertheless, near Prince's Island and São Tomé.

***Morus capensis* (Lichtenstein)**

Dysporus capensis LICHTENSTEIN, 1823, 'Verzeichniss Doubl. Zool. Mus. Berlin,' 1823, p. 86 (type locality: Cape of Good Hope).

Sula capensis JOHNSTON, 1884, 'The River Congo,' pp. 353, 354, 359 (estuary of the Congo).

Morus capensis SCLATER, 1924, 'Syst. Av. Ethiop.,' part 1, p. 20 (Loango).

Morus capensis ALEXANDER, 1928, 'Birds of the Ocean,' p. 282 (Loango).

Banana, 2 ♂, September 8.

ADULT MALE.—Iris white; eyelids blue, naked skin at base of maxilla and that of gular stripe velvety black; bill blue-gray, with tomia and nasal groove darker; feet blackish, but the lines of scales running up each of the toes to meet on the metatarsus pale greenish. In the second male the color of the gular stripe was bluish gray.

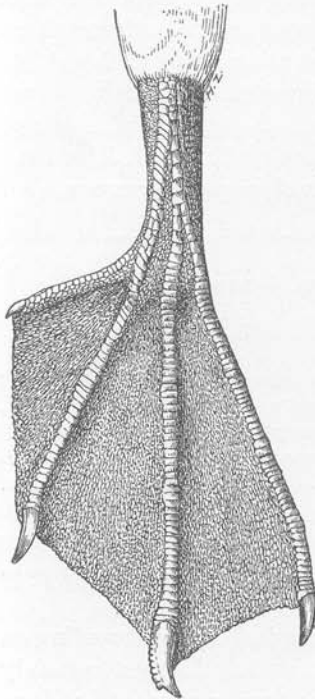


Fig. 178. Left foot of *Morus capensis*, from above. $\times \frac{1}{2}$.

DISTRIBUTION.—The Cape gannet or "Malagash" breeds in large colonies on islands off the coasts of Great Namaqualand and Cape Colony, and during the southern winter migrates northward to Zanzibar on the eastern coast and the Cameroon on the west. There is an immature bird in the Hamburg Museum from Bibundi, just west of Mt. Cameroon; and the Carnegie Museum has several birds in the same plumage from Batanga (May 31–August 2).

On our voyage to the Congo in 1909 we first encountered these birds one day before reaching Loango (June 20), in latitude $2^{\circ} 24' S$. Three or four were sighted during the morning, and in the afternoon they became very numerous and could be seen diving continually from the air. Flying around some twenty-five feet over the water, they would suddenly close their wings half way, stretch their necks straight out, and drop into the water like a lead, with only a slight splash. After a few seconds they would reappear on the surface, and sit there as though swallowing the prey that had been secured.

There were birds in three different plumages: immature examples in the first-winter plumage, very similar to the young of *Morus bassanus*; fully adult ones, like those of the northern gannet but with blackish secondaries and tails; and, lastly, birds intermediate in color, which may have been in a second-year plumage. Their heads were usually of a dirty white color, the back and wings dark brown. The fully adult individuals were greatly outnumbered by the young.

Shortly after sunset, we passed several flocks sitting in the water, where they perhaps intended to spend the night. The largest of these numbered seventy-six birds.

More were seen the following day, and on arriving at Banana we noticed three of them just off the point. Going up the coast again at the end of January, 1915, I, of course, saw no gannets, for Petit¹ tells us that they are found near Landana only from May to November, inclusive.

The Cape gannet does not ascend the Congo River any distance, but our two specimens, taken by Lang well inside Banana Point in September, were caught in the hand as they sat on the water. After being lifted into the boat, they flapped about, but Lang did not consider them sick, or gorged with food either. It has been remarked by several travelers along the Loango Coast that these gannets are sometimes easily captured by the blacks, and these travelers have supposed that the birds were caught in the surf and cast ashore. I do not believe in such a simple explanation, especially as the present specimens were caught in perfectly calm water. Some disease is more likely the cause.

FAMILY PHALACROCORACIDÆ. CORMORANTS

KEY TO THE CONGO SPECIES OF *Phalacrocorax*

- 1.—Rectrices 12; culmen less than 40 mm. long; tail longer than two-thirds of wing (which does not exceed 220 mm.); breeding plumage largely black, scapulars and wing-coverts gray with black spots at tips, but the majority of specimens are browner, whitish beneath. *P. africanus*.
- Rectrices 14; culmen more than 40 mm.; tail shorter than two-thirds of wing (which always exceeds 230 mm.) 2.
- 2.—Adults largely black, with white or buffy fore-neck (and white spot on each flank in breeding plumage); young browner above, and white below, though fore-neck is washed with brown; lores with only minute feathers; wing exceeding 290 mm. *P. carbo*.
- Fore-neck glossy black when adult, as is rest of plumage, save for olive-bronze on scapulars and wing-coverts; the young are browner, and brownish white beneath; lores feathered; wing less than 290 mm. long. *P. capensis*.

¹1899, Mem. Soc. Zool. France, XII, p. 105.

Phalacrocorax africanus africanus (Gmelin)

Pelecanus africanus GMELIN, 1789, 'Syst. Nat.,' I, part 2, p. 577 (Africa; restricted type locality; White Nile district).¹

Phalacrocorax LEACH, 1818, in Tuckey, 'Narrative Exp. Expl. R. Zaire,' p. 408 (Lower Congo).

Phalacrocorax minimus JOHNSTON, 1884, 'The River Congo,' pp. 353, 369 (Lower Congo up to Bolobo).

Phalacrocorax africanus DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 150 (region of L. Tanganyika); 1905, Annales Mus. Congo. Zoologie, I, f. 1, p. 23 (Nouvelle-Anvers; Umangi; Ituri; Province Orientale; Tanganyika). SCHWEINFURTH AND RATZEL, 1888, 'Emin Pascha,' German Ed., p. 166 (W. shore L. Albert, just S. of Mahagi). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 166 (L. Albert); 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 213 (Tunguru I. in L. Albert). OUSTALET, 1893, Naturaliste, VII, p. 128 (no exact locality). REICHENOW, 1900, 'Vögel Afrikas,' I, p. 93 (Ubangi R.; L. Upemba; Likulwe R.; L. Tanganyika); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 238 (Banalia; Usumbura). HARTERT, 1900, Nov. Zool., VII, p. 26 (Ituri R. one day E. of Avakubi). NEAVE, 1910, Ibis, p. 101 (L. Bangweolo). SASSI, 1912, Annalen K. K. Naturhist. Hof. Mus. Wien, XXVI, p. 359 (Ishangi; Kisenyi; L. Edward). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 150, 151 (Bukama). SALVADORI, 1914, Anuario Museo Zool. Napoli, IV, No. 10, p. 4 (L. Bangweolo; L. Tanganyika near Usumbura; L. Kivu). MENEGAUX, 1918, Rev. Française Orn., V, p. 257 (Zambi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 215 (Kabaré; Mukoto; Beni; L. Edward; Mawambi; Uvira); 1930, idem, XVIII, p. 279 (near Elisabethville). SCHUBOTZ, 1921, 'Die Tagebücher von Emin Pascha,' VI, part 2, p. 43, part 3, p. 241 (Magungo; Mundu; Dungu R.; Tunguru I. in L. Albert; Mswa; S. end of L. Albert). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 257 (Elisabethville; Kafubu R.; Bukama).

Graculus africanus MATSCHIE, 1887, Journ. f. Orn., p. 144 (Likulwe R.; L. Upemba).

Carbo africanus LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 4 (Kabare; L. Edward; Kasindi; Rutshuru).

Microcarbo africanus SCLATER AND M.-PRAED, 1920, Ibis, p. 783 (Yei). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 290 (Ngoma).

Phalacrocorax africanus africanus SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 310, 385 (Kasai R.; Lulua R.; Luebo R.; Kwamouth); 1924, idem, XII, pp. 259, 406 (Stanley Pool; Ruki R. between Eala and Bamanian; outlet of L. Tumba); 1925, idem, XIII, p. 2 (Bolobo; Kunungu; Mongende); 1926, idem, XIII, p. 184 (Lower Congo R.; Zambi). BANNERMAN, 1930, 'Birds of Trop. W. Africa,' I, p. 41 (Congo).

Stanleyville, ♀, August 6.

Medje, ♂, March 8.

Between Dungu and Faradje, ♂, February 2.

Faradje, 4 ♂, January 22, May 11, December 29; 2 ♀, April 26, December 29.

ADULTS OF BOTH SEXES.—Iris carmine, naked skin of face yellowish white, that of throat yellowish; bill yellowish with dusky-brown culmen and irregular dark bars at sides; feet black.

IMMATURE.—Iris light brown; bill paler than in adult; feet black.

¹See C. Grant, 1915, Ibis, p. 75.

Of these nine specimens, only four are in the adult black-bellied plumage; and even these have some brown feathers on the breast, neck, or head. One immature male is without any of the distinct terminal spots on the feathers of the back, which have simply scaly margins; but a second specimen of the same sex, though resembling it, also has a few black-spotted feathers beginning to appear in the scapular tracts.

Adults in breeding plumage are rare in collections from the Congo. I have seen but three. The first was taken by Grauer on Lake Edward in June. Its frontal crest is unusually long, the feathers attaining 30 mm. The shorter frontal feathers are white at the base, and similar ones extend back over the eye, behind which there are a number of fine, decomposed whitish plumes, reaching a length of 13.5 mm.

A very similar specimen, sexed as a male, was obtained by Dr. Schouteden near Zambezi, on the lower Congo. It still retains a few light brown feathers, however, on the abdomen, though having the nuptial plumes on the temporal region.

The third is a female in the U. S. National Museum collected by Raven at Nyanza on Lake Tanganyika, March 9. Though it has but few nuptial plumes behind the eye, it shows that in all other respects the breeding female resembles the male. This was doubted by Austin Roberts,¹ who appears to have seen very few black adults. I cannot see any justification for recognizing a distinct South African race. We have a black-plumaged adult from Natal with the tail as long as in West African specimens, and the supposed differences are perhaps to be ascribed partly to varying methods of measuring.

DISTRIBUTION.—The long-tailed cormorant is found over most of Africa from the Gambia and Upper Egypt (Fayoum) southward to the Cape, also on the island of São Tomé. Not restricted to the coast, but frequenting lakes and rivers, and found at some part of the year at least in every section of the Congo. Another race of the same species occupies Madagascar.

Along the Dunga and Uelle rivers, where we can say with practical certainty that they never breed, these cormorants were found to be wholly lacking when the water was in full flood, and then appeared again at about the middle of December, when the streams had scarcely begun to subside. In 1912, for example, the date of reappearance at Faradje was December 11, after an absence dating from the preceding May or June. On the Ituri River, near Avakubi, they did not disappear quite completely, but were seen in August, September, and October, while

¹1922, *Annals Transvaal Mus.*, VIII, part 4, p. 205.

four were seen on the Congo near Isangi in late July, and another at Stanleyville in early August. Going down the Congo from Stanleyville to Kinshasa in December, 1914, when the stream was very high, I did not note a single cormorant.

Regular migrations are certainly performed by this species in western equatorial Africa, and perhaps in other parts of the continent. With very few exceptions,¹ the records from north of 3° N. lat. fall within the months from November to June. From Lake Victoria southward the species is often reported during the period between June and October, as well as the other months of the year. Böhm² reports a breeding colony from the Ugalla River (E. of L. Tanganyika) in May and June; while in South Africa Stark and Sclater³ give breeding dates from June to September. Nesting colonies have been found as far south as the Berg River in Cape Colony.

In the Lower Congo we should expect the seasonal occurrence to be the opposite from that in the Uelle. In the Portuguese Enclave of Cabinda, wrote L. Petit,⁴ they are present in "April, May, June, July, and August. They appear each year at the same season, and spend the dry season."⁵ I have seen a specimen collected on May 2 in the Fernand Vaz district of the Gaboon by Aschemeier. On São Tomé, Correia has taken breeding birds in November and December.

From the Sudan there seems to be no indication of the breeding of *Phalacrocorax africanus*, not even in Heuglin's 'Ornithologie Nordost-Afr.' Though J. H. Gurney⁶ suspected that they might breed on the Fayoum Lake, where he found them common in June, it seems, nevertheless, very possible that the birds seen north of the equatorial forest, from Upper Guinea to the Uelle and the Sudan, are simply an annual overflow from the southern half of the continent.

HABITS.—To a newcomer in Africa it is a great surprise to find the small cormorant occurring in small numbers or even in relatively large flocks along all the rivers of the interior. Besides fishing in the stream, where they swim with bodies very low in the water and their slightly crested heads well raised, they frequently squat on rocks or perch with drooping tail for long periods—hours at a time—upon the boughs of trees or the posts of native fish-pounds. Most of the birds we

¹Anseba, Eritrea, July (Blanford); River Mao-Kebbi, northern Cameroon, June 10 (Second Mecklenburg Expedition).

²1882, *Orn. Centralbl.*, p. 113; 1882, *Journ. f. Orn.*, p. 179; 1885, *Journ. f. Orn.*, pp. 37, 64, 137.

³1906, 'Birds of S. Afr.', IV, p. 11.

⁴1899, *Mém. Soc. Zool. France*, XII, p. 105.

⁵For the seasonal occurrence of other water birds in the Gaboon, see Duchailu, 1890, 'Adventures in the Great Forest of Equatorial Africa and the Country of the Dwarfs,' pp. 183-185.

⁶1876, 'Rambles of a Naturalist,' p. 240.

used to see in the Congo were "out of plumage," often because of their immaturity, and among flocks traveling along the rivers, sometimes numbering up to seventy individuals, rarely more than one-fourth of them were in the black plumage. When alarmed they sought safety in flight rather than by diving and swimming. The appearance on the wing is rather ducklike, as is so often the case with cormorants. I never noticed any vocal sound; and, except for the specimen taken at Stanleyville (August 4), none ever showed, by the condition of its sexual organs, any signs of breeding.

In my notes I find records of only two stomach-examinations, and while fish bones were found in one, it is of interest that in both cases small fresh-water shrimps had been consumed, a full dozen of them by one of the birds.

[*Phalacrocorax capensis* (Sparrman)]

Pelecanus capensis SPARRMAN, 1788, 'Museum Carolinianum,' III, fasc. 3, p. 61 (type locality: False Bay, Cape of Good Hope).

Phalacrocorax capensis O.-GRANT, 1898, 'Cat. Birds Brit. Mus.,' XXVI, p. 352 (Mayumba R.; Landana). STARK AND SCLATER, 1906, 'Birds of S. Africa,' IV, p. 5 ("as far north as the Congo"). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part I, p. 20 ("north to the Congo [R.] on the west"). ALEXANDER, 1928, 'Birds of the Ocean,' p. 306.

The Cape cormorant inhabits the coasts of southern Africa, north to Natal on the southeast, and on the western coast to the vicinity of Landana, where it was collected by Petit. No one seems to have taken specimens on the lower Congo, but I myself have seen cormorants there on January 30 of much larger size than *Phalacrocorax africanus*, and they may have belonged to the present species. Their nesting is done chiefly on islands off the coast of Southwest Africa and Cape Colony, mostly from December to July.

[*Phalacrocorax carbo lucidus* (Lichtenstein)]

Halieus lucidus LICHTENSTEIN, 1823, 'Verzeichnis Doubl. Zool. Mus., Berlin,' p. 86 (type locality; Cape of Good Hope).

Carbo sp. SCHALOW, 1886, Journ. f. Orn., p. 411 (Mpimbwe, E. shore of L. Tanganyika).

?*Cormoranus* SCHALOW, 1887, Journ. f. Orn., p. 226 (W. of L. Tanganyika).

Phalacrocorax lucidus REICHENOW, 1900, 'Vögel Afrikas,' I, p. 89 (L. Tanganyika). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 4 (L. Tanganyika).

DISTRIBUTION OF *Phalacrocorax carbo* (LINNÆUS).—Shores of the north Atlantic from Greenland and northeastern United States to Europe; and thence to the Cape of Good Hope, Japan, Australia,

Tasmania, and New Zealand. Divisible into approximately eight races, it is represented in Africa by three of them.

Phalacrocorax carbo maroccanus Hartert occupies the western coast of Morocco,¹ but the birds of the Cape Verde Islands and adjacent coasts are referred by Sclater² to *P. c. lucidus*, which extends thence to the Cape, to Lake Nyasa, and up the eastern coast to the Tana River. We may safely assume that this was the bird collected by Marche and Compiègne on the Ogowé River and referred by Bouvier³ to *Graculus carbo*; and that it is to be expected about the mouth of the Congo. It also appears to be the form found on Lake Tanganyika. Raven secured it on the Kafue River in northern Rhodesia.

In adult plumage, *Phalacrocorax b. lucidus* is whitish from the chin down the front of the neck to the upper breast, and its bill is slenderer than that of the European races of *P. carbo*. *P. c. maroccanus* more closely approaches them but still has the fore-neck largely whitish.

P. c. lugubris of northeastern Africa is very close to *P. c. lucidus*, though it is said to have a still slenderer bill. Some specimens from Bukoba and the eastern Congo border have the white more restricted to the upper fore-neck, and these have received the name *P. gutturalis* Reichenow; but the difference has not proved constant. Immature birds have the breast and abdomen also white, the fore-neck at first spotted with brown.

In South Africa, *P. c. lucidus* nests on islands or rocks off the coast, and occasionally in a tree on the edge of fresh water. Its eggs are pale blue with a white, chalky covering.⁴

***Phalacrocorax carbo lugubris* Rüppell**

Phalacrocorax lugubris RÜPPELL, 1845, 'Syst. Uebers. Vögel N.O.Afr.,' p. 134, Pl. L (type locality: Abyssinia).

Phalacrocorax africanus PILETTE, 1914, 'A Travers l'Afrique Equatoriale,' p. 187, Fig. 44 (S. of L. Edward).

Phalacrocorax lucidus lugubris SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 215 (Kaniki; Mukoto Lakes; Vitshumbi).

Phalacrocorax lucidus gutturalis SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 215 (Beni).

Phalacrocorax carbo lugubris W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part I, p. 20 ("south to Victoria Nyanza and other lakes in Central Africa"). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., (3) I, No. 3, p. 290 (Lakes Edward, Albert, Kivu).

¹See Hartert, 1920, 'Vögel Paläarkt Fauna,' II, pp. 1390, 1391.

²1924, 'Syst. Avium Ethiop.,' part I, p. 20.

³1875, 'Cat. Géogr. Oiseaux Marche Compiègne,' p. 41.

⁴Stark and Sclater, 1906, 'Birds S. Afr.,' IV, p. 5.

This race is scarcely distinguishable from *lucidus*. According to Reichenow, it has a slightly shorter wing; but I find this measurement in four adult males from Lake Victoria and Lake Bunyoni to be 329–333 mm., whereas Reichenow gives the wing-length of *lucidus* as 315–335 mm. Three specimens of *lugubris* from Abyssinia, according to Neumann,¹ had wings 320–325 mm. long.

DISTRIBUTION.—Northeast Africa, south to Lake Manyara, Tanganyika Territory, Lakes Victoria, Kivu, Edward, and Albert. Also obtained by Pilette on the Mukoto Lakes. On Lake Victoria, according to Dr. van Someren,² they nest in large colonies on rocky islands, the nests being platforms of twigs on the ledges, or on the stunted trees growing in the Nile below Ripon Falls. One or two eggs are laid. They are pale bluish-green obscured by a thick chalky layer. None of the rivers of the eastern Congo, save the Semliki, seem to suit their taste.

FAMILY ANHINGIDÆ. DARTERS OR SNAKE-BIRDS

Anhinga rufa rufa (Lacépède and Daudin)

Plotus rufus LACÉPÈDE AND DAUDIN, 1802, in Buffon's 'Hist. Nat.' (18 mo Didot Ed.), Quadr. XIV, p. 319; Ois., XVII, p. 81 (type locality: Senegal). O.-GRANT, 1898, 'Cat. Birds Brit. Mus.,' XXVI, p. 412 (Lado). SHELLEY, 1901, Ibis, p. 167 (E. shore of L. Moero). DUBOIS, 1905, Annales Mus. Congo Belge, Zoologie, I, fasc. 1, p. 23 (Lower Congo; L. Leopold II; Mayombe; Umangi; Province Orientale; Tanganyika). NEAVE, 1910, Ibis, p. 102 (L. Bangweolo). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' p. 150 (no exact locality). PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 67 (Upper Kafue R. near Ndola). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 257 (Lubumbashi R.).

Platus anhinga SMITH, 1818, in Tuckey's 'Narrative Exp. Expl. R. Zaire,' pp. 283, 287 (mouth of the Congo R.).

Plotus congensis LEACH, 1818, in Tuckey's 'Narrative Exp. Expl. R. Zaire,' p. 408 (Lower Congo).

Plotus levaillantii HARTLAUB, 1857, 'Syst. Orn. Westafr.,' opposite p. lix ("Congo"). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 150 (region of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 144 (Lufira; Likulwe).

Plotus levaillanti SHARPE AND BOUVIER, 1878, Bull. Soc. Zool. France, III, p. 80 (Mboma). BOCAGE, 1881, 'Orn. Angola,' part 2, p. 519 (Boma). JOHNSTON, 1884, 'The River Congo,' pp. 202, 264, 353, 369 (3 days above Stanley Pool; Msuāta). SCHALOW, 1887, Journ. f. Orn., p. 226 (W. of L. Tanganyika). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 166 (L. Albert); in Stuhlmann, 1922, 'Tageb. Emin Pascha,' III, p. 209, 211 (N. end of L. Albert). DYBOWSKI, 1893, 'La Route du Tchad,' p. 137 (Afouru country, lower Ubangi, R., just N. of equator).

Plotus SCHALOW, 1886, Journ. f. Orn., p. 433 (Likulwe R.).

Anhinga rufa REICHENOW, 1900, 'Vögel Afrikas,' I, p. 95 (Boma; Lufira R.; Likulwe R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 238 (L.

¹1904, Journ. f. Orn., p. 326.

²1911, 'Studies of Birdlife in Uganda,' p. 14, Pls. xv, xvi; 1916, Ibis, p. 195.

Mohasi; Kisenyi). LÖNNBERG, 1907, Arkiv. f. Zool., III, No. 21, p. 3 (Mukimbungu). 1917, idem., X, No. 24, p. 4 (Kasindi). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 4 (bank of the Luapula; L. Bangweolo; L. Tanganyika near Usumbura). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 215 (Beni; Lesse; L. Edward; Kabaré; Katana); 1926, Rev. Zool. Afr., XIII, p. 184 (Lower Congo R.; Banana); 1930, idem, XVIII, p. 279 (Kafubu R.). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 44 (Kibali R.; S. end of L. Albert). GLYDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 290 (Ngoma).

Anhinga rufa rufa SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 310, 385 (Basongo; Luebo; Djoko Punda; Kamaiembi; vicinity of Tshikapa; Kwamouth); 1924, idem., XII, pp. 260, 406 (Stanley Pool; Kidada; Eala; Bikoro); 1925, idem, XIII, p. 2 (Kunungu; Mongende). FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 15 (L. Edward).

Avakubi, ♀ October 19; ♂ im., November 28.

Faradje, 2 ♂, January 14, July 6; ♀, February 7.

IMMATURE MALE.—Iris gray, with a narrower yellow circle just around the edge of the pupil and a brown circle about the outer border of the iris. Lores and eyelids dark green, naked skin of throat pinkish white. Maxilla grayish green, mandible light-greenish gray. Feet rather light gray, but blacker on back of metatarsus and claws, webs slightly greenish.

Though none is in full breeding dress, all are adults with glossy black breasts and abdomens, except one, a male (November 28) which I judge to be nearly a year old. Its breast is blackish brown, and of especial interest is the fact that it is undergoing a molt of the flight feathers, with all the primaries and secondaries growing in simultaneously, much as they do in ducks and in some rails and grebes. The longest primaries now measure 169 mm., though their full length would be about 240. The renewal of the rectrices is different. The full length of the tail is retained, alternate pairs of rectrices being dropped. Thus, in the specimen under discussion, two pairs of rectrices are retained, while the middle, the third, and the fifth (or outermost) pairs are now growing in and have reached a length of some 75 mm.

This bird answers Professor Reichenow's question¹ as to whether such a molt of the wings, observed once in a captive bird in the Berlin zoölogical garden, is normal among wild individuals. In the New York Zoölogical Park, August 27, 1924, I saw a snake-bird of the American species, apparently a female, extending its wings so as to exhibit a full set of remiges only about two-thirds grown, with basal sheaths clearly evident. The tail seemed fully grown.

In breeding plumage, the African snake-bird has the plumes of the white neck-stripes lengthened, especially posteriorly. Some of them

¹1901, 'Vögel Afrikas,' I, p. 98.

measure 17 to 20 mm. I failed to note the color of the iris in our adult males, and now find that it has been variously described as yellow, orange-yellow, red-brown, and red, by different collectors. Dr. Granvik's description¹ is probably the most reliable—brown with an inner ring of yellow, in both sexes.

DISTRIBUTION OF THE SPECIES.—Africa, Madagascar, and Syria. The Syrian darter, *A. r. chantrei* (Oustalet), has the greater wing-coverts striped with silver-gray [a resemblance to the Indian *A. melanogaster*

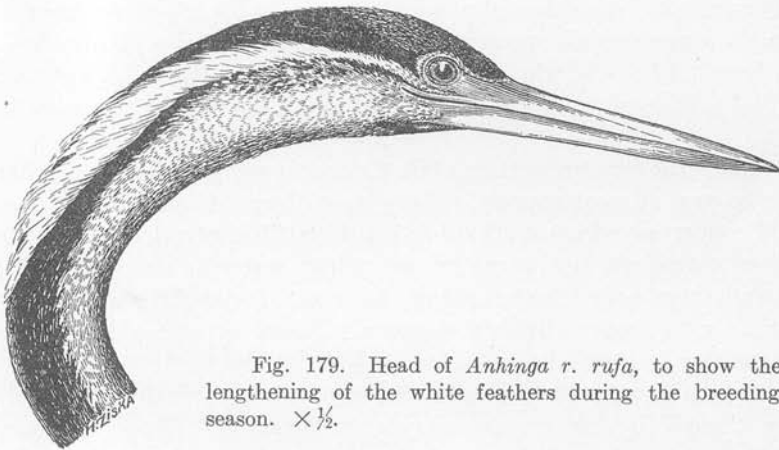


Fig. 179. Head of *Anhinga r. rufa*, to show the lengthening of the white feathers during the breeding season. $\times \frac{1}{2}$.

(Gmelin)], whereas such stripes in typical *rufa* are almost wholly restricted to the middle and lesser coverts. *Anhinga r. vulsini* Bangs of Madagascar, on the other hand, also has the greater coverts with light stripes.

Anhinga r. rufa occupies the whole of Africa, south of Suakin and Senegal, wherever there are rivers or lakes, so that it is found throughout the Congo. It nests in the most widely separated parts of its range: near Khartoum, near Lake Victoria, and along the Berg River in Cape Colony. Loose platforms of sticks are built in colonies in trees along the banks of streams, and chalky white eggs, with an underlying layer of bluish, are laid in sets of two or three, in South Africa sometimes as many as five.²

A young bird in whitish down with wings and tail two-thirds grown was collected by Aschemeier in the Fernand Vaz district of the Gaboon

¹1923, Journ. f. Orn., Sonderheft, p. 30.

²See Stark and Sclater, 1906, 'Birds S. Afr.', IV, p. 15; R.A.L. and V.G.L. van Someren, 1911, 'Studies of Birdlife in Uganda,' p. 13, Pls. XIII, XIV.

about August 1, which leads us to believe that these birds nest there in June or July. In September, Dybowski observed them nesting in great numbers on tall silk-cotton trees along the lower Ubangi River. About Lake Victoria the van Somerens give the breeding season as August, September, and October. At about the beginning of May, 1911, Doctors Rodhain and Bequaert learned that they were nesting in the small trees along the Lualaba River, between Kikondja and Bukama. They were evidently in great numbers, for the young were smoked by the natives and became an article of trade. In this southeastern part of the Congo they appear to be resident throughout the year. Dr. Bequaert gives me the following dates of capture: Kibombo (on the Lualaba, just inside the southern limit of the rain forest), January 17, 1911; Kongolo, February 4, 1911; Kikondja, October 17, 1911; and Lake Moero, January 26, 1912.

Along the forested portion of the Congo River, snake-birds may likewise be seen at most seasons. Many were observed by us in July, and Dr. Bequaert noted one on October 8, 1910, at Bolombo (left bank below Nouvelle Anvers); but, nevertheless, at high water in December, 1914, I found them very scarce; indeed, between Stanley Falls and Coquilhatville not a single individual was seen. This is the time when they are reappearing in the Uelle.

On the Ituri, at Avakubi, there seemed to be a few throughout the year, though they never gave any sign of breeding. We noticed occasional examples at Avakubi even during August, September, and October, 1913, whereas at this season they disappeared completely from the Dungu River near Faradje. In the northeastern corner of the colony their occurrence seemed to be governed to a large extent by the height of the water in the rivers. The latest date at which I observed them was in early July, and then for about five months they would vanish—northward into the Sudan, I suspect, since von Heuglin¹ fixed the breeding season as "late summer (August and September)." In 1912, for example, the date of reappearance on the Dungu River was noted as December 18.

The remarkable habits of snake-birds seem much alike wherever they occur. Almost as expert divers as the grebes, and like them often seen swimming low in the water, or even with only the head emerging, they differ in possessing a very long tail, and are quite at their ease perched in trees, where they spend a large part of their time resting or drying the plumage, with the long neck extending upward and the wings spread like a turkey vulture's.

¹1873, 'Orn. Nordost-Afrikas,' II, p. 1478.

Under water, says Selater,¹ the anhinga swims with wings partially expanded and with a peculiar jerky motion of the neck, something like the poising of a spear before it is thrown. When sufficiently close to the fish it suddenly throws its whole head forward and transfixes its prey on its sharp needle-like bill, both mandibles of which are serrated along their cutting edges. It then rises to the surface, and after a series of upward jerks of the head and neck, succeeds in throwing its prey up in the air, and opening its bill, swallows it head first. The forward thrust is effected by a peculiar modification of the vertebræ, muscles, and tendons of the neck, a detailed account of which was first given by Garrod.²

When frightened from its perch over the water, the snake-bird will often plunge directly into the stream below; and the water of African rivers is not usually limpid enough to allow one to follow the bird's movements. Not infrequently, however, they are seen in flight, the wing-beats strong and regular, the course very direct.

In the stomachs of four specimens we found only fish, a total of eight, of which several were 150 mm. or more in length, and one even 170 mm. long, by 45 mm. in depth, exclusive of fins. As all these fish are swallowed entire, the throat and neck must be capable of considerable distention.

FAMILY FREGATIDÆ. FRIGATE-BIRDS

Fregata aquila (Linnæus)

Pelecanus aquilus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 133 (type locality; Ascension Island).

Fregata aquila JOHNSTON, 1884, 'The River Congo,' pp. 353, 369 (off Banana Point). BANNERMAN, 1930, 'Birds of Trop. W. Africa,' I ('Congo Coast').

Tachypetes aquila PECHUËL-LOESCHE, 1888, 'Die Loango-Expedition,' III, part 1, p. 251 (Banya Lagoon).

It seems rather doubtful whether the frigate-bird can be listed here with certainty. While I cannot disprove Johnston's statement that it appears not uncommonly off Banana Point, neither Lang nor I saw any there, nor, indeed, during our outward or homeward voyages along the West African coast. And this is a bird that cannot be overlooked.

We can at any rate be positive that Reichenow's³ and Hartlaub's⁴ record from the Congo (Tuckey Expedition) is erroneous. The frigate-bird was neither collected nor observed by Tuckey and Cranch in the vicinity of the Congo, indeed the only reference in Tuckey's Narrative

¹1906, 'Birds S. Africa,' IV, p. 14.

²1876, Proc. Zool. Soc. London, p. 335.

³1900, 'Vögel Afrikas,' I, p. 87.

⁴1857, 'Syst. Orn. Westafr.,' p. 260.

(p. 43) to "*Pelicanus aquilus*" has to do with a few individuals noted off Cape Palmas, Liberia. In Professor Christian Smith's Journal in the same volume (p. 256) they are again mentioned from the same neighborhood. Neither has any frigate-bird recently been collected along the coasts of Angola or of the Gaboon.

There is just one reliable observation of a frigate-bird in the region of the Congo mouth. Dr. Pechuël-Loesche, of the German Loango Expedition, relates that toward the end of March, 1876, he watched one of these birds soaring over the lagoon of Banya, between 3° and 4° South latitude on the Gaboon coast. His familiarity with *Fregata* in other lands rendered misidentification impossible.

If any species of *Fregata* does reach the Congo, it is most apt to be *F. aquila*, now believed to be confined to Ascension Island and the neighboring seas, rather than any of the several other forms formerly included under this same name.¹

FAMILY PELECANIDÆ. PELICANS

KEY TO THE SPECIES OF *Pelecanus* OCCURRING IN THE CONGO

(Adults only)

- 1.—Frontal feathering cut off square at the base of culmen, or slightly concave; shafts of the primaries dusky brown on the upper side, only becoming white near the base. *P. rufescens*.
Frontal feathering running out to a point anteriorly; shafts of primaries entirely white. 2.
- 2.—Larger: males with wing 700 mm. or longer, culmen usually over 420 mm. long; females with wing 640 mm. or longer, and culmen 290–400 mm.
P. onocrotalus onocrotalus.
Smaller: males with wing under 700 mm., culmen usually less than 420 mm. long; females with wing usually less than 640 mm., and culmen 260–330 mm.². *P. onocrotalus roseus*.

Pelecanus rufescens Gmelin

Pelecanus rufescens GMELIN, 1789, 'Syst. Nat.,' I, part 2, p. 571 (type locality: West Africa). HARTLAUB, 1857, 'Syst. Orn. Westafr.,' p. 259 (Congo). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 150 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 23 (Province Orientale; Tanganyika). OUSTALET, 1893, Naturaliste, VII, p. 128 (no exact locality). REICHENOW,

¹See especially Mathews, 1915, 'Birds of Australia,' IV, pp. 264–271; Lowe, 1924, Nov. Zool., XXXI, p. 302; Alexander, 1928, 'Birds of the Ocean,' pp. 259–266.

²These dimensions are only approximate and have been compiled mainly from descriptions by Hartert, Reichenow, Bocage, Blanford, and W. L. Slater. A few specimens will be found to agree with one form in wing-length, but with the other in size of bill. I share the doubts of J. Domaniewski (1928, Ann. Mus. Zool. Polon., VII, pp. 69–74) as to the validity of *roseus*.

The material in museums is usually scanty and poorly prepared, if not of doubtful sex. The bill may be expected to be proportionately longer in males, and such measurements as I have been able to compare indicate that the culmen in both *roseus* and *onocrotalus* equals 54 to 66 per cent of the wing-length in males, and only 40 to 52 per cent in females. This may help in confirming the sex of specimens.

1900, 'Vögel Afrikas,' I, p. 102 (Congo; Ubangi R.; Karema). SHARPE, 1902, Ibis, p. 107, (L. Albert). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 4 (L. Bangweolo). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 4 (Kasindi). MENEGAUX, 1918, Rev. Française Orn., V, p. 257 (Zambi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 215 (Kasindi; Baraka; Kabaré); 1926, Rev. Zool. Afr., XIII, p. 184 (mouth of Congo R.; Island da Rosa; Island of Crabs near Banana). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 289 (L. Edward).

Pelicanus rufescens JOHNSTON, 1908, 'George Grenfell and the Congo,' II, p. 297 ("Congo region").

Pélican gris, PILETTE, 1925, Bull. Cercle Zool. Congolais, II, p. 150 (S. shore of L. Edward; Kansenga near L. Bangweolo).

?*Pelecanus onocrotalus* ACHTEN, 1926, Bull. Cercle Zool. Congolais, III, p. 51 (Mobendi near Basongo).

Zambi, 1 skin without sex or date (R. Van Saceghem).

Libreville, Gaboon, ♀, February 12.

ADULT FEMALE.—Iris gray, tinged with purplish, lores mottled blackish, eyelids and naked orbits orange-yellow, bordered with blackish posteriorly; bill pale lemon-yellow, becoming pale gray on outer part of mandible, "nails" of both maxilla and mandible light cadmium-yellow; pouch light rufous and bright yellow, the two colors alternating in rather narrow cross lines, of which the yellow ones are slightly raised; feet (including webs) rather dull red, paler behind metatarsi and beneath toes, claws light grayish-green.

The disparity in the size of the bills of these two adult specimens is very striking, the female's culmen measuring only 292 mm., less than the minimum in 'Vögel Afrikas,' while the other specimen, presumably a male, has a bill measuring 378 mm., equivalent to the maximum given by Reichenow. This difference extends also to the measurements of other parts, such as the wing and metatarsus. The larger bird was no doubt a male.

DISTRIBUTION.—Africa from the Gambia and Abyssinia south to the Cape; also in Madagascar. In the Congo, pelicans are restricted to the largest rivers and lakes and are apparently lacking even along the main stream from about Coquilhatville to Kindu. None were ever seen by us in the northeastern section of the colony.

On Stanley Pool, July 12, 1909, six pelicans of the present species were observed from the steamer, and a larger flock, on January 30, 1915, occupied the sandy part of an island below Boma, where, according to Van Saceghem,¹ they remain only during a few months of the year. Nevertheless, in the U. S. National Museum there is one which was taken by Aschemeier on Lake Ngové, south of Fernand Vaz, on July 4, 1918. I, too, have seen flocks of 23 and 40 below Matadi on July 12, 1930. In smaller numbers they frequent exposed sand-bars from Stanley

¹1918, Rev. Française Orn., p. 257.

Pool to Irebu in February and March. Our specimen from Libreville had the ovary enlarged as though breeding. It was captured by fishermen with a throwing net. The stomach of this bird contained three fish, the largest of which was more than 25 cm. long. These pelicans were not common at the time in the Gaboon River, where we spent several days.

Pelecanus rufescens also occurs in the eastern part of the Congo, on Lakes Tanganyika, Edward, and Albert, and is quite numerous in the great area of lakes and marshes along the Lualaba River near Lake Kisale. On Lake Edward, for example, it is seen in parties of eight to fifteen, which are less wary than the larger pelicans, and far more apt to remain in the swampy shallows along shore, where they seem to do most of their fishing. A sudden lunge forward as they swim, then the head comes back, and the pouch is agitated by the struggling fish.

From a considerable distance, on March 25, I saw four of these pelicans sitting in a tree amid a strip of woods along the Rutshuru River, some twenty-eight miles from its mouth, but could not be certain that they had nests there. In Nyasaland Belcher¹ reports that they nest in trees at the government station of Port Herold. Their eggs are laid in early February, and the young are still in the nests at the end of May.

***Pelecanus onocrotalus onocrotalus* Linnæus**

Pelecanus onocrotalus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 132 (type locality: Africa). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 23 (Lower Congo). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 215 (Kabaré); 1923, idem, XI, p. 310 (Wissmann Pool, on Kasai R.; Luebo).

Pelecanus sharpei BOCAGE, 1871, Journ. Sci. Lisboa, III, p. 166 (Casengo, Angola); DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, pp. 21, 23 (Lower Congo); 1907, Wytzman's 'Genera Avium,' part 7, p. 3, Pl. I, fig. 1 (Lower Congo). REICHENOW, 1915, Journ. f. Orn., p. 130 (Lower Congo).

Pelecanus onocrotalus JOHNSTON, 1908, 'George Grenfell and the Congo,' II, p. 927 (Congo—no exact locality).

Pelecanus sharpei JOHNSTON, 1908, 'George Grenfell and the Congo,' II, p. 927 (Congo—no exact locality).

Pelecanus onocrotalus onocrotalus HARTERT, 1920, 'Vögel Paläarkt. Fauna,' II, p. 1402 (E. African lakes to Angola).

?*Pelecanus onocrotalus onocrotalus* SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 385 (Kwamouth); 1924, Rev. Zool. Afr., XII, pp. 260, 406 (Stanley Pool; Congo River near Eala; L. Tumba).

The status of the two larger pelicans in the Congo is still rather puzzling. Hartert regards *onocrotalus* and *roseus* as races of a single species; and though both occur in tropical Africa, *onocrotalus* may be only a winter visitant there. While all the Congo records have thus

¹1928, Ibis, p. 2.

far been referred to *onocrotalus* or *sharpei*, the single adult male which I collected at the southern end of Lake Edward is plainly *roseus*, having the wing only 673 and culmen 369 mm. It seems very probable that this is the form occurring regularly in the eastern Congo, and that many published records of *onocrotalus* should be referred to it. But as measurements have so seldom been given with these records, it is impossible to do so with confidence. On the other hand, *onocrotalus* must occur on the lower Congo River, in view of the measurements given by Dubois for a specimen of "*sharpei*": wing 750, culmen 400 mm.

DISTRIBUTION.—Southern Europe to northern India, and south in Africa at least to Nyasaland. Its occurrence depends to a great extent on the presence of suitable bodies of water, and it is, therefore, somewhat local. Dubois records a specimen from the Lower Congo now mounted in the Congo Museum, and Petit¹ also mentions *P. onocrotalus* as occurring in the lagoons near Landana, Massabe, and Mayumba from March to June, inclusive. Reichenow's 'Vögel Afrikas' contains no record of specimens obtained either by Petit or by Dr. Lucan. It seems possible that Dr. Schouteden's records from the Congo River and Kasai District may refer to *P. rufescens*, for he appears to have secured no specimens.

Pelecanus sharpei Bocage² is almost certainly synonymous with *onocrotalus*, with which it agrees entirely in form, though having the lower parts ochreous yellow or rufous, with a large chestnut patch on the chest. It has been variously regarded as a distinct species, as a variety of *onocrotalus*, or simply as stained by iron salts in the water.

In Professor Reichenow's paper (with a colored plate) on this pelican,³ he concludes that it may be only an extreme case of color-variation. Two specimens, at least, of *P. sharpei* show only 16 rectrices, whereas *onocrotalus* and *roseus* are known to have either 22 or 24. In addition to examples from Kasengo in Angola, from the Lower Congo, and from Lomé in Togo, two others are known: one from Silistria in Dobrudja (lower Danube), and the other from Dubowa in southeast Hungary.

***Pelecanus onocrotalus roseus* Gmelin**

Pelecanus roseus GMELIN, 1789, 'Syst. Nat.,' I, part 2, p. 570 (type locality Manila, Philippine Is.). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 23 (along the White Nile).

Pelecanus onocrotalus LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 4 (Kabaré). PILETTE, 1925, Bull. Cercle Zool. Congolais, II, p. 150 (Katavi east of Karema; S. shore of L. Edward).

¹1899, Mem. Soc. Zool. France, XII, p. 106.

²1870, Proc. Zool. Soc. London, p. 173 (Angola).

³1915, Journ. f. Orn., p. 130.

Pelecanus rufescens PILETTE, 1914, 'A Travers l'Afrique Equatoriale,' p. 187, Fig. 42, p. 276, Fig. 72, p. 278, Fig. 75 (S. and S. E. of L. Edward).

Pelecanus onocrotalus subsp.? GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 289 (L. Edward).

Pelican, TIELEMANS, 1925, Bull. Cercle Zool. Congolais, II, p. 150 (Albertville or Mpala).

DISTRIBUTION.—Eastern Asia, supposedly from India and Burma to China, migrating to the Malay Islands and the Philippines. In Central and Southern Africa there are also pelicans which cannot be distinguished from the Asiatic form.

P. o. roseus is supposedly smaller than *onocrotalus*. In South African examples of *roseus* the male is said to have the culmen 419 mm., the female 330.¹ Hartert gives the length of bill in *onocrotalus* as 430–450 for the male, 290–400 for the female. The variation in size among the pelicans of Africa is complicated by the disparity between the sexes in the same race. Many more specimens, reliably sexed, will be needed before we can be sure of their exact distribution in the Congo.

Pelecanus o. roseus has been positively reported from the White Nile, and it occurs on the lakes along the eastern border of the Belgian Congo. At Kabare on Lake Edward on May 10, 1927, I collected one and personally determined its sex as male, with slight enlargement of the testes. Its forehead was not noticeably swollen, as that of *onocrotalus* commonly is. I am therefore doubtful as to the supposed occurrences of *onocrotalus* in this region.

Large pelicans, presumably *roseus*, are very common on Lake Edward. At Katwe on the northern shore I saw a flock of fifty-five in January, and at Kabare in May they were probably the most numerous of all large birds. They gathered in flocks of a dozen or more about the shallow pools between the reed-beds and the shore, and many scattered birds were also to be seen during the day far out on the lake. Some of them look pure white, especially in flight, and immature birds are perhaps really white. But the direction of the light makes a difference; and from the proper quarter, especially if the breast is turned toward the observer, the greater part of the plumage shows as a beautiful pink verging toward salmon.

As they rise from the water the wing-beats are laborious; but once well launched in the air, the birds are majestic in flight, soaring buoyantly, or alternately flapping and gliding, with little change in altitude whether the wings are moving or not. But they do not sail close to the surface of the water like the American brown pelicans.

¹Stark and Selater, 1906, 'Birds of S. Africa,' IV, p. 26.

Where the large pelicans of Lake Edward nest we do not know, but it seems probable that they do so on the sand or amid the reeds close to the shore of the lake. Eggs taken in South Africa have been described as white with a slight brownish stain, and measuring about 91.4×58.4 mm.

ORDER CICONIIFORMES

FAMILY ARDEIDÆ. HERONS, EGRETS, BITTERNES

KEY TO THE GENERA OF ARDEIDÆ IN AFRICA

- 1.—Plumage pure white, except sometimes for ochreous feathers on crown, chest, or lower back.....2.
- Plumage not so white as above.....6.
- 2.—Culmen less than 65 mm. long.....BUBULCUS.¹
- Culmen more than 65 mm. long, no ochreous feathers on crown, chest or back...3.
- 3.—Metatarsus and toes wholly blackish.....4.
- Metatarsus black, toes yellowish or light green (often rather dark in dried skins).....5.
- 4.—Culmen less than 85 mm. long.....MESOPHOYX.
- Culmen exceeding 85 mm.....CASMERODIUS.
- 5.—Bill largely black (with the exception sometimes of basal portion of mandible).
EGRETTA.
- Bill horn-brown or yellowish.....DEMIGRETTA.
- 6.—Length of wing exceeding 340 mm.....7.
- Length of wing less than 340 mm.....9.
- 7.—Neck largely brownish buff, streaked in front, but with wavy or zigzag bars of brown or blackish at sides.....BOTAURUS.²
- Neck not colored as above.....8.
- 8.—Middle toe (with claw) longer than culmen; a rather narrow black line running down the rufous side of neck, as well as one in the back; middle of abdomen blackish in adult (but cinnamon-rufous in young).....PYRRHERODIA.
- Middle toe (with claw) shorter than culmen; no black line down side of neck, which is light gray, rufous, or mostly black.....ARDEA.
- 9.—Length of wing exceeding 240 mm.....10.
- Length of wing less than 240 mm.....14.
- 10.—Plumage entirely slaty gray or blackish, or with throat at most white or vinous.....11.
- Plumage not mainly slaty gray or blackish.....12.
- 11.—Throat white.....DEMIGRETTA.
- Throat slaty or vinous.....MELANOPHOYX.
- 12.—Upper surface of wings uniformly colored, gray or dark brown (or in immature birds a pale spot at tip of each feather).....NYCTICORAX.
- Wing-coverts banded with buff on a blackish ground, or with dark zigzags or spots on a buffy ground.....13.

¹See also *Ardeola idæ*, although it has not been found in white adult plumage in Africa.

²*Botaurus*, *Ixobrychus*, and *Ardeiralla* may be distinguished from the members of the subfamily Ardeinae by the lack of a pair of powder-downs on the lower abdomen, just outside the paired ventral feather-tract.

- 13.—Bill distinctly longer than middle toe, wing-coverts with buff bands.

TIGRIORNIS.

Bill distinctly shorter than middle toe, wing-coverts with dark zigzags or spots.

BOTAURUS.

- 14.—Wings (including remiges) practically white, though the upper surface may be lightly washed with buff.....ARDEOLA.

Wings with little or no white.....15.

- 15.—Length of wing exceeding 190 mm.; upper wing-coverts largely maroon, belly rufous.....ERYTHROCINUS.

Length of wing less than 190 mm.....16.

- 16.—Whole upperparts, including crown, sides of neck, and wings, uniform bluish slate-color (in the young many of the feathers have rusty margins).

ARDEIRALLA.

Upperparts not uniform slate.....17.

- 17.—Wing-coverts dark slate, more or less glossed with green and margined with ochreous; crown black, sides of neck light gray.....BUTORIDES.

Wing-coverts ochreous, or gray washed in part with buff (in young the feathers have dark brown median streaks or spots).....IXOBRYCHUS.

SUBFAMILY Ardeinæ

KEY TO THE AFRICAN SPECIES OF *Nycticorax*

- 1.—Upper surface of wings uniform gray or brown, without light streaks or spots (adults).....2.

Upper surface of wings with conspicuous spots or streaks of whitish or light buff (immature).....3.

- 2.—Neck bright rufous, middle of back with a half-concealed white patch.

N. leuconotus.

Neck gray; middle of back more glossy green, but without any white.

N. nycticorax.

- 3.—Crown blackish without light streaks; feathers of neck gray-brown with rufous lateral margins, plumage of back and wing-coverts somewhat margined with rufous.....*N. leuconotus*.

Crown dusky brown, but each feather with a narrow median stripe of buff; feathers of neck, back, and wing-coverts not margined with rufous.

N. nycticorax.

Nycticorax nycticorax nycticorax (Linnæus)

Ardea nycticorax LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 142 (type locality: southern Europe).

Nycticorax europæus SHARPE AND BOUVIER, 1878, Bull. Soc. Zool. France, III, p. 78 (Mboma).

Nycticorax griseus BOCAGE, 1881, 'Orn. Angola,' part 2, p. 449 (Boma). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Likulwe). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Katanga; Umangi). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 260 (Karavia R.; Elisabethville; Lubumbashi R.).

Nycticorax nycticorax REICHENOW, 1901, 'Vögel Afrikas,' I, p. 362 (Boma; Likulwe R.). AUBERT AND HECKENRODT, 1911, Comptes Rendus Hebd. Soc. Biol. Paris, LXX, part I, p. 958 (Brazzaville).

Nycticorax nycticorax nycticorax BANNERMAN, 1930, 'Birds of Trop. W. Africa,' I, p. 77 (Lower Congo).

DISTRIBUTION OF THE RACE.—Southern Europe and Asia southward to Celebes and to South Africa. Apparently a rare bird in the central and northeastern parts of the Congo, in spite of Dubois' record from Umangi.

On the island of Sacra-embaca, opposite Boma, Petit¹ found a score of night-herons of this species, including young and old birds, while several nests were seen there on branches overhanging the water. He noted that they were present in January, February, and November.

At the south end of Lake Edward on May 5, 1924, Dr. John C. Phillips secured an immature night-heron which he identified with the present form. I have seen the specimen at the Museum of Comparative Zoölogy, and believe it to be rightly named.

A young night-heron was brought to us by natives at Faradje in January, 1913. It was fully fledged, and colored and spotted exactly like the young of *N. nycticorax*, to which species it may well have belonged, since the reddish edgings of the feathers of back and neck (described by Reichenow) were certainly lacking. I regret now that this bird was not preserved, but its captors had pulled out all its wing-feathers.

***Nycticorax leuconotus* (Wagler)**

Ardea leuconotus WAGLER, 1827, 'Syst. Avium,' Ardea No. 33 (type locality: Senegambia).

?*Nycticorax cucullatus* JOHNSTON, 1884, 'The River Congo,' p. 370 ("most parts by river and marshes").

Nycticorax leuconotus SALVADORI, 1914, *Annuario Museo Zool. Napoli*, IV, No. 10, p. 9 (L. Bangweolo). SCHOUTEDEN, 1930, *Rev. Zool. Afr.*, XVIII, p. 279 (near Elisabethville); 1932, *Bull. Cercle Zool. Congolais*, VIII, p. 104 (Buta).

Faradje, 4 ♂, March 11, August 17, October 25; ♀, October 25.

Niangara, ♂, April 3.

Rungu, ♂, June 25.

ADULT MALE.—Iris brown, lores greenish yellow; bill blackish, streaked with light green beneath mandible; feet greenish yellow.

All seven specimens are in the adult plumage, with concealed white patch in the middle of the back.

DISTRIBUTION.—From Senegal and the White Nile to South Africa, rare, however, in the south.

There are as yet no records from the central Congo basin, except a single specimen I secured near Lukolela. We never saw the white-backed night-heron on the Ituri River, but along the rivers of the Uelle system

¹1899, *Mem. Soc. Zool. France*, XII, p. 100.

they seem to be common. We used to see them flying up and down the streams at dusk, only one or two at a time, while we were waiting for a chance to shoot nightjars, bats, and *Machærhamphus*. Less often they were frightened from wooded islets in the Dungu during the day; and on October 25, 1912, we found a nest, built upon some leafless boughs projecting from the bank of one of these islands. This nest was rather large and flat, composed of dry sticks and reed-stalks, with smaller and softer bits of reeds and twigs in the middle. It rested about five feet above the surface of the water, which was beginning to recede. A dense growth of canes screened it from the water side. Only a single egg (44.9×33.5 mm.), soiled and whitish with a faint tinge of green, had yet been laid; but the ovary of the female bird showed four or five still to be laid. Both of the herons were sitting near the nest.

The stomach of the male bird contained only a single fly. Usually our night-herons had not yet partaken of food, being secured just as they started out for the night's foraging. In one case, however, the stomach contained remains of many small insects like winged ants, and in a second instance one small fish.

Even at Faradje, where we lived close to the river bank, so that night-herons were often passing by at night, we never heard a sound from them—very different from the habit of night-herons in America. It seemed equally strange that such an overwhelming proportion should be in adult plumage.

Tigriornis leucolopha (Jardine)

Tigrisoma leucolopha JARDINE, 1846, Annals Mag. Nat. Hist., London, XVII, p. 86 (type locality: "Western Africa").

Tigrisoma leucolophum SHARPE AND BOUVIER, 1876, Bull. Soc. Zool. France, I, p. 313 (R. Louemba). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 365 (Luemba). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Mayombe).

Tigrisoma scæolophum JOHNSTON, 1884, 'The River Congo,' p. 370 (lower Congo R.).

Tigrornis CHAPIN, 1915, Amer. Mus. Journ., p. 284 (Medje).

Tigrornis leucolopha CHAPIN, 1921, Amer. Mus. Novitates, No. 17, p. 15 (Gaman-gui; Medje; Niapu).

Tigriornis leucolopha W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 30 ("Lower Congo, east to N. E. Belgian Congo"). BANNERMAN, 1930, 'Birds of Trop. W. Africa,' I, p. 80 (N. E. Belgian Congo).

Tigriornis leucolophi W. DEW. MILLER, 1924, Bull. Amer. Mus. Nat. Hist., L, p. 329 (powder-downs).

¹No exact locality. Was in a collection brought home by vessels trading to the Bonny and Old Calabar rivers.

Gamangui, ♂, January 31; ♀, February 23.

Medje, ♂, March 24.

Niapu, 2 ♂, December 21, 23; ♂ juv., December 7.

ADULT MALE.—Iris yellow, with outer rim brownish, orbits and lores dark green; maxilla black, mandible dark green, black along upper edge; feet greenish brown.

The proper systematic position of *Tigriornis* is perhaps close to *Tigrisoma*, but certainly not among the bitterns, where we find it in Reichenow's 'Vögel Afrikas.' It has relatively short toes and small claws and possesses the three typical pairs of powder-downs of the herons.

DISTRIBUTION OF *Tigriornis leucolopha*.—West Africa from Liberia to the Loango coast, where it was secured by Petit on the river Luemba, the Mayombe forest, and eastward to the Ituri Forest.

The African tiger-heron is truly a bird of the forest, seldom to be seen along river banks, even where heavily wooded, but keeping to the smaller streams entirely hidden within the depths of the forest, where the river herons evidently dare not venture. Thus, it needs never to compete with the purple heron or any of its better known relatives, and it is readily understood how *Tigriornis* almost always eludes observation. Personally I saw just one bird, which flew up along a brook south of Medje and in a moment was lost from view; while during all our hunting around Avakubi, neither Nekuma nor I ever secured a specimen. The young bird was brought to Mr. Lang by natives, and all the others in the collection were trapped along small sylvan water-courses. An additional adult specimen has been obtained at Lukolela.

Three stomachs of adults, upon examination, showed the food to consist largely of small fish, but in two cases there were fresh-water crabs, in addition.

The natal down is white throughout, rather short on the belly, but reaching a length of 60 mm. on the crown. The juvenal, or first plumage following the down, is rather similar to that of the adult, but the feathers of the back have only a single terminal bar of rufous, while the primaries likewise are uniform blackish with white tips. The white patch on the back of the crown appears with this plumage. None of our specimens is barred below like the immature bird which Prof. Reichenow¹ mentions.

Examination of more than two dozen specimens of this heron has shown me that, while there is considerable individual variation in color, and especially in the light barring, adult females are apt to have darker backs, with narrower bars, than males. They also have shorter bills. In nine adult males from Lower Guinea the wing varied from 255 to 282

¹1901, 'Vögel Afrikas,' I, p. 365.

mm., the exposed culmen, from 90 to 115 mm. Measurement of four adult females from Lower Guinea gives: wing, 251–270 mm.; exposed culmen, 80–90 mm. Two additional adults from southern Nigeria were similar in size to those of Lower Guinea in general.

Material from Upper Guinea is scarce, but a male taken at Akposso, Togoland, by Baumann (Berlin Museum) is the largest I have examined: wing, 305 mm.; exposed culmen, 115. An adult in the British Museum from Denkera, not sexed, has the wing 285 mm., exposed culmen, 103; so it was probably a male. It did not differ appreciably in color from males of Lower Guinea.

The nearest ally of *Tigriornis* seems to be *Zonerodius heliosylus* (Lesson) of New Guinea. As for *Tigribaphe leucolæma* Reichenow,¹ a supposedly new tiger-heron from an island in Lake Victoria, my examination of the type showed it to be an adult specimen of *Tigrisoma salmoni* Sclater and Salvin of South America, or else some very closely related form. I compared it directly with a skin of *T. marmoratum*, but found slight differences both in color and in size. Reichenow's type bore no original label, and must have found its way into Father Conrads' collection by accident.²

***Butorides striatus atricapillus* (Afzelius)**

Ardea atricapilla AFZELIUS, 1804, K. Svenska Vet. Akad. Handl. Stockh., XXV, p. 264 (type locality: Sierra Leone). HARTLAUB, 1881, Abhandl. Naturwiss. Verein Bremen, VII, p. 85 (Magungo). BÜTTIKOFER, 1888, 'Notes Leyden Mus.,' X, p. 212 (Ango Ango). OUSTALET, 1893, Naturaliste, VII, p. 128 (no exact locality).

Butorides atricapilla SHARPE AND BOUVIER, 1876, Bull. Soc. Zool. France, I, p. 313 (Shiloango R.); SHARPE, 1884, Journ. Linn. Soc. London, Zool., XVII, p. 440 (Semio); 1898, 'Cat. Birds Brit. Mus.,' XXVI, p. 172 (Semio). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Mpala; Katanga; Umangi; Cataract Region; Mayombe). SHELLEY, 1901, Ibis, p. 167 (E. shore L. Moero). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 142, 156, 157 (Leopoldville to Katanga). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 10 (L. Bangweolo; L. Tanganyika near Ujiji).

Butorides atricapillus JOHNSTON, 1884, 'The River Congo,' p. 370 (middle and lower Congo). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 370 (Semio; Manyanga). SALVADORI, 1907, Boll. Mus. Zool. Anat. Torino, XXII, No. 570, p. 9 (near Lukonzolwa W. of L. Moero). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (L. Edward.) LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 9 (Kasindi). MENEGAUX, 1918, Rev. Française Orn., V, p. 253 (Zambi; Lukanga R.). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 225 (Karemi; Lesse); 1920, idem, VII, p.

¹1912, Orn. Monatsber., p. 61 ("Ukerewe Is., L. Victoria").

²Stresemann, 1923, Journ. f. Orn., p. 523 (foot-note). Sclater, 1924 'Syst. Avium Ethiop.,' part 1, p. 30 (foot-note). Miller, 1924, Bull. Amer. Mus. Nat. Hist., L, p. 328 (foot-note).

189 (Malela); 1923, idem, XI, pp. 310, 385 (Kasai R.; Lulua R.; Tshikapa R.; Luebo; Kwamouth); 1924, idem, XII, pp. 260, 406 (Stanley Pool; Kidada; Eala; between Irebu and Ikengo); 1926, idem, XIII, p. 185 (Moanda; Banana; Vista). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 260 (Bukama; Kongolo).

Ocniscus atricapillus REICHENOW, 1887, Journ. f. Orn., p. 299 (Manyanga).

Butorides striata atricapilla BANNERMAN, 1922, Rev. Zool. Afr., X, p. 183 (Belgian Congo).

Butorides striatus atricapillus FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 25 (L. Edward). SCHOUTEDEN, 1930, Rev. Zool. Afr., XVIII, p. 279 (Kafubu R.).

Niangara, ♂ im., December 4.

Faradje, ♂, October 26; ♀ im., December 18.

Dungu, ♂, March 1.

Gamangui, ♂, February 10; 2 ♀, January 27, February 16.

Avakubi, ♂, February 18; 3 ♀, January 6, September 26, October 12.

ADULT FEMALE.—Iris yellow, upper half of lores greenish yellow, lower half blackish; maxilla black, mandible yellowish green posteriorly, greenish gray near tip, a black line along its upper edge. Front of metatarsus and upper side of toes grayish brown, rest of foot yellow.

DISTRIBUTION OF THE SPECIES.—Warmer countries of both hemispheres, including many oceanic islands, from South America to southern Canada and from the region of Korea and Japan to South Africa, Australia, and Oceanica. Dr. Hartert¹ has recognized seventeen subspecies, pointing out the close resemblance between *atricapillus* and typical *striatus* of South America.

B. s. atricapillus occupies the greater part of tropical Africa, from Senegal and the Blue Nile south to Natal. On the Red Sea coast it is replaced by *B. s. brevipes* (Ehrenberg).

These small gray-and-green herons are found almost everywhere in the Congo along rivers,² where as a rule they haunt the shady banks beneath overhanging boughs, taking wing before an approaching canoe only if it is close to the shore. We saw them all the way from Boma to Faradje, and detected no sign of migration.

Yet we found no nests, and young birds were never abundant. From examination of sexual organs, and the fact that immature examples were taken in December, I conclude that in the Uelle district there is a definite breeding season about October. Of course the date may be different in the forest belt, and certainly would be to the southward.

The nest is known to be built of sticks, only slightly concave above, and placed in trees along the water's edge. Excellent photographs will be found in the van Somerens' 'Studies of Birdlife in Uganda,' 1911.

¹1920, 'Vögel Paläarkt. Fauna,' pp. 1249-1251.

²The species appears to be absent, however, in the highlands about Lake Kivu, as well as on the Ruwenzori Range; and Neave noted that he did not find it on the Katanga plateau.

The eggs, three to a set, are pale bluish-green and measure 36-40 mm. \times 27.5-29.¹

We examined eight stomachs of the green-backed heron, remains of small fish being noted in seven of them, accompanied in nearly every case by insects, particularly dragon-flies, and also one grasshopper. One stomach held only a large spider and some insects.

***Erythrocnus rufiventris* (Sundevall)**

Ardea rufiventris SUNDEVALL, 1851, Öfv. K. Vet.-Akad. Förh. Stockholm, for 1850, p. 110 (type locality: "Caffraria superior"; type from Mooi River, near Potchefstroom).

Erythrocnus rufiventris NEAVE, 1910, Ibis, p. 98 (Chambezi Valley; E. of L. Bangweolo). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 9 (near L. Bangweolo). SCHOUTEDEN, 1927, Bull. Cercle Zool. Congolais, III, p. 63 (L. Upemba). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 261 (Dembo des Hindous near Elisabethville).

DISTRIBUTION.—From eastern Cape Province and Natal north to Angola, the Kasai district, and Entebbe on Lake Victoria. It was collected by Piscicelli near Lake Bangweolo, but the first specimen actually from Congo territory was sent us by Father Callewaert from Luluabourg. It is a female, apparently adult, but with broad buffy streaks on the front of the neck and narrow ones at the sides of the neck. Colors of the naked parts were noted as follows: iris yellow, orbit greenish yellow; beak black above, changing to greenish yellow on the lower part; feet lemon-yellow.

On the western shore of Lake Victoria, according to van Someren,² the rufous-bellied heron frequents the trees and swamps by the lakeside but is not common. I have seen no description of the nest or eggs, but this heron has been found nesting at Lake Upemba by my friend G. F. de Witte. During 1927 I saw one individual at the southern end of Lake Edward, and another on the Lualaba River just south of Kabalo. While inhabiting the southern and eastern Belgian Congo, the species does not invade the heavily forested districts.

KEY TO THE AFRICAN SPECIES OF *Ardeola*

- 1.—Plumage entirely white, with only a light buffy wash on crown and back, and sometimes scattered dusky feathers on back.....*A. idæ*.
Crown and sides of neck streaked with dark gray or blackish; back mainly rufous, gray-brown or blackish brown.....2.
- 2.—Interscapular region rufous or gray-brown, unstreaked, although there may be light streaks on scapulars; wing 192-234 mm., tail 56-86 mm..*A. ralloides*.
Interscapular feathers blackish brown with median stripes of buff; wing 210-262 mm., tail 77-101 mm.....*A. idæ*.

¹Reichenow, 1901, 'Vögel Afrikas,' I, p. 372. Van Someren, 1916, Ibis, p. 208.

²1916, Ibis, p. 208.

***Ardeola ralloides* (Scopoli)**

Ardea ralloides SCOPOLI, 1769, Annus 1, Hist.-Nat., p. 88 (type locality: Carniola).

Ardea senegalensis LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 408 (Lower Congo).

Ardea squacco JOHNSTON, 1884, 'The River Congo,' p. 370 (upper river from Stanley Pool to Bolobo).

Buphus comatus DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Ardea comata SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 165 (N. end of L. Albert). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 166 (L. Albert); 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 211 (N. end of L. Albert).

Ardeola ralloides DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 25 (Katanga; Tanganyika; L. Leopold II). NEAVE, 1910, Ibis, p. 99 (L. Bangweolo). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 252 (L. Luhondo; Usumbura). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (L. Edward). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 10 (Usumbura). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 9 (L. Edward; Rutshuru). MENEGAUX, 1918, Rev. Française Orn., V, p. 253 (Lukanga R.; Paso-Konité). SCHOOTEDEN, 1918, Rev. Zool. Afr., V, p. 224 (Beni; Baraka; Kabaré). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 51 (Fanjimoro on L. Albert; Tunguru; Mswa; S. end L. Albert). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 260 (Kafubu R.).

Avakubi, 2 ♂, November 26, December 22; ♀, December 22; ♂ im., November 9; ♀ im., November 20.

ADULT MALE.—Iris chrome-yellow, lores and eyelids light green; maxilla blackish, mandible mostly greenish gray; feet light green, becoming dusky on upper side of toes.

Judging both from the plumage and from the condition of the sex-organs, two of the specimens were immature, the other three adults in winter plumage, their outer primaries pure white, while in the young birds they are more or less washed with gray-brown.

DISTRIBUTION.—Mediterranean countries to the Caspian Sea, south to the Cape Province and Madagascar. *Ardeola idæ* (Hartlaub), breeding only on Madagascar, is a distinct species, the adult of which is nearly pure white.

The squacco heron is apparently resident in the southern half of Africa, but certainly not in the northern Congo, where we found it only as a migrant or winter visitant, along the Ituri River. During November and December the birds were seen in small numbers, two or three at most, feeding along the banks. Occasionally they alighted on trees; but this was not the rule, for they exhibited a more bittern-like trait of dropping into the rank grass and sneaking off, so as to be difficult to flush. No sound was heard from them.

Their feeding habits were somewhat surprising. Not a fish was found in the four stomachs opened, and only two frogs. Insects seemed the

staple diet, and two spiders were also found; but while the former included many dragon-flies, some grasshoppers, a cricket, aquatic hemiptera and insect larvæ, two of these herons had between them swallowed twenty-six butterflies, wings and all, at least twenty of them being small brown hesperiids just then gathering by thousands in muddy spots.

If these birds are migrants from the north, as seems probable, it is hard to explain why we never noticed the species anywhere in the Uelle district. In the Lower Congo, whence Menegaux and Van Saceghem¹ record a female, December 8, 1915, the junior author notes that squacco herons are "very common along the main river, but even more so along the small streams." In that region they may perhaps be resident, since Aschemeier collected a specimen in the Fernand Vaz district, July 31, 1918.

On the eastern border of the Congo, too, at Lake Edward and Rutshuru, Lönnberg reported specimens taken in June, as well as on August 6 and 10, while Pilette secured them at Kabare on Lake Edward in October and November, and von Stegmann at Lake Luhondo in December. In the Vienna Museum I saw two adults taken by Grauer on Lake Edward in June which are in full breeding dress.

At the mouth of the Luapula in Lake Moero, Dr. J. Bequaert wrote a detailed description of a specimen in breeding plumage, taken there on January 26, 1912. Neave reported the species from Lake Bangweolo on July 4, so it must be resident also in the southeastern Congo, though breeding at the opposite time of year from the birds of Lake Edward.

Little seems to be known of the nesting in Africa, and probably the nest is well hidden in swamps. In southern Europe four to six greenish-blue eggs are laid, measuring about 36×30 mm.

***Ardeola idæ* (Hartlaub)**

Ardea idæ HARTLAUB, 1869, Journ. f. Orn., p. 167 (type locality: East Coast of Madagascar).

Although figured by Milne-Edwards and Grandidier² from an adult in breeding plumage, this heron was long confused with *A. ralloides*, which also inhabits Madagascar. The differences have been pointed out by F. Salomonsen³ and H. Friedmann.⁴

DISTRIBUTION.—Breeds in Madagascar, and wanders or migrates in some numbers to the eastern half of tropical Africa. Here it has never

¹1918, Rev. Française Orn., V, p. 253.

²1879, 'Hist. Nat. Oiseaux Madagascar,' I, p. 556; 1881, idem, III, Pl. ccxxvi.

³1929, Bull. Mus. Hist. Nat. Paris, (2) I, p. 355.

⁴1930, Bull. 153, U. S. Nat. Mus., p. 23.

been found in the white breeding plumage, and adults in off-season dress, as well as immature birds, bear considerable resemblance to *A. ralloides*.

The dates of occurrence in continental Africa fall between May 22 and October 20, specimens having been secured on Mt. Elgon,¹ at Kijabe, Nairobi,² Fort Hall, Dar-es-Salaam, and Moba on the western shore of Lake Tanganyika. The bird from Moba is immature, and was secured by Rockefeller and Murphy on May 22, 1929.

Bubulcus ibis (Linnæus)

Ardea ibis LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 144 (type locality: Egypt).

†*Ardea alba* SMITH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 287 (Sherwood's Creek near Congo R. mouth).

Ardea LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 408 (Lower Congo).

Ardea bubulcus SHARPE AND BOUVIER, 1878, Bull. Soc. Zool. France, III, p. 78 (Mboma). JOHNSTON, 1884, 'The River Congo,' p. 370 ("Everywhere," up Congo to Bolobo). SCHALOW, 1886, Journ. f. Orn., p. 415 (Mpala, Marungu); 1887, idem, p. 227 (W. of Tanganyika).

Bubulcus ibis BOCAGE, 1881, 'Orn. Angola,' part 2, p. 445 (Boma). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Mpala; Lulenge brook). REICHENOW, 1887, Journ. f. Orn., p. 299 (Manyanga); 1901, 'Vögel Afrikas,' I, p. 381 (Boma; Manyanga; Mpala); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 253 (Fort Beni). HARTERT, 1899, in Ansorge's 'Under the African Sun,' Appendix, p. 328 (Pongo, N. W. shore L. Albert); 1900, Nov. Zool., VII, p. 29 (Ituri R., 3 days E. of Avakubi). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (Province Urundi; Usumbura; Uvira; Ruzizi Valley). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 10 (prairie near Usumbura). SCHOUTEDEN, 1914, Rev. Zool. Afr., III, p. 261 (Kilo); 1918, idem, V, p. 225 (Beni; Kilo; Kalegela; Sanghé-Ruzizi; Banalia; Panga); 1923, idem, XI, pp. 311, 385 (Tshikapaka; Kamaiembi; Kwamouth); 1924, idem, XII, pp. 260, 406 (Leopoldville; Kisantu; Eala; Coquilhatville); 1925, idem, XIII, p. 2 (Bolobo); 1926, idem, XIII, p. 185 (lower Congo R.; Mateba I.). CHAPIN, 1916, Amer. Mus. Journ., p. 545 (Congo); 1931, Natural History, N. Y., XXXI, pp. 608, 614, 2 figs. PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 69 (upper Kafue R. near Ndola). BAYER, 1927, Bull. Agr. Congo Belge, XVIII, pp. 303, 304 (Belgian Congo). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 260 (Kafubu R.; Lubumbashi R.). FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 20 (Kamaniola).

Bubulcus SCHALOW, 1886, Journ. f. Orn., p. 431 (Lulenge R.).

Bubulcus lucidus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 25 (Tanganyika; Ituri; Umangi; Mayombe; L. Leopold II).

Bubulcus ibis ibis FRIEDMANN, 1930, in Strong, 'Afr. Republ. Liberia and Belgian Congo,' II, p. 750 (Kamaniola).

Paddy-Birds, BARNES, 1923, 'Across Great Craterland to Congo,' p. 96, Fig. 37 (Kindu).

¹Granvik, 1923, Journ. f. Orn., Sonderheft, pp. 25, 46.

²Van Someren, 1922, Novit. Zool., XXIX, p. 10.

Avakubi, 2♂, November 16, 19; 4♀, April 27, November 15, 22, December 22.
Medje, ♀, April 24.

Faradje, ♂, May 9; ♀, November 12; ♀ im., December 13.

ADULT FEMALE (in April).—Iris yellow; bill deep yellow, approaching orange; feet blackish.

DISTRIBUTION.—Southern Europe to western Asia, Africa, Madagascar, and the Mascarene Islands.

Wherever I have seen the cattle heron in the northern Congo, it was always a migrant, never remaining to breed. On the Ituri and Nepoko rivers, they appear each year in early November, spend about four weeks, and then disappear until April, when they remain even a shorter time; and from early May till the following November none are to be found. Whereas the birds of November are plainly in immature and winter plumage, with practically no trace of buffy plumes, of those in April about one quarter are adorned with the nuptial plumes, though the sexual organs have scarcely entered the period of activity.

In the Uelle district the dates of arrival and departure are practically the same as above, the latest dates for what would seem to be the northward departure were: Faradje, May 9, 1911, and Garamba, May 5, 1912. This agreement in dates would indicate a true migratory movement of considerable rapidity, and I supposed, while in the Congo, that these herons must nest somewhere in northern Africa.

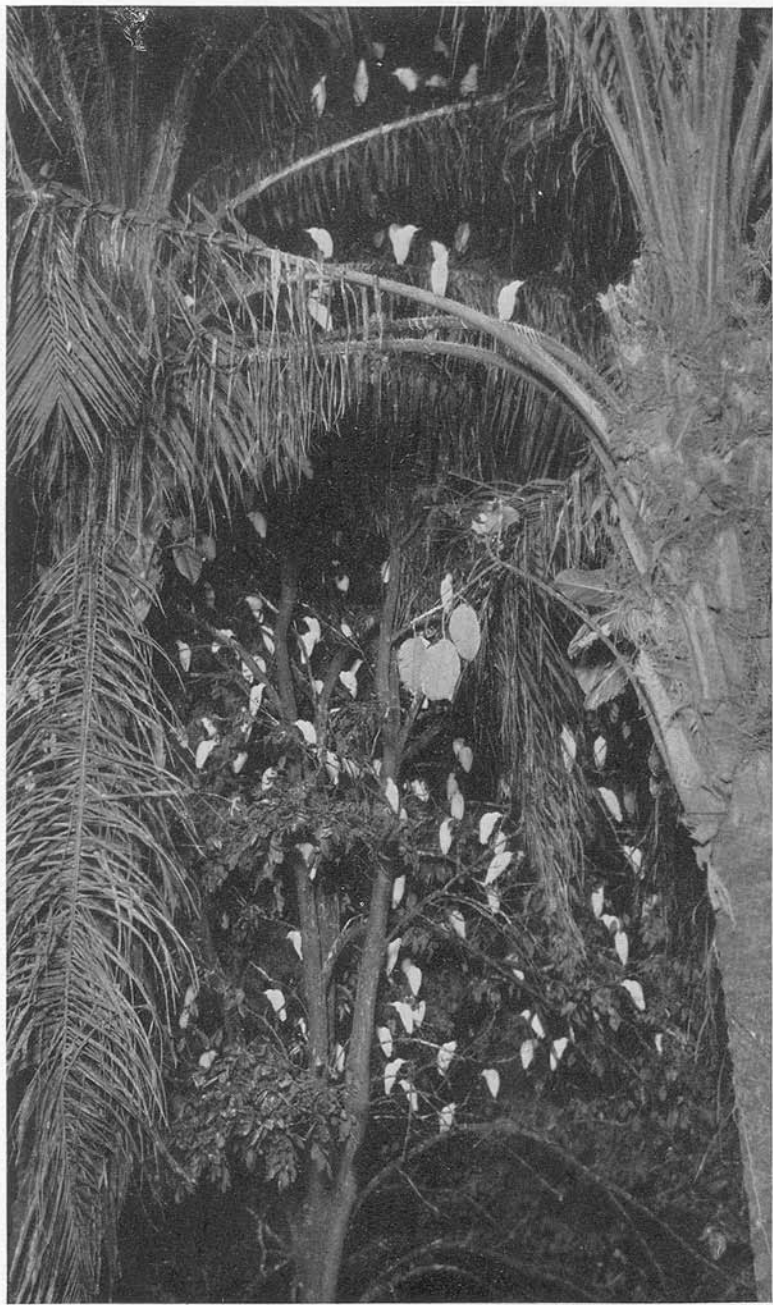
In the forest of the southern Cameroon, the same migratory habit has been commented upon by Bates,¹ who found cattle herons at the River Ja only in transit, in the months of May and November. He thought there must be a migration of these birds, perhaps only a part of them, from the great plains of the Haussa States in northern Nigeria, where Hartert found them so plentiful, when the drought sets in there in autumn. They must go to some open country in the south, the Lower Congo or Angola, returning north over the forest country in May.

This agrees entirely with my conclusions, but I may add that there is a strip of savanna just north of the forest where the cattle heron does not nest either. At Loko (on the R. Benue), says Hartert,² they vanish toward the end of April or early May, and even in the northern Uelle the same is true. A little farther north, however, in Haussaland, Hartert thought that a few must be resident, while in the Sudan, between 14° and 18° N. lat., said von Heuglin,³ they nested after assuming the nuptial dress in May and June, and then during the driest and hottest part

¹1909, *Ibis*, p. 9.

²1886, Hartert, *Journ. f. Orn.*, p. 606.

³1873, *Orn. Nordost-Afr.*, II, p. 1072.



Cattle herons (*Bubulcus ibis*) in their roost at night. Leopoldville, April 10, 1931.

of the year (January to May) were entirely lost sight of. So these are doubtless the ones which come south to the Upper Congo.

Still farther to the north, in Egypt, Heuglin stated that cattle herons were resident, and Mr. Wm. Raw tells me that near Giza they lay in May and June.

Certain it seems that there is no migration of birds breeding in the southern savannas northward across the forest, yet in South Africa the birds nest, too, and are usually considered as resident; and the same seems to be the case in Madagascar.

Closer to the southern border of the forest, where Bates and I both expected the northern migrants to "winter," Dr. Bequaert has furnished me with the following records of occurrence: Upper Katanga district, Kapoya, November 12, Muombe, November 17; Manyema district, Kasongo, December 25, Nyangwe, January 15. Raven also secured two specimens not in breeding plumage at Kongolo on the Lualaba, February 5. From Luluabourg in the Kasai district, Father Callewaert has sent us four, taken on April 26, May 5, and 10, and November 19. The November bird seems immature; those in April and May have only a little buff on the crown.

Further study in the southern Congo will probably show that many of these are migrants from the north. There can be no doubt that many of the cattle herons which breed in the Sudan perform a very regular annual migration southward across the forests of the Congo basin. It is possible even that the birds remaining at Luluabourg as late as May 10 would have time to migrate northward, for Aschemeier took a female with a few buff feathers in the crown in the Fernand Vaz district of the Gaboon on May 15, and Bates recorded a male from Bitye on May 18. Along the Likwala River in the French Congo, Migeod¹ noted one or two about May 24. Dr. Millet-Horsin told me that on the upper Niger River nesting takes place between May and September.

At Lukolela, near the southern margin of the forest, I have seen small parties of six to twelve cattle herons in August, September, and October, presumably visitors from the south. But the flocks of migrants from the north began to arrive only on November 9, and they remained in numbers through the succeeding months till early April, when I left. They were not breeding, and repaired every evening to roost on a wooded islet in the river.

Near the north end of Lake Tanganyika, on the other hand, Grauer procured four adults with full nuptial plumage in February and May.

¹1923, 'Across Equatorial Africa,' p. 125.

These I have examined. The plumes were fresher in February than in May, so these birds cannot be migrants from the north. I have also seen a number on Lake Kivu, in breeding dress on July 7. Conditions in East Africa are certainly unlike those in the northern Congo, for Lönnerberg,¹ in Kenya Colony, near Kagio, shot a male with sexual organs enlarged on March 30. Lang also obtained a male in worn breeding dress at Naivasha on June 23.

In South Africa the cattle heron nests in October and November, placing its stick nests in colonies in trees along rivers, often near those of other herons. There are three to five eggs in a nest, greenish blue, and measuring 41.2-49.3 mm. \times 32.7-36.

The habits of the cattle herons in the Congo offer but little subject for special comment. They find but few herds to follow, and are perhaps more apt to keep to river banks than elsewhere. While they do accompany elephants in the Uelle savanna, alighting on their backs, and circling about over them as they move along, this propensity cannot be indulged in while they are crossing the dense forests. Only occasionally did we hear their hoarse croak.

The native name of *Bubulcus ibis*, "Yange-yange," which Werther² heard in Uahi, East Africa, is exactly the same as that now in use in the Kiswahili language spoken on the Lualaba, for all the white herons. In the country of the Mangbetu (Uelle district) the bird is known under the name "Mapele," which simply describes its white coloration.

After watching these herons stalking about among horses and cows at pasture, I have been convinced that their sole object is to secure the insects stirred up, or sometimes attracted by the beasts, whereas parasites such as ticks offer little or no temptation. Dr. Bequaert, at Nyangwe and Kasongo, twice examined stomachs of birds accompanying cattle and found therein grasshoppers, ants, and a hemipter, but no ticks. The seven stomachs we looked through were largely filled, in six cases, with grasshoppers; but other unidentified insects were numerous. One cricket was noted, and besides some maggot-like larvæ, a number of large carrion flies. Never, however, were there any ticks.

KEY TO THE AFRICAN SPECIES OF *Demigretta*³

- Metatarsus markedly longer, 105-116 mm.; culmen slightly longer, 93-100 mm.; color of birds in gray phase generally lighter.....*D. schistacea*.
Metatarsus shorter, 80-100 mm.; culmen slightly shorter, 78-90 mm.; color of birds in gray phase very dark slate-color (with white throat).....*D. gularis*.

¹1911, K. Svenska Vet. Akad. Handl. Stockh., XLVII, No. 5, p. 43.

²1898, 'Mittleren Hochl. D. O.-Afr.', p. 270.

³Many individuals are entirely white, and thus resemble the true egrets. *Demigretta dimorpha* (Hartert) of Madagascar is remarkably similar to an egret in form.

[*Demigretta gularis* (Bosc)]

Ardea gularis Bosc, 1792, Actes Soc. Hist. Nat. Paris, I, p. 4, Pl. II (type locality: Senegal River).

The West African reef-heron ranges along the coast from Senegal to the mouth of the Ogowé River, as well as to the islands in the Gulf of Guinea. It is, therefore, to be looked for near the Congo mouth, though neither Falkenstein nor Petit is reported to have found it in the Portuguese Congo.

[*Demigretta schistacea* (Hemprich and Ehrenberg)]

Ardea, Leptorodas, schistacea HEMPRICH AND EHRENBURG, 1828, 'Symb. Phys., Aves,' fol. 1, Pl. VI (type locality: Red Sea).

The Red Sea reef-heron inhabits the coasts of the Red Sea and the Gulf of Aden, sometimes reaching the coast of East Africa, and possibly the Nile. We have a specimen collected at Butiaba on Lake Albert by Sir Frederick Jackson on November 19, 1901. It is possible, therefore, that it may occasionally stray to the western shore of Lake Albert.

***Melanophoyx ardesiaca* (Wagler)**

Ardea ardesiaca WAGLER, 1827, 'Syst. Avium,' Ardea, No. 20, (type locality: Senegambia). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Luvule R.). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Katanga; Karema).

Ardea calceolata DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

?*Ardea ardesiaca* SCHALOW, 1887, Journ. f. Orn., p. 227 (W. of L. Tanganyika to the Katanga).

Melanophoyx ardesiaca REICHENOW, 1901, 'Vögel Afrikas,' I, p. 373 (Luvule R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 252 (Tanganyika). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 10 (L. Bangweolo). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 9 (L. Edward). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 225 (Kabaré).

DISTRIBUTION.—Senegal and Upper Guinea to the White Nile and Sobat River, thence to Lake Edward and Tanganyika Territory, and southward to Natal. Wanting in all the forested area of Lower Guinea, but extending from the Katanga to Mossamedes.

It frequents open shores and marshes, and is apparently common in the northern Katanga. According to Loveridge,¹ it runs a little way, then stops and, lowering its beak, raises the wings and brings them forward and downward. Perhaps this is why Ayres, in South Africa, claimed that it shaded the water with one wing to see its prey more clearly.

¹1922, Proc. Zool. Soc. London, p. 858.

***Egretta garzetta garzetta* (Linnæus)**

Ardea garzetta LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 237 (type locality: "in Oriente"). SCHALOW, 1886, Journ. f. Orn., p. 434 (L. Upemba); 1887, idem, p. 227 (W. of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 146 (L. Upemba), EMIN, 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 411 (Tunguru on L. Albert).

Herodias garzetta DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Tanganyika; Katanga). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 387 (W. of L. Tanganyika; L. Upemba). JOHNSTON, 1908, 'George Grenfell and the Congo,' II, p. 927 ("Congo"). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 10 (probably L. Bangweolo). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 10 (L. Edward; Kabaré). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 226 (Kabaré; Bigoisagua).

Egretta garzetta garzetta VAN SOMEREN, 1916, Ibis, p. 209 (Kazinga Channel, between L. George and L. Edward). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 385 (Kwamouth); 1925, idem, XIII, p. 3 (Bolobo region); 1926, idem, XIII, p. 185 (lower Congo R.; Banana).

Egretta garzetta PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 68 (upper Kafue R.; Ndola).

Banana, ♂, September 6. (No aigrettes.)

Avakubi, ♂, November 1. (Only a few short aigrettes, no long crest-feathers.)

ADULT MALE.—Iris pale yellow, lores light grayish green; bill black with basal half of mandible pale bluish gray; tibia and metatarsi greenish black, toes light yellowish green, claws dusky.

DISTRIBUTION OF THE SPECIES.—Warmer parts of the Palearctic, as well as the Indian, Australian, and Ethiopian regions. While other races have been described from the Sunda Islands and Australia, the typical form extends over southern Europe and Asia from Spain to Japan, Hainan, Africa, and Madagascar. In the Ethiopian Region it is known to occur from Senegal and the Lower Nile Valley south to the Cape, breeding at localities as widely separated as Egypt,¹ Lake Victoria,² and the Berg River.³ It has been taken at Loango and Landana, for like many water birds with a distaste for forest it nevertheless is able to find a living along the West Coast. Yet within the thickly wooded parts of our territory it is certainly a very rare bird, appearing occasionally along the banks of rivers.

Our first specimen had alighted along the Ituri River on one of the patches of floating aquatic vegetation anchored against a fallen tree, and it was the only individual identified with certainty in the periods covering more than two years which I spent in the Ituri district. Examination of the stomach revealed a great many small shrimps, ten

¹Nicoll, 1919, 'Handlist Birds Egypt,' p. 64.

²Carpenter, 1920, 'Naturalist on L. Victoria,' p. 158.

³Layard and Sharpe, 1884, 'Birds S. Africa,' p. 716.

small dragon-flies, three spiders, a grasshopper and a water-strider. All the small white herons seen were usually *Bubulcus*, though they were apt to be called by the same name in native languages.

It was a surprise to find no egrets whatever in the Uelle district, at or above Niangara. Mr. Rossi, Procureur at Niangara in 1910, told me that in his long experience he knew of but a single egret, which was shot at Bambili. Yet Lake Albert, not so very far away, is known to have three species.

On the lower Congo, where Lang secured a non-breeding specimen in early September, the little egret is not at all common, and was not collected by Van Saceghem. I saw it on neither the middle nor the lower Congo.

On Lake Victoria, the little egret has been found nesting in January and in June, in much the same situations that are chosen by darters and cormorants, namely, ambatch trees growing in shallow water. The eggs are light bluish green, 44–47 mm. by 34–36 mm.

***Mesophoyx intermedia brachyrhyncha* (Brehm)**

Herodias brachyrhynchus BREHM, 1854, Journ. f. Orn., p. 80 (type locality: Blue Nile).

Mesophoyx brachyrhyncha NEAVE, 1910, Ibis, p. 97 (L. Bangweolo).

Herodias brachyrhyncha MOURITZ, 1914, Ibis, p. 34 (Sikobwa). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 11 (Is. in L. Bangweolo). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 10 (Kabaré). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 226 (Beni; Kabaré).

Ardea media EMIN, 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 209 (N. end of L. Albert).

Avakubi, ♂, November 20, 1913 (long aigrettes).

ADULT MALE.—Iris light yellow, eyelids and lores chrome-yellow, tinged with greenish, corners of mouth light green; bill ochreous yellow; feet black with a trace of yellowish mottling on tibiae, well up near feathers.

DISTRIBUTION.—This is the African race of a species represented by its typical race in Japan, China, India, and the Malay Archipelago, while another form extends to Australia. *Mesophoyx i. brachyrhyncha* ranges from Northeast Africa through East to South Africa, and thus is rare within the limits of the Congo.

Our single specimen was found perching on some bushes on an island in the Ituri River, accompanied by half a dozen cattle herons (*Bubulcus ibis*). The latter were on their regular annual migration, described on page 430, and it is easy to believe that this egret was traveling with them, since it certainly was not a resident species in the Ituri Forest, and was not in condition to breed.

Its stomach contained pieces of a water-bug, and of what appeared to be shrimps.

***Casmerodius albus melanorhynchus* (Wagler)**

Ardea melanorhynchus WAGLER, 1827, 'Syst. Avium,' Additamenta (last page) (type locality: Senegambia).

Ardea flavirostris SHARPE AND BOUVIER, 1878, Bull. Soc. Zool. France, III, p. 80 (Shiloango R.).

Ardea alba JOHNSTON, 1884, 'The River Congo,' p. 370 ("Upper River," Léopoldville to Bolobo). SCHALOW, 1886, Journ. f. Orn., p. 422 (Luvule R.); 1887, idem, p. 227 (W. of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Luvule R.). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 165 (N. end L. Albert). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 166 (on L. Albert); 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, pp. 209, 211, 389 (N. end of L. Albert).

Herodias alba REICHENOW, 1901, 'Vögel Afrikas,' I, p. 388 (Luvule R.; L. Albert); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 253 (Mpimbwe; L. Albert). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Katanga; Mayombe; L. Leopold II). JOHNSTON, 1908, 'George Grenfell and the Congo,' II, p. 927 ("Congo"). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 150, 152 (Nyangwe). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 10 (I. in L. Bangweolo). VAN SOMEREN, 1916, Ibis, p. 210 (Kazinga Channel, between L. George and L. Edward). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 10 (Kabaré). MENEGAUX, 1918, Rev. Française Orn., V, p. 253 (Lower Congo). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 225 (Beni; Katana; Kabaré). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 64 (Mangbetu country; S. end of L. Albert).

Casmerodius albus melanorhynchus SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 311 (Kasai R.); 1925, idem, XIII, p. 2 (Kunungu; Mongende); 1925, idem, XIII, p. 185 (lower Congo R.); 1930, idem, XVIII, p. 279 (Lubumbashi R.).

Casmerodius albus melanorhynchus SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 386 (Kwamouth).

Egretta alba alba GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 293 (Kabaré).

Avakubi, 2 ♀, November 9 (aigrettes rather worn), December 29 (no aigrettes).

Niapu, ♂, November 30 (no long aigrettes).

ADULT FEMALE.—Iris pale yellow, lores and eyelids greenish yellow, corners of mouth green, a little blackish beneath lores; bill ochreous yellow with some brownish black at tip; feet black.

DISTRIBUTION OF THE SPECIES.—Temperate and tropical regions over most of the Old and New Worlds, extending to Australia and New Zealand. Dr. Hartert¹ recognizes five subspecies, of which *melanorhynchus* is restricted to Africa from Sahara south to Cape Province, and Madagascar.

In the Congo the great white egret is certainly the commonest of the three true egrets, though entirely lacking in some districts, hardly

¹1920, 'Vögel Paläarkt. Fauna,' II, pp. 1236-1239.

because of persecution, I think, but rather because of a lack of suitable expanses of water. On the lower Congo a few were seen (January),¹ as well as others on the middle course of the Congo, above Irebu (July), and near Bolobo (December). None were ever encountered in the Uelle, and even on the Ituri River they were only noticed during November and December, 1913, undoubtedly as migrants. Single birds were in evidence near Avakubi on November 6, 9, 11; and on November 20, late in the afternoon, a wedge-shaped flock of seven of these large egrets, with one small white heron (either *Egretta garzetta* or *Bubulcus ibis*) came flying up the river, high in the air. Seeing the large clearing about the post, they flew to and fro for a while, keeping continuously in a very regular \wedge or \vee . The small bird was usually last or next to last in one arm of the formation, but was as much a part of it as any others, yet so strikingly smaller.

A solitary bird reappeared on December 29, but during the eight months following there were none. Even a lone bird standing on a dead trunk projecting from the water, with its snowy plumage reflected in the quiet stream, was a conspicuous object at half a mile or more, and could not have escaped observation.

In one bird's stomach was found a single water-bug (hemipter), another was entirely empty.

Casmerodius albus melanorhynchos, according to Stark and Selater,² is not known to breed in South Africa, and nests have thus far been reported from few localities on the whole continent. Prof. Reichenow³ gives only Accra (Gold Coast) and Sheikh Said Island near Massaua on the Red Sea (March); and von Heuglin⁴ states, on the other hand, that the species was found "in the whole region of the Blue and White Niles as a winter visitant." But the African race is now believed to be distinct from that of southern Europe and Asia, because of its pure black tibiae and shorter wing. Of our three specimens, the male has the longest wing, 395 mm.

KEY TO THE AFRICAN SPECIES OF *Ardea*

- 1.—Sides and back of neck whitish or light gray, adults with forehead and middle of crown white. *A. cinerea*.
- Back of neck rufous or black, no white on forehead 2.
- 2.—Wing exceeding 500 mm.; crown as well as sides and back of neck rufous, belly and "thighs" maroon. *A. goliath*.
- Wing less than 430 mm. long; throat and upper fore-neck white, often washed with pinkish buff, crown and back of neck black, belly and "thighs" light gray. *A. melanocephala*.

¹Van Saceghem (1918, *Rev. Française Orn.*, V, p. 253) states that they do not nest there.

²1906, 'Birds S. Afr.', IV, pp. 65-66.

³1901, 'Vögel Afrikas,' I, p. 389.

⁴1873, 'Orn. Nordost-Afrikas,' II, p. 1065.

***Ardea melanocephala* Vigors and Children**

Ardea melanocephala VIGORS AND CHILDREN, 1826, in Denham and Clapperton's 'Travels,' II, App. No. XXI, p. 201 (type locality: probably near L. Chad). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Tanganyika; L. Kivu; Kisanu). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 253 (L. Mohasi; Kisenyi). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, p. 358 (Province Urundi; Kisenyi). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 10 (near Usumbura on L. Tanganyika). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 9 (Rutshuru; Kasindi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 225 (Beni; Kasindi; Kalegela; Kabaré; Kayera; Mission St. Joseph; Sanghé-Ruzizi); 1923, idem, XI, pp. 311, 386 (marshes near Kasai and Lulua rivers; Kwamouth); 1924, idem, XII, pp. 260, 407 (Stanley Pool; Eala; Ruki R.; Ikoko); 1925, idem, XIII, p. 3 (Mongende); 1926, idem, XIII, p. 185 (lower Congo R.; Banana). SCLATER AND M.-PRAED, 1920, Ibis, p. 789 (Tembura; Yei). BERLIOZ, 1921, Rev. Française Orn., VII, p. 7 (Kivu district). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 293 (L. Edward). FRIEDMANN, 1930, in Strong, 'Afr. Republ. Liberia and Belgian Congo,' II, p. 750 (Luvungi).

Ardea atricollis JOHNSTON, 1884, 'The River Congo,' p. 370 ("Occasionally seen," up Congo to Bolobo).

Avakubi, ♀, September 4.

Gamangui, ♂, January 27.

Niangara, ♂, November 17; ♀, June 22.

Faradje, ♂, February 4; 3 ♀, February 7, March 30, November 14.

ADULT MALE.—Iris light yellow, eyelids light grayish green, lores light grayish green above, black below; maxilla black, mandible grayish white with light green tip; feet black, toes gray beneath.

DISTRIBUTION.—Occasional in Mediterranean countries, but regularly from the Senegal and Abyssinia south to the Cape, also in Madagascar.

Its occurrence in the forest area is apt to be sparing or irregular; and it does not nest there. We noted it at Gamangui in January, 1910, at Avakubi, September 4, November 8, and December 8, 1913.

Northward in the Uelle, where it is the common large heron of the dry season, arriving in early November and remaining till the end of April, it is rarely present during the remainder of the year, nor was there any indication that it bred there. In the single exceptional case, a female taken at Niangara, in June, the bird was in non-breeding condition, and as shown by its plumage, not yet fully mature.

This is explained by von Heuglin's observation,¹ that in the Sudan its range is extended northward during the rainy season, when it nests in Kordofan, on the lower Blue Nile and in Berber Province in June and July. East Africa does not conform to this rule, since Belcher² and Van

¹1873, 'Orn. Nordost.-Afr.,' II, p. 1056.

²1919, Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 15, p. 473.

Someren¹ report that they breed in Uganda or British East Africa in May, June, and July. Other breeding stations are: Karema on Lake Tanganyika (Böhm); Tabora, December 13 (Loveridge); Woodbush, northern Transvaal, December 11 (Roberts); and Berg River, South Africa (Layard). The nest is of sticks, and usually placed in a tree, though occasionally among reeds in a swamp. At Dufle, on the Bahr-el-Jebel, Emin² noted a nest on a tall *Borassus* palm (June 25), and in the Sudan the species sometimes nests amid colonies of *Sphenorhynchus abdimii* or *Bubulcus ibis*. The eggs, about three in a set, are pale blue or blue-green, and measure 53–63 mm. by 39–45.

During the period of its abundance in the Uelle district, *Ardea melanocephala* is found not only along rivers, but very commonly perching on trees in dry situations. In the evening it is frequently seen flying over, emitting at intervals a loud raucous squawk; and it is by no means a great fisher, since in the six stomachs we examined there were no fish, and the full list of their captures was: 3 rats (including 1 *Lophuromys*), 3 lizards, 1 snake, 2 frogs, and 6 grasshoppers.

In the region of Lake Albert and Lake Edward this heron is common and apparently resident throughout the year. At Lukolela on the Congo River, however, single individuals were noted only three times in eight months, on December 9, 25, and January 13.

The name "black-headed" does not describe the living bird very exactly, since the black feathers of the crown are then so dusted with powder from the "powder-down tracts" as to appear entirely gray. The use of this substance by a young heron in preening its feathers has been described by Dewar³ and Wetmore,⁴ such a function having been presumed for it, in the case of *Mesænas*, by Milne-Edwards⁵ as long ago as 1879.

***Ardea cinerea cinerea* Linnæus**

Ardea cinerea LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 143 (Europe, restricted type locality: Sweden). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 225 (Kabaré). EMIN, 1919, in Stuhlmann, 'Tageb. Emin Pascha,' II, p. 371 (Rimo).

?*Ardea cinerea* DYBOWSKI, 1893, 'La Route du Tchad,' p. 319 (region of Bangui).

Ardea cinerea cinerea PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 68 (Upper Kafue R. near Ndola).

DISTRIBUTION OF THE SPECIES.—Europe, Asia, Africa, and Madagascar, extending to Japan, Formosa, and Hainan, but only exceptionally,

¹1916, *Ibis*, p. 209.

²Schubotz, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, p. 62.

³1909, Dewar, 'British Birds,' II, pp. 285–289.

⁴1920, Condor, XXII, pp. 168–170.

⁵1879, 'Hist. Nat. Madagascar, Oiseaux,' I, p. 611.

if at all, to Australia. Eastern Asia is occupied by *A. c. jouyi* Clark, and Madagascar and Aldabra by a large-billed race that has been called *A. c. johannæ* Gmelin, or, by Hartert, *A. c. firasa* Hartlaub. The typical form ranges over a large part of Africa, and nests in South Africa. There it is much more common than in equatorial Africa, where it is extremely rare, if not entirely lacking, in the forested regions.

During the first Congo Expedition, only a single adult bird was observed by us, at Faradje, October 27, 1912, sitting in a tree where it was well examined through glasses, but could not be successfully stalked. On Lake Edward, however, the gray heron is evidently regular in occurrence. I saw three in a brackish pond at Katwe in January, 1927, and two more at Kabaré in May of the same year. On the lower Congo River I have also observed a single individual near Mateba Island, July 11, 1930; another on Stanley Pool, July 20; and a third on a sand-bar near Lukolela, March 22, 1931.

Ardea goliath Cretzschmar

Ardea goliath CRETZCHMAR, 1826, 'Atlas Reise N. Afr. Rüppell,' p. 39, Pl. xxvi (type locality: "Bahhar Abiad" = Bahrel Abiad). JOHNSTON, 1884, 'The River Congo,' pp. 355, 370 (Stanley Pool; "most common everywhere"). SCHALOW, 1886, Journ. f. Orn., pp. 431, 433, 435 (Lufira R.; Likulwe R.; L. Upemba); 1887, idem, p. 227 (W. of Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Lufira; Likulwe; L. Upemba). OUSTALET, 1893, Naturaliste, VII, p. 128 (no exact locality). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 376 ("Ubangi R."; Lufira R.; Likulwe R.; L. Upemba); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 252 (Tanganyika). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Ituri; Umangi; Mayombe). NEAVE, 1910, Ibis, p. 97 (L. Bangweolo). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 142, 156, 157 (Kibombo on Lualaba R.). PILETTE, 1914, 'A Travers l'Afrique Equatoriale,' p. 52, Fig. 16 (S. of L. Albert). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 10 (L. Tanganyika). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 224 (Kabaré; Beni); 1923, idem, XI, p. 311 (along the Kasai R.); 1924, idem, XII, p. 407 (between Irebu and Ikengo; between Irebu and L. Tumba); 1925, idem, XIII, p. 3 (between Bolobo and Mongende); 1926, idem, XIII, p. 185 (lower Congo R.). EMIN, 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 389 (N. W. shore of L. Albert). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 293 (Ngoma; L. Edward). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 261 (Lualaba R. from Kongolo to Bukama).

Ihuru River near Penge, ♀, April 21.

Faradje, ♂, September 12.

ADULT MALE.—Iris yellow, orbit dark green; maxilla black, mandible blackish above, but light green beneath tip, whitish below, posteriorly; feet black.

DISTRIBUTION.—From the Gulf of Aden and both shores of the Red Sea (northward to 24°—von Heuglin), across all Africa to the Senegal,

south to the Cape, and on the Island of Madagascar. Resident, so far as known, throughout its range. Casual in India.

The Goliath heron was very rare in the Uelle district, but it was seen occasionally along the middle Congo from the steamer, and along the Ituri River in January and March, 1914, single individuals each time.

The behavior of our female specimen was rather unusual. We were crossing the Ihuru River (usually incorrectly called Epulu) when my men noticed something come drifting downstream, which they at first took for a hippo's head. With the glass I could see it was a heron, swimming with the current, and as it neared some rocks it stepped up on them, holding a large fish in its bill. This it proceeded to swallow head first, stretching its neck like a snake's; and then taking alarm it flew off upstream, to alight on a tree, where later it was shot. The fish was found to be a carp of the genus *Labeo*, 34 cm. long. It was far from slender, and, in short, a fair mouthful even for this largest of all herons.

The dimensions of this individual, taken soon after death, were:

Length, tip of beak to tip of toes. 180 cm.

Length, tip of beak to tip of tail. 136.5 cm.

Spread of wings. 213.5 cm.

The Goliath heron was never seen away from water and is fond of wading in the shallows. The stomach of our male specimen also contained fish-remains.

From the published records it appears that this heron is found in virtually all parts of the Congo that have large rivers or lakes. Our specimens, while adult, were not in condition to breed; and the nest has not been reported from the Congo. In South Africa, where nests have been found in October, they are described as platforms of sticks and reeds, placed either on a patch of sedge in a marsh or on the boughs of a tree over water. The eggs are three in number, pale blue, and measure 70–76 mm. by 49–51 mm. (Reichenow).

***Pyrrherodia purpurea purpurea* (Linnæus)**

Ardea purpurea LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 236 (type locality: "in Oriente," ex Brisson, possibly from France). SHARPE AND BOUVIER, 1876, Bull. Soc. Zool. France, I, p. 313 (Shiloango R.). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Tanganyika; Umangi; Lower Congo). DYBOWSKI, 1893, 'La Route du Tchad,' p. 319 (vicinity of Bangui). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 377 (Tanganyika; Yanga on Ituri R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp., Mecklenburg,' III, p. 253 (Usumbura). NEAVE, 1910, Ibis, p. 97 (L. Bangweolo). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' p. 150 (no exact locality).

SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 224 (Kabaré). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 261 (Kafubu R.; Elisabethville; Bukama).

Ardea purpurea JOHNSTON, 1884, 'The River Congo,' p. 370 ("Most parts by river and marshes").

Phoyx purpurea HARTERT, 1900, Nov. Zool., VII, p. 29 (Yanga on the Ituri R.—one day E. of Bomili).

Ardea (Pyrhherodias) purpurea SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (Ishangi).

Pyrhherodia purpurea purpurea SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 311 (Luebo; along Kasai R.); 1924, idem, XII, pp. 260, 407 (Stanley Pool; Kidada; Eala); 1925, idem, XIII, p. 3 (Kunungu; Mongende).

Avakubi, ♂, November 15.

Niagara, ♂, December 18.

Faradje 5 ♂, March 13, April 6, July 8, August 20, October 27.

ADULT MALE.—Iris light yellow, skin behind eye dark grayish brown, lores light green in middle, but dark brown above and below; maxilla dark brown, with a yellow stripe on the side; mandible yellow, greenish at base. Feet largely yellow, with front of shanks, upper side of toes, and claws, brownish black.

One adult male (November 15) is plainly darker, especially on the lengthened rufous scapular plumes, than two adults from Hungary. It does not, however, seem to agree with the Madagascan bird, and perhaps the differences are largely due to its fresher plumage. The two other adult males differ less from our European specimens.

DISTRIBUTION OF THE SPECIES.—Central and southern Europe, Africa, Madagascar, and southern Asia to the Philippines and Celebes. Of the three races, *P. p. manilensis* (Meyen) inhabits the Indian region and adjacent islands, *P. p. madagascariensis* (Van Oort) the island of Madagascar, and the typical race the remainder of the range, including southern Arabia and all Africa south of the Sahara. It nests in southern and eastern Africa, building a large rough structure of sticks and rushes in a reedy swamp, and laying two or three eggs, pale blue, 54–59 mm. by 39.5–43 mm.

In the Upper Congo, where the purple heron is not believed to nest, it is nevertheless to be found throughout the year. Our three birds (males) which are perfectly adult were all found upon dissection to be in non-breeding condition, and were collected from October to December. I believe them to be migrants from the north. As for the other specimens, two of which were collected in July and August, they all show some evidence of immaturity, at least in the lighter color of wing-coverts, and none was in condition for reproduction. Immature examples were also seen near Faradje in July, 1912, though none was collected.

Purple herons were found singly or at most by two's, along the banks of the Ituri, Uelle, and Dungu rivers. They kept much more strictly

to the neighborhood of water than did *Ardea melanocephala*. A couple were seen on the Congo River near Yumbi, July 24; and at Lukolela they were of regular occurrence in small numbers between October 7 and March 15. About Lake Edward I have noted purple herons in January and in early May.

Three of the four stomachs examined held nothing but fish, including a small puffer (*Tetraodon*), the largest fish measuring seven inches. Even the fourth stomach contained some fish-scales, but was largely filled with a fibrous green mass, probably of vegetable origin, in addition to two wings of a dragon-fly and some rat-claws.

SUBFAMILY **Botaurinæ**

***Botaurus stellaris stellaris* (Linnæus)**

Ardea stellaris LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 144 (Europe, restricted type locality: Sweden).

Botaurus stellaris stellaris W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 31 (Uelle district). GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 77 (Uelle district).

Niapu, specimen without sex, November 19.

A single bird, obtained by a native hunter, was the only one that ever came to our notice. This is the southernmost record I can find for Africa. The common bittern of the temperate Palæarctic Region ranges in winter to India and Burma; and while it has been recorded from Abyssinia and Kordofan, it is not a regular winter visitor to the Sudan.¹ In South Africa there is found a closely related form, *B. s. capensis* (Schlegel), smaller, with remiges more narrowly and irregularly barred, and wing about 311 mm. Bowen² has recently obtained a specimen on the upper Quanza River, Angola; and it is not impossible that this southern race may occur rarely in the Katanga.

***Ixobrychus minutus minutus* (Linnæus)**

Ardea minuta LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 240 (type locality: Switzerland).

Ixobrychus minutus minutus HARTERT, 1920, 'Vögel Paläarkt. Fauna,' II, p. 1257 (in winter, Africa to Cape Colony). GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 77 (Wadelai).

Avakubi, 2 ♂ im., November 14, 27; ♀ im., November 24.

Both sexes in the juvenal plumage are dull, streaky birds with feathers of the back dark brown margined with buff. One young male (Avakubi, November 27), is beginning to molt directly from this into

¹Sclater and Mackworth-Praed, 1920, *Ibis*, p. 793.

²1931, *Proc. Acad. Nat. Sci. Philadelphia*, LXXXIII, p. 267.

the black-backed adult plumage, showing that there is no imperfect "first winter" plumage. The wings of these immature specimens measure 142, 147, 147 mm. They are clearly of the Palæarctic race, for the distance from the tip of the innermost primary to the end of the longest primary is 46, 47, 47 mm.

At Lukolela on the Congo River, March 3, 1931, I collected a male in nearly complete adult plumage, with sides of the head grayer than in some European examples. Its wing measures 147 mm., and the longest primary exceeds the innermost by 48 mm.

DISTRIBUTION.—Southern and central Europe to Transcaspia, Kashmir, and northwestern India; as well as from Morocco to Egypt. Migrates south into Africa, especially by way of the Nile Valley and East Africa. Undoubted specimens of the European least bittern have been taken in South Africa; and Loveridge secured two at Kilosa in Tanganyika Territory. Now these specimens show that *Ixobrychus m. minutus* winters near the equator in the Upper Congo, even along rivers in the forest belt, where there are occasional open grassy marshes. It may likewise be expected near the lakes along the eastern Congo border.

***Ixobrychus minutus payesii* (Hartlaub)**

Ardea payesii HARTLAUB, 1858, Journ. f. Orn., p. 42 (type locality: Casamance R., West Africa).

Ardea minuta REICHENOW, 1874, Correspondenzblatt der Afr. Gesellschaft, No. 10, p. 186 (Loango coast).

Botaurus pusillus BOCAGE, 1881, 'Orn. Angola,' part 2, p. 447 ("Congo").

Ardetta pusilla REICHENOW, 1887, Journ. f. Orn., p. 302 (Leopoldville).

Ardetta podicipes SHELLEY, 1901, Ibis, p. 167 (E. shore of L. Moero).

Ardetta payesi REICHENOW, 1901, 'Vögel Afrikas,' I, p. 367 (Leopoldville; Kwango R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 252 (L. Mohasi). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (L. Edward). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 9 (L. Edward). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 225 (Luvungi).

Boma, ♂, January 5.

Pawa, 2 ♂, July 12, 13; ♀, July 13.

Faradje, ♂, August 14; 4 ♀, August 16, September 16, 30, November 26.

ADULT MALE.—Iris rather light orange-red, lores pale yellowish green; bill greenish buff, tip of maxilla dusky brown; feet light green, stained with brown.

ADULT FEMALE.—Iris dull orange-red, shading to yellow on inner border; culmen dark brown, rest of bill, like lores and feet, greenish yellow.

The color of the back, in the adult females, varies from brownish black to a rather rich chestnut.

The adult males from Faradje and Pawa are more rufous on the neck than that from Boma, and all are more richly colored than an adult

of the same sex from the Casamance River in the American Museum. So far as our material for comparison goes, it would seem as though there was a gradual deepening of color toward the east and the south, for our most brightly colored male, with a heavy rusty wash on the wing-coverts, is from Natal. One of the birds from Pawa is almost like it, save that its wing-coverts are largely light gray. The Natal specimen bears a close resemblance to two of *I. m. podiceps* (Bonaparte) from Madagascar, and bears out Neumann,¹ who believed that the Madagascan form extended to Zanzibar, Natal, and the Transvaal.

The rufous spot near the bend of the wing seems to be practically lacking in *I. m. minutus* and is not very pronounced in the Casamance specimen of *payesii*, but this latter agrees with our Congo specimens (adults of both sexes) in having the outermost primary slightly shorter than the next. In *minutus*, a more migratory bird, the outermost primary is the longest. The wing-tip of *payesii* exceeds the innermost primary by only 29–34 mm. The wing of *payesii* is shorter than that of *minutus*; in seven adult males of the former, 135–142 mm., in five adult females 127–136. For *minutus* Hartert gives: males, 145–159 mm., females, 141–150. The culmen in *payesii* measures 45–50 mm. for males, 44.5–48.5 for females; metatarsus, 41–44.5 for males, 41–44 for females.

DISTRIBUTION.—This African form of the least bittern inhabits most of the continent from Dakar and the White Nile south to the Cape. If least bitterns were as easy to observe as many other birds perhaps we should consider them rather common in the Congo, for they are found widely distributed in the tall reeds and papyrus of the marshes in savanna districts. Fortunately for the collector, they betray their presence by taking occasional flights up over their haunts, particularly in the breeding season; and it is a curious fact that a single bird, presumably the same, will sometimes be seen on several successive days, flying over a marsh or along a stream at a fixed hour.

In the marshes at Faradje I sometimes heard toward evening a low cooing or grunting sound which was probably produced by these birds. They may stand with the bill pointing straight upward, and I have sometimes had great difficulty in making out just where a bird might be perched among some canes, even when within four yards of it.

It was clear, from examination of the reproductive organs, that at Faradje there was a well-defined breeding season in August and perhaps September. At Pawa all three specimens were in the breeding condition

¹1898, Journ. f. Orn., p. 282.

in July. So north of the forest the season of reproduction is in the middle of the rains. On Lake Edward I have taken a breeding male in May.

In the Fernand Vaz district of the Gaboon, Aschemeier collected a nestling on October 22, and a young bird not long out of the nest on September 5. The nest, as described by Roberts from the Transvaal, is placed about four feet above the water in dense reed beds, and contains two or three white eggs, 36.8 by 27.9 mm. On the Gold Coast Reichenow found nests with eggs in August, the set consisting of four eggs, which measured 31–32.5 mm. by 24–25 mm.

FOOD.—Fish far exceeded the other food in eight stomachs examined, being present in four cases, and amounting to five minnows and one tiny catfish. One small frog, four rather large spiders, two small shrimps, one mole-cricket, and a number of unidentified insects completed the list.

Ardeiralla sturmi (Wagler)

Ardea sturmi WAGLER, 1827, 'Syst. Avium,' *Ardea*, No. 37 (type locality: Senegambia).

Botaurus sturmi SHARPE, 1884, *Journ. Linn. Soc. London, Zool.*, XVII, p. 440 (Semio).

Ardeirallus sturmi SHARPE, 1898, 'Cat. Birds Brit. Mus.,' XXVI, p. 244 (Semio). SCHOUTEDEN, 1924, *Rev. Zool. Afr.*, XII, p. 407 (Eala).

Ardetta sturmi REICHENOW, 1901, 'Vögel Afrikas,' I, p. 368 (Semio); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 252 (Avakubi). SCHOUTEDEN, 1920, *Rev. Zool. Afr.*, VII, p. 189 (Malela).

?*Ardeirallus sturmi* SCHOUTEDEN, 1923, *Rev. Zool. Afr.*, XI, p. 311 (Basongo).

Ardeirallus sturmi BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 83 (Congo mouth).

Garamba, ♂, June 16, 1912.

Niangara, ♀ im., June 6, 1913.

ADULT MALE.—Iris brownish red, lores light yellowish green; maxilla blackish, mandible light green; feet brownish green in front, yellowish behind and below.

IMMATURE FEMALE.—Iris orange-red.

The tibia is bare for some 14 cm. above the tarsal joint, and the basal phalanx of the middle toe is about equal in length to the second phalanx of the same toe, instead of being much shorter as in *Ixobrychus m. payesii*. The claws too are shorter, and the general character of the foot is more like that of a normal heron. The powder-downs are in two pairs; rectrices only ten, as is usual with most other bitterns.

The young bird still shows traces of buff tips on the wing-coverts, and a much broader, streaked buff area on the fore-neck.

DISTRIBUTION.—From Senegal and the White Nile to South Africa. Not common in the Congo, and though it was said to have been collected by the Expedition of the Duke of Mecklenburg at Avakubi, April 24, 1908, we never found it there; indeed the two specimens listed above

were all we saw during the Congo Expedition. I have since collected one adult in the Rutshuru Plain, and one adult and an immature bird at Lukolela.

It would seem that in a general way the little slaty bittern is less secretive than its near relatives. The bird at Garamba was found alone near a pool of water in a grassy marsh, whence it flew up and alighted in a small tree well out in the drier savanna. The other, at Niangara, was taken in an open grassy marsh.

The stomach-contents of these two examples included a tiny fish, a small frog, pieces of some tiny crabs, a spider, a grasshopper, and a water-bug (*Nepa*).

Andersson, who found nests in the Ondonga district of northern Damaraland, described them as flattish, composed of stalks of coarse grass or small twigs, and placed in palm bushes a few feet above the water. The eggs were four to a set; and Nehrkorn¹ described eggs from West Africa as bluish white, 40–41 by 28 mm.

FAMILY **BALÆNICIPIDÆ**. WHALE-HEADED STORKS

Balæniceps rex Gould

Balæniceps rex GOULD, 1851, Proc. Zool. Soc. London, p. 1, Pl. xxxv (type locality: Upper White Nile). JOHNSTON, 1884, 'The River Congo,' pp. 355, 370 ('Upper Congo'); 1902, Ibis, p. 335 (L. Albert). REICHENOW, 1885, Journ. f. Orn., p. 217; 1901, 'Vögel Afrikas,' I, p. 357 (reported as seen by Teusz on Stanley Pool). HELLMAYR, 1911, p. 574 (L. Kisale). SCHOUTEDEN, 1912, Rev. Zool. Afr., I, p. 347 (Bukama); 1930, in L. Franck, 'Le Congo Belge,' II, p. 377 (L. Kisale). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 156, 157 (no locality). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 32 ('Katanga district'). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 294 (reported on L. Albert). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 87 ('Stanley Pool').

DISTRIBUTION.—Bahr-el-Ghazal and White Nile south of Lake No, to Lake Victoria, the marshes of the Lualaba about Lake Kisale, and very doubtfully the Cunene River, where Sir Harry Johnston² claimed to have observed it. Teusz also said he had seen it on Stanley Pool, but this seems surely erroneous. He did not collect any, and none of us has since been able to find one there.

The whale-headed stork does occur on Lake Kioga in northern Uganda, and according to Johnston and Gyldenstolpe it has been seen on Lake Albert. Several specimens were taken in the vicinity of Entebbe, and Sir Harry Johnston³ believed that its range extended from the Kavi-

¹1910, 'Katalog der Eiersammlung,' 2nd Ed., p. 81.

²1883, Ibis, p. 578.

³1903, Ibis, pp. 334–336.

rondo Gulf around the northern and northwestern shore of the lake to the Kagera River. Count Erbach Fürstenau¹ related that Dr. Kandt had shown him the head of a *Balæniceps* killed on the Kagera.

Little credence was given to Stanley's statement² that he had observed the whale-head on the upper Congo near Ukaturaka. In 1911, however, Dr. Hellmayr announced that one had been collected by Captain Michell in July, 1909, in the papyrus swamps of Lake Kisale. The next specimen from that region was secured by Rodhain and Bequaert at Lake Kazibaziba, an hour's march to the east of Bukama. In its stomach, Dr. Bequaert tells me, were five large specimens of *Protopterus*, the lung-fish. This is approximately the southern limit of the species in the southeastern Congo. It is more common to the northward, where a great number of lakes, largest among them Upemba, are scattered along the course of the Lualaba. Here papyrus and ambatch are abundant, water birds very plentiful, and the whale-headed stork is well known to the natives under the name "Motuta" or "Mututa."

The northernmost locality that Dr. Bequaert can give me is the village of Mulongo at the outlet of Lake Kabamba, where the chief in October, 1911, had three young birds, said to have hatched from a single set of eggs, and taken by one of his men from a nest amid the papyrus—a mere heap of vegetation. On the Lualaba as in the Bahr-el-Ghazal province, *Balæniceps* would appear to breed in the dry season. On the Jur River Lieutenant Fell procured two young nestlings in February.³

The egg of *Balæniceps* is known to be of blunt oval form, dull chalky white, sometimes faintly tinged with bluish, and measuring 81–91 mm. by 56–58 mm.⁴

Whale-headed storks living in captivity were photographed by Raven and by Akeley along the Lualaba River in 1920 and 1921. In December, 1921, I saw a splendid example in the Antwerp Zoo, which had been presented by M. Lippens, Governor General of the Belgian Congo. It seemed adult, and had a light greenish-gray iris. The bill was grayish, faintly if at all tinged with green. This specimen was very tame, and struck me as far more stork-like than heron-like. Its whole plumage had a pale gray, powdery bloom; and the crest was erected almost all the time, perhaps never completely lowered.

As a rule, the bill was carried pointing downward, even below 45°, but at times raised above the horizontal and clattered after the manner of

¹1912, Sitzb. Ges. Naturf. Freunde Berlin, p. 299.

²1878, 'Through the Dark Continent,' II, p. 293.

³Butler, 1905, Ibis, p. 376.

⁴Heuglin, 1873, 'Orn. Nordost-Afr.,' p. 1098. Oates, 1902, 'Catalogue Birds' Eggs Brit. Mus.,' II, pp. 110, 376.

storks. The noise seemed less loud than with a marabou and more hollow. At such times the small tongue can just be seen in the back of the throat. Standing with lowered bill, the bird has good binocular vision, the two eyes coming as nearly into the same plane as with a bateleur eagle, for example. The legs were kept very stiff and straight, a further resemblance to storks. Another live example which I saw in the Antwerp Zoo in February, 1926, had been brought home from the Congo by Prince Léopold of Belgium.

At the Munich Museum I had an occasion to compare Michell's male specimen from Lake Kisale with a female from Lake No. There seemed to be no difference of consequence, the male bird having a longer wing, 705 mm., tail 281, exposed culmen 213, maximum width of maxilla, 87, metatarsus 246. The wing of the female measured 667 mm.; but another bird from Lake No, secured by Mr. I. K. Taylor for the American Museum, has the wing 721 mm.

FAMILY SCOPIDÆ. HAMMERHEADS

Scopus umbretta umbretta Gmelin

Scopus umbretta GMELIN, 1789, 'Syst. Nat.,' I, part 2, p. 618 (type locality: Africa, i.e., Senegal). LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 408 (Lower Congo). HARTLAUB, 1850, 'Beitr. Orn. Westafr.,' p. 41 (Congo); 1857, 'Syst. Orn. Westafr.,' p. 229 (Congo). HEUGLIN, 1873, 'Orn. Nordost-Afr.,' p. 1091 (Congo). JOHNSTON, 1884, 'The River Congo,' pp. 36, 202, 355, 370 (Kissange; 3rd day above Stanley Pool; Stanley Pool; "Everywhere"). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 25 (Tanganyika; Ituri; Umangi; Stanley Pool; Lower Congo). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Luvule; Luvilombe Falls; Likulwe). SCHALOW, 1887, Journ. f. Orn., p. 227 (Likulwe R.). REICHENOW, 1887, Journ. f. Orn., p. 299 (Manyanga); 1901, 'Vögel Afrikas,' I, p. 353 (Congo; Manyanga; Luvule R.; Likulwe R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 251 (L. Mohasi; Usumbura; Tshingogo); 1921, Journ. f. Orn., p. 265 (Tshingogo district). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 174 (Kibiro on L. Albert). PECHUËL-LOESCHE, 1888, 'Loango Expedition,' III, part 1, p. 261 (Lower Congo). O.-GRANT, 1908, Ibis, p. 315 (L. Edward). NEAVE, 1910, Ibis, p. 96 (Katanga). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (Usumbura); 1924, Ann. Naturhist. Mus. Wien, XXXVIII, p. 74 (Usumbura). MOURITZ, 1914, Ibis, p. 32 (Luapula R. in S. E. Katanga). MENEGAUX, 1918, Rev. Française Orn., V, p. 253 (Zambi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 224 (Kasindi; L. Edward; Kaniki; Kabaré; N. shore Tanganyika). BERLIOZ, 1921, Rev. Française Orn., VII, p. 6 (L. Ruisamba, "Congo belge"). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 59 (Tunguru on W. side of L. Albert). CHRISTY, 1924, 'Big Game and Pygmies,' pp. 247, 248, Fig. 99 (Nile-Congo divide). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 261 (Dembo des Hindous near Elisabethville).

Scopus SCHALOW, 1886, Journ. f. Orn., pp. 424, 432, 433 (L. Itambe; Lufira R.; Luvilombo R.; Likulwe R.). EMIN, 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 408 (Tunguru on L. Albert).

Scopus umbretta bannermanni SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 311, 386 (rivers of the Kasai district; Luebo; Kwamouth); 1924, idem, XII, pp. 260, 407 (Leopoldville; between Eala and Bamanian; Tondou); 1925, idem, XIII, p. 3 (Bolobo); 1926, idem, XIII, p. 185 (between Banana and Boma; Makaia Ntete). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 294 (Mukimbungu).

Scopus umbretta bannermanni FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 27 (L. Edward). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 91 (Lower Congo).

Boma, ♂, December 31.

Avakubi, ♀, April 17.

Dungu, ♂, June 5; 2 ♀, March 2, June 5.

ADULT MALE AND FEMALE.—Iris dark brown; bill and feet black.

The specimens from Dungu and Avakubi are referred to the typical race because their wings measure 305 (♂), and 307–313 mm. (♀). Of the specimen from Boma only the skeleton was preserved.

DISTRIBUTION OF THE SPECIES.—Western Arabia, Madagascar, and the whole of Africa south of the Sahara. Hammerheads from the coastal region of West Africa between Sierra Leone and Cameroon are dark-colored and small, with wings 250–266 mm. These have been separated as *Scopus umbretta minor* Bates.¹ The type locality of *S. u. umbretta* is Senegal, where the dimensions are somewhat larger. A female from Senegal in the Rothschild collection has the wing 296 mm. long, and an old mounted specimen in the American Museum from "Senegal" has the wing 305 mm. Prof. Reichenow² has measured eleven specimens from Togo with wings 295–315 mm., Dr. Sassi reports one from Fouta Djallon with the wing 300 mm., and the American Museum has one from Kati in French Sudan with the wing 304 mm. long.

Our specimens from the Congo, therefore, do not differ appreciably in size from the typical subspecies. Whether *S. u. bannermanni* C. Grant³ of eastern and southern Africa is valid remains in doubt. The wing-lengths in those parts of the continent varies from 297 to 334 mm.⁴

The hammerhead is most commonly found along the rivers, and yet the type of predominant vegetation strongly influences its distribution in the Congo. Ubiquitous, says Neave of this bird for the Katanga; yet in all the time spent by us in the Ituri region, I was able to secure but a single example, and doubt if I saw two others. Along the middle course of the Congo River, to be sure, more were seen; but it was

¹1931, Ibis, p. 302 (Bonthe, Sherbro Is., Sierra Leone).

²1921, Journ. f. Orn., p. 265.

³1914, Bull. Brit. Orn. Club, XXV, p. 27 (Mt. Leganisho, Brit. E. Africa).

⁴Bannerman, 1922, Rev. Zool. Afr., X, pp. 180–182.

only along the streams running through savanna, yet bordered generously with trees, that we found the species common. Even at Faradje I saw but a single example, October 30, 1912.

Along the Kibali River from Nzoro to Dungu, and down the Uelle to Niangara, the hammerhead is a characteristic sight, usually in pairs, and frequenting the muddy shores or rocks in the stream during the day,

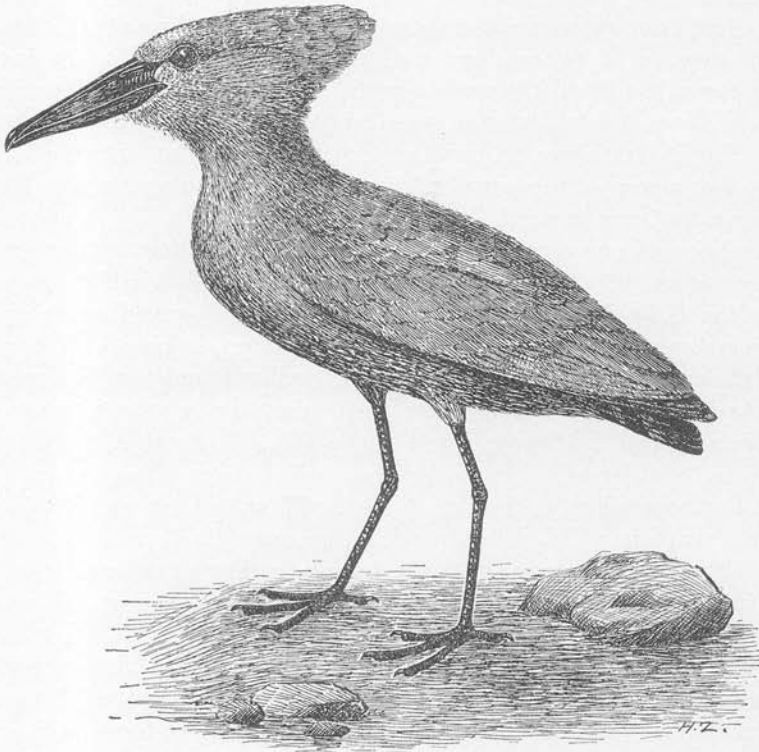


Fig. 180. *Scopus u. umbretta*. $\times \frac{1}{4}$.

yet rather active toward dusk. The flight is rendered characteristic by the large wings, the bird's body seeming very light; and the neck is only slightly curved, not drawn in on the shoulders as with herons. They were never seen to soar like storks, and I never heard them utter a sound, though it has been said that they can make a croak or a short metallic note.

Nests were found along the Garamba River (north of Faradje), and near Nzoro, Dungu, Bumba, and Boma. A few were still unfinished,

open at the top, and looking like osprey nests; the completed, roofed structure is enormous, very solid, and doubtless lasts many years, though perhaps not occupied for more than a few. Those we saw were all in large forks of trees, usually twenty to thirty-five feet above the ground, and none contained eggs or had more than one interior chamber. One situated in the dense woods fringing the Kibali River, ten miles above Dungu, could be seen from the opposite bank of the river. It measured five feet in height and about three feet through, and was built of sticks and grass (with its roots and considerable mud) as well as dry leaves. On the side toward the water (south) was the small round entrance, about five inches in diameter, its edges plastered with mud.

Eight feet away, in another fork, there was an unfinished nest, two feet across, of the same building materials. On such a nest I have known the birds to perch during the day.

None of our specimens was in breeding condition. This may be taken as an indication that eggs are not laid in the first half of the rains. On the Bahr-el-Jebel, Emin Pasha¹ obtained well-grown young in late December and January, so laying would seem to take place in November or the end of October. Farther south, Fischer found eggs in a nest on Lake Victoria in late December; and Pechuël-Loesche took two young from a nest on the Loango Coast late in July. In South Africa eggs are said to be laid usually from September to November, though at least one set has been taken at the end of May. Three or four eggs form a set. They are plain white, unless soiled, and measure 42–48 mm. by 33–36.²

The natives along the Uelle have a curious tradition about the “Nimbungumu,” as it is named in the Mangbetu language. They call it the king of the birds, since it is said to order all its subjects to bring materials for the construction of its home. Opinions differ as to what species acts as royal messenger, some claiming that it is the “Makoko” (*Cuculus solitarius*). It is also pretended that after the nest is completed a swallow plasters the sides of the doorway with mud.

Curiously enough, Monteiro³ brought back a very similar story from the river Kwanza in Angola. “The natives affirm that it never builds its own nest, but that other and different species do so for it.” Pechuël-Loesche (1888) related the same tale from the Loango Coast, as does Paget-Wilkes⁴ from Nyasaland.

FOOD.—Two stomachs of *Scopus* contained a nondescript dark gray muddy substance, but in a third were found four small fish and a shrimp.

¹Schubotz, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, p. 59.

²See especially R. B. Cowles, 1930, Auk, pp. 159–176, Pls. vi–x.

³1862, Ibis, p. 333.

⁴1928, Ibis, p. 703.

FAMILY CICONIIDÆ. STORKS

KEY TO THE AFRICAN GENERA OF CICONIIDÆ

- 1.—Head and neck practically naked, only clothed in part with scanty down; fore-neck with a pendent, air-filled pouch; bill extremely large; wing exceeding 630 mm. LEPTOPTILOS.
Neck wholly feathered or at least clothed with thick wooly down; head feathered or partially naked. 2.
- 2.—Maxilla and mandible touching at tips, but gaping widely farther back; maxillary tomia with a brushlike border; plumage largely blackish, many feathers in adults with widened shafts or tips resembling strips of celluloid. ANASTOMUS.
Maxilla and mandible touching, or almost so, throughout their length; plumage never entirely blackish. 3.
- 3.—Black tail deeply forked, while the white under tail-coverts are unusually strong and extend beyond rectrices; neck clothed with white wooly down. DISSOURA.
Tail square or rounded, as long or longer than its under coverts. 4.
- 4.—Wing exceeding 625 mm. in length; bill somewhat upcurved, with a flattened area of bare skin, enclosed by a line of small feathers, at base of culmen. EPHIPPORHYNCHUS.
Wing less than 625 mm. long; bill straight or decurved, without "saddle" at base of culmen. 5.
- 5.—Forehead and cheeks entirely feathered, a naked line at most through lores; bill practically straight. CICONIA.
Forehead or cheeks, or both, bare. 6.
- 6.—Bill decurved toward tip, culmen smooth and rounded; head bare to behind eyes in adult, though cheeks are more feathered in young; back pale pink in adult, brownish gray in young. IBIS.
Bill little if at all decurved, culmen distinctly ridged; feathering of crown always extends to anterior border of eyes, cheeks naked nearly to ear; back black with more or less metallic lustre. SPHENORHYNCHUS.

Ibis ibis (Linnæus)

Tantalus ibis LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 241 (type locality: Egypt). SCHALOW, 1886, Journ. f. Orn., p. 434 (L. Upemba). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 146 (L. Upemba). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 333 (L. Upemba); 1911, 'Wiss. Ergeb. D. Zentr-Afr. Exp. Mecklenburg,' III, p. 250 (Tanganyika). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 8 (marsh in Kagera Valley; L. Mohasi). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 9 (Kabaré; L. Edward). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 223 (Kalembe; Kabaré). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 294 (L. Edward). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 261 (upper Lualaba R.).

Tantalus sp. JOHNSTON, 1884, 'The River Congo,' p. 370 (Stanley Pool).

Tantalus SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 4 (between Beddén and Kiri, on Bahr-el-Jebel).

Pseudotantalus ibis DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Tanganyika; Katanga; Umangi; Kasai; Nouvelle-Anvers). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 150, 151 (Bukama).

Ibis ibis SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 312, 386 (Kasai R.; Lulua R.; Ngombe in the Kasai; Kwamouth); 1924, idem, XII, pp. 261, 407 (Kisantu; Stanley Pool; L. Tumba; between L. Tumba and Ikengo; Eala; Bamanian); 1925, idem, XIII, p. 3 (region of Bolobo); 1926, idem, XIII, p. 185 (lower Congo R.; Is. da Rosa; Is. of Crabs). ACHTEN, 1926, Bull. Cercle Zool. Congolais, III, p. 51 (Mobendi near Basongo).

Bolobo, ♀ im., December 19.

Faradje, ♀, February 6.

ADULT FEMALE.—Iris very dark brown, naked skin of head and throat mostly deep carmine, but changing abruptly to orange posteriorly, near the commencement of the feathers. This orange border widens into a considerable patch on the throat. There is also a little yellow before and above the eye, though the rim of the eyelids is carmine. Bill bright yellow. Bare part of tibiae pale, waxy orange-red, metatarsi and toes brownish pink, nails dusky brown.

IMMATURE FEMALE.—Iris gray; colors of bill, face, and feet much duller than in adult.

DISTRIBUTION.—All tropical Africa, from the Gambia and Sudan south to Cape Province, and the island of Madagascar. While known in our language as the wood ibis, it cannot be very partial to the wooded parts of the Congo, since the only examples we saw during our first expedition, in addition to the two collected, were two adults between Dungu and Faradje, February, 1911, and a single bird in full plumage, alighting on a tree along the river bank, near Nouvelle Anvers, December 13, 1914. Around the shores of Lake Edward, on the other hand, and in the Ruzizi Valley, wood ibises are common, and sometimes gather in flocks.

More recently, along the Congo River between Irebu and Kwamouth, I have seen wood ibises—usually singly, and at most four in a party—in February, March, April, July, October, and December. Wings were shown me of specimens killed on the Kasai River, where Dr. Schouteden reports that it is very common, and often erroneously called “flamant rose” or flamingo by Europeans. Along the Lualaba south of the forest it would seem rather common; Rodhain and Bequaert took it at Bukama, April 27 and 30, 1911, as well as at Nyangwe, November 20, 1910. But Neave never observed it on the Katanga plateau, and there are no records from Lake Kivu. Within the forest belt it occurs only along broad rivers or lakes.

In the Portuguese Congo Petit¹ wrote that the wood ibis was found only from March to June, inclusive; but Aschemeier secured specimens for the U. S. National Museum in the Fernand Vaz district in July and late August. In the Uelle district it did seem as though the species

¹1899, Mém. Soc. Zool. France, XII, p. 98.

were only present during the drought, and then in very small numbers. Little seems to be known of the nesting of the species, except that it builds in colonies on high trees, from the Gambia to Nigeria, at the end of the rains. It is said to nest also in Nyasaland, and probably does so in the southern Congo toward July and August. Its eggs are described by Reichenow as dull white, greenish by transmitted light, dimensions, 59–62 mm. by 43–44.

The gizzard of our adult specimen contained fish-bones, while in the proventriculus and lower part of the oesophagus there were eight small catfish and three minnows.

***Sphenorhynchus abdimii* (Lichtenstein)**

Ciconia abdimii LICHTENSTEIN, 1823, 'Verzeichniss Doubl. Zool. Mus. Berlin,' p. 76 (type locality: Dongola, Sudan). SCHALOW, 1886, Journ. f. Orn., p. 431 (Lulenge R.). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Lulenge R.). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Karema; Ituri; L. Kivu).

Abdimia sphenorhyncha DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Abdimia abdimi REICHENOW, 1901, 'Vögel Afrikas,' I, p. 343 (Lulenge R.; Kwango R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 251 (Usumbura). SALVADORI, 1909, Annali Mus. Civ. Stor. Nat. Genova, (3) IV, p. 326 (between Buta and Dungu). MOURITZ, 1914, Ibis, p. 31 (Inkosakapenda, S. E. Katanga). SCHOUTEDEN, 1914, Rev. Zool. Afr., III, p. 261 (Kilo); 1918, idem, V, p. 223 (Beni; Kilo; Ruzizi); 1930, idem, XVIII, p. 280 (Elisabethville; L. Kisale). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 59 (Tunguru I. in L. Albert; Khor Ayu).

Abdimia abdimii CHAPIN, 1916, Amer. Mus. Journ., p. 542 (Upper Congo—migration).

Sphenorhynchus abdimii BANNERMAN, 1922, Rev. Zool. Afr., X, p. 179 (Belgian Congo). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 312 (S. of Tshikapa; Thysville); 1924, idem, XII, p. 261 (Kidada); 1925, idem, XIII, p. 3 (Kunungu). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., (3) I, No. 3, p. 294 (Lulenga).

Avakubi, ♂, November 14.

Bafwabaka, ♂, April 14.

Rungu, 2 ♂, October 28.

Faradje, 2 ♂, February 15, March 20; 3 ♀, February 15, March 6, November 1.

ADULT MALE.—Bill dark reddish, with a sort of greenish wash over outer sheath; iris pale brownish, forehead pink, sides of head bright blue, with a red patch in front of and over the eye, throat red; feet blackish or very dark reddish, with bright red toes and tarsal joint, nails black.

DISTRIBUTION.—Southern Arabia and most of Africa south of the Sahara. Reichenow gives¹ "East and Southern Plains Region," but this stork ranges west to the Gambia and is also found sparingly, on migration, in clearings of the forest. Marche collected it at Doumé on

¹1901, 'Vögel Afrikas,' I, p. 344.

the upper Ogowé, and we noted it at Bafwabaka, April 14, 1910; at Avakubi on April 28, 1910, and November 14, 1913; at Medje, October 11, 1910; and at Stanleyville November 8, 1914. Still, in the Ituri forest we never noticed more than four or five together, so I think that the large flocks noticed to the northward must pass over without a stop.

That this stork migrated with annual regularity may be said to have been established many years ago. Von Heuglin,¹ who described their nesting in Kordofan and Sennar, stated that they were considered as harbingers of spring, or better, of the rainy season, arriving suddenly in May, FROM THE SOUTH, and that they left again as unexpectedly in October and November, when the young were fully fledged.²

This was supplemented by Andersson's account³ of their visiting Damaraland in the other half of the year, when the rains were in progress there, the same thing being true for Angola, according to Bocage.⁴ But in southern Africa no one has ever found them nesting.⁵ So all that remained to prove was that *Sphenorhynchus* did not tarry in the vicinity of the equator but simply passed over, from the Sudan to South Africa, and back again. This is now clearly demonstrated.

We found in the Upper Congo that there are two seasons at which this stork is seen—in March and April, and again in October and November. Scattered records, beginning in April, 1910, have already been noted; but they are not very frequent in the forest area. There is great regularity, however, just on its northern edge. On October 21, 1910, near Pawa, a flock of over two hundred was watched, while the birds circled high in the air over a native village, going round and round on set wings, as in a great whirlpool, their white bellies gleaming when the sunshine struck them. Six days later a smaller flock was again observed at Rungu and the day following two birds were secured from a flock of eight, resting in a tall tree. Thereafter they disappeared, and now we know that this was the second migration period we had witnessed.

At Faradje, February 15, 1911, we next saw a flock of nine, but these did not mark the main stream of northward migration, which began about three weeks later, when flocks of several hundred began flying over the country, stopping frequently to revolve in a great vortex, extending high into the air, and then toward evening alighting on trees or rocks along the River Dungu. Our native assistants and some of the soldiers—though they ought to have known better—insisted that they were "bata," or ducks.

¹1873, 'Orn. Nordost-Afr.,' II, p. 1106.

²See also Butler, 1905, *Ibis*, p. 378.

³1872, 'Birds of Damaraland,' p. 280.

⁴1881, 'Orn. Angola,' part 2, p. 451.

⁵Stark and Selater, 1906, 'Birds of S. Africa,' IV, p. 34.

During the middle of the rainy season, none were ever seen in the Uelle district, and it is certain that they never nest there. The "autumn" migration was noticed again in 1912 around November 1, and about February 20, 1913 we came upon a single bird near a stream. On March 3, considerably large flocks were seen alighting along the Uelle River above Niangara, so the "spring" migration was on. As was to be expected, these storks never made any vocal noise.

Once more the species was noted in November, 1913, when a single bird dropped into the clearing about Avakubi. The year 1914 was spent entirely in the forest, and only one flock of five was seen over Stanleyville in early November; but our observations had extended over four years, showing that the northward migration is in progress from the middle of February to early May, while that toward the south begins in September and continues till the middle of November. I do not believe that the course of travel takes most of the birds around the eastern end of the Ituri Forest, but rather that they generally pass over in large flocks at a great height.

At Lukolela, close to the southern margin of the Congo forest, a single individual was noted on December 9 and 10, 1930, and on February 6, 1931, a flock of about 300 visited a clearing there, departing soon toward the northeast. Bates has collected *Sphenorhynchus* in southern Cameroon, where it passes over on its travels, and has found them nesting at Rei Buba, northern Cameroon, and Ngigmi, Lake Chad, beginning in April. Hartert¹ found them nesting on March 29, 1886, at Igabi, northern Nigeria. This stork nests as far west as the Ivory Coast, for Bouet and Millet-Horsin² under the name *Ciconia nigra* offer a note which, as Dr. M.-Horsin himself assured me, certainly refers to this little black stork of Africa, and not to the European species. "Bouaké (May) Kong, arrives during May in the Upper Coast, but seems not to descend toward the forest. Is never met with in the Lower Coast. Builds its nest at this period upon the large trees about villages."

During the Smithsonian Expedition through Africa, my friend, Mr. H. C. Raven, secured photographs of these storks upon their nesting tree at Jebelein, White Nile, August 15, 1920. They also build on the roofs of native huts. Admiral Lynes³ reported them nesting at Zalingei, Darfur, on May 30, and described their departure from the region on October 23. Van Someren⁴ stated that he had found them breeding as

¹1886, Journ. f. Orn., p. 606.

²1917, Rev. Française Orn., V, p. 5.

³1925, Ibis, p. 530.

⁴1916, Ibis, p. 207.

far south as Gondokoro; and Emin reported a nest at Khor Ayu (near Dufile) on June 14, 1885.

FOOD.—Seven stomachs were examined, five of which contained remains of insects, usually beetles or grasshoppers, occasionally crickets, and once a large bug. Small millipedes and the legs of a crab were found once. Two stomachs contained nothing but what was apparently green vegetable matter. Such a mass is often found in storks' stomachs, and I believe it to be simply an accumulation of indigestible substances taken in by accident with the food, and remaining for a long time in the gizzard.

***Dissoura episcopus microscelis* (Gray)**

Ciconia microscelis G. R. GRAY, 1848, 'Genera Birds,' III, p. 561, Pl. CLI (type locality not given. Africa, according to Reichenow, 1901, 'Vögel Afrikas,' I, p. 348).

Ciconia episcopus SHARPE AND BOUVIER, 1878, Bull. Soc. Zool. France, III, p. 78 (Lukula R.). SCHALOW, 1886, Journ. f. Orn., p. 428 (Lufua R.). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Lufua R.).

Dissura episcopus JOHNSTON, 1884, 'The River Congo,' p. 370 ("Upper River").

Dissoura microscelis REICHENOW, 1901, 'Vögel Afrikas,' I, p. 347 (Lukula R.; Lufua R.). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 224 (confluence of the Talia and Semliki).

Dissoura episcopus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (L. Leopold II).

Dissura microscelis NEAVE, 1910, Ibis, p. 96 (Lufupa R., 4000 ft.).

Dissoura episcopus macroscelis BANNERMAN, 1922, Rev. Zool. Afr., X, p. 178 (Belgian Congo).

Dissoura episcopus microscelis SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 312, 386 (Basongo; Luebo; Djoko Punda; Kwamouth); 1924, idem, XII, pp. 261, 407 (Kisantu, Eala; Bikoro); 1925, idem, XIII, p. 3 (Kunungu); 1926, idem, XIII, p. 186 (Banana).

Faradje, 2 ♂, January 31, February 27; 2 ♀, February 27, March 12; 3 ♀ juv., February 27, March 13.

Aba, ♂, December 19.

ADULTS OF BOTH SEXES.—Bill blackish with culmen and tip red; orbits blackish, iris red, border of sclerotic membrane yellow posteriorly, blackish and gray anteriorly; feet blackish, with red showing in places.

NESTLING.—Iris dull green, eyelids and lores black; bill black with reddish-orange tip; feet dark gray with pale yellowish nails.

The white neck and abdomen are already plainly marked in the natal down, and sharply cut off from the dark areas of the plumage, which are then represented by thick blackish-brown down, lightly tipped with whitish so as to give a faint pepper-and-salt effect.

Among the very first feathers of the juvenal plumage to make their appearance are those of the crown, which are black streaked with white, and gradually becoming wholly cream-buff toward the nape. This is

not markedly different from the adult plumage, and the juvenal plumage over all the rest of the body is even more similar to the adult, with almost an equal amount of purple gloss.

DISTRIBUTION OF THE SPECIES.—Africa and India, to Ceylon, Indo-China, Philippines, southern Borneo, and Celebes. The differences between the African and the three Indo-Malayan races are slight, the most conspicuous being the color and feathering of the head, yet I strongly doubt if there is intergradation between them. *D. e. microscelis* inhabits practically all Africa south of the Sahara, but is very rare in South Africa.

The wool-necked stork is not a very abundant species in the Congo, and in the Ituri forest we saw only one example. On the Congo River I noted it on December 14, 1914, from a river steamer near Nouvelle Anvers, first a solitary bird, then a pair of them and what I took to be their nest in a tree. Just north of this spot there is a very large region of marsh, which is said to be especially favored by water birds. At Lukolela in 1930, wool-necked storks were noticed several times during September, once in October, and once in late December. There were never more than two together, and I suspect that they breed there toward July. At Eala two single birds were recorded on March 10, 1931.

In the more open country of the Uelle we saw a number of these storks, but never in flocks, usually two together. A pair with their two nestlings were taken near Faradje during the dry season, when they had a nest built of sticks in a tree along a watercourse. Another young bird brought by natives was reared and kept at liberty around the post of Faradje.

Sometimes they were attracted to the scene of grass-fires, along with marabou storks and birds of prey; and after the fire had swept ahead, they would drop down to the blackened ground and hunt about for food. I could not see that they caught any grasshoppers on the wing, as most of the other birds were doing. The bird taken at Aba, with one other of its kind, alighted near the top of a high granite hill, where a little water oozed out over the face of a large sloping rock. All dates of occurrence in the Uelle district, it will be noted, were within the dry season, and I think it is wanting during the rest of the year. That its migration is probably not a crossing of the equator is indicated by a study of the dates in 'Vögel Afrikas.' Antinori found it in Eritrea in June, and more recently Riegenbach has taken it at Garua¹ on the Benue in July. Lynes saw it in Darfur only from August 4 to early November. In the

¹1911, Mitt. Zool. Mus. Berlin, V, p. 210.

southern savanna, similarly, the species seems to remain throughout the year, so while the birds may migrate to a slight extent, they do not parallel *Sphenorhynchus*.

Six stomachs examined showed insect remains in five cases (grasshoppers, mantises, and insect-larvæ), usually mixed with some brown earthy substance or what seemed to be vegetable matter. In one case, however, an adult bird had in its œsophagus four frogs swallowed head foremost, and two more, plus additional frog-bones, in its stomach.

KEY TO THE SPECIES OF *Ciconia*

- Plumage white, with the exception of remiges, their greater coverts, and the longer scapular feathers. *C. ciconia*.
 Plumage blackish brown with more or less metallic lustre, but lower breast, abdomen, under tail-coverts, and axillaries white. *C. nigra*.

Ciconia ciconia ciconia (Linnæus)

Ardea ciconia LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 142 (Europe, Asia, and Africa. Restricted type locality: Sweden).

Ciconia alba JOHNSTON, 1884, 'The River Congo,' p. 370 ("Upper River"). SCHALOW, 1886, Journ. f. Orn., p. 412 (Mpala; Marungu); 1887, idem, p. 227 (L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Lufuku). NEAVE, 1910, Ibis, p. 96 (Katanga).

Ciconia ciconia REICHENOW, 1901, 'Vögel Afrikas,' I, p. 345 (Tanganyika; Lufuku R.). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 224 (Kinzi; Kalegela). THOMSON, 1926, 'Problems of Bird-Migration,' p. 164 (Azande country near Mbomu R.). LUCANUS, 1928, 'Rätsel des Vogelzuges,' 3rd Ed., pp. 58, 62 (Lake Region and Congo). SCHÜZ AND WEIGOLD, 1931, 'Atlas des Vogelzuges,' pp. 12, 13, Pls. XIII, XVIII (ringed birds from Europe).

Ciconia ciconia ciconia GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 73 (Katanga); 1931, idem, XVII, p. 411 (Dakwa; L. Kivu—ringed birds from Denmark).

Avakubi, ♂, April 28.

Medje, ♀, May 13.

Faradje, ♂, April 28; ♀, March 30.

DISTRIBUTION.—Europe to North Africa and western Asia,¹ south in winter to northern India and to South Africa. Occasional individuals spend the whole year in South Africa, but seem never to breed there. In the northern Congo they are only seen passing on migration, but records from Kenya Colony, January to April, have been given by Lönnberg,² and van Someren also states that they winter there. An excellent résumé by F. C. Lincoln of the results obtained from the banding of storks in Europe and the many recoveries in southern and eastern Africa will be found in the Auk, 1925, pp. 361-364.

¹Two other races extend the range of the species east to Japan.

²1911, K. Svenska Vet. Akad. Handl. Stockh., XLVII, No. 5, p. 42.

In addition to the individuals collected by us, others were positively identified as follows: Avakubi, April 23, 27; Medje, May 1, 6; Faradje, October 5; Garamba, July 2, 3.

As a rule, they appeared singly or in groups of not more than three. An individual in very worn plumage, seen at Garamba on July 2, 1912, was walking alone in a native farm; but on the day following, a flock numbering eighteen came circling over at no great elevation. It may be that these July birds had not returned to Europe or had not, at any rate, bred. A record for July 13 from Ujiji is given by Heidke,¹ and others from the Blue Nile in June by A. L. Butler.² Captain Pitman³ even suggests that white storks may be starting to nest in East Africa, but I have seen nothing to warrant this conclusion. The stragglers remaining in Africa are probably non-breeding individuals.

At Avakubi and Medje, the natives managed to catch white storks alive, and after clipping their wings, brought them in to the Europeans. Twice these captive birds served as decoys to bring down others passing over. They were fed on frogs, of which they would eat five or six without a pause, and a lizard was also taken; yet wild birds must often content themselves with much smaller game, since in the four stomachs examined we found frog bones but once, a small millipede once, and remains of crabs twice. Insects had been eaten by all, usually grasshoppers and beetles; but once there were large ants, and again many termites. What bird in Africa can refuse winged termites?

[*Ciconia nigra* (Linnæus)]

Ardea nigra LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 142 (type locality: "North Europe," restricted to Sweden).

The black stork breeds across Europe and Asia, migrating southward to India and Africa. It has been taken many times in South Africa, even in the Cape Province, and there are isolated records from Portuguese Guinea, the Gold Coast, Darfur, and Huilla in Mossamedes. In the Belgian Congo it may yet be found, therefore, as a rare migrant.

A. D. Millar believed that he found a nest of the black stork in Zululand in August, 1908, as reported by Chubb,⁴ and had two eggs in his collection attributed to this species. Other nests have been discovered in Natal by Symons and by Clarke, and in the Grahamstown district, Cape Province, by Paget-Wilkes.

¹1914, *Mittel. Deutsch. Schutzgeb.*, XXVII, p. 174.

²1905, *Ibis*, p. 378.

³1929, *Bateleur*, I, pp. 48-52.

⁴1914, *Annals Durban Museum*, I, p. 45. See especially H. Grote, 1932, *Orn. Monatsber.*, pp. 81-84.

Ehippiorhynchus senegalensis (Shaw)

Mycteria senegalensis SHAW, 1800, Trans. Linn. Soc. London, V, p. 35, Pl. III (type locality: Senegal). DE SOUSA, 1886, in Capello and Ivens, 'De Angola a Contra-Costa,' II, p. 446 (Quinfunpa near Serra Lupampa). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Lofunso Valley; L. Itambe; Boga on the Lufira R.; Likulwe R.). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 165 (N. end of L. Albert). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 166 (L. Albert); 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 408 (Tunguru on L. Albert).

Xenorhynchus senegalensis JOHNSTON, 1884, 'The River Congo,' pp. 355, 370 (Stanley Pool; "Upper River").

Mycteria SCHALOW, 1886, Journ. f. Orn., pp. 422, 431, 433 (L. Itambe; Lufira R.; Likulwe R.).

Ehippiorhynchus senegalensis SHARPE, 1898, 'Cat. Birds Brit. Mus.,' XXVI, p. 312 (Ambriz, Angola). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 341 (Quinfunpa; Mpala; Lofunso R.; L. Itambe; Lufira R.; Likulwe R.; L. Albert); 1911, 'Wiss. Ergeb. D. Zentr.-Afr., Exp. Mecklenburg,' III, p. 251 (Mpala; L. Albert). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Tanganyika; Katanga). NEAVE, 1910, Ibis, p. 96 (Katanga). MOURITZ, 1914, Ibis, p. 27 (headwaters of the Munien-gashi R.). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 8 (Kabaré). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 223 (Kabaré); 1923, idem, XI, p. 312 (between Dima and Basongo; Kasai R. between Makumbi and Tshikapa). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, p. 57 (Tunguru; S. end of L. Albert). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., (3) I, No. 3, p. 295 (L. Edward). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 261 (Katentania on Bianco Plateau).

Mycteria senegalensis EMIN, 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 211 (N. end of L. Albert).

Faradje, ♀, February 6.

ADULT FEMALE.—Iris cadmium-yellow,¹ rim of eyelids black; naked skin of throat and sides of face, as well as outer portion of bill, deep scarlet, basal section of bill black, "saddle" chrome-yellow.

Our specimen lacked fleshy wattles at the sides of the chin, doubtless because of its sex. Feet brownish black, with light rosy-red tarsal and toe joints. Naked breast-spot crimson.

DISTRIBUTION.—All tropical Africa, from the Gambia and Abyssinia southward, but very rare in Natal and Cape Colony, and probably equally scarce in the forested part of the Congo basin.

In addition to the specimen noted above, a single bird was seen near Faradje flying low over a grassy marsh, on July 3, 1911. Its extreme rarity in this corner of the Congo is surprising, in view of its Sudanese distribution and because it is nowhere more common than on the upper Nile. There Heuglin² found it breeding in January and

¹In the male it is said to be brown. Stark and Sciater, 1906, 'Birds of S. Afr.,' IV, p. 44.

²1873, 'Orn. Nordost-Afr.,' II, p. 1113.

February, on acacias in the midst of swamps. The eggs are dull white, of coarse texture, and measure 76–80.5 mm. by 56–57.5 mm.

On the shores of Lake Edward this stork is not uncommon, in small numbers. I found it at Katwe in January and Kabare in May. Johnston saw the saddle-billed stork on Stanley Pool; and I have watched it walking on sand-bars exposed at low water in March and early April near Kwamouth, Yumbi, Lukolela, and Sungu. Once a couple was seen, otherwise only single birds. Along the Kasai River below Basongo, Schouteden observed but a few individuals. Farther up the same river, beyond Makumbi, they were numerous. In the Upper Katanga, Neave

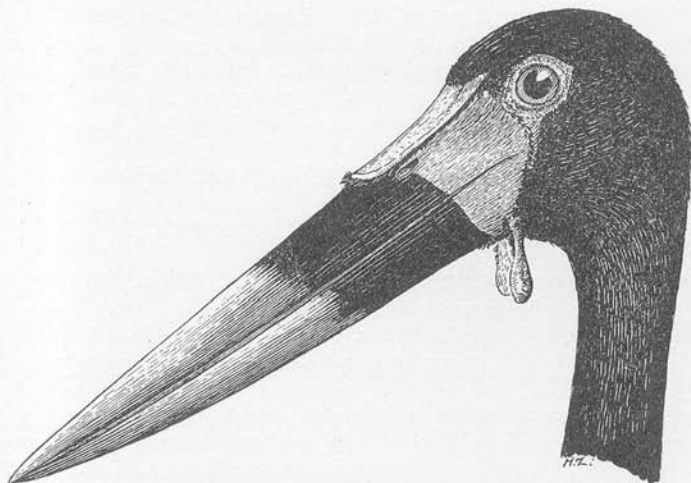


Fig. 181. Head of *Ephippiorhynchus senegalensis*, male. $\times \frac{1}{4}$.

called them common, singly or in pairs, wherever there are open plains. Rodhain and Bequaert took one specimen (♀) at Welgelen, on the Katanga-Rhodesia frontier, June 16, 1912. Since the species is found throughout the year in the Katanga district of the Congo, I can find no evidence there of migratory habits. But along the middle Congo River it seems to be absent when the water-level is high.

Our example had eaten many large water-beetles, the remains of which were mixed with a mass of brown fibrous matter such as one usually finds in stomachs of marabous and other storks.

***Leptoptilos crumeniferus* (Lesson)**

Ciconia crumenifera LESSON, 1831, 'Traité d'Ornith.,' p. 585 (type locality: Senegal).

Leptoptilus crumeniferus JOHNSTON, 1884, 'The River Congo,' pp. 355, 370 (Islands in Stanley Pool; "most parts" Congo R. to Bolobo). DUBOIS, 1905, *Annales Mus. Congo, Zoologie*, I, f. 1, p. 25 (Umangi; Mongala; Nouvelle-Anvers). NEAVE, 1907, *Mem. Proc. Manchester Lit. Phil. Soc.*, LI, No. 10, p. 18 (near Irumi Mts. on Alala Plateau); 1910, *Ibis*, p. 96 (near Lakes Bangweolo, Mweru, and Tanganyika). MOURITZ, 1914, *Ibis*, p. 30 (Inkosakapenda on Loömbwa R.). SCHOUTEDEN, 1923, *Rev. Zool. Afr.*, XI, pp. 312, 386 (vicinity of Basongo and Luebo; Kwamouth); 1924, *idem*, XII, p. 407 (between Irebu and Ikengo); 1925, *idem*, XIII, p. 3 (Bolobo region; Kunungu). GYLDENSTOLPE, 1924, *K. Svenska Vet. Akad. Handl.*, (3) I, No. 3, p. 295 (Rutshuru and Ruindi plains). PAGET-WILKES, 1926, *S. Afr. Journ. Nat. Hist.*, VI, p. 67 (upper Kafue R. near Ndola). DE RIEMAECKER, 1927, *Rev. Zool. Afr.*, XIV, p. 261 (Elisabethville).

Leptoptilus SCHALOW, 1886, *Journ. f. Orn.*, p. 431 (Lufira R.).

Leptoptilus crumenifer SCHALOW, 1886, *Journ. f. Orn.*, p. 435 (L. Upemba). MATSCHIE, 1887, *Journ. f. Orn.*, p. 146 (Lufira; L. Upemba). OUSTALET, 1893, *Naturaliste*, VII, p. 128 (no exact locality). LÖNNBERG, 1917, *Arkiv. f. Zool.*, X, No. 24, p. 8 (Kabaré). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 338 ("Ubangi R."; Lufira R.; L. Upemba). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 223 (Kabaré; L. Edward; Beni).

Leptopteros crumenifer PILETTE, 1914, 'A Travers l'Afrique Equatoriale,' p. 278 Fig. 73 (S. of L. Edward).

Leptopilos crumeniferus SCHOUTEDEN, 1930, *Rev. Zool. Afr.*, XVIII, p. 279 (Elisabethville).

Faradje, 3 ♀, January 4, 24, February 7; 2 ♀ juv., February 16, April 21.

ADULT FEMALE.—Bill greenish white, very dirty; irides grayish brown on inner edge, shading nearly to white on outer rim. Crown, front of lores and a patch at each side of the base of mandible covered with a rough, blackish-red, scablike skin. Skin below eye orange-yellow, shading to red on back of head. Back of neck light blue, separated abruptly from the dirty pinkish white on the front of neck and the pouch. Base of neck above is bright brick-red. On the head and neck are many spots of black, usually small, but forming a U-shaped mark about ear. Just below the feathers on the tibia is some soft naked skin, bright red. The scaly parts of the feet are black, but whitened with excrement.

DISTRIBUTION.—All Africa, north to Senegal in the west, and Khar-toum on the Nile, extremely rare south of the Orange River.

In the Congo the marabou is usually not uncommon in savanna country, but lacking in forest districts, save where they are traversed by very broad rivers. Thus it has been recorded by Dubois from Umangi, Mongala, and Nouvelle Anvers, yet along the Ituri River it is unknown. That the marabou nests near Nouvelle Anvers may be regarded as certain, for in the Congo Museum there is a young bird (taken on April 24), just about ready to fly. Sir Harry Johnston's record from Stanley Pool is confirmed by our seeing more marabous there in July, 1909. Along the middle Congo River near Lukolela and Ngombe I noted marabous on October 1 and December 18, 1930, and January 9 and

March 6, 1931. Except for a party of eight soaring overhead (January) they were solitary birds.

The savanna country of the Uelle is better suited to these large storks, which are seen no more often along the rivers than out in remote uninhabited tracts where roam the larger game animals. It sometimes seems as though the echoes of a successful rifle shot had scarcely died away before a vulture or a marabou could be made out soaring overhead, awaiting its chance to share in the kill. Certainly they were not attracted by smell, but it did appear as though they had learned what the report of a gun signified.

During the warmer hours of the day, the marabous seem to be sailing about so high as to escape one's attention,¹ the bill pointed straight out, neck not much extended, and the feet directly behind. Having spied carrion below, they begin to circle around, descending slowly, and finally, when still some two hundred feet above the earth, their legs drop to an angle of 45°, the beak points groundward, and the spiral descent becomes more rapid. If there is a vulture already at work, it departs precipitately. Perhaps, however, the vultures with their hooked bills aid the stork by leaving loose pieces of flesh.

Having eaten its fill, the stately marabou mounts a tree and sits at peace with the vultures. Whether perching or walking, the attitude is usually erect, the head drawn down when at rest, or raised when on the alert. The size of the neck-pouch varies greatly, according to its inflation.

The largest number of marabous noticed at once was ten, flying over our camp to the northwest of Faradje. Sometimes five would alight on the same tree, but the majority were always birds of the preceding year, lacking the light stripes on wing-coverts. They had a frowsy look alongside the old birds, but of the latter there was hardly one in six. Marabous are attracted in small numbers to grass-fires, and sail about overhead, but I could not observe that they caught any insects on the wing.

This account of habits applies mainly to the dry season, for during the rainy season, in 1911 and 1912, neither Lang nor I ever saw a marabou. They seemed to disappear entirely from the country. But while they were with us they nested, for in February, 1911, Chief Maruka had four young ones alive, two of which he presented to us, saying we would find them more delicious than ducks. But as we had no idea of eating them we kept one alive for a few months. The young birds seemed rather stupid, and stood motionless for long periods, but uttered a reiterated

¹For a discussion of the soaring of the related Indian stork, see Hankin, 1913, 'Animal Flight.'

grunting sound when disturbed, often with nodding head and partially opened wings. Meat was eaten greedily, rats being first bitten and shaken to break the bones, then swallowed head first. If a bone were too large for the œsophagus, it could at least be swallowed for two-thirds of its length, and would gradually disappear as digestion progressed. Even the gristly parings from large mammal hides were not despised, and subsequent examination of the stomach revealed the remains of insects. From the puddles left by rains, or from native water-jars, our captive bird drank thirstily but awkwardly, often with a loud clattering of the bill. A very evil disposition was evinced in attacks upon other smaller birds, such as the young wool-necked stork; and young ducks or chicks cannot be kept where there is a tame marabou.

Our young bird, after we had had it about six weeks, learned to fly. The first attempts were made only on windy days, on account of the difficulty in rising from the ground. After this it began to roost at night on the tops of houses, and soon it was able to take long flights, sailing aloft at a great height, but returning to the village, its base for rations.

In the next dry season the breeding period for marabous came on again; and on April 15, 1912, I was taken by an Azande chief, Gangura, to visit a place between Faradje and Nzoro where these birds were accustomed to breed. He assured me that sometimes there were twenty nests, and we made our four-hour march to the spot with good hopes. Finally in a narrow wooded valley he pointed to two great trees towering above the rest. One was very straight, its trunk smooth, unbranched; and amid the leafy boughs, at a height of seventy feet, we discerned two large flat nests, roughly built of sticks, and supported on branches well out from the main limbs. On one sat a single young marabou, rather large; and the other was already deserted, but on the small twigs about it there hung two weaver-birds' nests (undoubtedly of *Sitagra atrogularis*).

Disappointed by the scarcity of nests, Gangura explained that the main colony was over in the next valley, a quarter-mile farther. There again we found many small trees, and a few giants, on one of which there were three more nests, but all empty. It was plainly evident that a party of native hunters had camped on the spot and collected all the young, other nests having been thrown from the trees. Close to one of the remaining nests there were again three of the weaver-birds' nests.

On our way back, passing near the occupied nest, we saw one of the parents visit it. Alighting on a nearby bough, it approached the nestling with slightly opened wings, giving its grunting note.

This neighborhood had a nesting colony of marabouts each dry season, and was evidently selected by them for its remoteness, four hours march from the nearest village, and because of the abundance of large game such as elephants, white rhinos, and buffaloes.

Again in February, 1913, Chief Kasima sent two young marabouts to the post of Faradje; but in the intervening periods of rains I could get no evidence of marabouts in the district. Neither in August nor in October did any of these great storks appear while elephant carcasses were being disposed of, though vultures were numerous. To me this seemed at the time to be a clear-cut case of migration.

Even as far west as Haussa Land, Hartert¹ found much the same seasonal appearance of the marabou. At Saria and to the northward they were found in the dry season, and in February and March their nests, built in tall baobab-trees, contained young.

From an observation by Heuglin I conclude that the birds of the Uelle district, after breeding, move northward into the Sudan. "In April and May," he says,² "it [the marabou] moves in bands, or more singly, from the interior to the plains between the Atbara and southern Nubia. During the driest part of the year, from November and December on, the Marabouts disappear again; and I believe that probably they cross the equator." In the region of our investigations, to be sure, they do not cross the line, but are stopped at about 4° N. lat. by the commencement of the forest, a type of country which does not support carrion-feeding birds. Just what the conditions are in East Africa, where there is no such barrier, I cannot say. In Kenya Colony they do occur from April to August, and on Lake Albert I have seen the marabou in August. I cannot as yet arrange the dates of occurrence south of the equator so as to demonstrate a corresponding migration, but the fact that it is not known to breed in South Africa,³ though nests have been reported by Fischer⁴ near Mt. Kilimanjaro (July), by Neave⁵ near the Irumi Mountains, northern Rhodesia (August or September), and by Paget-Wilkes⁶ in Nyasaland (May to December), may be taken to indicate that similar conditions prevail. Heidke⁷ mentions the reappearance of marabouts near Ujiji on Lake Tanganyika about the middle of August, or somewhat later than I should expect. Dr. J. M. Derscheid has recently shown me photographs of three young marabouts taken by L. Puissant in the southern Lomani District on July 5, which confirm my anticipations.

¹1886, *Journ. f. Orn.*, p. 607.

²1873, '*Orn. Nordost-Afr.*,' II, p. 1115.

³Stark and Selater, 1906, '*Birds S. Afr.*,' IV, p. 48.

⁴1885, *Journ. f. Orn.*, p. 117.

⁵1907, *Mem. Proc. Manchester Lit. Phil. Soc.*, LI, part 3, p. 18.

⁶1928, *Ibis*, p. 707; 1930, *idem*, p. 437.

⁷1914, *Mitteil. Deutschen Schutzgebieten*, XXVII, p. 174.

The eggs of the marabou are white, looking greenish by transmitted light, with finely granular surface, 77–84.5 by 54–60 mm.

The pouch that hangs from the front of the marabou's neck has nothing to do with a crop, but is an enlargement of the air-sac system of the neck. As shown by my sketches (Figs. 182–184) from the dissection of a specimen from the New York Zoölogical Park, it receives air not

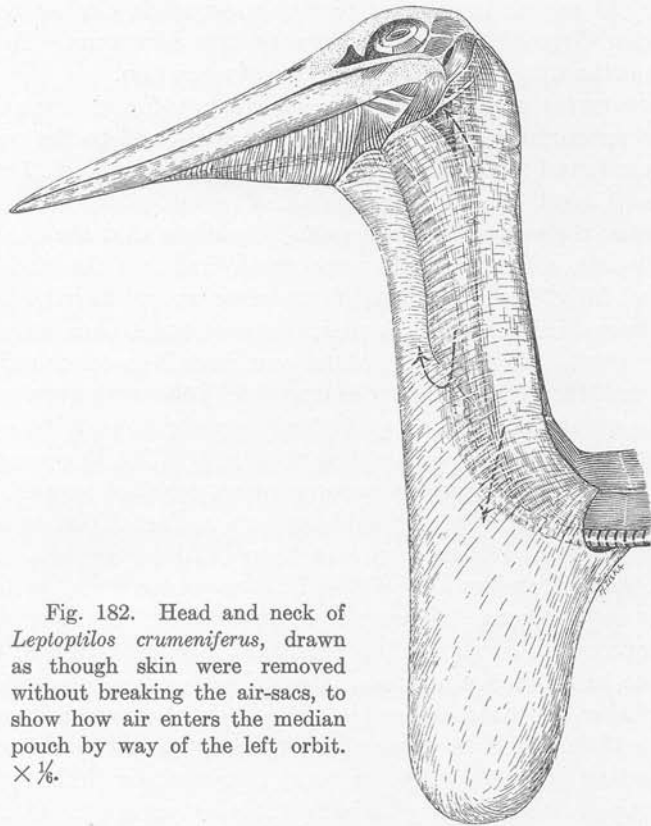


Fig. 182. Head and neck of *Leptoptilos crumeniferus*, drawn as though skin were removed without breaking the air-sacs, to show how air enters the median pouch by way of the left orbit. $\times \frac{1}{6}$.

from the lungs or the air-sacs of the body, but from the left nostril, the air passing beneath the eye-ball and through an aperture on the inner side of the pterygoid bone. The right side of the neck is similarly provided with a large air-sac, but this one is shorter and completely separated from the pouch by a thin membrane. Just how air is forced into these sacs is not clear, unless it is blown from the glottis into the internal nares.

The marabou's pouch was described by Peters (1866, Monatsber. Akad. Wiss. Berlin, pp. 168, 169); and other birds of the stork family have homologous though less developed air-sacs in the neck.¹ The air-sacs of the throat-region in the frigate-bird and ground-hornbill are similarly constituted, but in both these cases they communicate with the air-sacs of the body. The nasal connection is also present, however, in the ground-hornbill.



Fig. 183

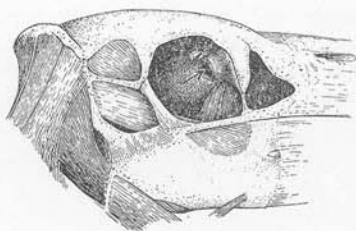


Fig. 184

Fig. 183. Right orbit of *Leptoptilos*, after removal of eye. The arrow leads out of the passage communicating with the right air-sac of the neck. $\times \frac{1}{3}$.

Fig. 184. Right orbit of *Leptoptilos*, turned slightly to show aperture by which air enters from the nostril. The arrow points to it. $\times \frac{1}{3}$.

Anastomus lamelligerus lamelligerus Temminck

Anastomus lamelligerus TEMMINCK, 1823, 'Planches Coloriées,' livr. 40, Pl. CCXXXVI (type locality: Africa). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Tanganyika; Bumba; Umangi). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Luvule R.; L. Itambe; Lufira R.; Likulwe R.; L. Upemba). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., pp. 162, 165 (S. of Wadelai; N. end L. Albert). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 166 (L. Albert); 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, pp. 209, 211 (N. end of L. Albert). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 355 (Kwango R.; Luvule R.; L. Itambe; Lufira R.; Likulwe R.; L. Upemba; L. Albert); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 250 (Tanganyika; L. Albert). NEAVE, 1910, Ibis, p. 96 (L. Bangweolo). NEAVE, 1910, Geogr. Journ., XXXV, p. 141 (L. Bangweolo). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 8 (Usumbura). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 8 (Kasindi; Beni). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 223 (Beni; Sanghé-Ruzizi). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, p. 56 (L. Albert). PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 68 (Upper Kafue R. near Ndola). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 261 (Lualaba R. near L. Kisale).

¹See especially Milne-Edwards, 1865, Annales Sci. Naturelles, (5) III, p. 137; Boulart, 1882, Journ. Anat. Physiol., Paris, pp. 467, 468; 1885, Bull. Soc. Zool. France, p. 348; Mlle. F. Bignon, 1889, Mem. Soc. Zool. France, II, p. 315.

Anastomus SCHALOW, 1886, Journ. f. Orn., pp. 422, 431, 432, 435 (Luvule R.; L. Itambe; Likulwe R.; L. Upemba). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 162 (S. of Wadelai).

Anastomus lamelligirus RODHAIN ET AL., 1913, 'Rapp. Miss. Sci., Katanga,' p. 150 (no exact locality).

Anastomus lamelligerus lamelligerus SCHOUTEDEN, 1924, Rev. Zool. Afr., XII, p. 408 (vicinity of Coquilhatville); 1925, idem, XIII, p. 3 (region of Bolobo). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 295 (Ngoma). CHAPIN, 1927, Bull. Amer. Mus. Nat. Hist., LIII, p. 537 (Ituri; Uelle; Kongolo; L. Kisale.—food).

Avakubi, 2 ♂, January 12, October 31; ♀ December 10.

Faradje, ♂ im., December 28; ♀ im., December 23.

ADULT MALE.—Iris dusky brown, inner rim lighter, greenish brown; naked skin of lores and chin dull bluish; base of bill light gray soiled with brownish, and separated from the darker tip by an irregular dusky area; feet black.

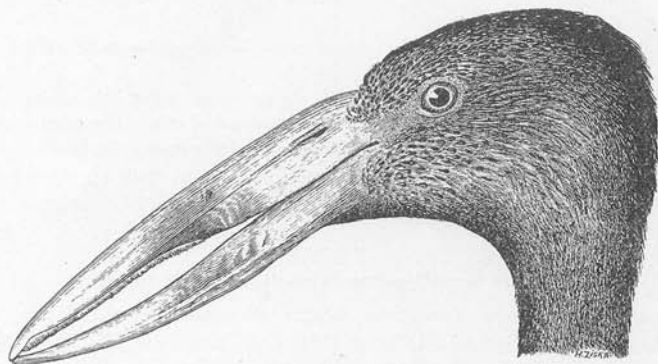


Fig. 185. Head of *Anastomus l. lamelligerus*. $\times \frac{1}{3}$.

DISTRIBUTION.—From the Ivory Coast, Kordofan and Abyssinia south to Natal and the Orange River, but scarce in the western forests. On the island of Madagascar lives a slightly different subspecies, *A. l. madagascariensis* Milne-Edwards,¹ with bill more deeply ribbed when adult (the young more spotted with white on the neck).

Not only were all our specimens secured in the Uelle and Ituri between October and January, but this was the only season at which we saw the African open-bill there. They were beyond any doubt merely birds of passage, never stopping long, and never nesting. While walking about on the river banks they would carry the bill pointing groundward, like the more typical storks. The largest number seen together was a flock of only seven, over the post of Avakubi. In their manner of flight,

¹See Bangs, 1918, Bull. Mus. Comp. Zool., LXI, p. 496.

as well as their curious circling evolutions, they resembled *Sphenorhynchus*, but were close enough for the bill to be seen plainly.

In the three stomachs found to contain food, there were only mollusc remains. One bird had extracted the soft parts (feet and gills) of 65 fresh-water mussels, and yet had swallowed just one small bit of shell. The other two had been feeding on the large fresh-water snail (*Pila*, formerly called *Ampullaria*), ten being the largest number in one

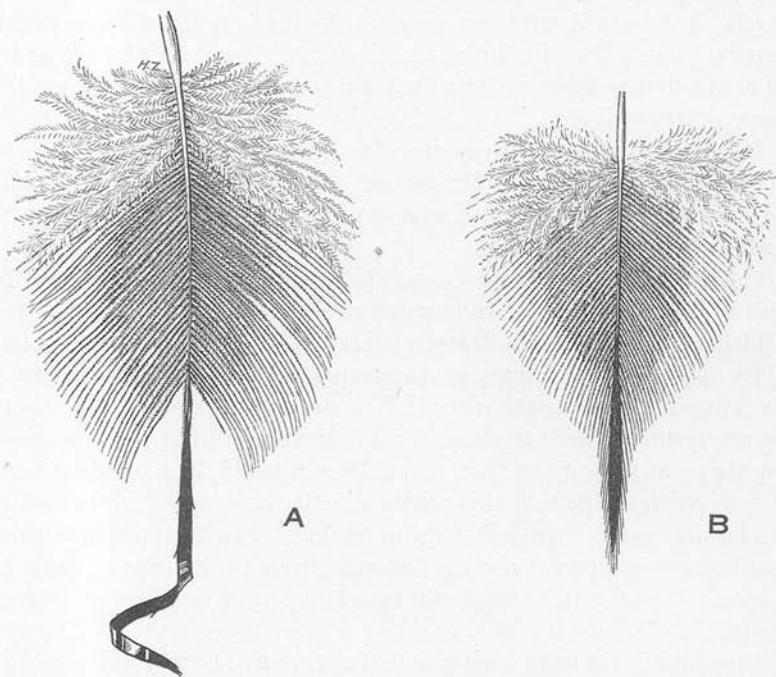


Fig. 186. Feathers from an adult *Anastomus l. lamelligerus*: A, from lower breast; B, from upper back. $\times 1$.

stomach, and while they avoided eating any pieces of shell, they seemed less careful about opercula, of which a few had been swallowed.

Between Kikondja and Bukama, at Moipungoi, on October 13, 1911, Rodhain and Bequaert shot one specimen, and noted that extraordinary numbers were seen that day along the Lualaba River. At Lake Kisale, too, in February it formed immense flocks, and was probably the commonest water-bird. Near Lake Kisale, Dr. Bequaert tells me, the open-bill stork eats only a few snails of the genus *Pila* and probably no fresh-

water mussels, for the latter are rare in that district. By far the greater part of its food consists of a large aquatic snail, *Lanistes procerus magnus* (Furtado), of the family Ampulariidae, almost the size of a hen's egg. The animal is not withdrawn from its shell, but is secured by crushing the shell. This was observed with birds kept in captivity during the scientific mission headed by Dr. Rodhain. The curious form of the bill is more or less due, no doubt, to the consequent wear of the mandibles.

Raven procured a specimen for the U. S. National Museum at Kongolo, February 3, and two more at Nyanza on Lake Tanganyika, February 27 and 28. In the stomach of the Kongolo bird he found a snail about 13 mm. long, with its shell cracked but not removed, possibly because of its small size.

It is in the bodies of two species of water-snails, a *Pila* and a *Lanistes* (Dr. Bequaert tells me) that Dr. Gerard, formerly stationed at Kikonja, has found the cysts of a fluke, related to *Distomum*, which is known to parasitize the open-bill stork.

Only a few hundred miles away, in the upper Zambesi Valley, the open-bill is known to breed in large numbers. Livingstone¹ related how at Chitlane's village, in the Barotse Valley, 175 young birds were gathered by natives from a colony of *Anastomus*, which "breeds in society at certain localities among the reeds." The date was about July 31. That they are resident there is shown by his having noticed their presence along the same part of the river about December 17, in a previous year. Again in August, 1859, in the marshes of the river Shire, at 16° 30' S. latitude, the same explorer² tells of seeing "hundreds of linongolos (*Anastomus lamelligerus*) rise on the wing from the clumps of reeds or low trees . . . on which they build in colonies, and are speedily high in mid-air."

From the vicinity of Dodoma in Tanganyika Territory Loveridge³ has reported a fledgling received from natives on May 13. Neave⁴ met with the species in large flocks on Lake Bangweolo, July 7, so it seems very likely that it will be found nesting within our limits in or near the Katanga. In 1927, I myself saw many flocks of open-bills on the Lualaba River between August 7 and 10, some as far north as Kabalo, but the greatest flocks were just north of Bukama, where one was estimated at 500 individuals.

In no other parts of the continent have nests been found. In the northern Sudan, where the species is said to arrive with "the beginning of

¹1858, 'Missionary Travels,' p. 494 (Amer. Ed., p. 531).

²Livingstone, 1866, 'Narrative of an Expedition to the Zambesi,' p. 111.

³1928, Proc. U. S. Nat. Mus., LXXIII, Art. 17, p. 32.

⁴1910, Ibis, p. 96.

the greater rainy season," Heuglin was unable to secure any satisfactory proof of its breeding. I believe that many individuals do migrate from the southern savanna to the Sudan, mainly about December, but return southward again before nesting, since the Sudan records with dates extend through December, February, March, April, and May, while Hartert found the bird at Loko, on the Benue River, in June.¹ At Katwe on Lake Edward I saw a flock of thirty on January 21, and in the lower Rutshuru Plain a party of four flying southward on May 14, 1927. At Lukolela on the middle Congo only a single open-bill was noted, February 10, 1931; but another solitary bird was observed on the lower Congo near Mateba Island on July 11, 1930.

On the other hand, many open-bills remain in the southern savanna between December and May. There are records from Lake Upemba, February; Lake Shirwa in February and July; Tanga, April; Kilosa, April; and Kingani River and Mashonaland, in June. Perhaps at this season some individuals even wander southward, inasmuch as they have been taken in Natal in March, and in the Transvaal twice in February.

FAMILY PLATALEIDÆ. IBISES, SPOONBILLS

KEY TO THE CONGO GENERA OF PLATALEIDÆ

- 1.—Bill widened distally to a flat spoon-like form, plumage of adult entirely white.
PLATALEA.
- Bill not widened, but growing thinner toward tip. 2.
- 2.—Front of metatarsus with wide transverse scutes, its posterior surface with small scales, more or less hexagonal; plumage largely dark brown and rufous with metallic green and bronze. PLEGADIS.
- Front and back of metatarsus with small scales, more or less hexagonal. 3.
- 3.—Head and neck naked and blackish in adult; plumage largely white, wing-tips green-black, inner secondaries violet-black with broad decomposed webs.
THRESKIORNIS.
- Neck feathered, bare skin only on face; plumage not white. 4.
- 4.—Feathers of head and neck mainly gray-brown or gray, no well-marked crest.
HAGEDASHIA.
- Head and neck brown, not grayish, or dusky olive-brown, sometimes with salmon-buff centers on many feathers; a long occipital crest always present.
LAMPRIBIS.

SUBFAMILY Plegadinæ

Plegadis falcinellus falcinellus (Linnæus)

Tantalus falcinellus LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 241 (type locality: Austria and Italy).

Falcinellus igneus DUBOIS, 1886, Bull Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

¹1886, Journ. f. Orn., p. 607.

Plegadis autumnalis REICHENOW, 1901, 'Vögel Afrikas,' I, p. 329 (Tanganyika); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 250 (Tanganyika). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 223 (L. Edward; Kabaré).

Plegadus falcinellus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (in part. Tanganyika). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (L. Edward). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 8 (Is. in L. Bangweolo). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., (3) I, No. 3, p. 296 (L. Edward). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 262 (Sakania). SCHOUTEDEN, 1930, Rev. Zool. Afr., XVIII, p. 280 (near Elisabethville).

Egatheus (*Plegadis*) *autumnalis* LÖNNBERG, 1917, Arkiv f. Zool., X, No. 24, p. 8 (Kabaré).

DISTRIBUTION.—From southern Europe and Asia to Africa, and Madagascar; also in southeastern United States. Only two races are recognized, *P. f. peregrinus* (Bonaparte) differing supposedly by its smaller size, and ranging from the Philippines and Java to Australia.

The glossy ibis probably nests locally in tropical or southern Africa,¹ and is reported from most sections of the continent, save the deserts and the equatorial forests. Perhaps this is also the winter range of birds breeding in the Mediterranean region or Asia; but specimens have been taken in eastern and southern Africa in May, June, and July. Within our limits the species is known only from the vicinity of Lakes Edward, Tanganyika, and Bangweolo; but it may also be expected in the Lower Congo. The bird reported under the name *Plegadis autumnalis* from Banalia by Dubois (1905) was really *Lampribis rara*; I saw it in the Congo Museum.

Hagedashia hagedash nilotica Neumann

Hagedashia hagedash nilotica NEUMANN, 1909, Ornith., XIII, p. 193 (type locality: Kimo, near Adis Ababa, Abyssinia). CHAPIN, 1927, Bull. Amer. Mus. Nat. Hist., LIII, p. 538 (N. E. Congo).

Ibis hagedash EMIN, 1894, Journ. f. Orn., p. 165 (near Irumu).

Hagedashia hagedash HARTERT, 1900, Nov. Zool., VII, p. 29 (Bomili). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 8 (Usumbura; Ruanda).

Theristicus hagedash REICHENOW, 1901, 'Vögel Afrikas,' I, p. 325 (in part. Irumu); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 250 (Kisenyi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 222 (L. Edward; Kaniki; Kabaré; Busuenda; Kivu).

Hagedashia caffrensis DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (in part. Province Orientale; Ituri).

Hagedashia hagedash guineensis NEUMANN, 1909, Ornith., XIII, pp. 191, 194, 196 (in part. Bomili). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p.

¹Menegaux, 1923, 'Voyage Babault Afr. Orient.,' Oiseaux, p. 32, quotes a description by G. Babault of a nest in an acacia on an islet in Lake Victoria, found in April. The single nestling was collected, but I cannot suppress a doubt as to its identification.

358 (Usumbura). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 8 (Rutshuru). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 296 (Ngoma). FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 35 (Semliki Valley).

Avakubi, 2 ♂, August 4, October 9; ♀, August 4.

Niapu, ♂, January 1.

Faradje, ♂, February 13; 2 ♀, February 24, March 23.

Nzoro, ♂, August 4.

ADULT MALE.—Iris dark red or carmine, skin of face and throat black; bill black with basal half of culmen red; feet blackish, with scutes on upper side of toes red.

ADULT FEMALE.—Iris red, with outer edge light pink—another individual, iris carmine.

DISTRIBUTION OF THE SPECIES.—All Africa south of the Sahara. The geographic races distinguished by Neumann¹ are undoubtedly valid, in spite of the considerable variation in length of bill, which is one of the principal marks of distinction. His measurements are the following:

	CULMEN	AVERAGE
<i>H. h. hagedash</i> (South Africa)	115–133 mm.	(124.8 mm.)
<i>H. h. erlangeri</i> (East Africa)	126–163	(140.6)
<i>H. h. guineensis</i> (Western Africa to the Congo)	128–165	(142.4)
<i>H. h. nilotica</i> (Abyssinia to Uganda)	152–174	(160)

In color the East and South African races differ in being duller and lighter-colored on the body. Unfortunately, the areas of intergradation are very broad.

Our small series from the northeastern Congo is referable to *H. h. nilotica*, since their bills (both sexes included) vary from 145 to 166 mm. (average 156 mm.). The type of *H. brevirostris* (Reichenow) in the Berlin Museum is clearly a young bird with bill not yet fully grown; and so this name, unfortunately, must replace *guineensis*. Birds from the western half of the Congo are doubtless identical with *brevirostris*, and those of the Katanga probably *erlangeri*.

DISTRIBUTION OF *H. h. nilotica*.—Abyssinia and the Anglo-Egyptian Sudan, south at least to Ukerewe Island in Lake Victoria, Lake Kivu or the northern end of Tanganyika, and the northeastern part of the Belgian Congo. Gyldenstolpe's specimens from Lake Kivu had bills 153–162 mm., and must therefore be included here.

The hadada ibis is certainly common in every part of the Congo, except on the higher mountains, but I have never seen a true flock of them. Usually they occur in pairs, and their loud mournful calls are a common sound in the vicinity of watercourses. In the savanna districts they are found in the woods that border streams, whether large or small;

¹1909, Ornith., XIII, pp. 190–196.

in the forest they are usually seen only along the banks of rivers, and never venture far into the undergrowth of the forest. After sundown it is a common sight to see a pair flying high overhead on their way to some favorite roosting-place.



Fig. 187. *Hagedashia h. nilotica*, in captivity. Photograph by H. Lang.

They perch readily, and when flushed commonly take to the trees. When put to flight by an approaching canoe, they usually give a loud, nasal "hã-hã, hã-ã-ã!"¹ flap heavily out from a tree, and may keep moving on ahead of the boat for some time, alighting at safe distances, before

¹In my attempt to write the calls of some of these ibises, *ã* is used for a sound like the French nasal *an*.

making up their minds to cross to the other bank and be done with the nuisance. While more at its ease, or standing with its mate in some large tree, the hadada may deliver a single, long-drawn "whaaaah."

All the ibises whose stomachs we examined seemed primarily insect-feeders, and it is doubtful if *Hagedashia* ever attempts to catch fish. That the long bill is used for probing is perfectly clear from the mud that so often adheres to it, and in one case eighteen mole-crickets were counted in a single stomach. Water-bugs, beetles, and other insects are also captured, and even large maggot-like larvæ, probably of flies.

I am unable to say from the dissections whether there is a definite season for breeding and regret that we never found a nest. They are known, however, to build in trees at no great height, laying three eggs, with diffuse red-brown spots on a light grayish-green ground, 59-65 mm. by 41-43.¹

***Hagedashia hagedash brevirostris* (Reichenow)**

Theristicus brevirostris REICHENOW, 1907, Orn. Monatsber., p. 147 (type locality: Alén, S. Cameroon).

?*Plegades falcinellus* JOHNSTON, 1884, 'The River Congo,' p. 370 ("Upper and Lower river").

Hagedashia caffrensis DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 26 (In part. Umangi; Lower Congo). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 262 (between Bolobo and Coquilhatville).

Hagedashia hagedash guineensis NEUMANN, 1909, Ornith., XIII, pp. 191, 194, 196 (In part. Upoto). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 36 ("Gambia to the Congo").

Hagedashia hagedash MENEGAUX, 1918, Rev. Française Orn., V, p. 253 (Zambi).

Hagedashia hagedash brevirostris SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 313, 386 (Kasai district along rivers; Kwamouth); 1924, idem, XII, p. 408 (Eala); 1925, idem, XIII, p. 4 (Mongende). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 115 (Congo R.).

DISTRIBUTION.—West African coastal region, from Senegal to the Congo River, Kasai district, and perhaps Angola. I have not examined a specimen from the Kasai, and can only accept Dr. Schouteden's identification. He states that it is widely distributed along the rivers of that part of the Congo. Sir Harry Johnston's reference to *Plegades falcinellus* was probably based on the hadada, for he spoke of it as rather common from the Lower Congo to Bolobo, and did not list *Hagedashia* at all.

We have a specimen of *brevirostris* from the Gambia with culmen only 128 mm., but birds of the Gaboon and western Congo may be ex-

¹Reichenow, 1901, 'Vögel Afrikas,' I, p. 327.

pected to have somewhat longer bills. A female I collected at Lukolela has the culmen 136 mm., while a specimen from the Camma River, Gaboon, in the Philadelphia Academy, has the culmen 160 mm. long.

Hagedashia hagedash erlangeri Neumann

Hagedashia hagedash erlangeri NEUMANN, 1909, Ornith., XIII, p. 193 (type locality: Dogge, South Somaliland).

Ibis hagedash SCHALOW, 1866, Journ. f. Orn., pp. 418, 431 (Lufuku R.; Likulwe R.). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Lufuku; Likulwe).

Theristicus hagedash REICHENOW, 1901, 'Vögel Afrikas,' p. 325 (in part. Lufuku R.; Likulwe R.). MOURITZ, 1914, Ibis, p. 32 (Luapula R. in S. E. Katanga).

Hagedashia hagedash NEAVE, 1910, Ibis, p. 95 (L. Bangweolo; Katanga).

Hagedashia caffrensis DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 262 (in part. Kafubu R.; Lufidizi R.).

DISTRIBUTION.—Eastern Africa from southern Somaliland to the Zambesi, and presumably the Katanga district. Neave speaks of the hadada ibis as a common inhabitant of wooded spots on river banks throughout the Katanga district, usually met with in pairs and rather wary. The natives called it "nga nga."

KEY TO THE CONGO SPECIES OF *Lampribis*

Wing exceeding 305 mm., but bill relatively short, measuring from rear border of nostril less than 95 mm.; neck mainly of a rather uniform brown, though feathers may be somewhat lighter along shafts. *L. olivacea*.

Wing less than 305 mm. long, but bill relatively long, measuring 95 mm. or more from rear border of nostril; neck never uniform brown, its feathers always with salmon-buff centers, and often mainly of that color, with blackish borders. *L. rara*.

Lampribis olivacea cupreipennis (Reichenow)

Theristicus cupreipennis REICHENOW, 1903, Orn. Monatsber., p. 134 (type locality: Cameroon, the specimen was from Bipindi).

†*Lophotibis carunculata* JOHNSTON, 1884, 'The River Congo,' pp. 202, 371 (third day above Stanley Pool).

Lampribis olivacea CHAPIN, 1921, Ibis, p. 609 (Avakubi).

Lampribis olivacea olivacea CHAPIN, 1921, Amer. Mus. Novitates, No. 17, p. 15 (Avakubi). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 37 (Ituri district). SCHOUTEDEN, 1925, Rev. Zool. Afr., XIII, p. 4 (Bolobo).

Lampribis olivacea cupreipennis CHAPIN, 1923, Amer. Mus. Novitates, No. 84, pp. 3, 5, Fig. 3B (Avakubi; region of Bolobo). BANNERMAN, 1929, Nov. Zool., XXXV, p. 80, Pl. IV (Belgian Congo); 1930, 'Birds Trop. W. Afr.,' I, p. 120, Fig. 41 (Avakubi; Bolobo).

Avakubi, ♂, May 18.

ADULT MALE.—Iris very dark red, naked skin of face plain blackish; bill rather dull dark red; feet soiled pinkish brown.

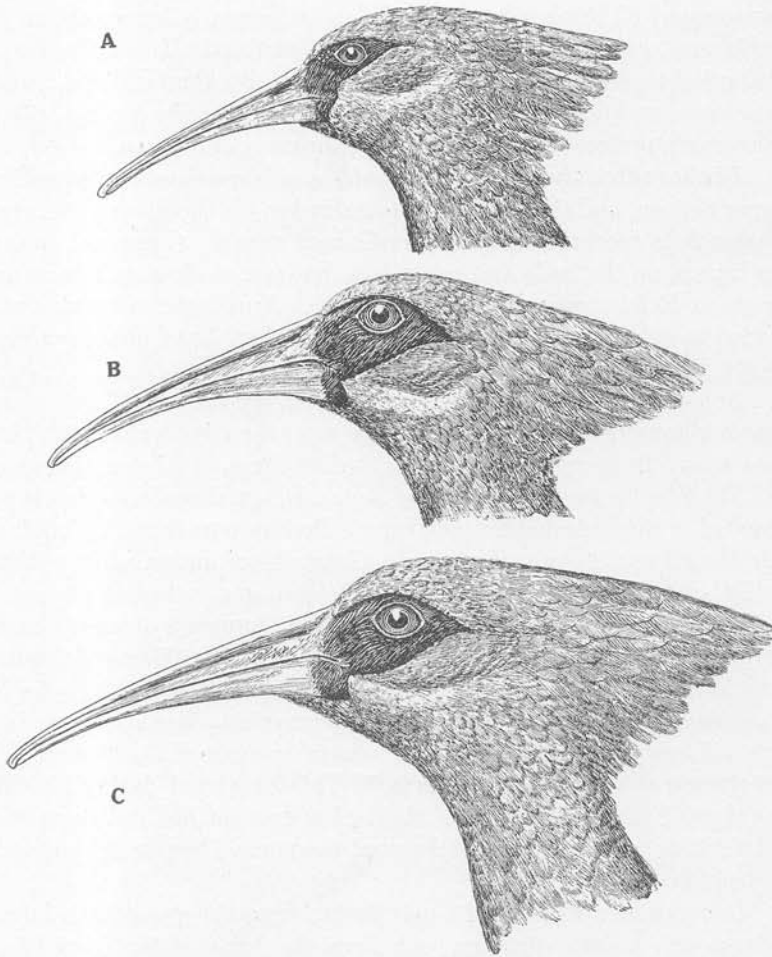


Fig. 188. Heads of three races of *Lamprolaima olivacea*: A, *bocagei*; B, *cupreipennis*; C, *akeleyorum*. $\times \frac{2}{3}$.

DISTRIBUTION OF THE SPECIES.—Despite the small number of specimens known, it doubtless ranges through the forests of Upper and Lower Guinea, from Liberia to the eastern Congo, while *L. rothschildi* Bannerman¹ of Princes Island and *L. akeleyorum* (Chapman)² of Mt. Kenia are certainly only subspecifically distinct. *Lampribis bocagei* Chapin³ of the island of São Tomé is much smaller than either *rothschildi* or *olivacea*, and may possibly be regarded as specifically distinct, though Bannerman prefers to include it among the races of *olivacea*.

I believe that the type of *Lampribis o. olivacea* (Dubus)⁴ came from Upper Guinea, and that *L. splendida* Salvadori,⁵ is therefore a synonym. Inasmuch as specimens from Lower Guinea seem more greenish in tone, less brown, on the body and neck than the type of *olivacea*, I have used for them Reichenow's name *cupreipennis*. Further comparisons were needed to substantiate this distinction, and these have now been made by Mr. Bannerman.

So far as I am aware, there are only six specimens of *L. o. cupreipennis* in museums. Reichenow's type was taken by Zenker at Bipindi, Cameroon; Bates secured one immature specimen at Efulen, Cameroon; and Du Chaillu an adult at the Camma River, Gaboon, which is now mounted in the Philadelphia Academy. Besides ours from Avakubi, the only Congo specimens are one in the Congo Museum, an adult obtained by Dr. Schouteden in the region of Bolobo, and a male collected by Rockefeller and Murphy at Kita-Kita in the Manyema district, October 2, 1929. The Bolobo specimen lends weight to Sir Harry Johnston's remarks in 'The River Congo': "I also saw, but failed to shoot, *Lophotibis*, a curious dun-colored species of Ibis, with greenish wings and a relatively short bill, very deep at the base, the general contour of the bird recalling the above-named *Scopus umbretta*." This happened during his third day above Stanley Pool. One might of course set his bird down for a hadada ibis, but I believe that he used the name *Plegades falcinellus* for the hadada.

Our specimen was one of a pair flushed from the ground amid dense undergrowth a little distance back from the bank of the Ituri River. No others were ever observed in the region, and I was inclined to doubt the statements as to noisy cries uttered by ibises of this immediate group. Now I know that *Lampribis rara* has a loud, raucous voice, and I believe that I have heard somewhat different notes from *L. olivacea*.

¹1919, Bull. Brit. Orn. Club, XL, p. 6 (Infant d'Henrique, Princes I.).

²1912, Bull. Amer. Mus. Nat. Hist., XXXI, p. 235 (Mt. Kenia, 9000 ft.).

³1923, Amer. Mus. Novitates, No. 84, p. 5, Figs. 2A, 3A (Rio de São Thomé).

⁴1838, Bull. Acad. Royale Sci. Bruxelles, IV (1837), p. 105 (Côte de Guinée).

⁵1903, Ibis, p. 185 (Soforé Place, Liberia).

Near Lukolela, on three or four occasions, usually toward dusk, I saw ibises flying over that repeated a short nasal call of two syllables like "ka'-ā," with the stress on the first syllable. Now and then it would change to a single "kā" or "kau." In the nasal tone there was a slight resemblance to the voice of *Hagedashia*, but the calls were definitely shorter. Never was I able to shoot one of these ibises, or to be sure that it had a crested head. If my identification is correct, *Lampribis olivacea* is far less common at Lukolela than *L. rara*.

The nest of this *Lampribis* has not yet been discovered, but is doubtless similar to that of *L. o. akeleyorum*, which was found by Akeley to be composed of dead sticks and placed on the limb of a small tree twenty-five feet above the ground. It contained three young and a large fragment of an egg-shell. The latter was pale pea-green somewhat stained with cinnamon-rufous and with irregular blotches of chestnut more or less evenly distributed. The natal down of the young was uniform brownish black, and the bare patches of their face had exactly the same extent as in the adult.

The measurements of five adults of *L. o. cupreipennis* are: wing, 309-351 mm.; tail, 125-148; culmen from rear border of nostril, 85-94; metatarsus, 57-70; middle toe with claw, 61.5-70.

***Lampribis rara* Rothschild, Hartert, and Kleinschmidt**

Lampribis rara ROTHSCHILD, HARTERT, AND KLEINSCHMIDT, 1897, Nov. Zool., IV, p. 377 (type locality: Denkera, Ashanti, Gold Coast). BANNERMAN, 1921, Ibis, pp. 108, 109 (Upper Congo); 1929, Nov. Zool., XXXV, p. 81, Pl. iv (Belgian Congo; Avakubi; Bomokandi); 1930, 'Birds Trop. W. Afr.,' I, p. 117 (Avakubi; Bomokandi R.; Bompona). CHAPIN, 1921, Ibis, p. 609 (Avakubi; Niapu); 1921, Amer. Mus. Novitates, No. 17, p. 14 (Avakubi; Niapu). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 313 (Sankuru R.; Basongo). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 36 (Ituri district).

Plegadis falcinellus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Banalia).

Niapu, ♂, January 2.

Avakubi, ♀, November 5.

ADULTS OF BOTH SEXES.—Iris dark brown; skin of face blackish, with a few small reddish warts at sides of forehead. Before and behind the eye are two large, well-defined spots of pale blue, and another elongate patch of light blue at the side of lower jaw. Bill dark red, a blackish groove extending forward from nostril; feet light purplish rose, with some blackish between the scales on front of tarsal joint and at base of toes; claws black.

IMMATURE.—Naked skin of face uniform dark purplish-blue.¹

¹Bates, 1911, Ibis, p. 485.

DISTRIBUTION.—From Liberia and Ashanti eastward across the Cameroon and Gaboon to the Upper Congo, reaching at least to the Ituri River, and southward to the Kasai district (south to Luluabourg), Kinda in the eastern Lulua district, and northern Angola.¹

There seems to be no character by which Lower Guinea specimens can be separated from those of Upper Guinea, unless perhaps they average larger. Besides the type, in the British Museum, there is a second full-grown bird from Denkera, darker below, but having some well-marked salmon streaks even on the crown. There is also a young bird from the same district, with wing only two-thirds grown, bill relatively very short, but crest showing plainly. The wings of the two adults from Denkera measure, respectively, 263 and 267 mm., bills from posterior border of nostril, 110 and 111 mm. A specimen from Liberia in the Philadelphia Academy has the wing 255 mm., bill from rear edge of nostril 115 mm.

From Lower Guinea, including the Congo, I have examined twenty-six specimens in various museums. The rather considerable variation in length of wing and bill cannot be attributed to sex. Immature birds have short bills. Among those which seem to be adult the wing varies from 262 to 299 mm. (smallest, a female from Lolodorf, Cameroon; largest, a supposed female from Kinda in southeastern Congo). The bill (measured from posterior border of nostril) varies from 95 to 134 mm. (smallest, a female from Lolodorf; largest, from Luluabourg, Kasai district, without sex). Length of tail, 101–120 mm.; metatarsus, 52–66 mm.

Dimensions of our two specimens from Niapu and Avakubi: wing, ♂, 267 mm., ♀, 280; tail ♂, 107, ♀, 113; bill from posterior border of nostril ♂, 115.5, ♀, 111; metatarsus ♂, 60, ♀, 57; middle toe with claw ♂, 63, ♀, 60. They both have a maximum amount of salmon-buff on the underparts, the breast-feathers entirely of that color save for narrow dusky margins.

Of the three specimens procured for us by Father Callewaert in the vicinity of Luluabourg, none has so much light coloring beneath. Neither have the majority of specimens I have seen from the Cameroon and Gaboon. One of the Luluabourg birds is only streaked with buff below, but the slight gloss of its wing-coverts indicates immaturity, though the bill exceeds the average length. The immature examples in other collections have usually been dark in color, and the sexes cannot be distinguished in this regard.

¹Reichenow, 1903, *Orn. Monatsber.*, p. 132.

The species is known from several other localities in the Congo region. The British Museum has a female obtained at Bompona [= Mompono] on the Maringa River, central Congo basin, by the Rev. H. M. Whiteside, March 30, 1911. Another adult specimen in the Congo Museum was collected by Commandant Hutereau in the vicinity of Bambili on the Uelle River; and the female from Kinda, Lulua district, in the same museum was secured by Baillet-Latour, April 2, 1915. In September and October, 1930, I collected two males and a female at Lukolela on the middle Congo.

The individual reported by Dubois as *Plegadis falcinellus* is still in the Congo Museum. It is an immature bird, with small salmon spots, and came from the River Bolokwa near Banalia (Commandant Nahan). The long crest-feathers are present, though soiled. A little outside our limits, at Diélé on the Alima River, French Congo, on November 1, 1882, the Mission de Brazza prepared a skin of this ibis, now in the Paris Museum.

For many years, the handsome *Lamprolaima rara* was considered to be the young of *L. olivacea*, and remained without a name, because no one had been able to make a proper comparison. Not only do the two species differ in color, but *rara* is smaller, with a longer bill and the naked areas of the face of different outline.

The mere statement of this bird's range is enough to indicate a forest-dwelling species, yet it is even more restricted as to haunts than one might guess. In the southern Congo, to be sure, it must content itself with heavy gallery forests; but in the Ituri we never knew it to come out along the bank of a river, or into a clearing. Our female specimen was one of a pair, feeding along a small forest brook. On taking alarm they flew up into a tree, where one was secured by my hunter, Nekuma. Enlargement of the ovary showed that it was ready to breed (November 5), the male killed on January 2 gave a contrary indication. Another example was observed near Penge in April, 1914, when it flew up from a small swamp in thick forest, but quickly disappeared.

At Lukolela in 1930 I became better acquainted with *Lamprolaima rara*. It lives usually in pairs, feeding by day in forested swamps. Shortly after sundown, however, each pair flies from its feeding ground to some other swamp where it will roost for the night in a large leafy tree, and at such a roost two or even three pairs may join company. The flight to the roost is made to the accompaniment of loud harsh cries like "k-hah!", reiterated at almost every beat of the wings.¹ In this call

¹Reichenow's excellent note, 1874, Journ. f. Orn., p. 378, really refers to *L. rara*, not *olivacea*.

it is the second syllable that is stressed, and the tone is far less nasal than that of *Hagedashia*. The male certainly gives these cries, and it often sounds as though both sexes called together. Occasionally they are varied by a more nasal "haw."

Toward 5:30 the next morning the birds fly off again, often a half-mile or more, to feed, advertising their passage in the same raucous voice, and often retracing the route of the previous evening. Occasionally this ibis will be heard moving about in the middle of the night, especially if there is bright moonlight, but never does it call while the sun is shining. I have heard this ibis in the Ituri forest and southern Uelle, near Coquilhatville, and very frequently near Lukolela. It appears to call at all seasons.

A female secured at Lukolela on September 26, at the beginning of the rains, was almost ready to lay; but it seems likely that the breeding season there extends over a large part of the year. A nest has never been found.

In three stomachs examined there was always a good deal of mud, and in each case three or four maggot-like insect larvæ (some of them 50 mm. long). Insect remains were noted once, shells of aquatic snails twice, and some soft parts apparently from these same mollusks.

***Threskiornis æthiopica æthiopica* (Latham)**

Tantalus æthiopicus LATHAM, 1790, 'Index Ornith.,' II, p. 706 (type locality: Ethiopia).

Ibis æthiopica JOHNSTON, 1884, 'The River Congo,' pp. 169, 199, 355, 370 (Islands in Stanley Pool; "Upper River"). MATSCHIE, 1887, Journ. f. Orn., p. 145 (Likulwe); REICHENOW, 1901, 'Vögel Afrikas,' I, p. 321 ("Ubangi R."); Likulwe, Marungu); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 250 (L. Mohasi). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Karema; Lower Congo). NEAVE, 1910, Ibis, p. 95 (L. Bangweolo; Mansya R. near L. Young). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 8 (Ujiji; Usumbura; Ruanda). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 8 (Kabaré). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 222 (Kivu; Busuenda; Kabaré). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 262 (L. Kisale).

Ibis religiosa DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Threskiornis SCHALOW, 1886, Journ. f. Orn., pp. 431, 434 (Likulwe R.; L. Upemba).

Ibis sacer SCHALOW, 1886, Journ. f. Orn., p. 432 (Likulwe R.).

Ibis æthiopica (= *religiosa*) OUSTALET, 1893, Naturaliste, VII, p. 128 (no exact locality).

Ibis æthiopicus SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 55 (Nyamsansi on S. W. side L. Albert).

?*Threskiornis æthiopicus* SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 312 (stated to occur on Kasai R.).

Avakubi, ♂, December 28.

Faradje, ♀, March 28.

ADULT MALE.—Iris dark grayish brown, rim of sclerotic membrane scarlet all around; bill and naked skin of head and neck blackish; feet blackish, with a tinge of dark red. The skin on the under side of the wings is partly nude, and there colored with red.

ADULT FEMALE.—Iris brownish gray, sclerotic ring brownish red behind cornea, dusky in front.

DISTRIBUTION.—Spread over the whole of the Ethiopian Region, but rather rare in most of the equatorial forest region. In a stay of five and one half years in the Congo I saw four sacred ibis: two on an island in Stanley Pool, July 12, 1909, and the two we collected. Two more were seen near Leopoldville on July 14, 1930. In the more southern and eastern parts of the colony they are more common; Rodhain and Bequaert shot specimens at Bulongo, on the Lualaba River below Bukama, April 24, 1911, and at Kasenga, Luapula River, January 30, 1912. On the lakes along the eastern border they are of regular occurrence. I have seen them on Lake Albert in August, and Lake Kivu in July. But in the Uelle and forested Ituri they are merely accidental, although it may be remarked that in each case they were seen at a time when the river they were visiting was at a low level.

The natives of the Upper Congo, or some of them at least, have seen ostrich feathers, and in the Uelle they have a name for this almost mythical bird, "Maligbwanga," which they know occurs somewhere to the distant northeast. Yet on seeing the loose inner secondaries of the ibis shot at Faradje they evinced great interest, and solemnly assured me that this must be one sort of "Maligbwanga."

Even in British East Africa, according to Lönnberg,¹ there would seem to be a seasonal migration of the sacred ibis. "During the dry season," he says, "I did not observe a single specimen . . . , but when the rains had begun, flocks . . . were seen in the beginning of April, at Roiru River some distance north of Nairobi."

On Lake Victoria the van Somerens² believe that they nest during the month of July, on certain of the lake islets. Von Heuglin³ found in the Nile Valley that in the northern Sudan they nested in July and August. In middle and southern Nubia, Senaar, and Kordofan they were merely birds of passage, arriving at Khartoum at the beginning of June, and returning toward the south again in December, January, and February.

¹1911, K. Svenska Vet. Akad. Handl. Stockh., XLVII, No. 5, p. 42.

²1911, 'Studies of Birdlife in Uganda,' p. 7.

³1873, 'Orn. Nordost-Afr.,' II, p. 1137.

"In South Africa" we read in Stark and Sclater¹: "the Sacred Ibis is met with throughout the whole country where suitable conditions exist, but it appears to leave the inland districts early in the spring and resort to the coast islands to breed." In the Transvaal, however, Roberts² found several breeding colonies of three to eighty nests each on a reed-grown "pan," December 11. The nests were built of rushes, very close together, and only a few inches above the water. The nests described by Heuglin in the Sudan were placed in colonies on large trees. Eggs of the sacred ibis, laid in sets of two or three, are rather rough in texture, chalky white with a faint blue-green tinge, and often sparsely streaked or blotched with rufous. Reichenow gives the measurements as 57-65 mm. by 39.5-45 mm.

Food.—The stomach of our female specimen contained very many crickets, two grasshoppers, two large water-bugs, and one water-beetle.

SUBFAMILY *Plataleinae*

KEY TO THE SPECIES OF *Platalea* IN AFRICA

- Feathering of forehead extending above the eyes to the base of the culmen; malar region feathered; naked skin of throat extending back to a median point at least 50 mm. from corner of mouth; feet always black.....*P. leucorodia*.
 Feathering of forehead does not extend to between front of eyes, and leaves forehead bare; malar region bare; naked skin of throat does not run back to a point, and scarcely extends 40 mm. from corner of mouth; feet crimson or light purplish-red in adults, blackish brown only in young.....*P. alba*.

[*Platalea leucorodia leucorodia* Linnæus]

Platalea leucorodia LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 139 (Europe; restricted type locality: S. Sweden).

The European spoonbill winters in northeast Africa and on some of the lakes of East Africa. Loveridge has taken it at Kilosa on April 4, and H. E. Anthony has brought us a specimen from El Dueim, White Nile, January 20.³ It seems not unlikely, therefore, that it may wander occasionally to Lake Albert.

Platalea alba Scopoli

Platalea alba SCOPOLI, 1786, 'Deliciæ Flor. Faun. Insubricæ,' II, p. 92 (type locality: "Luzon" ex Sonnerat; specimen probably from Cape of Good Hope). SHARPE, 1898, 'Cat. Birds Brit. Mus.,' XXVI, p. 49 (Lado). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 331 (Mpala); 1911, 'Wiss. Erbeg. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 250 (L. Mohasi). MOURITZ, 1914, Ibis, p. 33 (near Kalonga in S. E.

¹1906, 'Birds of S. Afr.,' IV, p. 96.

²1905, Journ. S. Afr. Orn. Union, I, pp. 32, 33.

³The bill of this immature specimen measures 217 mm., its wing 377 mm., so it cannot be assigned to *P. i. archeri* Neumann of the southern Red Sea coast (see Journ. f. Orn., 1928, p. 783).

Katanga). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 8 (Kabaré, L. Edward). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 223 (Beni; Kabaré). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 296 (S. shore L. Edward).

Platalea JOHNSTON, 1884, 'The River Congo,' p. 370 ("Stanley Pool"). SCHALOW, 1886, Journ. f. Orn., p. 413 (Mpala).

Platalea tenuirostris DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 25 (Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 146 (Mpala). SCHALOW, 1887, Journ. f. Orn., p. 227 (Mpala).

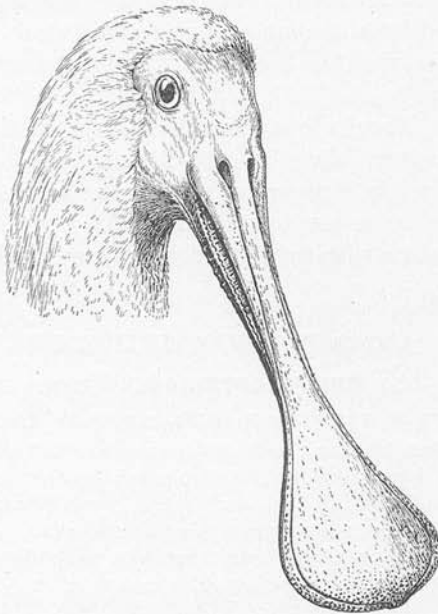


Fig. 189. Head of *Platalea alba*. $\times \frac{5}{12}$.

DISTRIBUTION.—Madagascar, and Africa from the Gambia to Sennar and south to the Cape Province, but not in the West African and Congo forests. It has been taken in the Gaboon, and may perhaps be expected in the region of Stanley Pool, where it was reported by Johnston, and on the lower Congo. Elsewhere in the Congo it has been observed only along the eastern border.

Near Kabaré on Lake Edward, August 21, Dr. Bequaert noted the African spoonbill as rather common. It was observed at the same place by Gyldenstolpe in April, and collected by Pilette in October and November, and so is evidently resident. At Mpala Böhm obtained it in July, and in the southeastern Katanga, Mouritz reported it in November.

On Lake Edward, where I too saw a number in January and May, 1927, the African spoonbills often gather in flocks of eight or ten. They walk on the muddy shores, or wade in the shallows, moving their bills from side to side in the water, and opening and closing the mandible as though feeling for food. In the stomach of one adult, I found a number of aquatic hemiptera. Their flight is ibis-like, with neck outstretched, and on the wing they sometimes repeat a quacking note.

The trachea of my adult female specimen was curiously twisted into a complete loop near the lower third of the neck, and had the appearance of being traversed by a median septum in this whole section. Similar looping of the windpipe has been described in *P. leucorodia*, but lower down.

In the Sudan, Heuglin found nests in September, while in the Transvaal, Butler discovered them in early October, and on Lake Shirwa, Roberts found them in September. They may be placed either among reeds in a swamp, or on trees near water. Two or three eggs are laid, sometimes four, white with rufous and violet-gray markings, 62-71 mm. by 43-45 mm.

ORDER PHENICOPTERIFORMES

FAMILY PHENICOPTERIDÆ. FLAMINGOS

KEY TO THE SPECIES OF FLAMINGOS IN AFRICA

- Wing-length exceeding 340 mm.; metatarsus exceeding 260 mm.; hind toe (with nail) 10-14 mm. long; distal portion of maxilla somewhat overlapping the edges of the mandible. *Phenicopterus antiquorum*.
 Wing shorter than 340 mm.; metatarsus less than 230 mm.; hind toe occasionally vestigial and never more than 7 mm. long (with nail); distal portion of maxilla narrower, fitting between the borders of the mandible. *Pheniconaias minor*.

Phenicopterus antiquorum Temminck

Phenicopterus antiquorum TEMMINCK, 1820, 'Man. d'Ornith.,' 2nd Ed., II, p. 587 (type locality: Europe).

?*Phenicopterus antiquorum* JOHNSTON, 1884, 'The River Congo,' p. 368 ("Congo R.").

?*Phenicopterus roseus* DERSCHIED, 1925, Bull. Cercle Zool. Congolais, II, p. 104 (Baraka; "Lake Mukamba, between Dibaya and Luluabourg").

Phenicopterus ruber antiquorum PONCY, 1926, Bull. Soc. Zool. Genève, III, fasc. 5, pp. 22, 23 (L. Kivu; Loanda).

The greater flamingo of the Old World, regarded by Hartert and by Selater as a race of *P. ruber* Linnæus, ranges from the Cape Verde Islands and the Mediterranean region to Lake Baikal and India, and has also been found in many parts of Africa, south to the Cape Province.

It is entirely wanting in the forest-regions of western and central Africa, save that specimens have been taken on the Gaboon coast. As flamingos of uncertain species have also been reported to occur at Kisémbó (or Kinsembo) on the Angola coast north of Ambriz,¹ they might well be expected to appear occasionally on the lower Congo.

Captain Tuckey,² who visited the lower Congo at the beginning of the rainy season, mentioned that "Flocks of flamingos going to the south denote approach of the rains." Pechuël-Loesche,³ a very competent observer, likewise described the irregular migration of flamingos along the Loango Coast, where they stopped occasionally on the beach outside Banya Lagoon and on the banks in Loango Bay. For the most part, he said, they hastened south to Kinsembo in Angola, where they fed in the extensive swamps. He noted flocks traveling southward in March, June, September, November, and December, and others moving northward in January and March.

Specimens seem never to have been obtained on the lower Congo, but Cassin⁴ listed a young specimen of "*erythræus*" from the Camma River, and Reichenow observed *antiquorum* in the Gaboon. So there can be no doubt as to the occurrence of the larger flamingo on the coast north of the Congo mouth, nor any great hope of finding *Phæniconaias* there.

As Dr. Schouteden has pointed out, Europeans in the Congo often apply the name "flamant" or flamingo to the pink wood-ibis, and this may be responsible for much confusion. Sir Harry Johnston told of seeing feathers and wings of flamingos in native hands on his way up the Congo to Bolobo, although he also listed the wood-ibis as *Tantalus* in the same work. Still more doubt attached to feathers of a flamingo from Lake Mukamba in the Kasai district, seen by Jobaert. Schouteden stated that the flamingo was totally wanting in the Kasai.

On a small lake near Baraka, Jobaert has also reported seeing a pair of flamingos, mentioned as *Phænicopterus roseus*; but his specific identification cannot be accepted without more proof. Poncy (1926) states that there is a skin of *antiquorum* from Lake Kivu in the Berlin Museum.

It is doubtful whether the larger flamingo ever breeds in tropical Africa; and while we have an immature bird from Lake Elmenteita, Kenya Colony, in October, it is not so young that it may not have been a migrant from the north. That some members of the species do, however,

¹Marquadsen, 1920, 'Angola,' p. 69.

²1818, 'Narrative Exp. R. Zaire,' p. 225.

³1888, 'Loango-Expedition,' III, part 1, p. 251.

⁴1859, Proc. Acad. Nat. Sci. Philadelphia, XI, p. 175.

spend the northern summer in East Africa is an established fact. I myself have seen numbers of them in fully adult dress in July, mingling with the flocks of *Phæniconaias* on Lake Elmenteita.

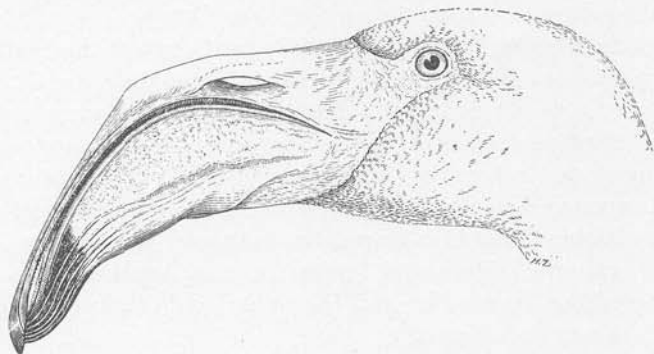


Fig. 190. Head of *Phænicopterus antiquorum*. $\times \frac{1}{2}$.

***Phæniconaias minor* (Geoffroy)**

Phænicopterus minor GEOFFROY, 1798, Bull. Sci. Soc. Philom., I, part 2, bulletin No. 13, pp. 97, 98, Pl. opp. p. 100, figs. 1-6 (type locality: Senegal). MATSCHIE, 1887, Journ. f. Orn., p. 146 (L. Upemba). REICHENOW, 1901, 'Vögel Afrikas,' p. 352 (L. Upemba; Tanganyika); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 251 (Kirandu Bay, E. shore of Tanganyika; L. Upemba). DUBOIS, 1905, Ann. Mus. Congo, Zoologie, I, f. 1, p. 25 (Tanganyika). VAN SOMEREN, 1916, Ibis, p. 207 (Kabeleka L. in Toro); 1922, Nov. Zool., XXIX, p. 11 (lakes in western Uganda).

Phænicopterus parvus DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Phænicopterus SCHALOW, 1886, Journ. f. Orn., pp. 412, 434 (Kirandu Bay; L. Upemba). TIELEMANS, 1925, Bull. Cercle Zool. Congolais, II, p. 149 (Mpala).

Phæniconais minor JOHNSTON, 1908, 'George Grenfell and the Congo,' II, p. 927 (Tanganyika; "Congo lakes; and broad rivers").

DISTRIBUTION.—Southern and eastern Africa, from Cape Province to Shoa; also Madagascar and northwest India. Its occurrence in Senegal is very doubtful. A specimen was secured by Storms in the vicinity of Lake Tanganyika, probably near Mpala. Flamingos were noted by Reichard at Kirandu on the east side of Tanganyika, and by Böhm at Lake Upemba, with the remark in both cases that they were not very red. These were referred by Matschie to *P. minor*, but confirmation is still needed.

Dr. Phillips tells me that he saw no flamingos of any sort during his visit to Lakes Albert, Edward, and Kivu; yet van Someren has twice stated that *Phæniconaias minor* is plentiful on the lakes in western Uganda, and that he saw old nests, or at least empty ones on Kabeleka Lake, between Fort Portal and Lake George. Scott-Elliot¹ likewise mentioned flamingos as occurring about lakes near Katwe. During a visit there in January, 1927, I failed to see even a feather of one; but

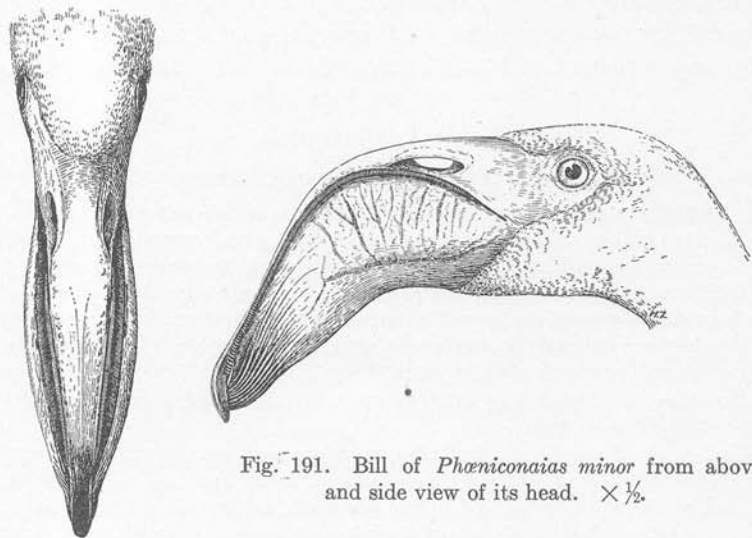


Fig. 191. Bill of *Phæniconaias minor* from above, and side view of its head. $\times \frac{1}{2}$.

Dr. A. C. Stanley Smith, Medical Missionary in British Ruanda, assures me that he once observed two large flocks on a "tiny lake to the left of the road [in coming from the east] just before you reach Katwe, a part of Lake Edward." He shot one of these flamingos, which "stood about as high as a marabou"; but cannot be sure now of its species.

Phænicopterus antiquorum and *Phæniconaias minor* are found together on Lakes Baringo, Hannington, Nakuru, Elmenteita, and Naivasha in East Africa; but there is still much uncertainty as to the distribution of the species within our limits. It is quite possible that both will be found occasionally along the Belgian shore of Lake Edward.

In Africa, as elsewhere, flamingos are partial to brackish water, and scarcely more than casual on fresh-water lakes. The lesser flamingo is not migratory in eastern tropical Africa, and within our territory it is to be expected only along the eastern frontier. It would seem that the

¹1896, 'Naturalist in Mid-Africa,' pp. 127-128.

"rosy flamingos" observed in numbers at the Lofu estuary near the southern end of Tanganyika by Johnston,¹ may well have been *Phæniconaias minor*. But I have heard no recent report of any flamingo on Lake Upemba.

Nests of *Phæniconaias* which I saw on Lake Elmenteita in Kenya Colony were low platforms of earth, only three or four inches high, and nearly flat above. On them lay numbers of rosy feathers from their builders, but only one old addled egg. Many nests were arranged in a line parallel to the water's edge, and very close to it. The egg was chalky white, and measured 85.5×54.9 mm.

ORDER ANSERIFORMES

FAMILY ANATIDÆ. DUCKS, GEESE

KEY TO THE GENERA OF ANATIDÆ OCCURRING IN OR NEAR THE CONGO

- 1.—Hind toe with a moderate or broad flap of skin on its lower edge, its breadth at least one-third length of toe; wing always lacks metallic speculum. 2.
Hind toe not lobed, or only very narrowly; wing with or without speculum. . . . 4.
- 2.—Secondaries with white or whitish areas; tail-feathers not markedly stiffened or narrowed, middle ones more than 15 mm. wide; back not conspicuously barred, nor with a white patch. NYROCA.
No white on secondaries; tail-feathers narrow and stiff, middle ones usually not 15 mm. wide. 3.
- 3.—Nail at tip of maxilla unusually large; upper back and scapulars barred with black and buff, a large white patch on lower back. THALASSORNIS.
Nail of bill not so large, but deflected slightly backward; no white patch on back, which is largely rufous in adult male, dark brown with buffy vermiculation in female. ERISMATURA.
- 4.—Wing without metallic speculum on secondaries. 5.
With metallic speculum on secondaries. 11.
- 5.—Size large, wing-length exceeding 400 mm.; face bare; a spur sheathed with horn on bend of wing. PLECTROPTERUS.
Wing very seldom reaching 400 mm.; face not bare; no spur on wing, though there may be a bony knob on outer border of bend of wing. 6.
- 6.—Sides of head and neck white, interspersed with numerous black feathers; wing at least 280 mm. long; adult males often with an upright fleshy comb, of blackish color, on culmen. SARKIDIORNIS.
Head and neck not white and black speckled; wing very seldom reaching 280 mm.; no comb on culmen. 7.
- 7.—Very small: wing-length less than 160 mm.; height of maxilla at base at least one-half of culmen; lower breast white, a broad band of light cinnamon-rufous across upper chest. NETTAPUS.
Larger: wing more than 160 mm. long; height of maxilla at base less than one-half of culmen. 8.

¹1923, 'Story of My Life,' p. 273.

- 8.—All upper wing-coverts light blue, back and breast deep rufous, head and neck black, often with a white patch about forehead or crown . . . *PTERONETTA*.
All upper wing-coverts not blue, though a part may be slaty 9.
- 9.—Metatarsus exceeding 45 mm.; lower breast not whitish, but buff, rufous, or black, sometimes barred at sides *DENDROCYGNA*.
Metatarsus less than 45 mm. long; lower breast whitish, sometimes indistinctly mottled or barred with dusky 10.
- 10.—Wing-length less than 195 mm.; an indistinct whitish stripe over the temporal region *QUERQUEDULA*.
Wing-length exceeding 200 mm.; no light temporal stripe *DAFILA*.
- 11.—Size large, wing exceeding 370 mm.; wing-coverts almost wholly white, a black subterminal bar on greater series; adults with a rufous patch around eye and another on middle of breast *ALOPOCHEN*.
Size smaller, wing less than 300 mm. long; not colored as above 12.
- 12.—Metallic speculum restricted to basal part of secondaries, the remainder of which is pale salmon-buff like tips of greater coverts; axillaries whitish with blackish bars or large spots *PÆCILONITTA*.
Speculum covering the greater part of secondaries, which are usually tipped with white 13.
- 13.—Wing exceeding 220 mm. 14.
Wing less than 210 mm. 16.
- 14.—Tail very pointed, the median pair of rectrices with narrow tips extending far beyond the next pair; lower fore-neck white, this color extending up in a stripe on each side almost to nape; upper back and flanks finely barred or vermiculated with gray and black *DAFILA*.
Tail but little pointed, median rectrices at most only a few millimeters longer than adjacent ones 15.
- 15.—Maxilla greatly widened toward tip, where it is more than 25 mm. broad; lesser upper wing-coverts blue or blue-gray; adult male with white on upper chest, but glossy green head *SPATULA*.
Maxilla little if at all widened distally, and not exceeding 23 mm. in breadth; no pure white on fore-neck or chest, or only a small white patch; male not green on head *ANAS*.
- 16.—A whitish or pale buff stripe from above eye over temporal region; wing-coverts largely blue-gray, greater ones tipped with white *QUERQUEDULA*.
No whitish stripe over eye or temporal region; wing-coverts not blue-gray.
NETTION.

SUBFAMILY *Erismaturinæ*

Erismatura maccoa Eyton

Erismatura maccoa EYTON, 1838, 'Monogr. Anat.,' p. 169 (type locality: "Indian Isles" = South Africa). SCHOUTEDEN, 1929, Bull. Cercle Zool. Congolais, V (1928), pp. 105, 115 (L. Gando).

Erismatura maccoa SCHOUTEDEN, 1929, Bull. Cercle Zool. Congolais, VI, p. 5 (L. Gando); 1932, idem, VIII, p. 42 (Pinga).

DISTRIBUTION.—Eastern and Southern Africa from Shoa to Cape Province. The first known occurrence in the Congo was at Lake Gando in the Kivu District, where Dr. Schouteden collected it. It has since

been reported from Pinga, southwest of Lake Edward. Scarce throughout its range, the African ruddy duck is found in small numbers on lakes in East Africa, usually amid the highlands. There are no precise records from Uganda, and the species is apparently very rare in the Kivu.

Expert at diving, this duck is wary and difficult to secure. Its egg is large, bluish white, and of rather rough texture. The nest is still unknown.

***Thalassornis leuconotus leuconotus* Eyton**

Thalassornis leuconotus EYTON, 1838, 'Monogr. Anatidæ,' p. 168 (type locality: South Africa). REICHENOW, 1900, 'Vögel Afrikas,' I, p. 106 (Chinchoxo). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 216 (Kabaré); 1929, Bull. Cercle Zool. Congolais, V (1928), p. 115 (Belgian Congo).

Thalassornis leuconota PECHUËL-LOESCHE, 1888, 'Loango-Expedition,' III, part 1, p. 262 (Loango Coast). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 23 (Katanga). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 4 (L. Bangweolo).

Thalassornis leuconota leuconota PHILLIPS, 1926, 'A Natural History of the Ducks,' IV, pp. 136, 142, Pl. LXXXIII (L. Chahafi).

DISTRIBUTION OF THE SPECIES.—Madagascar, and Africa from the Cape north to the Portuguese Congo, Katanga, Lake Edward, and Abyssinia. Madagascan specimens belong to the subspecies *T. l. insularis* Richmond. Selater¹ mentioned the typical race as occurring perhaps in the eastern Cameroon, but it is unknown in the forest area of the Upper Congo, as well as in the Kasai and the Uelle. It probably occurs rarely in the Lower Congo, but elsewhere is only found along our eastern border. Dr. J. C. Phillips obtained a half-dozen specimens on Lake Chahafi, so the species may be expected on other highland lakes of the Kivu district.

The white-backed duck is an expert diver, and builds a floating nest of rushes amid reeds on water three to five feet deep. Three to seven eggs are laid, of a warm brown color throughout, 64–68.6 mm. by 48.3–50.8 mm. In Natal, Millar found nests in November, December, and February; in Kenya Colony, van Someren noted adults in breeding condition in April and October.

SUBFAMILY Nyrocinæ

KEY TO THE SPECIES OF *Nyroca* TO BE EXPECTED IN THE CONGO

- 1.—Lower breast and abdomen dusky brown or brownish gray, the feathers sometimes tipped with gray in female; but never with white; under wing-coverts and axillaries dark gray; wing-length 197–212 mm.; no crest in either sex, sides of head in male more or less tinged with deep rufous; iris red or brown.

N. erythrophthalma.

¹1924, 'Syst. Avium Æthiop.,' part 1, p. 40; 1930, idem, part 2, p. 837.

- Lower breast whitish, or feathers tipped at least with whitish; axillaries and most of under wing-coverts white. 2.
- 2.—Male with a long occipital crest, head black glossed with violet or green, chest black; female with little or no crest, head dark brown to blackish, chest dark brown; iris yellow in both sexes; wing 188–210 mm. *N. fuligula*.
- No crest in either sex; head and chest of male rich reddish brown; head of female duller reddish brown, and chest rufous or dull brown; iris white in adult male, gray or brown in young and females; wing 176–193 mm. *N. nyroca*.

***Nyroca erythrophthalma* (Wied)**

Anas erythrophthalma WIED, 1832, 'Beitr. Naturg. Bras.,' IV, p. 929 (type locality: Lagoa do Braço, near Villa de Belmonte, Bahia, Brazil).

Aythya capensis DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 150 (region of L. Tanganyika).

Æthya brunnea DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 23 (Tanganyika).

Aythya erythrophthalma NEAVE, 1910, Ibis, p. 101 (E. shore of L. Bangweolo).

Nyroca capensis REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 239 (L. Karago south of Karisimbi in Ruanda). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 5 (Rutshuru). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 216 (Mukoto; Kibati; Katana; Kabaré); 1929, Bull. Cercle Zool. Congolais, V (1928), p. 114 (Belgian Congo).

Anas capensis PHILLIPS, 1923, 'A Natural History of the Ducks,' II, pp. 267, 268 (Rutshuru).

Nyroca brunnea GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., Stockh., (3) I, No. 3, p. 293 (L. Edward).

?*Nyroca nyroca* F. DE SCHAECK, 1924, Bull. Soc. Zool. Genève, III, fasc. 6, p. 80 ("Luluabourg").

Nyroca erythrophthalma PHILLIPS, 1925, 'A Natural History of the Ducks,' III, pp. 220, 222 (Ruwenzori district; L. Bangweolo; Katanga district; lakes of Kigezi district; Tanganyika).

DISTRIBUTION.—Africa from the Cape north to Angola in the west, and to Kordofan and Shoa in the northeast; also in Brazil. *Nyroca nationi* (Selater and Salvin), ranging from Peru to Colombia, is very closely allied, as pointed out by Dr. Chapman.¹

Within our limits, the African pochard is found only along the eastern border. Neave reports it as rare in the region of the Katanga, but it is more common in the Kivu district. Dr. J. C. Phillips obtained specimens for the Museum of Comparative Zoölogy at Lake Chahafi in April, when they seemed to be breeding there. In Nyasaland the nesting season extends from November until May.² The nest is made of sedge, lined with down and feathers, and located in reed-beds; the eggs creamy white, 55.9–58.5 mm. by 38.2–43.2 mm. In South Africa sets were said by Layard to number five to eight.

¹1917, Bull. Amer. Mus. Nat. Hist., XXXVI, pp. 234, 235.

²Roberts, 1924, Ibis, p. 359.

[*Nyroca nyroca* (Güldenstädt)]

Anas nyroca GÜLDENSTÄDT, 1770, Nov. Comm. Sci. Petropol., XIV, part 1, p. 403 (type locality: S. Russia).

Nyroca nyroca nyroca JACKSON, 1926, 'Notes on Game Birds of Kenya and Uganda,' p. 250 (Butiaba on L. Albert).

The white-eyed pochard of Europe and western Asia migrates to India and to northern tropical Africa—Northern Nigeria, Khartum, and Abyssinia. A few apparently travel still farther, for Jackson records a male bird from Butiaba on Lake Albert, which was shot from a flock by Sir Geoffrey Archer. So this duck may be added to the list of possibilities for the western shore of Lake Albert. A supposed occurrence in the Kasai district is probably based on *N. erythrophthalma*.

[*Nyroca fuligula* (Linnæus)]

Anas fuligula LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 128 (Europe; restricted type locality, Sweden).

Nyroca fuligula PHILLIPS, 1925, 'A Natural History of the Ducks,' III, pp. 228, 234 (Butiaba, on E. side L. Albert; L. Chahafi).

The tufted duck breeds from Ireland to the Commander Islands, east of Kamtchatka, and migrates south to the Greater Sunda Islands, the Seychelles, East Africa, and occasionally Liberia. We have a male from Lake Naivasha (Caldwell), and van Someren reports an example from the Yala River, Kavirondo district. Dr. J. C. Phillips saw a male on Lake Chahafi, shot it, but could not secure it. This lake is just over the Uganda border from Belgian Ruanda, so the species deserves mention here. It is to be expected on Lake Albert.

SUBFAMILY *Anatinae*KEY TO THE CONGO SPECIES OF *Anas*

- Innermost secondaries, longer scapulars, and rectrices with conspicuous bars or patches of white or pale buff; a broad bar of white across the greater wing-coverts; abdomen dark gray-brown, its feathers narrowly tipped at most with gray.....*A. sparsa*.
 No light barring on inner secondaries, scapulars, or rectrices; greater wing-coverts with only a very narrow white subterminal band; abdomen rather light gray with rounded, dusky-brown spots on the feather-centers.....*A. undulata*.

Anas sparsa leucostigma Rüppell

Anas leucostigma RÜPPELL, 1845, 'Syst. Uebersicht Vög. N.-O. Afr.,' pp. 130, 138, Pl. XLVIII (type locality: Abyssinia, especially in southern part).

Anas sparsa SALVADORI, 1909, 'Il Ruwenzori. Parte Scientifica,' I, p. 163 (Bujongolo, on Ruwenzori). O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 443 (Mubuku Valley, 10,000 ft.). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr.

Exp. Mecklenburg, III, p. 239 (Mubuku Valley, 10,000 ft.). JACKSON, 1926, 'Notes on Game Birds of Kenya and Uganda,' p. 233 (Kigezi). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 257 (Lubumbashi R.). SCHOUTEDEN, 1929, Bull. Cercle Zool. Congolais, V (1928), p. 114 (Belgian Congo).

Anas sparsa leucostigma PHILLIPS, 1923, 'A Natural History of the Ducks,' II, pp. 120, 121, 126 ("Ituri River").

Anas sparsa sparsa GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 291 (Mt. Sabinyo, 2600 m.).

?*Anas sparsa* CHAPIN, 1928, Natural History, XXVII (1927), p. 623 (W. Ruwenzori).

Gamangui, ♂, February 12.

Medje, ♂, ♀, May 24.

ADULT MALE.—Iris dark brown; "nail" of the maxilla, and a large area on top of maxilla black, rest of bill grayish pink, but the posterior half of the skin enclosed by mandibular rami is also black; feet brownish yellow, webs blackish.

ADULT FEMALE.—Colors of soft parts similar, but black patch of maxilla smaller, no black skin beneath chin.

DISTRIBUTION OF THE SPECIES.—Africa from the Cape Province north to Abyssinia and northern Cameroon, but wanting, it would seem, in most of the Lower Guinea forest and the savannas on its southern edge. We found it only at the northern and eastern edges of the Ituri forest. I have since observed it at Nizi, on the plateau west of Lake Albert, and on the Biakobe River in the highlands west of the upper Semliki. A pair of brownish ducks seen in a lake at 14,200 feet, just below the glaciers of Mt. Stanley, must also have belonged to this species.

Typical *sparsa* of South Africa has the bill dark lead-blue with a black saddle-mark and black nail. In *A. s. leucostigma*, which appears to range from East Africa and Abyssinia to northern Cameroon, the light areas of the bill are much paler, and in dried skins become yellowish. This difference was pointed out by Professor Reichenow,¹ but the geographic limits of the two forms cannot yet be fixed. There is a light-billed specimen from Nyasaland in the Tring Museum.

One of our males has a few white feathers on the fore-neck at the point where a white patch is sometimes seen in the South African bird. Our two other examples show no trace of it. The light bars on the long scapular feathers and the tail are slightly buffier than in a South African skin.

I have compared these specimens with a mounted male from Abyssinia in the American Museum, and with a male and a female from Kenya Colony in the Museum of Comparative Zoölogy. The black area on the culmen is most restricted in the Abyssinian specimen. This bird has

¹1912, Journ. f. Orn., p. 319.

the wing 21 mm. longer than the larger of our two males, the Kenya Colony birds being intermediate in size. Measurements of the three Ituri specimens: wing, ♂ 246, 251 mm., ♀ 234; tail, ♂ 103, 107, ♀ 105; culmen ♂ ♀ 40–44.5; metatarsus, ♂ ♀ 40–41. Though always placed in the genus *Anas*, this duck has a knob on the outer bend of the wing as large as that of *Pteronetta*.

It was a great surprise to find this duck in the northern Ituri, especially as we never met with it farther north, in the savanna country. Our first specimen was trapped by natives, and the others, a pair, were shot in a small forest brook, a place where *Pteronetta* also occurred. The stomach of the second male was found to contain small rough stones, pieces of a few insects and of a crab.

These specimens were in non-breeding condition. At an elevation of 10,000 feet on the eastern side of Ruwenzori, Woosnam noted that a pair or two were nesting in January in a broad swampy part of the Mubuku Valley. In Abyssinia, the species nests in February and March; in Southern Rhodesia, in June; and in South Africa, mainly from August to December, though nests have also been found in February and July. They were situated in masses of drift and similar situations (sometimes as high as six feet above the water), being lined with down and containing from five to eleven eggs. The latter are pale yellowish, glossy, and measure about 57 mm. by 42.5.¹

Anas undulata undulata Dubois

Anas undulata DUBOIS, 1837, 'Orn. Gallerie,' I, p. 119, Pl. LXXVII (type locality: Cape of Good Hope). NEAVE, 1910, Ibis, p. 100 (Bangweolo district). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (Urundi). MOURITZ, 1914, Ibis, p. 31 (Inkosakapenda). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 5 (Ruanda; near Katana). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 216 (Uganda-Congo frontier at the north of L. Edward); 1929, Bull. Cercle Zool. Congolais, V, (1928), p. 114 (Belgian Congo). PHILLIPS, 1923, 'A Natural History of the Ducks,' II, pp. 114, 115 ("Stanley Pool"; "upper Congo R."; Katanga; L. Bangweolo; Kalungwisi; S. E. Congo).

Anas xanthorhynchus JOHNSTON, 1884, 'The River Congo,' p. 369. ("Stanley Pool, and all broad parts of river, lagoons, etc.").

Anas undulata undulata GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., Stockh., (3) I, No. 3, p. 292 (Mt. Sabinyo, 2600 m.).

DISTRIBUTION OF THE SPECIES.—From South Africa north to Angola, Kasai district, the eastern Congo border, and Abyssinia. A northeastern subspecies, *A. u. ruppelli* Blyth, is separated because of its more bluish-green speculum and darker underparts. The transitional area is about Lake Victoria, and Congo specimens are best referred to the typical form.

¹Phillips, 1923, 'Natural History of the Ducks,' II, pp. 124, 125.

Sir Harry Johnston's statement that the yellow-billed duck was found on Stanley Pool and adjoining stretches of the Congo River still lacks confirmation. Father Callewaert has, however, sent us three specimens from Lake Munkamba, some forty miles east of Luluabourg, where they were taken on August 21.

The Congo Museum has a pair from Katentania, Katanga, taken by Charliers on December 4; but Neave found that they were not very common in the Katanga district. Rockefeller and Murphy obtained specimens in Marungu. In the highlands near Lake Kivu they are perhaps more numerous than elsewhere within our limits. Dr. Phillips secured specimens on Lake Bunyoni, just over the Uganda border; and Count Gyldenstolpe found them on a small brook in the saddle between Mts. Sabinyo and Mgahinga. Sage and I observed one individual in a swamp near Masikini at 5500 feet on the Lendu Plateau; and it is one of the commonest ducks on the lakes in British Ruanda.

In Kenya Colony, the yellow-billed duck is said to breed from February to July, and perhaps other months as well; in South Africa, from October to April. The nest, of rushes and other vegetable materials, is hidden near water, or sometimes far from it. Six to eleven eggs are laid, pale brown to cream-color, 50–53 mm. by 37–41 mm.

***Querquedula querquedula* (Linnæus)**

Anas querquedula LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 126 (Europe; restricted type locality; Sweden). HARTERT, 1920, 'Vögel Paläarkt. Fauna,' II, p. 1318 (Ruwenzori; S. shore L. Edward). PHILLIPS, 1923, 'A Natural History of the Ducks,' II, pp. 358, 363 (L. Edward; Ruwenzori region; Avakubi). SCHOUTEDEN, 1929, Bull. Cercle Zool. Congolais, V (1928), p. 114 (N. and E. Congo). GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 78 (Ruwenzori district.)

Querquedula circia O.-GRANT, 1910, Trans. Zoöl. Soc. London, XIX, p. 443 (Fort Portal, 5000 ft.).

Avakubi, ♀, December 4.

DISTRIBUTION.—Europe and Asia, south in winter to the Malay Archipelago and Africa as far as the Gambia River, Nyong River in Cameroon, the Ituri River, Marungu, and Tabora in Tanganyika Territory. Widely distributed in the Sudan, it is less common in the northern and eastern Congo.

On the Ituri River at Avakubi we noticed it in November and December, 1913. Our specimen was shot from a flock of about twenty-five garganeys, which would sit in a compact mass, far out in the stream, drifting down with the current. When they came close to the edge of a rapid, they all took wing, generally keeping low down close to the

water, sometimes spreading out in a long line, and then they flew some distance up-river again, only to repeat the performance. We found it almost impossible to approach them in a canoe, and even during flight they would always avoid passing within a fair shot-gun range. First noticed about November 20, they stayed in the vicinity during early December, the largest flock seen numbering close to forty. The stomach of the individual listed above contained small hard seeds.

We did not observe the garganey in the Uelle district, but the Congo Museum has a male from Niangara, procured by Calonne-Beaufaict. In January, 1927, I found four on a pond at Katwe, a few miles beyond the Congo border on the north shore of Lake Edward. On April 26, 1929 Messrs. Rockefeller and Murphy secured an adult male in full plumage at Kakonde in the Marungu highlands, which seems to constitute the southernmost record in Africa.

KEY TO THE CONGO SPECIES OF *Nettion*

- Larger: wing exceeding 180 mm. in length; crown and sides of head pale buff, thickly and finely spotted with blackish; back, rump, and upper tail-coverts more coarsely spotted, or in part barred, with brownish black; greater wing-coverts broadly tipped with white.....*N. capense*.
 Smaller: wing-length less than 165 mm.; whole crown blackish, cheeks white or buff; back-feathers blackish brown margined with buff; greater wing-coverts without white tips.....*N. punctatum*.

Nettion capense (Gmelin)

Anas capensis GMELIN, 1789, 'Syst. Nat.,' I, part 2, p. 527 (type locality: Cape of Good Hope). PHILLIPS, 1923, 'A Natural History of the Ducks,' II, pp. 267, 268 (In part. Katanga district). SCHOUTEDEN, 1929, Bull. Cercle Zool. Congolais, V (1928), p. 113 (Belgian Congo).

Nettion capense MOURITZ, 1914, Ibis, p. 35 (Moushosi in Katanga).

DISTRIBUTION.—From the drier, western parts of South Africa to southern Angola, Upper Katanga, eastern Africa, southern Abyssinia, Darfur, and Lake Chad. Unknown in the forested areas of West Africa and the Upper Congo. Neumann¹ remarked that in East and Northeast Africa he saw the Cape widgeon only on salt lakes, where it appeared to eat the small crustaceans that lived in them. It is plentiful, according to van Someren, on Lakes Nakuru and Naivasha in Kenya Colony.

The only definite Congo record is that of an individual shot by Mouritz near the Mushosi Escarpment in the southeastern Katanga district, on a small stream flowing out of a ravine. Phillips' mention of a

¹1904, Journ. f. Orn., p. 329.

specimen from Rutshuru¹ is erroneous, the bird reported by Lönnerberg being *Nyroca capensis* (= *erythrophthalma*).

In January, 1927, I saw what I believe were three Cape widgeons on a brackish pond at Katwe, near the northern shore of Lake Edward, but could not approach them. The large white area on the upper surface of the wing was conspicuous in flight, especially in one which I supposed to be a male.

Downy young have been recorded by Sjöstedt from the Kilimanjaro district in March, and a female with enlarged ovary on Lake Nakuru in October by van Someren. In the Cape Province, nests have been found in July and August. Littledale² described them as depressions beneath small bushes, the sides encircled with down. Sets consist of seven to nine eggs, yellowish white, 48–54 mm. by 34–38 mm.

***Nettion punctatum* (Burchell)**

Anas punctata BURCHELL, 1822, 'Travels Int. S. Afr.,' I, p. 283 (type locality: Zak River, Fraserburg Div., Cape Province). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 239 (L. Mohasi). PHILLIPS, 1923, 'A Natural History of the Ducks,' II, pp. 287, 288 (mouth of Lufuku R., W. of L. Tanganyika). SCHOUTEDEN, 1929, Bull. Cercle Zool. Congolais, V (1928), p. 113 (Belgian Congo).

Querquedula hottentota DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Querquedula punctata DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Tanganyika).

Nettion punctatum JACKSON, 1906, Ibis, p. 510 (Crater L., near Fort Portal). NEAVE, 1907, Mem. Proc. Manchester Lit. Phil. Soc., LI, No. 10, p. 22 (Kafulafuta R., in N. W. Rhodesia).

DISTRIBUTION.—From the Cape Province to southern Angola, Lake Tanganyika, Uganda, and Shoa; also on Madagascar. Neave (1910, Ibis, p. 100) stated that he did not see it on the Katanga plateau, but it is found in the highlands near Lake Kivu. Dr. Phillips secured specimens on Lake Bunyoni, British Ruanda, where I have also seen it. In a papyrus swamp near Masikini, at 5500 feet, in the highlands west of Lake Albert, De Witt Sage secured a female on August 17, and we saw two others. I have also noted a couple near the north shore of Lake Edward in January. The Hottentot teal, though usually described as not sociable, sometimes gathers in large flocks.

C. C. Roberts³ found several nests on Lake Chilwa, Nyasaland, usually situated in reeds in shallow water. They were constructed of fine reeds and grass, lined with down and feathers. The eggs were four to

¹1924, 'Natural History of the Ducks,' II, p. 268.

²1908, Journ. S. Afr. Orn. Union, IV, pp. 16–19, Pl. III.

³1924, Ibis, pp. 358, 359.

six in number, of pale cream color and smooth in texture; average dimensions 45.7 by 35.6 mm.

***Pæcilonitta erythrorhyncha* (Gmelin)**

Anas erythrorhyncha Gmelin, 1789, 'Syst. Nat.,' I, part 2, p. 517 (type locality: Cape of Good Hope). REICHENOW, 1900, 'Vögel Afrikas,' I, p. 118 (Likulwe R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 239 (L. Karago). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 5 (Kabaré). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 216 (Beni; Mukoto; Kabaré); 1929, Bull. Cercle Zool. Congo-lais, V (1928), p. 113, with fig. (Belgian Congo). PHILLIPS, 1923, 'A Natural History of the Ducks,' II, p. 353 (Ankole; both sides of L. Edward; Katanga, region of upper Lufira).

Querquedula erythrorhyncha DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 144 (Likulwe R.).

Dafla erythrorhyncha DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 23 (Katanga; Tanganyika).

Pæcilonetta erythrorhyncha NEAVE, 1910, Ibis, p. 101 (Upper Lufira R., 4000 ft.). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 292 (L. Edward).

Anas (Pæcilonetta) erythrorhyncha SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 359 (L. Edward).

DISTRIBUTION.—From the Cape Province north to southern Angola, Katanga district, Mokoto Lakes, Lake Edward, Semliki Valley, East Africa, and Abyssinia; also in Madagascar. Absent from the Lower Guinea forest and the savannas just to the south; unknown also in the Uelle district.

The red-billed duck keeps mainly to fresh water, often going in small flocks. Its nest is said to be made of sedge and lined with down and small feathers, placed among thick rushes on the border of a marsh. The eggs are greenish white, averaging 55.9 by 43.2 mm.¹ Six to ten form a clutch. Nests have been found in May in Nyasaland, and a female about to lay was taken in the same month by Sjöstedt near Kili-manjaro.

The position of this species in the genus *Pæcilonitta* Eyton is contested by Blaauw and by Phillips.² The type of the genus is *P. bahamensis* (Linnæus), to which *erythrorhyncha* bears some resemblance in color-pattern; but Dr. Phillips believes that the latter species really belongs near the teals.

[*Dafla acuta acuta* (Linnæus)]

Anas acuta LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 126 (Europe; restricted type locality: Sweden). PHILLIPS, 1923, 'A Natural History of the Ducks,' II, pp. 306, 315 (Ankole).

¹Roberts, 1924, Ibis, p. 359.

²1924, 'Natural History of the Ducks,' II, p. 355.

The pintail breeds in the northern part of both hemispheres, and in Africa migrates south to Northern Nigeria and Tabora in Tanganyika Territory. Doggett obtained a specimen on Lake Ruaketenge in south-west Ankole,¹ so there is a likelihood of its occurring along the eastern Congo border as far south as Lake Tanganyika. On January 20, 1927, indeed, I observed three pintails, one of them an adult male, at Katwe, which is scarcely twelve miles from the boundary of the Belgian Congo.

[*Spatula clypeata* (Linnæus)]

Anas clypeata LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 124 (Europe; restricted type locality, S. Sweden).

Spatula clypeata EMIN, 1892, Zool. Jahrbücher, p. 151 (Wadelai). PHILLIPS, 1925, 'A Natural History of the Ducks,' III, p. 17 (Wadelai).

The shoveler, a Holarctic duck breeding in Europe, Asia and North America, migrates southward in Africa to Senegambia, Northern Nigeria, and Kenya Colony, and has once been recorded from Cape Province. Emin Pasha secured two specimens near Wadelai on November 22 and December 7, respectively, so the species is likely to occur occasionally in the northeastern Congo, at least on Lake Albert.

***Pteronetta hartlaubii hartlaubii* (Cassin)**

Querquedula hartlaubii CASSIN, 1859, Proc. Acad. Nat. Sci. Phila., p. 175 (type locality: Camma River, Gaboon).

Querquedula hartlaubi SHELLEY, 1888, Proc. Zool. Soc. London, p. 50 (Tingasi).

Pteronetta hartlaubi SALVADORI, 1895, 'Cat. Birds Brit. Mus.,' XXVII, p. 63 (Tingasi). BANNERMAN, 1921, Ibis, p. 107 ("Boma in northern Belgian Congo" = Bondo; Uelle R.; Tingasi). PHILLIPS, 1922, 'A Natural History of the Ducks,' I, p. 85 (Alima R.; Tingasi; Niangara; Rungu). CHAPIN, 1927, Bull. Amer. Mus. Nat. Hist., LIII, p. 538 (Congo forest—food). SCHOUTEDEN, 1929, Bull. Cercle Zool. Congolais, V (1928), pp. 105, 111 (Mayombe; forested regions of Congo).

Pteronetta cyanoptera REICHENOW, 1900, 'Vögel Afrikas,' I, p. 123 (Tingasi).

Pteronetta CHAPIN, 1915, Amer. Mus. Journ., p. 284 (Congo).

Pteronetta hartlaubi hartlaubi SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 387 (Kwamouth); 1925, idem, XIII, p. 4 (Kunungu).

Pteronetta hartlaubii W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 44 ("to Congo; upper Uelle and Ituri districts"). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 149 (Tingasi; Bomokandi R.; Loango coast).

Medje, 2 ♀, April 5, May 24.

Niangara, 4 ♂, March 27, April 18, May 4; 6 ♀, March 22, April 17, 18, November 16; 3 ♂ im., December 8, 18; ♀ im., December 10.

ADULT MALE.—Iris reddish brown exteriorly, shading to dark greenish-brown on inner edge; bill black, with whitish, gray, or pinkish-gray subterminal band (on both maxilla and mandible) which often shades to yellow at each side, and a small light-

¹O.-Grant, 1905, Ibis., p. 204.

yellow spot below each nostril; feet dusky brown, tinged with yellowish or greenish, webs blackish.

ADULT FEMALE.—Iris dark brown or reddish brown; the cross-band and spots on bill entirely pinkish gray, not yellow; feet as in male.

At the base of the culmen adult males exhibit a slight swelling beneath the naked skin, which disappears nearly entirely in drying. This is of interest with reference to the frontal "comb" of *Sarkidiornis*.

Immature birds may readily be recognized by the straw-colored tips of the feathers of breast and belly, and two young males even at this stage have considerable white at the base of the culmen. Four adult males in the present series measure: wing, 272–277 mm.; tail, 100–102.5; exposed culmen, 46–48; metatarsus 41.5–44. Seven adult females: wing, 248–266; tail, 94–108; exposed culmen, 44–47; metatarsus 40–45. The wing of a male from Luluabourg, Kasai district, measures 287 mm.

As soon as their first remiges are full-grown, young birds have practically the same dimensions as adults, the tail alone remaining 9 or 10 mm. shorter.

DISTRIBUTION OF THE SPECIES.—Forest areas of Upper and Lower Guinea, from Liberia to the Uelle, Ituri, and Manyema districts, and south to the Mayombe forest, Kwamouth on the middle Congo, and Luluabourg in the Kasai district. Very likely it extends to the region of the upper Lualaba, and perhaps the entry "*Sarkidiornis ruber*" in Böhm's notebook at Lake Itambe was intended to designate this duck.¹

Slater² and Bannerman³ have both decided against the validity of Neumann's eastern race, *P. h. albifrons*⁴; yet no bird with so large a white patch on the forehead as Neumann's type has ever been taken near the West Coast. Bates' comments⁵ still hold good: in brief, that males from the Cameroon have a small white spot on the forehead, and females either none at all or only a faint "ticking," whereas the white spot is better developed in birds from the Upper Congo. Among the adult females in the present series, two have indications of white on the forehead, and a third shows a well-marked spot, 7 mm. from front to back. From Upper Guinea I have seen only two specimens in the British Museum. Neither has any white on the forehead, but both may be females.

If we do recognize *albifrons* as a subspecies, we must limit it to the Upper Congo, Ituri, and Aruwimi rivers, for males from the Uelle have

¹See Schalow, 1886, Journ. f. Orn., p. 424.

²1924, 'Syst. Avium Ethiop.', part 1, p. 44.

³1921, Ibis, p. 106.

⁴1908, Bull. Brit. Orn. Club, XXI, p. 42 (Ituri Forest).

⁵1911, Ibis, p. 482.

only a little more white on the head than those of the Cameroon, and scattered white feathers sometimes on the crown or the loreal region. A male from Luluabourg, obtained by Father Callewaert, likewise has a clear-cut white forehead, and then an ill-defined whitish patch in the middle of the crown. An adult in the Congo Museum, received from the "Compagnie du Kasai," is perhaps a female and has only a narrow whitish band on the forehead.

Cassin's type of *hartlaubii* in the Philadelphia Academy is adult, and labeled as a male, but has no trace of white on the forehead. Three specimens in the U. S. National Museum from the Fernand Vaz district (Aschemeier) have practically no white there either, though two of them were sexed as males. Of fourteen in the Carnegie Museum from Lolodorf and Batanga, Cameroon, only three have really white frontal patches, the widest 12 mm. from front to back. Many of them, though sexed as males, have no distinct frontal spot.

On the other hand, the type of *albifrons* is by no means unique, for I have examined three other similar specimens from the Ituri and Aruwimi, and one from Coquilhatville. It must be added that males with smaller white patches on the forehead also occur in the same localities.

Pteronetta hartlaubii is practically the only duck that is typical of the "West African" rain forests and the adjacent gallery forests. In the southern Cameroon, it is clear from the collections of G. L. Bates¹ that it is the only duck to be seen, and likewise in the forested regions of the Ituri and southern Uelle districts this is the only duck that can be called characteristic of the country. The other species collected there were more or less uncommon and irregular. Yet, even so, we never found it very abundant; and, strangely enough, it seemed more common at the northern edge of its range, near the Bomokandi River and Niangara, than anywhere along the Ituri River. I have traveled in April, for example, some fifty miles along the Ituri by canoe, without seeing a single duck of any sort, although the water was still rather low. On the other hand, just north of the forest, in the region about Faradje, we spent two years without seeing a single example of *Pteronetta*, our most northerly record being on the Uelle River between Niangara and Dungu, in early March, 1913. No migration or marked seasonal variation in numbers was noted in the case of this duck.

Near Niangara, I once saw six of them, in company with a spur-winged goose, in a small pond; but more often they are found in pairs, or even singly. They are shy enough never to allow a man within gun-

¹1909, *Ibis*, p. 6; 1911, *Ibis*, p. 482.

shot if he is in plain view, and on flying up they frequently alight on large boughs of leafy trees. Small forest brooks, often completely hidden beneath the trees, are frequented by these ducks. There are no lakes in this vicinity, and they seem not to be fond of large rivers. The habits of the few we found in the Ituri district were the same, but there one might sometimes spend a whole month collecting birds without seeing a single *Pteronetta*. At Lukolela on the middle Congo it was equally difficult to find.

Occasionally in taking off from the water this duck utters a rather harsh "kah-hak-k-k-k!" or "gr-r-r-r-r!," but is not as a rule a noisy bird. The male possesses a rounded "labyrinth" of only modest dimensions, at the left side of the syrinx.

Though I never found or heard of a nest, one of the old birds taken in November near Niangara had the ovary slightly enlarged. This, with the fact that fully-fledged but immature birds were shot in December, makes me feel certain that breeding occurs towards September, and probably it does not extend throughout the year; yet where the bird is found south of the equator, as in the Kasai, the season would naturally be reversed.

Near Bitye, southern Cameroon, Bates¹ says that the young, which are marked with four light spots on the dark brown back, are caught on or near streams rather frequently. In November (wet season), a native found a female with her brood of nine ducklings, and some of the latter were kept for several weeks. They could climb out of an old keg, clinging to the wood with their sharp claws; and similarly, when put in a wire pen, "the first jump from the ground landed the duckling several inches up the wire netting, where it clung with its claws; then another jumping effort, with one foot clinging fast, brought its other foot far above the first station; and so it worked its way to the top. The disposition, and perhaps the power, to climb ceased after a day or two; it seemed to be a special endowment enabling these young ducklings, when hatched in a hollow tree, to reach the opening and escape."

Eleven stomachs of *P. hartlaubii* examined by us revealed in six instances only coarse sand, with no identifiable food-remains; but of the five remaining birds, one had eaten twenty-four aquatic insect-larvæ, mainly of dragon-flies, some about two inches long. A second had eaten similar larvæ, plus eight fresh-water snails with hard conical shells; a third, one spider, one shrimp, and two tiny bivalve molluscs; a fourth, 150 shrimps, one water-bug, and one dragon-fly larva; and the last, many

¹1911, Ibis, p. 482.

small seeds. Bates¹ reports that this duck also eats the cassava roots that the natives lay in streams to soak.

***Pteronetta hartlaubi albifrons* Neumann**

Pteronetta hartlaubi albifrons NEUMANN, 1908, Bull. Brit. Orn. Club, XXI, p. 42 (type locality: Ituri Forest, N. E. Congo).

Pteronetta hartlaubi DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Popoi; Ituri). BANNERMAN, 1921, Ibis, p. 107 (in part. Ituri Forest). PHILLIPS, 1922, 'A Natural History of the Ducks,' I, p. 85, Pl. VII (in part. Northeastern Congo; Avakubi).

Pteronetta cyanoptera albifrons REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 240 (Ituri). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 216 (Ituri; Popoi; Panga); 1924, idem, XII, p. 408 (Eala; Tondu).

?*Pteronetta hartlaubi albifrons* HARTERT, 1925, Nov. Zool., XXXII, p. 273 (Ituri Forest).

Avakubi, 3 ♂, February 4, March 31.

Colors of eye, bill, and feet the same as in *P. h. hartlaubii*.

DISTRIBUTION.—Restricted, in so far as known, to the Ituri and Aruwimi valleys and the Congo River near Coquilhatville. The type, which I examined at Tring, was collected by C. F. Camburn somewhere in the vicinity of Irumu or Kilo. Camburn secured two other specimens in the same neighborhood: one marked male, the other female, but both of these have only small white frontal patches.

Similarly, of the three adult males we obtained at Avakubi, only one (February 4) has the entire crown and the feathers encircling the base of the bill white. This is the individual figured by Phillips (1922, 'Natural History of the Ducks,' I, Pl. VII). Another has a squarish frontal patch some 12 mm. deep and a couple of white feathers in the crown; the third shows a smaller frontal spot but more numerous white feathers scattered in the crown, and a few on the lower fore-neck.

In the Congo Museum at Tervueren there are two males from Popoi on the Aruwimi collected by Nahan. One has the entire forehead and crown white, but loreal region black; the second has the white extending down beside the base of the bill to the gape, but a little less extensive on the hind-crown. Two females in the same collection from Popoi and Panga have only narrow brownish white or whitish bands across the forehead. Mr. J. De Riemaeker has shown me a *Pteronetta* which he collected near Coquilhatville, with as much white on the crown as any I have seen from the Ituri.

Measurements of three white-crowned males from Avakubi and Popoi: wing, 270–286 mm.; tail, 104–107; exposed culmen, 46.5–49. The female from Panga has wing, 269; tail, 101; exposed culmen, 45.

¹1907, Ibis, p. 425.

***Alopochen ægyptiacus* (Linnæus)**

Anas ægyptiaca LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 197 (type locality: Egypt).

Anas LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 408 (Lower Congo).

Chenalopez ægyptiaca JOHNSTON, 1884, 'The River Congo,' pp. 169, 202, 355, 369 ("Stanley Pool, and all broad parts of river, lagoons, etc."). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika). SHELLEY, 1901, Ibis, p. 167 (E. shore of L. Moero).

Chenalopez SCHALOW, 1886, Journ. f. Orn., pp. 422, 432 (Luvule R.; Lufira R.; Luvilombo R.).

Chenalopez ægyptiacus MATSCHIE, 1887, Journ. f. Orn., p. 144 (Luvule R.; Lufira Falls). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 165 (N. end L. Albert). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 166 (L. Albert). OUSTALET, 1893, Naturaliste, VII, p. 128 (no exact locality). REICHENOW, 1900, 'Vögel Afrikas,' I, p. 131 ("Ubangi R."; Tanganyika; Luvule R.; Lufira R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 241 (L. Mohasi; Kisenyi). LÖNNBERG, 1907, Arkiv. f. Zool., III, No. 21, p. 3 (Mukimbungu); 1917, idem, X, No. 24, p. 5 (Kabaré; L. Edward). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 5 (L. Kivu; salt lake near L. Edward). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 217 (Beni; Kabaré; Kaniki; S. of L. Edward; Old Mission Saint-Gustave); 1929, Bull. Cercle Zool. Congolais, V (1928), p. 108 (Belgian Congo). MENEGAUX, 1918, Rev. Française Orn., V, p. 254 (Zambi).

Alopochen ægyptiaca DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Mayombe; Umangi; Kisantu; Tanganyika).

Chenalopez (Alopochen) ægyptiacus SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 358 (Kisenyi).

Alopochen ægyptiacus PHILLIPS, 1922, 'A Natural History of the Ducks,' I, p. 187 (L. Albert; L. Edward; Luvule; Lufira; W. shore L. Tanganyika; Katanga; Mukimbungu). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 313 (Basongo; Luebo; Tshikapa). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., Stockh., (3) I, No. 3, p. 291 (Ngoma; L. Edward; L. Albert). FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 39 (eastern Belgian Congo).

DISTRIBUTION.—Throughout Africa south of the Sahara, and extending to the northeast through Nubia and Egypt as far as Palestine. Very rare, nevertheless, in the forested part of the Congo, except along the broadest rivers.

Even in the country about Faradje the Egyptian goose was so extremely scarce that we could never secure a specimen; and personally I saw it there only on a single occasion, between Dungu and Faradje in early February, when two examples passed overhead, near enough to be clearly observed with the glass.

On our way up the Congo River, in July when the water was low, geese of this species were occasionally noted on sand-bars from Stanley Pool at least as far as Lukolela; and others were observed on small islets in the lower Congo below Boma in late January and July. Dubois'

record from Umangi, and Johnston's from Stanley Pool are doubtless authentic; but along the Nepoko, Ituri, and Aruwimi rivers we failed to find any Egyptian geese. Neither did I see any along the upper Congo in December, at high water. The species is common about the lakes on the eastern Congo border, as well as on the rivers of the Katanga and Kasai districts. Besides frequenting the shores of lakes and the open banks of rivers, they are often seen feeding in tilled fields on dry ground. Their calls include a hoarse honk and even harsher sounds somewhat like the voice of guinea-fowls.

Egyptian geese live usually in pairs or small parties rather than large flocks, and know how to perch on limbs of trees. In the Sudan, they breed mainly from July to September, during the rains; in South Africa mostly from August to January. The nests are occasionally on the ground, but more often in trees, sometimes on old nests of other birds, or even on cliffs. From five to eight eggs are the rule, relatively small and round, yellowish white. Dimensions: 55-68.6 mm. by 44-48.3.¹

***Sarkidiornis melanotos* (Pennant)**

Anser melanotos PENNANT, 1769, 'Indian Zoöl.,' p. 12, Pl. XI (type locality: Ceylon).

Sarkidiornis africana DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Sarcidiornis SCHALOW, 1886, Journ. f. Orn., p. 434 (between the Lufira and Kamolondo).

Sarcidiornis melanotos MATSCHIE, 1887, Journ. f. Orn., p. 144 (Luvule R.; Lufira R.). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 5 (Kasindi).

Sarcidiornis africana OUSTALET, 1893, Naturaliste, VII, p. 128 (no exact locality).

Sarkidiornis melanotos REICHENOW, 1900, 'Vögel Afrikas,' I, p. 129 ('Ubangi R.'; Marungu; Luvule R.; Lufira R.). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 313, 387 (Kasai R.; Lulua R.; Kwamouth); 1925, idem, XIII, p. 4 (Kunungu; Mongende; Bolobo); 1929, Bull. Cercle Zool. Congolais, V (1928), p. 109, with fig. (Belgian Congo).

Sarkidiornis melanonota DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Tanganyika; Popoi; Ituri).

Sarcidiornis melanonota O.-GRANT, 1910, Trans. Zoöl. Soc. London, XIX, p. 444 (Fort Portal, 5000 ft.). NEAVE, 1910, Ibis, p. 100 (E. shore of L. Bangweolo). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 150, 152 (Kongolo). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 5 (L. Bangweolo). MENEGAUX, 1918, Rev. Française Orn., V, p. 254 (Zambi). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 257 (Elisabethville).

Sarcidiornis melanota PHILLIPS, 1922, 'A Natural History of the Ducks,' I, p. 68 ('Ubangi'; Katanga; Tanganyika; 'Upper Congo'; Marungu; Luvule; Lufira).

¹Phillips, 1922, 'Natural History of the Ducks,' I, p. 196.

Avakubi, 4 ♀, January 12, November 30, December 12.

Faradje, 3 ♂, January 10, 23, February 3; 3 ♀, January 18.

ADULT MALE.—Iris dark brown; bill and comb black; feet rather dark brownish gray.

ADULT FEMALE.—Iris dark brown; bill black, gray beneath mandible; feet rather light grayish green.

Of our three males only a single one has a well-developed comb, which measured 48 mm. from front to rear, and 58 mm. from its top to the edge of the maxilla. It was slightly concave on the left side, bulging on the right; internally it was composed of dense connective tissue filled with oil. It seems very doubtful whether the comb dwindles in size after the breeding season, as is sometimes stated. I am inclined rather to look upon its development as an indication of age.

The tufts of bright yellow feathers borne by adult males at each side of the base of the tail are the lateral under tail-coverts. Even in specimens that are not exposed to the light they are found to have lost their color completely within a couple of years, and can then only be recognized by their more glossy texture as compared with the neighboring whitish feathers. Females are strikingly smaller than males, in all their measurements.

DISTRIBUTION.—*Sarkidiornis melanotos* is found in India, Ceylon, and Burma, while in Africa it extends throughout the continent from the Gambia and Khartoum southward to the Orange River, and also to Madagascar.

In the Belgian Congo it is apparently found everywhere along rivers, from the Lower Congo to the Ituri, Uelle, and Katanga. In the Uelle and central Ituri, curiously enough, we saw it only from November to February, and are convinced that it does not breed there, none of our specimens having the sex-organs sufficiently enlarged. Sometimes single birds were seen, but more often small flocks, though rarely as many as two dozen together, generally following the course of some stream, seldom alighting in the water, but more often walking on rocks and even perching upon dead trees. Though usually silent, once shortly after sunset they were heard to utter short, hoarse, whistled sounds, repeated again and again, as they flew by. Their speed is not great, but the flight is direct, with wings moving rather slowly for a duck.

In other sections of Africa the comb-duck is said to feed in grain fields or open marshes; so this part of the Congo seems not a very favorable habitat. Indeed, though the stomach of every specimen secured was examined, we never found one to contain anything but coarse sand, save in the last two cases, where the birds' gullets (not enough ex-

panded to be called crops) were crammed with small fleshy plants of the family Podostemonaceæ, with which were mingled some soft brown insect-larvæ.

For some days, at Avakubi, in January, ducks of this species had been walking upon the rocks in the Ituri River, pulling up or scraping off these plants, which grew so thickly as to form a moss-like covering. At high water, of course, this food would be inaccessible.

The smaller females always seemed to outnumber the other sex; and, on the whole, probably not more than one bird in eight had a well-developed comb.

Other localities at which we saw this duck but did not secure it are: Ngayu (December), Medje (January), Dungu (February). Rodhain and Bequaert noted a flock of twelve at Kongolo on January 29, 1911; and Dr. Rodhain shot a male with comb along the river Lufubu, near Niangwe, on December 31, 1910. The apparent migration noted by us must be restricted to the equatorial region, for the species is present in the Sudan, as it is in southern Africa, throughout the year. More recently I have noted the comb-duck on the southwest shore of Lake Albert in August, and along the Semliki River in January.

No record is given in Phillips 'Natural History of the Ducks' of any nesting in Africa north of the equator. Lynes¹ suspected that they nested to the north of Darfur, since they migrated through in June-July and in November. In the Transvaal, Taylor² found that they breed regularly during November and December, making a nest in the long grass, usually at the side of a "vlei" or near a pan. In one instance, they nested among stones on a low hill. In India, strangely enough, the nesting site is usually a hollow in an old tree, or in a depression between large branches.

Neave obtained a male comb-duck in breeding condition on Lake Bangweolo in October; but Roberts³ gave the breeding season on Lake Chilwa, Nyasaland, as January to June, nests being built in thick reeds over fairly deep water. Sets he found to consist of four to six eggs, yellowish white, averaging 57.1 by 43.2 mm. Kuschel's measurements⁴ were larger: 60-61.5 mm. by 45-46 mm.

KEY TO THE CONGO SPECIES OF *Dendrocygna*

Face, throat, and fore-neck white, whole back of head black; middle of belly black; rump and upper tail-coverts wholly black. *D. viduata*.
Crown brownish, sides of head buff, throat paler; a black stripe only down the back of the neck; middle of belly whitish or tawny; upper tail-coverts whitish.
D. fulva.

¹1925, Ibis, p. 542.

²1907, Journ. S. Afr. Orn. Union, III, p. 36.

³1924, Ibis, p. 357.

⁴1895, Journ. f. Orn., p. 84.

***Dendrocygna fulva* (Gmelin)**

Anas fulva GMELIN, 1789, 'Syst. Nat.,' I, part 2, p. 530 (type locality: Nova Hispania, i.e., Mexico).

Dendrocygna fulva BOCAGE, 1881, 'Orn. Angola,' part 2, p. 500 (Landana). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Karema). SALVADORI, 1895, 'Cat. Birds Brit. Mus.,' XXVII, p. 149 (Landana). NEAVE, 1907, Mem. Proc. Manchester Lit. Phil. Soc., LI, No. 10, p. 22 (Kafue R. near Ndola). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 217 (Kabaré); 1929, Bull. Cercle Zool. Congolais, V (1928), p. 110 (Belgian Congo). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 257 (Kafubu R.).

Dendrocygna bicolor PHILLIPS, 1922, 'A Natural History of the Ducks,' I, p. 128 (Tanganyika; L. Bangweolo).

DISTRIBUTION.—From the southwestern United States to Argentina; India and Indo-China; Madagascar; and eastern Africa from Natal north to the Anglo-Egyptian Sudan, there extending westward again to the vicinity of Lake Chad. There is one record from the Portuguese Congo. The species is wanting in the whole Congo forest.

The fulvous tree-duck inhabits the Katanga district and probably the western shore of Lake Tanganyika, and the only authentic record from elsewhere in our area seems to be a specimen taken at Kabaré on Lake Edward, November 20, by Pilette.

In the Sudan, Heuglin observed these ducks in considerable flocks on temporary pools and in marshes. In Nyasaland Roberts¹ found nests during the months from November to June, in thick reeds growing in water four or five feet deep. They were constructed of reeds and rough grass, with a lining of down and feathers. The clutches consisted of five to seven eggs, ivory-white, averaging 50.8 by 43.2 mm.

When on the wing fulvous tree-ducks utter whistling notes similar to those of *D. viduata*.

***Dendrocygna viduata* (Linnæus)**

Anas viduata LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 205 (type locality: Cartagena, Colombia).

Dendrocygna viduata DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Tanganyika; Katanga; Kisanu). DE SOUSA, 1886, Jorn. Sci. Lisboa, XI, p. 81 (Luapula R.); 1886, in Capello and Ivens, 'De Angola a Contra-Costa,' II, p. 447 (Luapula R.). MATSCHIE, 1887, Journ. f. Orn., p. 144 (Mbuga Viano; L. Upemba). PECHUËL-LOESCHE, 1888, 'Loango-Expedition,' III, part 1, p. 262 (Loango Coast). OUSTALET, 1893, Naturaliste, VII, p. 128 (no exact locality). REICHENOW, 1900, 'Vögel Afrikas,' I, p. 124 ('Ubangi R.'; L. Upemba); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 240 (L. Mohasi; Tshingogo region E. of L. Kivu).

¹1924, Ibis, p. 358.

LÖNNBERG, 1917, *Arkiv. f. Zool.*, X, No. 24, p. 5 (Kabare). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 216 (Sanghé-Ruzizi; Bigoisagua); 1923, *idem*, XI, pp. 313, 387 (Kasai R.; near Basongo; Djoko-Punda; Kwamouth?); 1924, *idem*, XII, pp. 261, 408 (Kisantu; Leopoldville; Eala; between Irebu and Ikengo); 1929, *Bull. Cercle Zool. Congolais*, V (1928), p. 110 (Belgian Congo). PHILLIPS, 1922, 'A Natural History of the Ducks,' I, p. 117 (Tanganyika; L. Upemba; N. E. Congo basin; "Ubangi"; "Cabinda at mouth of Congo"). GYLDENSTOLPE, 1924, *K. Svenska Vet. Akad. Handl. Stockh.*, (3) I, No. 3, p. 291 (mouth of Rutshuru R.). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 151 (Congo).

Dendrocygna viduata SALVADORI, 1895, 'Cat. Birds Brit. Mus.,' XXVII, p. 145 (Niam-Niam Country); 1914, *Annuario Museo Zool. Napoli*, IV, No. 10, p. 5 (Kagera R.; L. Mohasi).

Dendrocygna viduata SCHOUTEDEN, 1926, *Rev. Zool. Afr.*, XIII, p. 186 (Banana). Avakubi, ♂, December 18.

ADULT MALE.—Iris dark brown; bill black, with light blue cross-band near tip of maxilla, and a spot of the same color beneath the mandible near its tip, skin just around nostril pale bluish; feet rather dark bluish, becoming dusky on toes.

In this specimen, at least, the "bulla ossea" of the trachea was comparatively small, and symmetrical.

DISTRIBUTION.—Includes the greater part of South America, from the West Indies to the Argentina, as well as most of Africa south of the Sahara, and Madagascar. Not a common species in the Congo, yet probably occurring occasionally in most parts. We never met with it in the Uelle district, but I have seen it along the forested part of the upper Congo, in July, 1909, and at Avakubi it was seen three times in the latter half of December, 1913. First our single specimen was found in a brook traversing a recent clearing near the post. Then on December 21 a flock of perhaps ten passed through, and on December 27 three more birds. In spite of being tree-ducks, they never went into the forest, but kept to the clearing and to the open river.

The stomach of our specimen contained nothing but sand. Bocage¹ reports that according to Anchieta "this duck feeds upon fish, aquatic insects, and vegetable matters." Büttikofer² found that in Liberia they ate small crustacea and molluscs left by the receding tide.

From my own brief experience with the masked tree-duck I should have suspected that it is migratory, crossing the Congo forest belt in December and perhaps in July, yet not breeding there. The species is known to nest both north and south of the equator, however, and the birds seen in the forest belt are probably wanderers from both regions during their off-season.

A female in the U. S. National Museum from the Fernand Vaz district of the Gaboon was taken July 23. On the middle Congo below

¹1881, 'Orn. Angola,' II, p. 499.

²1885, *Notes Leyden Mus.*, VII, p. 248.

Ngombe, on March 6 and 15, 1931, I saw parties of eight and nine. We have specimens from Luluabourg, Kasai district, dated May 25, September 9, and December 9; and I have seen flocks near Lake Kisale on the Lualaba River in August. Admiral Lynes¹ reported the species as a summer visitor to Darfur, breeding there in August.

This tree-duck has been known to nest on the coast of Liberia and the Gold Coast in August and September; in Tanganyika Territory in March; and in the Transvaal Haagner² obtained very young ducklings during May. In Nyasaland, according to Roberts,³ the breeding season lasts from November to June. A nest he found on Lake Chilwa, May 12, was situated in thick reeds in deep water, constructed of reeds and fine grass, and lined with down and feathers. There were five eggs, pale pinkish cream-color when fresh, and with slightly rough surface. Average dimensions, 50.8 by 40.6 mm. Reichenow gave slightly different measurements: 45.5–48 mm. by 36–37 mm.

The note of *Dendrocygna viduata* is a whistling sound often repeated while the birds are on the wing, and this has given them the popular name of whistling ducks.

***Nettapus auritus* (Boddaert)**

Anas aurita BODDAERT, 1783, 'Tabl. Planches Enluminées,' p. 48 (type locality: Madagascar).

Nettapus SCHALOW, 1886, Journ. f. Orn., p. 422 (Luvule R.; L. Itambe).

Nettapus auritus DE SOUSA, 1886, Journ. Sci. Lisboa, XI, p. 80 (Luapula R.); 1886, in Capello and Ivens, 'De Angola a Contra-Costa,' II, p. 447 (Luapula R.). MATSCHIE, 1887, Journ. f. Orn., p. 144 (Luvule R.; L. Itambe). REICHENOW, 1900, 'Vögel Afrikas,' I, p. 127 (Luapula R.; L. Itambe; Luvule R.). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Katanga; Kisanu; L. Leopold II; Mayombe). MENEGAUX, 1918, Rev. Française Orn., V, p. 254 (Zambi). SCLATER AND M.-PRAED, 1920, Ibis, p. 784 (Meridi). PHILLIPS, 1922, 'A Natural History of the Ducks,' I, p. 94 (L. Chiwakawaka; Luapula; Katanga). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 313, 387 (Luebo; Kwamouth; probably whole Kasai district); 1924, idem, XII, p. 261 (Kidada); 1925, idem, XIII, p. 4 (Kunungu); 1926, idem, XIII, p. 186 (Moanda; Vista); 1929, Bull. Cercle Zool. Congalais, V (1928), p. 111, with fig. (Belgian Congo). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 257 (Kafubu R.).

Faradje, ♀, May 31.

ADULT FEMALE.—Iris dark brown; upper surface of maxilla dusky, sides greenish, mandible buff; feet black.

DISTRIBUTION.—Africa from the Gambia and Kordofan south to Cape Province, and on the island of Madagascar. Within our limits it is not known to occur in the forested area of the Upper Congo, although

¹1925, Ibis, p. 545.

²1915, Journ. S. Afr. Orn. Union, X, p. 16.

³1924, Ibis, p. 357.

recorded from the Gaboon, the Lower Congo, and the southern savannas of the Belgian Congo. In the Uelle district it occurs only very sparingly. Our single specimen was found sitting alone on a small open pool in a swamp, and seemed not in the least shy. Lang also noted a half-dozen in some extensive papyrus-marshes at the head of the Duru River, a little farther northwest from Faradje, on October 25, 1911. The Hamburg Museum has a male from Duma, Ubangi district, September 22 (Schubotz).

In the southern Sudan, say Selater and Mackworth-Praed,¹ it is not uncommon, and occurs in Kordofan in the rains. Despite the lack of published records from the highlands near Lake Kivu, or from Lakes Edward and Albert, Dr. J. C. Phillips secured two examples at Lake Chahafi in British Ruanda, and he tells me that he saw this pygmy goose near Butiaba on Lake Albert. Neave probably saw it in the Katanga, for though his specimens were from the Loangwa River and Lake Bangweolo, he added: "Common in suitable localities, in pairs or small flocks." Schouteden believed the pygmy goose to occur throughout the Kasai district, and I have seen a flock on Lake Kisale in August.

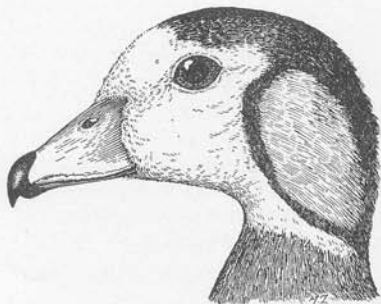


Fig. 192. Head of *Nettapus auritus*, male. $\times \frac{2}{3}$.

These birds are surprisingly good divers, and can also perch on boughs. Where they nest was all but unknown until Jackson² discovered that, like the Indian species of the same genus, they often use a hollow in a tree. The eggs are said to be ivory-white, 41.5 by 31.5 mm. (Reichenow). At Mwanza on the south shore of Lake Victoria, Mr. F. G. Carnochan collected a pair of pygmy geese on January 4, 1929. He tells me that they had built a nest in the thatch of a native house, pushing up the dry grass so as to make a tunnel about a foot long. There was down in the lining of the nest, but no eggs as yet.

SUBFAMILY *Plectropterinae*

Plectropterus gambensis gambensis (Linnæus)

Anas gambensis LINNÆUS, 1766, 'Syst. Nat.', 12th Ed., I, p. 195 (type locality: Gambia).

Plectropterus gambensis JOHNSTON, 1884, 'The River Congo,' pp. 36, 169, 355, 369 (Kissangé; Stanley Pool; neighboring parts of Congo R.). MATSCHIE, 1887,

¹1920, Ibis, p. 784.

²1926, 'Notes on Game Birds of Kenya and Uganda,' pp. 218-220.

Journ. f. Orn., p. 144 (Luvua R.; Luvule R.; L. Itambe; Lugoma Brook; Lufira Falls; Likulwe; Mbuga; Upemba L.). REICHENOW, 1900, 'Vögel Afrikas,' I, p. 134 (Tanganyika; "Lualaba" [i.e., Luvua R.]; Luvule R.; L. Itambe; Lugoma; Lufira R.; Likulwe R.; L. Upemba); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 241 (L. Mohasi). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 24 (Katanga). MOURITZ, 1914, Ibis, p. 33 (near Kalonga). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 5 (Luapula R. in S. E. Katanga; marsh near L. Bangweolo). PHILLIPS, 1922, 'A Natural History of the Ducks,' I, p. 49 (summary of earlier records). SCHOUTEDEN, 1929, Bull. Cercle Zool. Congolais, V (1928), p. 108 (Belgian Congo).

Plectropterus SCHALOW, 1886, Journ. f. Orn., pp. 420, 422, 425, 432, 433, 434 ("Lualaba" [i.e., Luvua R.]; Luvule R.; L. Itambe; Lugoma R.; Lufira R.; Luvilombo R.; Likulwe R.; between Lufira R. and Kamolondo).

Plectropterus gambensis gambensis SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 313 (Kasai R., near Basongo). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 161 (Congo basin).

Niagara, 2 ♀, April 29, May 10.

ADULT FEMALE.—Iris dark brown; tips of both maxilla and mandible blue-gray, rest of bill and most of naked skin of head dark purplish red, lores, however, bluish gray; carpal spur pinkish white; feet pale pinkish, with some dusky brown on webs and about tarsal joint.

Of our females, both apparently adult, but not breeding, the first is somewhat browner, and more worn on the upperparts. They agree closely in pattern, having low frontal protuberances, white malar region and throat, a considerable amount of white on bend of wing and lesser coverts. A few scattered black feathers occur singly on the lowerparts. Measurements: wing (without spur), 422, 437 mm.; tail, 130 (worn), 162; bill from gape, 78, 76; tarsus, 91, 92.

DISTRIBUTION OF THE SPECIES.—From Senegal, Sennar, and the southern border of the Sahara south to the Cape Province; but wanting in the drier parts of Somaliland and Southwest Africa, and not reported thus far from the heavily forested areas of the Upper Congo or the southern Cameroon.

The great variability in color pattern has led to the description of several races, of which only *P. g. gambensis* and *P. g. niger*¹ can be recognized. The latter is restricted to the countries south of the Zambesi, and has no frontal knob even in the adult male, no naked neck-spots, no white on the head, and the white of the belly more restricted, sides of breast and flanks entirely black. Very many intermediate specimens are found within the range assigned to *niger*.

Typical *gambensis* will doubtless be found in all parts of the Congo save the forests, but is still extremely scarce just to the northward,

¹P. L. Selater, 1877, Proc. Zool. Soc. London, p. 47 ("Zanzibar," but type probably from near Cape Province).

along the Uelle River. Our two specimens represent all that we ever saw there. One was shot in a rather open grassy marsh, the other was sitting with six Hartlaub's ducks (*Pteronetta*) on a small stagnant pool surrounded by woods. In the stomach of the first there was coarse sand mixed with fibrous green vegetable material, perhaps grass. The second had eaten a number of starchy fruits, probably of some aquatic plant.

In the Hamburg Museum there is a specimen, apparently immature, from Duma, Ubangi district, October 13 (Mecklenburg Expedition). The spur-winged goose is doubtless found about Stanley Pool, as Johnston stated, for at Lukolela I noted three on December 11, 1930, and a flock of ten on April 17. The broad middle course of the Congo River provides them with feeding grounds. In the Kasai district they are apparently not abundant.

Along the upper Lualaba, Dr. Bequaert tells me, these geese breed commonly. At the end of the dry season, or toward October, he saw numbers on the sand-bars near Ngoi, half way between Bukama and Lake Kisale. Many of them were quite young, so nesting seemed to be carried on at the time of low water. Rodhain and Bequaert killed adult specimens at Niangwe, January 4, and Bukama, April 28.

The nest of the spur-wing is said to be placed, as a rule, in long grass or reed-beds, but sometimes on termite hills, or even on top of a nest of *Scopus umbretta*. The eggs number seven to twelve, and are shining ivory-white, 71-75 mm. by 53-58 (Reichenow).

ORDER FALCONIFORMES

FAMILY **SAGITTARIIDÆ**. SECRETARY-BIRDS

Sagittarius serpentarius (Miller)

Falco serpentarius J. F. MILLER, 1779, 'Icon. Anim.,' Pl. xxviii (type locality: Cape of Good Hope).

Sagittarius serpentarius SCHOUTEDEN, 1924, Bull. Cercle Zool. Congolais, I, p. 12 (vicinity of Kapolowe; Upper Uelle). DERSCHIED, 1925, Bull. Cercle Zool. Congolais, II, pp. 103 (Kapolowe; Baraka).

Serpentaire, PILETTE, 1925, Bull. Cercle Zool. Congolais, II, pp. 148, 149 (S. of L. Bangweolo near lower Luombwa R.). SCHOUTEDEN, 1928, Bull. Cercle Zool. Congolais, V, p. 18 (Lower Uelle district).

Sagittarius serpentarius gambiensis BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 165 (W. Nile country of Uganda).

DISTRIBUTION.—Senegambia to the Anglo-Egyptian Sudan and Abyssinia, then south through East Africa to the Cape, and also extending westward again to southern Angola. Does not occur in the Congo-Cameroon forests, nor even in the savannas of the Kasai or Lower Congo.

In the northern part of the Uelle district we used to see natives from time to time wearing the long middle tail-feathers of secretary-birds in their hats. Two of these feathers we brought home so that there could be no doubt of the identification. Maruka, a Logo chief near Faradje, appeared to be quite familiar with the bird, which he assured us lived on his territory; but though he seconded our prolonged efforts, no specimen could be secured. On just one occasion between Faradje and Aba, in December, 1911, I believe I saw a secretary-bird flying low over the scrubby savanna, too far off to afford any chance of pursuit.

Not long after our departure from Faradje, Mr. G. Lebrun became Chef de Poste there, and to him Maruka brought a live secretary-bird, of which we now have a photograph. Mr. Lebrun procured a number of live animals for the Antwerp Zoölogical Park, but this bird seems not to have reached Europe, nor is its skin in the Congo Museum. In 1921, indeed, the Congo Museum had no secretary-bird from the Belgian Congo. Recently, as reported by Schouteden (1928), Brother Hutsebaut of the Mission at Buta has secured a skin from the Uelle district, probably somewhere well to the north of Buta.

From the known distribution of the species, it was certainly to be expected in the Upper Katanga, Neave¹ did not see it within the limits of the Belgian Congo, but only once on a large open plain in the Kalungwisi district, east of Lake Moero. Neither did Mouritz record it. In 1922, however, Mrs. M. H. Bradley² wrote of seeing secretary-birds in the Upper Katanga; and in the following year T. A. Barns³ told of occasional pairs in the highlands of Marungu, where Böhm apparently had failed to note it.

Casual references like these are so apt to prove unreliable that it was fortunate when the Congo Museum finally received a specimen in 1924, procured by Monseigneur de Hemptinne in the vicinity of Kapolowe on the Lufira River. A. Pilette reported the birds from just south of Lake Bangweolo, perhaps within Belgian territory, and also in the Loangwa Valley. Dr. J. Derscheid has told of a single secretary-bird which was seen at Baraka on Lake Tanganyika by Mr. A. Jobaert in October, 1917. Dr. van Someren⁴ supposed that it would be found on the western plains of Uganda, so it may also reach the plains of Ruanda or Urundi.

The nest of the secretary-bird is a large structure of sticks and sod, usually in a low tree or bush, but sometimes high above the ground when

¹1910, *Ibis*, p. 102.

²1922, 'On the Gorilla Trail,' p. 42.

³1923, 'Across the Great Craterland to the Congo, p. 193.

⁴1922, *Nov. Zool.*, XXIX, p. 38.

a large tree is available. As a rule, two eggs are laid. They are whitish with rough texture and a greenish or bluish tinge by transmitted light. Sometimes they are said to be marked with brown. Dimensions: 76-84.5 mm. by 56-61.

In the Sudan, nests with three or four young in September were reported by Heuglin, and Butler¹ received a nestling from the White Nile in December. In South Africa, the breeding season is said to be in July or August; while in the Kidong Valley, Kenya Colony, I have seen nests with eggs in June.

FAMILY ÆGYPIIDÆ. VULTURES

KEY TO THE GENERA OF ÆGYPIIDÆ IN TROPICAL AFRICA

- 1.—Malar region and middle of crown and throat feathered, skin bare only from lores to behind eye and in a stripe at each side of throat; plumage black-and-white when adult, brown when immature; wing less than 450 mm. long.

GYPHIERAX.

Malar region and throat naked or with only small downy or hair-like feathers, crown-feathers, if present, are hair-like or downy, hind-neck with a feathered ruff; if plumage is black-and-white, then the long scapulars are white; wing more than 450 mm. long.....2.

- 2.—Bill very slender and elongated, nostrils lengthened horizontally; wing less than 550 mm. long.....3.

Bill stout, nostrils lengthened in a more or less vertical direction, slit-like or oval; wing more than 550 mm. long.....4.

- 3.—Adult largely white, with black on wings only;² tail with 14 rectrices. *NEOPHRON*.
Adult and young mainly dark brown except on neck; tail with 12 rectrices.

NECROSYRITES.

- 4.—Crown entirely covered with thick downy feathers (white in adult), which become longer posteriorly, and form a slight crest; beak light reddish, rather short and deep; nostrils oval.....*TRIGONOCEPS*.

Crown not so thickly feathered, but with scanty down, not forming a nuchal crest, or with short hair-like feathers; beak usually mainly gray or black..5.

- 5.—Beak exceedingly deep, measuring more than 40 mm. from culmen to gonys; nostrils oval; down on head and neck very sparse; in life, flaps of naked skin often hang below ears; tibiae clothed with thick whitish down, a few longer brown feathers on outer side or behind.....*TORGOS*.

Beak less than 40 mm. deep; nostrils more slit-like, nearly vertical; crown and neck with more down, or even short hair-like feathers on crown; no ear-flaps; outer surface of tibiae with many feathers over 60 mm. long.....6.

- 6.—Twelve tail-feathers; lower back white when adult, but brown in young; wing usually less than 625 mm.....*PSEUDOGYPS*.

Fourteen tail-feathers; lower back always dark-colored (except bases of feathers); wing usually exceeding 625 mm.....*GYPS*.³

¹1908, *Ibis*, p. 254.

²The brown young of *Neophron* can be distinguished from *Necrosyrtes* by the fact that the narrow feathers of the neck-ruff continue well up on the hind-neck, practically to the occiput, whereas in *Necrosyrtes* the hind-neck is clothed with short down, and the ruff restricted to its lower end.

³Not yet recorded from the Congo, but *G. ruppellii erlangeri* may occasionally reach the eastern border.

***Gypohierax angolensis* (Gmelin)**

Falco angolensis GMELIN, 1788, 'Syst. Nat.,' I, p. 252 (type locality: Angola).

Gypohierax angolensis HARTLAUB, 1853, Journ. f. Orn., p. 388 (Congo); 1857, 'Syst. Orn. Westafr.,' p. 1 (Congo). SHARPE, 1874, 'Cat. Birds Brit. Mus.,' I, p. 312 (Congo R.). SCHALOW, 1886, Journ. f. Orn., p. 434 (L. Upemba). MATSCHIE, 1887, Journ. f. Orn., p. 148 (L. Upemba). DYBOWSKI, 1893, 'La Route du Tchad,' p. 116 (Congo R. just above Stanley Pool). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 603 (Kasai; Congo; "Ubangi R."; L. Upemba); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 263 (Usumbura). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Ituri; Umangi; Lower Congo). LÖNNBERG, 1907, Arkiv. f. Zool., III, No. 21, p. 5 (Mukimbungu). NEAVE, 1910, Ibis, p. 104 (Lualaba R.). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 13 (Ruanda). MENE-GAUX, 1918, Rev. Française Orn., V, p. 257 (Zambi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 233 (Angodia; Kivu; Beni; Ruzizi; Baraka; Bigoisagua); 1920, idem, VII, p. 189 (Malela); 1923, idem, IX, pp. 314, 387 (Ngombe in Kasai; Kwamouth); 1924, idem, XII, pp. 261, 408 (Stanley Pool; Kisantu; L. Tumba; Ikengo; Eala); 1925, idem, XIII, p. 4 (between Bolobo and Mongende); 1926, idem, XIII, p. 186 (lower Congo R.; Boma; Banana; Makaia Ntete). EMIN, 1919, in Stuhlmann, 'Tageb. Emin Pascha,' II, p. 447 (near Bellima). SWANN, 1920, 'A Synoptical List of the Accipitres (Diurnal Birds of Prey),' p. 93 (tropical W. Africa, Angola to Senegambia); 1922, idem, 2nd Ed., part 3, p. 145 (same). BANNERMAN, 1922, Rev. Zool. Afr., X, p. 178 (N. Belgian Congo); 1930, 'Birds Trop. W. Afr.,' I, p. 271 (Congo). BERLIOZ, 1922, Bull. Mus. Paris, p. 348 (Uelle R.). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 65 (Niam-Niam country). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 265 (Congo R.; Lualaba R.; Banana to Bukama).

Gypohierax JOHNSTON, 1884, 'The River Congo,' pp. 36, 71, 84, 199, 202, 355, 356 (Kissangé; Pallaballa; Yellala Falls; 1 day above Stanley Pool); 1908, 'George Grenfell and the Congo,' II, p. 927 (Congo basin).

Gypohierax formosus JOHNSTON, 1884, 'The River Congo,' p. 371 (Congo R. to Bolobo).

Gypohierax angolensis OUSTALET, 1893, Naturaliste, VII, p. 60 (no exact locality).

Boma, ♂, January 8.

Yumbi, ♀ im., July 16.

Lié, ♂ im., July 27.

Ngayu, ♂, December 22.

Niangara, 2 ♂, December 10, 19; ♂ im., May 26.

Dungu, ♂, January 27.

ADULT MALE.—Iris yellow; lores and naked skin about eye orange, cere yellowish green, bill light greenish-gray; feet dull grayish-yellow, claws black.

IMMATURE MALE.—Iris brownish yellow; beak blackish, cere dusky above, pale dull yellowish at sides, this color extending over lores and orbits; feet dirty yellow, claws black.

Gypohierax is here included among the vultures, following the classification of the birds of prey by the late Professor P. Sushkin, which is set forth in Menzbier's 'Faune de la Russie,' Aves, IV, 1916. Professor Sushkin's arrangement is based on his very careful investigations of

internal anatomy, and I may add that in life *Gypohierax* struck me as much more vulturine than eagle-like. As a concession to the more familiar classifications of the group, I have retained family rank for the *Ægyptiidae*, without contesting their phylogenetic relation as established by Sushkin.

DISTRIBUTION.—West Africa from the Gambia to Angola, extending across the continent to Usambara, Pemba Island, and Lake Nyasa. Accidental as far south as the Transvaal. In the Congo, its abundance lessens as one goes from west to east, and likewise as one leaves the forest belt on the north or south. *Gypohierax* is wanting in the mountains of the eastern border, and apparently rare in the Upper Katanga. Neave observed it only at Lake Young, east of Lake Bangweolo, and on the

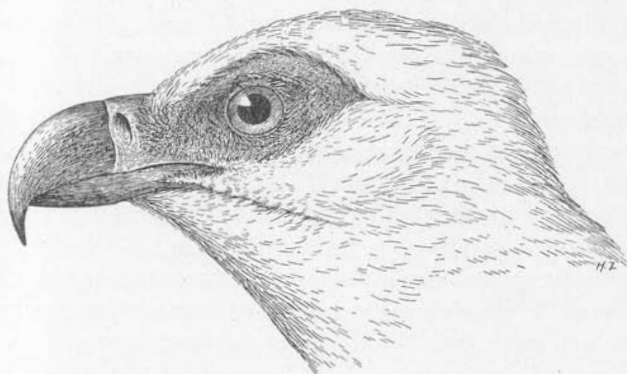


Fig. 193. Head of *Gypohierax angolensis*. $\times \frac{1}{2}$.

upper Lualaba River near the vicinity of Funda Biabo. Rodhain and Bequaert obtained an adult at Bukama, May 4; but the species may be wholly absent from the Katanga plateaus.

Nowhere have I ever seen the black-and-white vulture more abundant than on the lower Congo. No sooner had we cast anchor inside Banana Point than several of these large birds, eagle-like in flight, yet with bare vulturine faces, were seen flying over the quiet inlet; and all the way up to Matadi they were abundant, circling over the water, perched on the trees, or walking along the edge of the water. Between Boma and Noki I counted twenty-five. Early one morning as we were crossing the railroad yard at Matadi, a *Gypohierax* flying overhead let something fall; we watched, and down came a dead fish within a few feet of where we stood.

At Leopoldville the bird was already much scarcer, but along the Congo above Stanley Pool it became fairly common again, and is one of the regular sights along the forested banks of the Upper Congo. Never more than two or three are seen together, except when they alight on the sand-bars exposed at low water. A very large proportion of the individuals are adult, perhaps less than half in the brown immature condition.

It was near Bumba, on December 12, 1914, that I saw the only nest positively identified as belonging to *Gypohierax*, a large, rough mass of sticks, in a big silk-cotton tree (*Ceiba*) close to the river bank, with one of its owners standing upon it, while numbers of weaver-birds (*Textor cucullatus bohndorffi*) had their nests in the branches all about. But *Gypohierax* nests in small numbers throughout most of the Congo. At Okondo's, near Niangara, a pair were reported to be building in December, 1910; and the male bird, with testes enlarged, was killed by a native.

The eggs are described by Nehrkorn¹ as soiled whitish, clouded all over with brownish and diffusely spotted with darker brown. Dimensions, 69×52 mm.

In the Ituri and southern Uelle the bird is of regular occurrence, though not to be called abundant. At Avakubi, for instance, they occasionally came to some oil-palms (*Elæis guineënsis*) growing on the island opposite the post, for the fruit of this tree, as is well known, provides their most stable source of food. Perhaps this is why the "vulturine sea-eagle"—which I might propose to call the "palm-nut vulture"—has such a characteristic West African distribution, for if it were content with dead fish alone, one might well expect it to extend its range over the whole continent. Instead, the area it occupies may be shown to coincide almost exactly with the territory in which oil-palms flourish. Along the eastern Congo border, I have seen a few in the Semliki Valley and on Lake Tanganyika.

From the Anglo-Egyptian Sudan there is only a single, doubtful sight-record by Heuglin² on the Kosanga River (Bahr-el-Ghazal Province), and in the northeastern Uelle we found the limit of distribution agreeing very closely with the disappearance of the oil-palm. During our stay of two years in the region of Faradje and Aba, I never saw a single *Gypohierax*, but along the Kibali River just above Dungu, several were noticed in June, 1911, and from Palamasi's to Niangara, along the Uelle, they were common in March, 1913, especially in spots with many oil-palms. One adult bird, as it sat quietly in a tree, was heard to utter

¹1910, 'Katalog der Eiersammlung,' 2nd Ed., p. 368.

²1869, 'Orn. Nordost-Afr.,' I, p. 106.

a low, hoarse sound of one syllable, but as a rule *Gypohierax* is quite as silent as an ordinary vulture. Though truly carrion-feeders along the banks of rivers, I have never known them to come to the carcass of an animal on dry land. Van Saceghem has observed this on the lower Congo.¹

On the lower Congo, undoubtedly, fish might prove their principal food, as Reichenow states for the Niger and Cameroon mouths, adding that he saw them seize fish in the water, and that they also eat "cray-fish." Petit adds crabs, and Van Saceghem molluscs, as part of their food. Ussher's account of an attack upon a small kid² is certainly exceptional.

Hartert and Sjöstedt have both commented on their fondness for palm-nuts, a fact we can confirm not only by observations in life, but from dissections of seven specimens, six of which had the greasy, fibrous husk of *Elæis* fruit in their stomachs, and the seventh some greenish matter of vegetable origin. Pieces of fish were also present in two cases, and one stomach even disclosed some mouse-fur.

***Necrosyrtes monachus monachus* (Temminck)**

Cathartes monachus TEMMINCK, 1823, 'Planches Coloriées,' livr. XXXVIII, Pl. CCXXXII (type locality: Senegal).

Necrosyrtes monachus monachus SWANN, 1925, 'Monograph of the Birds of Prey,' part 2, p. 60 (Faradje). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 182 (Belgian Congo).

Niangara, 2 ♂ im., December 2, 6.

Dungu, ♂, January 28.

Faradje, ♂, December 15; ♀, March 1; ♂ im., October 29; ♀ im., March 20; ♂ juv., March 28.

ADULT MALE.—Iris dark brown; naked skin of head and throat light purplish-pink, with the thickened spots on front of neck white, outer portion of beak brownish black; feet pale greenish-blue, with black claws.

While watching wild individuals of *Necrosyrtes* we often noticed that adults, distinguishable by the whitish nape, had the skin of the head deep pink, or even light red, whereas the young were oftener bluish there. That this coloration is merely due to the blood-supply, and very changeable, I found when once I broke the wing of an adult red-headed bird. On catching the wounded bird I was surprised to find that the bare skin of its head had already faded to bluish-white. Similar changes were noted in the case of a young captive bird, and it was also found that when a dead specimen was hung up by the feet, the head might become

¹1918, Rev. Française Orn., V, p. 258.

²1874, Ibis, p. 44.

actually purplish. The gradual changes in the feathering of the head and neck, from the nestling to the adult, are worthy of remark. The natal down, says Hartert,¹ is light gray, with a weak yellowish wash. In our youngest specimen, about half grown, the body is clothed in a first plumage of dark brown, and the thick down of the neck is grayish brown, only a sharply separated triangular patch on the crown retaining the pale-colored (almost whitish) down. The face and throat are entirely naked. Upon these bare parts, however, patches of black feathers begin to appear, as circles around the eyes and ears, restricted tufts on the lores, malar region, and a broader patch on the throat. This black coloration then extends to the triangular crown-patch, which thus becomes very much darker than the nape and neck.

A new, darker brown coat of down on the neck tends to equalize the shade of crown and nape, and this is the sort of immature plumage most commonly seen. The lanceolate feathers of the ruff are still longer than in the adult.

Besides having the downy feathers on nape and hind-neck brownish white, and of a more "scaly" texture, the adult birds have lost almost all the feathering of the throat and crown, the patches about the eye and on the lores are more bristly, though blackish, and the ring around the ear is now pale grayish-brown.

DISTRIBUTION OF THE SPECIES.—From about 15° N. lat. in the Sudan, and Senegal in the northwest, southward to the Orange River. It is entirely unknown, however, in the forests of the Congo and Cameroon.

Specimens from Senegal, say Sclater and Mackworth-Praed,² are smaller than those of northeastern and southern Africa. The former, representing typical *monachus*, have the wing usually under 470 mm., while the larger subspecies *pileatus* has a wing of more than 470, generally over 500 mm.

It appears that *N. m. monachus* extends eastward along the northern edge of the Congo forest to the Upper Uelle. Our specimens are indistinguishable from the West African race, for the two adult males have wings of 466 and 477 mm.; three immature males, 470, 473, 474; and one adult female 489. An adult male in the American Museum from Kati, French Sudan (Millet-Horsin), has the wing 478 mm.

The intergradation between *monachus* and *pileatus* is no doubt a gradual one. An adult male from Kenya Colony in this museum has

¹1886, Journ. f. Orn., p. 601.

²1919, Ibis, p. 707.

the wing 488 mm. long, two adult females from the same region 492 and 523. Count Gyldenstolpe gave the wing-length of a male from Mt. Sabinyo in the Kivu district as 495 mm., and we may consider specimens from the eastern Congo border as *N. m. pileatus*.

We first encountered these small brown vultures at Okondo's village south of Niangara after coming out of the forest into the Uelle district, and thereafter observed them everywhere, at least in small numbers, up to the borders of the Sudan. Present both in the rainy season and in the dry, they are commonly seen high in the air, in groups of three to six, proceeding with slow flapping flight, or circling about with set wings, their gaze fixed on the ground. Although corresponding, in a way, to the turkey-vulture of America, their powers of flight are vastly inferior. In soaring they hold the wings more nearly horizontal, not "dihedrally up"¹ as does the American *Cathartes*; so they resemble more closely the American black vulture (*Coragyps*). The turkey vulture's method of flight is more closely paralleled among African birds by the bateleur eagle.

Necrosyrtes m. monachus nests sparingly in the region of Faradje in February, for on March 1, 1911, a young one was brought alive by natives. One of its parents was secured by sending a hunter to replace it in the nest, which he told me was of no great size, built of sticks, and placed in a tree along a wooded watercourse. A second young bird was later produced by the blacks, who claimed that both had come from the same nest, but the great difference between them in age made this seem improbable. On the coast of the southern Red Sea, according to von Heuglin,² the usual set consisted of only a single egg, a fact which seems confirmed by observations of Böhm, Hartert, and Buchanan. These eggs are dull white, sometimes with reddish-brown spots or blotches around the blunt end, and measure 68-74 mm. by 54-58 mm.

In many parts of Africa *Necrosyrtes* is common about the towns, as I have seen it for instance in Sierra Leone, but such is not the case in the northeastern Congo, where it is only attracted in numbers by carrion out in the bush. It is apt to become a familiar attendant around an elephant-hunter's camp, and is the commonest vulture by far, though greatly outnumbered in the dry season by the kites. A dead antelope must always be safeguarded by covering it with leafy branches.

Even with its relatively slender beak, *Necrosyrtes* is able to do considerable tearing of meat, and yet the association of the various vultures,

¹Cf. Hankin, 1913, 'Animal Flight.'

²1860, 'Orn. Nordost-Afr.,' I, p. 17.

the kite, and the marabou is apt to cause one to reflect upon the competition between different species and its relation to natural selection. If the slight differences in shape of vultures' beaks are of selective value, how is it that the several distinct types of vultures are all able to find a living side by side, even at the same carcass? Why should the most abundant species, in regions like the Uelle, be that one apparently least endowed for the struggle?

The kite, to be sure, does not come into direct competition with the vultures, but rather profits from the scraps they may scatter or leave. In a somewhat parallel fashion, the marabou probably needs the vulture's aid in first tearing an animal to pieces, since its beak is not very well adapted to the purpose, but this great stork is then big enough to step in and seize its share, without any fear of protest. Even the largest vultures, as is well known, give place to it. In all this there may be as great a measure of coöperation as of competition, and so we find here again a "bird-party" comparable to those of small insectivorous species that roam the equatorial forest.

While *Necrosyrtes* is fond of flesh if it can be had, it doubtless eats very many other things. For instance, we found one bird's crop to be filled with large winged termites. It hardly seemed as though these could have been captured on the wing; and I have since read how Reichard¹ watched a vulture catch swarming termites on the ground. In another case, we found the crop to be filled with human fæces. Reichenow² mentions this as a service rendered by the species on the Gold Coast.

***Necrosyrtes monachus pileatus* (Burchell)**

Vultur pileatus BURCHELL, 1824, 'Travels Int. S. Africa,' II, p. 195 (type locality: between Graaff Reinet and the Orange R., i.e., Hopetown district of Cape Province).

Neophron pileatus DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 147 (Lufuku). SCHALOW, 1887, Journ. f. Orn., p. 229 (Mpala).

Neophron monachus EMIN, 1894, Journ. f. Orn., p. 163 (Ndussuma). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 522 (Lufuku R.). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Tanganyika; "Upper Congo"). JOHNSTON, 1908, 'George Grenfell and the Congo,' II, p. 927 ("Congo basin"). PILETTE, 1914, 'A Travers l'Afrique Equatoriale,' p. 51, Fig. 14 (probably Kayera). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 12 (Kabaré). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 230 (Karemi; Kayera; confluence of Talia R. and Semliki). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 265 (Dembo des Pères at Elisabethville; confluence of Kapanda R. and Lualaba R.).

¹Böhm, 1887, Journ. f. Orn., pp. 147, 229.

²1901, 'Vögel Afrikas,' I, p. 524.

Necrosyrtes pileatus MOURITZ, 1914, *Ibis*, p. 37 (Moushosi R. in Katanga).

Neophron monacus SALVADORI, 1914, *Annuario Museo Zool. Napoli*, IV, No. 10, p. 12 (Ruanda).

Necrosyrtes monachus pileatus GYLDENSTOLPE, 1924, *K. Svenska Vet. Akad. Handl. Stockh.* (3) I, No. 3, p. 289 (Mt. Sabinyo, 2600 m.; Rutshuru and Ruindi plains; Mgahinga Volcano). SWANN, 1925, 'Monograph of the Birds of Prey,' part 2, p. 61 (eastern Congo). SCHOUTEDEN, 1930, *Rev. Zool. Afr.*, XVIII, p. 280 (Elisabethville).

DISTRIBUTION.—Southern and eastern Africa from the Cape Province to Angola, Lake Albert, Kenya Colony, Abyssinia, and supposedly the eastern Sudan. It is rather surprising that there are no published records from the Kasai district or the Lower Congo. Father Callewaert has sent us one immature specimen taken at Luluabourg in May. It must be remembered that collectors have often neglected to secure vultures even in places where they are common. But I did not notice it myself in the Lower Congo.

Neave made no attempt to collect vultures in the Katanga, and remarked that they seemed to be entirely absent from a large part of the high plateau country. Mouritz, nevertheless, observed this species and *Trigonoceps occipitalis* in the southeastern Katanga; and at Elisabethville on August 17, 1927, I counted four *Necrosyrtes* and one *Pseudogyps* circling above the slaughter-house.

At Nyanza on Lake Tanganyika, Raven procured an immature male *Necrosyrtes* with wing 517 mm. long. Count Gyldenstolpe found this brown vulture very common on the Rutshuru and Ruindi plains, and rather numerous also north of Lake Kivu and in Uganda. Emin Pasha observed it at Ndussuma on the Lendu plateau, but of course it is not certain to which of the races birds from that vicinity would belong.

***Neophron percnopterus percnopterus* (Linnæus)**

Vultur perenopterus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 87 (type locality: Egypt).

Neophron percnopterus SCHALOW, 1886, *Journ. f. Orn.*, p. 424 (L. Itambe). MATSCHIE, 1887, *Journ. f. Orn.*, p. 147 (L. Itambe). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 521 (L. Itambe).

DISTRIBUTION OF THE SPECIES.—Canary Islands, southern Europe, and northern Africa; east to the Himalayas and India. Through East Africa it extends southward to the Cape Province and Mossamedes. Birds from India are smaller than the typical form and have yellower bills, so they have been separated as *N. p. ginginianus* (Latham).

The Egyptian vulture is wanting in all the forested areas of West Africa, and is probably not very migratory. It has been found breeding

in South Africa. No specimen is known from the Belgian Congo; but it might well be expected to reach the Katanga, or some part of the eastern borders. Böhm and Reichard are credited with having observed it at Lake Itambe on October 23. They noted that the bird was sitting on the ground, eating swarming termites. Inasmuch as they had collected both *Neophron* and *Necrosyrtes* in East Africa, the record appears to be reliable.

***Pseudogyps africanus* (Salvadori)**

Gyps africanus SALVADORI, 1865, Not. Stor. R. Accad. Torino, p. 133 (type locality: Sennar).

Pseudogyps africanus DYBOWSKI, 1893, 'La Route du Tchad,' p. 296 (near Pic Crampel, in upper Shari Valley). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 12 (Kabaré). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 289 (plains south of L. Edward).

Pseudogyps africanus africanus C. GRANT, 1915, Ibis, p. 237 (Busongora in Uganda).

Pseudogyps africanus fülleborni SWANN, 1924, Monograph of the Birds of Prey, p. 44 (Faradje).

Faradje, ♂, January, 26; ♂ im., January 7; ♀, im., January 8.

Nzoro, ♂, April 19.

ADULT MALE.—Iris dark brown, skin of head and neck dusky, bill and feet blackish.

The immature birds could be distinguished at a distance by their browner color, underparts more broadly streaked with light gray, and feathers of the ruff much longer and more lanceolate, darker in color. They always outnumbered the older birds. When they were on the wing, it could be seen that they lacked the white patch on the back and the white under wing-coverts.

Sclater and Mackworth-Praed refrained from discussing the geographic races proposed by Erlanger,¹ and I likewise find myself without the material necessary to form a final opinion of their worth. After reading Erlanger's descriptions and comparing our two adults from the Uelle with his plates, I find that they do not agree with what he calls *P. a. africanus*, for their backs, and especially the long scapulars, are too dark, without any isabelline wash. They are indeed not unlike an adult male from Tanganyika Territory, the home of *P. a. schillingsi* Erlanger, but darker below, on crop-feathering, breast, and flanks. *P. a. fülleborni* Erlanger, of the Nyasa region, was described as a very dark form, but would scarcely be expected to reach the Uelle.

The truth seems to be that Erlanger not only ignored the possibilities of individual variation and feather-abrasion among adults, but also

¹1904, Journ. f. Orn., pp. 150-152.

overlooked the difference between the sexes. In the Kidong Valley, Kenya Colony, I collected an adult female which is far paler in color than any of our males. Her plumage is very worn, to be sure; but the upper back and wing-coverts are sand-colored, and the breast and flanks uniform isabelline. Crop-patch brown, but white around its edges. Her wing measures 587 mm., that of the male from Tanganyika Territory, 585 mm. Wings of two males from the Uelle district, 582 and 592 mm.

Willoughby P. Lowe,¹ after shooting several breeding pairs in the Gambia Colony, finds that this is the usual state of affairs; among fully adult birds females are far paler in color than males. Moreover, the final adult dress is not attained for several years, and younger birds in dark brown plumage are found breeding. So it is clear that no reliance can be placed in the characters given by Erlanger for the supposed races. If there are geographic forms, more material, more carefully collected, will be needed to uphold them.

Pseudogyps africanus is known from a large part of the Ethiopian Region, from Senegal east to Kordofan and Abyssinia, then south through East Africa to the Transvaal, and west to southern Angola. Count Gyldenstolpe believes this to be the commonest vulture in the eastern Belgian Congo, especially in the neighborhood of Lake Edward. It is doubtless found along the northern Congo border as far west as the Ubangi district, and I have seen it in the Katanga, at Elisabethville. Near the Luvua River, Böhm noted "many large vultures feeding on a buffalo,"² and while they may have been *Trigonoceps*, the occurrence of *Pseudogyps* would be equally probable.

Since all the more typical vultures avoid the equatorial forest, it is not surprising that *Pseudogyps* is only to be found along the less wooded borders of the Congo basin, and in the Katanga. In the Uelle, for example, the white-backed vulture is unknown from south of the Uelle River, and it was especially in the region from Faradje northward that we found it attracted by carcasses of big game. Neither *Gyps fulvus* nor *rüppellii* was ever observed by us in the Uelle, and they evidently do not come in so close to the forest border.

A traveler simply crossing this region would not be likely to see any other vulture than *Necrosyrtes monachus*, for that is the only species we ever knew to approach the larger villages, and it is but seldom that the other species of vultures are seen soaring high overhead, unless one is hunting the larger game.

¹1929, *Ibis*, pp. 439-442.

²1886, *Journ. f. Orn.*, p. 421.

When carrion was abundant around our camps in remote sections of the bush, the white-backed species used to come singly or in small numbers, never more than six or seven at a time. The majority were immature birds, and even they were rather wary, much more so than *Necrosyrtes monachus*, with which they associated at such times.

The skin of the larger antelopes is not readily pierced by the beaks of these birds, so they usually begin work around the eyes, lips, and ears of such an animal. Once we lost a wounded waterbuck (*Cobus defassa*), and only came across it dead a day or two later, and after the vultures had found it. Its eyes had been removed, and the whole throat cleaned out through the mouth. Then by enlarging the anal aperture a trifle, and inserting their heads, these vultures had stripped all the flesh from the pelvis and from one hind leg as far down as the hock, without tearing the skin or removing the entrails. In these operations their long necks, free from large feathers, are of prime service.

In order to guard a kill from the vultures, all the native hunters and gun-bearers of this region simply cover it with green boughs, and then it is safe, at least from the birds, though the hyenas would get it if left overnight. This seems to prove that neither the vultures nor the marabouts are guided to their food by the scent. It is left in plain sight, on the other hand, they often begin to gather within a very few minutes, even while the animal is still warm. They cannot conceivably smell it; indeed I used to think that they had learned the significance of the report of a gun.

These large vultures will remain sitting on their roosts for quite a time each morning; and on reading Hankin's 'Animal Flight' (1913), I was very forcibly impressed by the great similarity in habits and flight between the Indian kite, vultures, and adjutant, as he so carefully and vividly depicts them, and the corresponding birds of tropical Africa. These soaring birds, says Hankin, patiently await the time in the morning when the sunlight renders the air capable of sustaining them with the least effort, and he hints that this "soarability" of the air is based on some mechanical principle of which we are still ignorant, not simply on ascending currents of air. From my own experience with the marvelous soaring powers of these great birds, I feel extremely susceptible to Hankin's arguments.

It seems to me that such powers of flight are peculiarly valuable for carrion-feeders, since they are thus enabled without so great an expenditure of energy to pass a large part of the day in the air searching broad expanses of territory for a possible meal, which, after all, is not often available.

Very possibly, too, air-conditions over the equatorial forest are entirely different from those over the plains, and this may help explain the aversion of vultures for forest country. Even the withdrawal of marabous from the savannas of the Uelle in the rainy season may be conditioned by a change in "sun-soarability" as well as the chances of finding their food. These questions certainly deserve the special attention of ornithologists in Africa, and Hankin's book will well repay careful study on their part.

We noticed *Pseudogyps* close to Faradje only in the dry season, but it may remain throughout the year, as it certainly does only a little way north, at Garamba. Over this insignificant village they could sometimes be seen circling during the heat of the day, and a couple of miles away, along one of the paths running northward into the Sudan, there stood a large tree amid the bush whose dead upper branches served them as a comfortable roost. There Lang found them breeding in March, 1912, on a couple of large stick-nests, and during June and July, I used to see a pair of them perching there.

On the eastern slope of Mt. Elgon in July, Dr. Granvik¹ found four nests of this white-backed vulture in very tall trees. The materials were twigs of varying sizes, with a lining of antelope-hair and feathers. Two of the nests held single eggs, with granular surface and white ground-color, blotched with grayish yellow and some larger markings of rufous. In one case, there were also lilac streaks. Dimensions: 87-88.4 mm. by 63.2-66.4. Larger eggs have been found in the Transvaal: 94.5-96 mm. by 70-74.5.² In the Gambia, Lowe found nests in early January, each with one egg. Sometimes the eggs were laid in depressions in the forks of baobab trees, sometimes there were stick nests. Dimensions of three eggs: 87-90 mm. by 61-69 mm.

***Trigonoceps occipitalis* (Burchell)**

Vultur occipitalis BURCHELL, 1824, 'Travels in Int. Southern Afr.,' II, p. 329 (typelocality: Makkwari River, near Kuruman, Bechuanaland).

Lophogyps occipitalis SHARPE, 1902, *Ibis*, p. 107 (Semliki Valley). MOURITZ, 1914, *Ibis*, p. 29 (Loëmbwa R.). LÖNNBERG, 1917, *Arkiv. f. Zool.*, X, No. 24, p. 12 (Kabaré). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 230 (Karemi).

Trigonoceps occipitalis GYLDENSTOLPE, 1924, *K. Svenska Vet. Akad. Handl. Stockh.* (3) I, No. 3, p. 288 (Rutshuru and Ruindi plains). SWANN, 1925, 'Monograph of the Birds of Prey,' part 2, p. 53 (Belgian Congo). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 179 (Faradje).

Faradje, ♂ im., January 14; 2 ♀ im., January 24, 25.

¹1923, *Journ. f. Orn.*, Sonderheft, pp. 62-65.

²Kirke Swann, 1924, 'Monograph Birds of Prey,' part 1, pp. 44, 45.

IMMATURE MALE.—Iris dark brown; tip of cere light green, rest of cere and base of bill light blue, outer part of bill dull light red; bare skin of head and neck pinkish and bluish white; feet pinkish white with dusky claws.

All three specimens are still in immature plumage with brown heads. The male is somewhat smaller than the females.

The range of *Trigonoceps occipitalis* spreads over the plains and more open savannas of Africa, from the Abyssinian coast of the Red Sea, through the Sudan and East Africa south to the Orange River, and west to Senegal and the Gaboon coast.

If present at all in the Lower Congo, it must be rare; and it is entirely wanting in much of the Upper Congo, since it seems impossible for a vulture to find a living in a country where the ground is so hidden by a blanket of forest. Gyldenstolpe says that it is by no means common along the eastern Congo border near Lake Edward. In the northeastern corner of the Congo, it is only within a few days march of the Sudan border that one finds the present species, whose limits here correspond roughly to those of *Pseudogyps africanus*, the two species mingling when attracted by carrion.

At the camp where I noted the greatest numbers of vultures and marabouts, some sixteen miles northwest of Faradje in an uninhabited expanse of bush-country, we never saw more than three *Trigonoceps* at any one time. They were perhaps even warier than either of the other vultures, and though adults with white crown, crop, and belly were seen, they could not be secured. Even poisoning meat was not a successful method of securing specimens of vultures, for they would always fly off some little distance before succumbing, and the great number of bushes and small trees, in addition to the high grass, made it next to impossible to find them.

At Garamba, Lang saw one adult white-headed vulture in June, so some, at least, must remain in the region during the rains. We never saw a nest of this vulture, but most large carnivorous birds in the Uelle choose the time of drought for breeding. At Lake No, toward the end of February, Lynes¹ found a large stick nest of *Trigonoceps* in a tree, which contained one half-fledged nestling. In South Africa, likewise, it has been reported to lay but one egg, white with a few faint brown cloudings, about 100×68 mm.²

It would seem superfluous to describe the food of *Trigonoceps*, but it may, nevertheless, be remarked that, in addition to meat, we found in one stomach quills of a porcupine (*Hystrix*) about four inches long and some grass that had doubtless been swallowed by chance.

¹1925, *Ibis*, p. 415.

²Stark and Sclater, 1903, 'Birds S. Afr.,' III, p. 393.

Our inadequate knowledge of the exact distribution of some African vultures is due, as Sclater and Mackworth-Praed remark,¹ to the general neglect of collectors. On reading Professor Reichenow's 'Vogelfauna des Mittelafrikanischen Seengebietes,' 1911 (while still in the Uelle district), I was astonished to find that he listed not a single species of typical vulture, either because of an oversight, or because none of the numerous East African records fell quite within what he regarded as the limits of the Lake region. But now we know that the three species of vultures found in the Uelle occur in the lake Region too, and, in at least one locality, the eared vulture as well.

***Torgos tracheliotus* (Forster)**

Vultur tracheliotus FORSTER, 1791, in Levaillant, 'Reise Afrikas,' (German Edition), III, p. 363 (type locality: Cape Colony).

DISTRIBUTION OF THE SPECIES.—Open arid regions of Africa from Cape Province north to Benguela, Mashonaland, and the dry interior of East Africa to Somaliland, Abyssinia, Egypt, and southern Tunisia—perhaps formerly to Algeria. Wanting in the central Sahara, and apparently rare in the Upper Guinea savannas. Birds from north of the Zambesi are often separated as *T. t. nubicus* (Smith), but this race appears to need further investigation.

Although omitted by oversight from Dr. van Someren's 'Notes on the Birds of East Africa,'² the eared vulture is common on many of the dry plains of Kenya Colony and Tanganyika Territory. I have never seen more than seven or eight together, and, of course, they are far outnumbered there by *Gyps rüppellii erlangeri*. I was very much surprised, however, to find *Torgos* in the eastern Congo, on the Ruindi Plain, on March 28, 1927. We were walking eastward from Kabasha to the Ruindi River, through a game reserve where numbers of cob, topi, and water-buck stared at us within rifle-shot, when two large vultures came soaring overhead. That they were eared vultures was clearly apparent from their size, their broad pink heads, tibiae clothed with white down, and the abundance of down showing on flanks and abdomen.

The numbers of large ruminants on this plain would render it the most hospitable spot in all the Congo for eared vultures, and I have little doubt as to their regular occurrence there. Inasmuch as I have also seen *Trigonoceps*, *Pseudogyps*, and *Necrosyrtes* on the Ruindi or the adjacent Rutshuru plain, I believe it possible that *Gyps rüppellii erlangeri*, a most

¹1919, *Ibis*, p. 706.

²1922, *Novitates Zoologicae*, XXIX, pp. 1-246.

abundant vulture in Kenya Colony, may yet be found in this auspicious spot in Congo territory.

FAMILY AQUILIDÆ. HAWKS, HARRIERS, KITES, BUZZARDS, EAGLES

KEY TO THE GENERA OF AQUILIDÆ AS REPRESENTED IN THE CONGO

- 1.—Metatarsus unusually long and thin, approximately twice as long as middle toe without claw; lores and orbit entirely naked; adult plumage largely gray with lower breast and tibiæ barred with black and white; immature plumage browner.....GYMNOGENYS.
Metatarsus never so long, relatively, unless lores are clothed with the usual bristly feathers.....2.
- 2.—Cutting edge of maxilla (or "upper mandible") with one or two well-marked notches just behind the distal hook. These are not always noticeable in the young, but the unusually short, weak feet are distinctive, metatarsus only 28–35 mm. long.....AVICEDA.
Cutting edge of maxilla without notches along its distal portion, though often sinuate, and sometimes with a noticeable downward projection at about the midpoint.....3.
- 3.—Metatarsus feathered both in front and behind nearly to base of toes, or even a little beyond.....4.
Metatarsus largely naked, especially behind, though the front may be feathered for two-thirds of its length.....8
- 4.—Wing-tip short, longest primaries (when wing is folded) do not extend more than 30 mm. beyond the longest secondaries.....STEPHANOÆTUS.
Wing-tip longer, primaries extending more than 60 mm. beyond the secondaries, and usually for a distance equal to or exceeding the length of metatarsus..5.
- 5.—Occiput with a long crest of band-shaped feathers, some of which usually exceed 100 mm., though wing does not exceed 420 mm.; plumage (at all ages) mainly blackish brown or black.....LOPHAÆTUS.
The crest, if present at all, relatively short, its feathers of more normal shape and seldom attaining 60 mm.....6.
- 6.—Plumage rather uniform brown, of much the same color above and below, even though tinged with rufous, or when, as in some immature birds, it becomes very much bleached.....AQUILA.
Plumage of lower breast and abdomen much lighter than that of back, and often white in ground-color in adults, or buff or rufous in young, darker spots or streaks frequent on underparts.....7.
- 7.—Size much larger: wing at least 550 mm., tail at least 285 mm., metatarsus at least 110 mm.....POLEMAÆTUS.
Size smaller: wing at most 480 mm., tail at most 300 mm., metatarsus at most 100 mm.....HIERAÆTUS.
- 8.—Tail exceedingly short, not more than one-fourth as long as the wing, so that the primaries (when wing is folded) project 115 mm., or more, beyond the tip of tail; lores naked down to corner of gape, save for sparse hair-like feathers; nape broadly crested; adults with much black in plumage, young mostly dark brown.....TERATHOPIUS.
Tail always exceeding one-third of wing-length.....9.

- 9.—Lores thickly clothed with short feathers. 10.
 Lores more sparsely clothed with feathers of bristly or hairy texture, or nearly naked. 11.
- 10.—Wing less than 350 mm. long, only two outer primaries emarginate on inner web; loreal feathers soft and plush-like; bill extremely small and compressed.
 MACHÆRHAMPHUS.
 Wing more than 380 mm. long, three or four outer primaries emarginate on inner web; loreal feathers directed backward and more "scaly"; bill not so small or compressed. PERNIS.
- 11.—Tail forked, sometimes very deeply. 12.
 Tail square, rounded, or graduated. 14.
- 12.—Wing more than 400 mm. long; plumage largely brown and rufous, with little or no white. MILVUS.
 Wing less than 300 mm. long; underparts mainly white, upperparts largely gray. 13.
- 13.—Fork of tail not more than 12 mm. deep, upper wing-coverts almost entirely black. ELANUS.
 Fork of tail at least 70 mm. deep, upper wing-coverts gray. CHELICHTINIA.
- 14.—Front of metatarsus with only small scales, more or less hexagonal¹. 15.
 Front of metatarsus with a row of broad scutes, or with an almost unbroken longitudinal plate. 19.
- 15.—Orbit and lores naked save for scanty, bristly feathers; bill from cere longer than inner toe without claw; adults black-and-white, young brown
 (see *Gypohierax* in *Ægyptiidae*). 16.
- 16.—Metatarsus longer than middle toe with claw. 17.
 Metatarsus shorter than middle toe with claw. 18.
- 17.—Tail less than three-fourths the length of wing. CIRCAETUS.
 Tail longer than three-fourths of wing. DRYOTRIORCHIS.
- 18.—Wing exceeding 440 mm. in length; front of metatarsus feathered for only about one-third of its length, under surface of toes with sharp spiculate scales.
 PANDION.
 Wing shorter than 300 mm.; front of metatarsus feathered for about two-thirds of its length, under surface of toes smooth. ELANUS.
- 19.—Middle tail-feathers considerably longer than wing. UROTRIORCHIS.
 Tail shorter than wing. 20.
- 20.—Tail little more than half as long as wing, or even less than one-half. 21.
 Tail two-thirds as long as wing, or exceeding two-thirds. 23.
- 21.—Hind surface of metatarsus, at least toward middle, with large scutes extending across it; primaries with little or no rufous; wing less than 490 mm. long.
 BUTEO.
 Hind surface of metatarsus entirely covered with smaller scales, more or less hexagonal. 22.
- 22.—Wing 500 mm. or more in length; no rufous on primaries. HALIÆTUS.
 Wing less than 330 mm. long; middle portion of primaries mainly bright rufous.
 BUTASTUR.
- 23.—Middle toe very long, tip of claw of inner toe does not reach to base of middle claw. 24.

¹Occasional specimens of *Butastur* may exhibit this condition, but there it is not normal.

- Middle toe relatively shorter, so that tip of inner claw does reach base of middle claw.....25.
- 24.—Nostril elliptical, without visible tubercle in it; tail square, or nearly so. ACCIPITER.
- Nostril more rounded, with tubercle near its upper border; tail distinctly rounded.....MELIÆRAX.
- 25.—Lower part of face with feathers arranged in a slight disk, faintly resembling that of owls; metatarsi relatively long and thin; longest primaries exceeding secondaries (in folded wing) by at least 100 mm.....CIRCUS.
- Face without disk of feathers.....26.
- 26.—Lower breast or abdomen with more or less regular gray, rufous, brown or blackish barring.....27.
- Lower breast and abdomen not regularly barred, though sometimes streaked or spotted.....29.
- 27.—Wing exceeding 270 mm. in length; hind surface of metatarsus always with a row of broad scutes.....MELIÆRAX.
- Wing less than 270 mm. long.....28.
- 28.—Scales on hind surface of metatarsus relatively small and hexagonal; plumage always predominatingly gray, with a conspicuous black stripe down the middle of whitish throat.....KAUPIFALCO.
- A more regular row of scutes on back of metatarsus when young, often tending to fuse in a plate when adult; a black stripe on throat is seldom present, and then plumage is not mainly gray.....ASTUR.
- 29.—Primaries as seen from above largely bright rufous, with a few broken bars and blackish tips, bases whitish; breast rufous, and throat usually with blackish median stripe.....BUTASTUR.
- Primaries without any considerable area of bright rufous, mainly barred with light gray and blackish; blackish stripe on throat only present in some young birds.....ASTUR.

SUBFAMILY Pandioninæ

Pandion haliaetus haliaetus (Linnæus)

Falco haliaetus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 91 (Europe; restricted type locality: Sweden).

Pandion haliaetus REICHENOW, 1901, 'Vögel Afrikas,' I, p. 607 (Tanganyika).

Pandion haliaetus haliaetus HARTERT, 1914, 'Vögel Paläarkt. Fauna,' II, p. 1191. Fig. 198 (southern and tropical Africa).

Pandion haliaetus SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 233 (Kivu; Baraka). Avakubi, ♂, February 21.

ADULT MALE.—Iris greenish yellow; bill black, cere and base of mandible bluish gray; feet very pale blue, claws black.

A fully adult male, with chest heavily spotted, and wing 482 mm., tail, 220 mm. Crop and stomach filled with fish.

DISTRIBUTION OF *P. h. haliaetus*.—Europe and Asia, from the British Isles to Kamtchatka, breeding at least as far south as the Cape Verde Islands, Red Sea, and Somali coast. The ospreys' southward migrations take them as far as the Philippines, Celebes, and Cape Province.

Not at all numerous in the Congo basin, but I have observed it more or less regularly along the rivers Dungu, Kibali, Uelle, and Ituri, from August to April, inclusive, and once on the Congo River above Tshumbiri, April 8. Even on July 12, 1909, I noted seeing one on a sand-bar in Stanley Pool, and I have no reason to doubt the identification, despite the unusual date. No nesting of the osprey in the Congo has come to my notice, and I have some doubt about the identity of the nest which Carpenter¹ photographed on an islet in Lake Victoria in January, 1919.

The fishing and other behavior of the osprey in Africa are the same as those of the American race; but we found them excessively wary, and I never heard one whistle.

SUBFAMILY *Elaninae*

Pernis apivorus apivorus (Linnæus)

Falco apivorus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 91. (Europe; restricted type locality: Sweden).

Pernis apivorus SHARPE AND BOUVIER, 1877, Bull. Soc. Zool. France, II, p. 472 (Shiloango R.). SHARPE, 1884, Journ. Linn. Soc. London, Zool., XVII, p. 437 (Semio). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 613 (Sassa; Semio). BEQUAERT, 1922, Rev. Zool. Afr., X, p. 317 (Avakubi). DE SCHAECK, 1927, Bull. Soc. Zool. Genève, III, p. 80 (Luluabourg).

Pernis apivorus apivorus SCHOUTEDEN, 1924, Rev. Zool. Afr., XII, p. 408 (Eala); 1926, idem, XIII, p. 186 (Temvo). GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 72 (Congo).

Stanleyville, ♀, September 5.

Avakubi, ♀, July 4; ♀ im., November 11.

Medje, ♀, April 7.

Niangara, ♀, April 2.

ADULT FEMALE.—Iris yellow; bill blackish, with base of lower mandible gray; cere dark gray, or dusky greenish, or entirely yellow; corners of mouth yellow; feet chrome- to cadmium-yellow, claws dark gray.

IMMATURE FEMALE.—Iris rather light grayish-brown; cere chrome-yellow; bill black with base of lower mandible pale bluish-gray; feet chrome-yellow, claws dusky.

While no two of these birds look exactly alike—one might expect this in a small series of *Pernis apivorus*—the one from Medje and that taken at Avakubi in July agree in being generally light brown below; the other three are white-breasted, though with dark streaks.

All but the Niangara specimen have the tips of the primaries blackish brown for a greater length than our six European specimens, dark, in fact, up to the notch of the inner web.

None of these Congo specimens has the uniform ashy coloration of crown and cheeks, but this I am inclined to regard as a mark of the male sex.

¹1920, 'Naturalist on L. Victoria,' p. 160. Van Someren, 1932, Novit. Zool., XXXVII, p. 272, states that the osprey now breeds at Lake Naivasha.

Lumping both sexes, Hartert¹ gives the following measurements: wing, 395–425 mm.; tail, 255–277. The females, he says, are the larger birds; and yet our five females are all rather small: wing, 378–405 mm. (average, 391.8); tail, 220–253 (238.4). In two cases, to be sure, the wings or tail show some wear, but this is not a sufficient explanation.

DISTRIBUTION.—The honey-buzzard of Europe breeds from France and Norway (until recently also in England) eastward to Asia Minor and the Urals, being replaced in Siberia by *Pernis apivorus orientalis* Taczanowski, supposedly somewhat larger.

In Africa, to which the European form migrates annually, it has been taken as far south as Angola and Natal, but is best known from the western forests. In East Africa it is a rarity, and from the Anglo-Egyptian Sudan there is but a single record, in the Red Sea Province. Bohndorff's records from Semio and Sassa, and ours from Niangara, make it probable that some migrants do travel by way of the Sudan. I have recently taken another specimen, at Lukolela, October 25.

Dr. Hartert does not believe that the honey-buzzard ever breeds in tropical Africa; and while we secured a female on July 4, its ovary was not at all enlarged, nor were any of the others in condition to breed.

We found this a silent bird of rather sluggish nature, usually seen near the borders of clearings. Wasp-buzzard would be a far better name than the one commonly used in English, for I do not think it ever molests honey-bees. In the Congo, wasps' nests must supply practically all its food, though in Europe it also eats the brood of bumble-bees, reptiles, eggs, young birds, and small mammals.

The crops or stomachs of our five specimens contained in every case pieces of the paper comb from wasps' nests of various kinds, with larvæ, often pupæ, and in three cases the adult wasps as well. The feet of *Pernis* give an impression of no great strength, but the long and relatively straight claws must be effective in tearing open the paper covering of wasp colonies. From remains found in its stomach, I believe that even those of the redoubtable *Polybioides melaina* are laid waste, and to my mind the feathered lores are not sufficient to explain this apparent immunity to stings. On one occasion we found this venomous species of wasp and its larvæ to have been eaten by a bulbul, *Bæopogon clamans*.

Aviceda cuculoides cuculoides Swainson

Aviceda cuculoides SWAINSON, 1837, 'Nat. Hist. Classif. Birds,' II, p. 214, Fig. 193; 1837, 'Birds W. Africa,' I, p. 104, Pl. 1 (type locality: West Africa).

¹1914, 'Vögel Paläarkt. Fauna,' II, p. 1182.

Baza cuculoides SHARPE, 1884, Journ. Linn. Soc. London, Zool., XVII, p. 438 (Semio). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 618 (Semio).

Aviceda cuculoides cuculoides W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 56 (Niam-Niam country). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 220 (in part. Niam-Niam).

Between Dungu and Faradje, ♂, February 22.

MALE.—Iris cadmium-yellow; cere and corners of mouth chrome-yellow, bill black with a little whitish at base of mandible; feet light cadmium-yellow, claws black.

DISTRIBUTION OF THE SPECIES.—From Senegal, the Bahr-el-Ghazal Province, and Mt. Elgon, south to Cape Province, chiefly in wooded districts. There are apparently three races. Typical *cuculoides* is relatively pale gray on the upperparts, with uniform rufous under wing-coverts, and ranges from Senegal to the Benue River, the Bahr-el-Ghazal, and the savannas of the Uelle. *A. c. batesi* is a much darker form, also without light bars on under wing-coverts, living in the forests of western and central Africa, as far east as the upper Ituri and south to the Kasai district. *A. c. verreauxii*, with under wing-coverts barred with rufous and white, is usually lighter and more brownish above than *batesi*, and ranges from Mombasa, Mt. Elgon, and the Kwango district south to Knysna in Cape Province.

Aviceda c. emini, based on Emin's brief description of a bird from the Lendu plateau in the eastern Ituri district, is perhaps synonymous with typical *cuculoides*, but more probably represents the dark forest form, and will eventually replace the name *batesi*.

The specimen here referred to typical *cuculoides* is in nearly complete adult plumage, but retains a few feathers of the browner immature dress. Its long adult primaries and rectrices are full-grown, yet the wing measures only 278 mm.; tail, 178; culmen from cere, 20; metatarsus, 33. On crown, back, and wings the gray coloration is relatively light; and the inner secondaries (of adult plumage) are of a warm brown, rather light, with concealed white bases. The black bars on the adult primaries are hardly one-half as wide as in our specimens of *batesi*, and the white of the inner web extends farther out. The gray of the chest is likewise pale; and the rufous bars on the breast are not only narrower than in *batesi*, but more concealed by the overlying white tips. Upper tail-coverts more broadly barred with white. A rufous patch on the nape includes the longer feathers of the crest, instead of being almost hidden by a gray crest. This is the only feature in which it agrees particularly with the original description of *emini*.

I have seen specimens of essentially similar coloration, save for the rufous crest, from Semio (Bohndorff) and from Serikin Kudu on the

Benue River (Alexander) in the British Museum, from Kratchi in Togo (Zech) in Berlin, and from "Senegal" in the Brussels Museum. Swainson's plate of *A. c. cuculoïdes*, it may be added, also shows brownish inner secondaries. The wings of three females of typical *cuculoïdes* vary from 284 mm. to 297; tails, 185 to 188.

I had long been on the lookout for *Aviceda* in the Uelle district, for late in January, 1911, I had tried to stalk an adult example near the post of Dungu, and, later on, at Faradje, one had eluded me, likewise during the dry season. It was not until shortly before leaving the district that I finally shot one, in the bushy savanna between Dungu and Faradje. This is a very different habitat from that of *A. c. batesi*, so much so that relatively few raptorial species are common to both. Even *A. c. verreauxii* in South Africa is said to frequent only wooded districts. This hawk was not heard to utter any sound; its stomach contained many grasshoppers and two caterpillars, and its very weak feet, resembling those of *Pernis*, would lead one to expect insectivorous propensities.

I have very little doubt that Heuglin¹ did see this bird near the Djur River, Bahr-el-Ghazal province, in September, 1863.

***Aviceda cuculoïdes batesi* (Swann)**

Baza cuculoides batesi SWANN, 1920, 'Synop. List Accipitres,' 1st Ed., p. 107 (type locality: River Ja, Cameroon. Also to Aruwimi R.).

?*Baza emini* REICHENOW, 1894, Journ. f. Orn., p. 163 (Ndussuma); 1901, 'Vögel Afrikas,' I, p. 619 (S. W. of L. Albert); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 264 (S. W. of L. Albert).

Baza cuculoides CHAPIN, 1921, Amer. Mus. Novitates, No. 17, p. 15 (Avakubi; Ngayu; Rungu).

Aviceda cuculoides batesi SWANN, 1922, 'Synop. Accipitres,' 2nd Ed., p. 168 (Cameroon to Aruwimi R.). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 314 (Bassongo). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 57 (Aruwimi R.).

?*Aviceda cuculoides emini* SWANN, 1922, 'Synop. Accipitres,' 2nd Ed., p. 168 (Ituri district). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 57 (Ituri district).

Aviceda cuculoides batesi BANNERMAN, 1922, Rev. Zool. Afr., X, p. 169 (Aruwimi R.).

?*Aviceda cuculoides emini* BANNERMAN, 1922, Rev. Zool. Afr., X, p. 169 (Ituri district).

Aviceda cuculoides cuculoides BANNERMAN, 1930, 'Birds of Trop. W. Afr.,' I, p. 220 (in part. Ituri).

Avakubi, ♂, January 8; 2 ♀, July 20, November 27; ♀ im., January 3; ♀ juv., June 11.

Ngayu, ♀ juv., December 15.

Rungu, ♂, July 2.

¹1869, 'Reise in Gebiet Weissen Nil,' p. 335; 1869, 'Orn. Nordost-Afr.,' I, p. 106.

ADULT MALE.—Iris deep cadmium-yellow, with dark brown inner rim; bill blackish, cere greenish yellow, or dusky brownish, corners of mouth pale gray; feet cadmium-yellow, claws black.

ADULT FEMALE.—Iris cadmium-yellow, edge of eyelids green, cere dirty greenish; bill black, but bluish gray beneath mandible; feet cadmium-yellow.

A very young female had the iris gray. In an older bird of the same sex, but still in the brown plumage, it had become light green.

The correct name for this race may be *emini*, of which the type is not in existence. But it was said to have a rufous crest, which I have seen duplicated in only one specimen of *A. c. cuculoïdes* from the Uelle. This makes it impossible to determine the status of *emini* until another adult is collected near the type locality on the Lendu plateau:

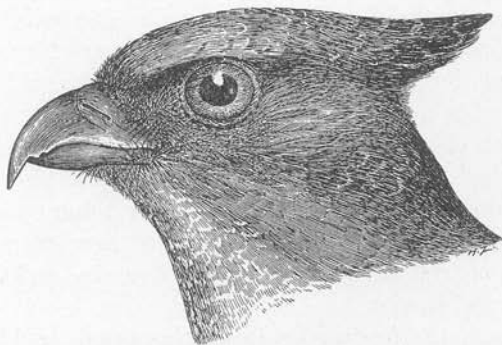


Fig. 194. Head of *Aviceda cuculoïdes batesi*. $\times \frac{3}{4}$.

DISTRIBUTION.—Heavy forests of West Africa from Sierra Leone to Portuguese Congo, across southern Cameroon and central Congo to the Ituri district (perhaps to Lake Albert), and south to Luluabourg in the Kasai. Reichenow has recorded it also from Malanje in northern Angola.

The bird of the rain forests of Upper Guinea is *Aviceda c. batesi*, not typical *cuculoïdes*. There are two dark-colored adults in the British Museum, a female from Bo, Sierra Leone (Kemp), and another without sex from the Gold Coast (Aubinn).

Father Callewaert has sent us two specimens of *batesi* from Luluabourg; one immature, the other an adult female. My measurements of five adults of *batesi* from the Congo are: wing, ♂ 296, 297 mm., ♀ 298–313; tail, ♂ 187, 189, ♀ 195–204; culmen from cere, ♂ 20.5, ♀ 20–21.6.

It is not strange that we did not note this hawk except in the forests of the Ituri and the Bomokandi, for it is a rather shy and inconspicuous

bird, which I have only seen in trees along forest-roads, in or dense timber along river banks. Certainly it seldom ventures into clearings, and is never seen soaring.

There is evidence to show that the present species of *Aviceda*, like many other birds of the equatorial forest, may breed at widely varying periods of the year. The young bird taken at Avakubi in June, with tail only two-thirds grown, had only recently left the nest, being accompanied by one of its parents. Yet the specimen from Ngayu, in December, was not much farther advanced, perhaps not more than a week older, for its first wing-quills were not yet fully developed.

The vernacular name of "cuckoo falcon" would not be objected to if *Aviceda* had really any resemblance to a falcon, but I cannot see that two pairs of notches in the sheath of the maxilla¹ can weigh very heavily against the many striking differences: the primary formula, the shape of the tail, and the very small, weak feet. In *Aviceda cuculoides* the notches in the beak vary with age. In the nestling, there is only a slight indication of one at each side, but this becomes more marked in the brown-backed immature birds, until just before they molt into the slaty adult plumage, when the second, smaller notch makes its appearance. If we may place any reliance upon the characters to be seen in skins, then the nearest allies of *Aviceda* are *Leptodon* and *Chondrohierax*, of the Neotropical Region.

Furthermore, the feeding-habits of this genus could hardly differ more from those of any but the smallest falcons like *Cerchneis*, for it is very largely insectivorous. Notes were preserved of the food eaten by six of our specimens, totalling eleven grasshoppers, two mantises, a small frog, and a considerable number of green, hairless caterpillars. The latter filled one hawk's stomach completely, and were present in two other cases.

***Aviceda cuculoides verreauxii* Lafresnaye**

Aviceda verreauxii LAFRESNAYE, 1846, Rev. Zool., p. 130 (type locality: near Port Natal, i.e., Durban).

DISTRIBUTION.—Mt. Elgon and the Tana River south to Knysna in Cape Province, also to Angola and the Kwango district, where Charliers procured an adult specimen at Atene for the Congo Museum. There is no record from the Upper Katanga, but I think it will surely be found there. In five specimens of *verreauxii* from different parts of its range I find the wing to vary from 303 to 328 mm., the tail 192–205.

¹The mandible has not the true falcon shape.

In southeastern Africa *Aviceda c. verreauxii* is said to frequent the more thickly wooded places, its habits and food resembling that of *batesi*. It may occasionally kill small mammals or birds, but its diet consists principally of insects, with a few lizards or chameleons.

A nest was discovered by P. A. Sheppard¹ near Beira in Mozambique on November 11. Built in the top of a young tree in fairly open woods, about twenty-five feet from the ground, it was placed between some branches forming a clump of thick foliage, and was betrayed only by the male bird flying from it. This nest measured about 40 cm. in diameter, and was loosely built of sticks, roots, and coarse grasses, lined with leaves and small bits of stick. The single egg, which probably did not represent the whole set, was pale greenish-white, rather sparingly yet evenly spotted and scrawled with rich and dull red-browns. Dimensions: 41.1×34.8 mm.

***Elanus caeruleus caeruleus* (Desfontaines)**

Falco caeruleus DESFONTAINES, 1789, Hist. (Mém.) Acad. Roy. Sci. Paris (1787), p. 503, Pl. xv (type locality: environs of Algiers).

Elanus melanopterus LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 407 (Lower Congo). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 368 (Rimo, in Lado Enclave). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 369 (Rimo).

Elanus caeruleus FLOWER, 1894, Proc. Zool. Soc. London, p. 599 (Ipoto). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Province Orientale; Umangi; Kisantu). O.-Grant, 1910, Trans. Zool. Soc. London, XIX, p. 441 (Mokia). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 263 (Kisenyi; N. slope of Mt. Sabinyo; forest W. of Tanganyika). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 360 (Province Urundi). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 14 (Caslivami, in Ruanda, 2400 m.). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 14 (Beni). SCLATER and M.-PRAED, 1919, Ibis, p. 689 (Tembura).

Elanus coeruleus SCHOUTEDEN, 1914, Rev. Zool. Afr., III, p. 263 (Kilo); 1918, idem, V, p. 233 (Beni; Kilo; Kibole; Kivu; Rutshuru; Niembo; Baraka; Kalembé; Masidongo; Busuenda; Boga; foot of Mt. Karisimbi).

Elanus caeruleus caeruleus BANNERMAN, 1922, Rev. Zool. Afr., X, p. 171 (Belgian Congo); 1930, 'Birds Trop. W. Afr.,' I, p. 231 (Loango Coast). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 314, 387 (Kabambaie; Kwamouth). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 288 (Masidongo). FRIEDMANN, 1930, in Strong, 'Afr. Republ. Liberia and Belgian Congo,' II, p. 750 (Kamaniola).

Elanus coeruleus coeruleus FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 56 (Kamaniola).

Stanleyville, ♂, August 18.

¹1910, Journ. S. Afr. Orn. Union, VI, p. 39.

Niagara, 2 ♀, November 10, 16; ♂ im., May 29.

Dungu, ♀, January 23.

Faradje, 2 ♂, November 6, 20; ♀, March 9; 2 ♀ im., October 3, 31.

ADULTS OF BOTH SEXES.—Iris red; bill black, cere and corners of mouth light yellow; feet light yellow with claws black.

IMMATURE FEMALE.—Iris first warm yellowish brown, later orange.

DISTRIBUTION.—Mediterranean region, practically all Africa, Madagascar, southwestern Asia, India, and the Malay Peninsula.¹ A bird of such a distribution might scarcely be expected in the West African forests, yet it does occur there, in the larger clearings. Besides our specimen from Stanleyville, we noted two at Avakubi in April, 1910.

On the lower Congo it is of regular occurrence, and in the savannas of the Uelle district a common bird everywhere. Doubtless the same is true for the Manyema, Kasai, and Katanga, although there are no records from the last-named district.

The flight is extremely buoyant and graceful, and sometimes I have been tempted, as the bird sailed aloft, to compare it with that of the bateleur eagle, on account of the relative size and proportions of the wings, which are, however, usually raised a little higher. At other times it hovers against the wind with flapping wings, kestrel-like, as it watches the ground below, where doubtless a mouse or lizard has been spied. When dropping upon its prey, instead of coming down in a headlong rush like a falcon, or a swoop like *Milvus*, it is apt to drop gracefully from a considerable height, with wings raised high over the back, and claws stretched down in front.

The shorter the grass or other vegetation, the better satisfied is this little "kite," which consequently is often seen about cultivated fields, and spends a considerable part of its day perched on trees, not necessarily high ones, and keeping quite silent. The wing-tips commonly droop below the rather abbreviated tail, and the latter is wagged occasionally up and down, so the bird's outline has distinct individuality.

No evidence is at hand that *Elanus caeruleus* nests in the Uelle. Only a single specimen (Dungu, January) had the ovary noticeably enlarged. On the other hand, there was no sign of migration, the species being observed throughout the year. It is known to nest both in the Sudan and in South Africa, building in acacias or other low trees, and using twigs, palm-fibre, and bits of sod. The eggs are from three to five in number, white tinged with green, clouded and blotched with reddish and purplish brown. Dimensions: 35–43 mm. by 28.5–33. While the

¹*E. hypoleucus* Gould of the Philippines, Sunda Islands, and Celebes is no more than subspecifically distinct. Indian birds are sometimes separated as *E. c. vociferus* (Latham).

young are being raised, the nest becomes covered with mouse fur, according to Brehm. This is easy to understand, for an immature bird that we kept alive cast up small pellets of hair, just like an owl.

Seven out of eight stomachs investigated contained only hair and bones of mice and rats, the remaining one had pieces of a lizard. At Jinja (Uganda) Carpenter recounts¹ that he used to watch these kites carry the mice which they had caught on to a certain tree in front of his tent, and noted that they usually pulled out the viscera, and let them drop to the ground below. Small rodents and lizards are the most usual prey; but Heuglin also states that bats are captured, and grasshoppers taken on the wing, while both he and W. L. Sclater say that birds are killed by these kites.

[*Chelictinia riocourii* (Vieillot)]

Elanoides riocourii VIEILLOT, 1822, 'Gal. Oiseaux,' I, p. 43, Pl. xvi (type locality: Senegal).

?*Chelidopteryx riocourii* EMIN, 1881, Petermann's Mittheilungen, p. 10 (Bahr-el-Jebel, S. of Wadelai); 1888, 'Emin Pasha in Central Africa,' p. 160 (S. of Wadelai). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 160 (the Nile, where it leaves L. Albert).

The African swallow-tailed kite ranges across the continent from Senegal through northern Nigeria to Darfur, Sennar, Shoa, and the Rift Valley in Kenya Colony.² Emin reported seeing what was probably this bird, between Wadelai and the mouth of the Victoria Nile, not very far from Mahagi: "I saw here a small hawk with very long, pointed wings, dark gray upon the upper surface, white underneath. Perhaps it is the *Chelidopteryx Riocourii*; it flew in pairs." There is a possibility of its occurrence within our territory near the northern end of Lake Albert.

***Machærhamphus alcinus anderssoni* (Gurney)**

Stringonyx anderssoni GURNEY, 1865, Proc. Zool. Soc. London, p. 618 (type locality: Otjimbingue, Damaraland).

Machærhamphus anderssoni JOHNSTON, 1884, 'The River Congo,' pp. 357, 372 (Vivi).

Machærhamphus anderssoni DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Vivi; Banalia). LÖNNBERG, 1907, Arkiv. f. Zool., III, No. 21, p. 5 (Mukimbungu). LANG AND CHAPIN, 1917, Bull. Amer. Mus. Nat. Hist., XXXVII, pp. 493, 551, Pls. LII, figs. 2, 3, LV. (Across Belgian Congo from Boma to Faradje.) SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 315 (Luebo). BUTLER, 1929, Ibis, p. 261 (Kajo Kaji in Lado Enclave).

Machærhamphus CHAPIN, 1915, Amer. Mus. Journ., XV, p. 291 (all across the Belgian Congo). CHRISTY, 1924, 'Big Game and Pygmies,' pp. 248, 249 (Avakubi; Mawambi).

¹1920, 'A Naturalist on Lake Victoria,' p. 162.

²There one was clearly observed by me in the Kidong Valley, June 17, 1926.

Machærhamphus alcinus anderssoni BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 233 (Lado Enclave; Loango Coast).

Banalia, ♀, September 21.

Avakubi, 2 ♂, February 24, November 10; 2 ♀, January 21, October 6.

Medje, ♂, September 14; ♀, September 7.

Akenge, ♂, October 10.

Faradje, ♀, January 12.

ADULTS OF BOTH SEXES.—Iris deep chrome- or light cadmium-yellow; beak black, with cere and sides of mouth bluish gray, feet grayish white (sometimes with a faint yellowish or greenish tinge), claws black.



Fig. 195. Head of *Machærhamphus alcinus anderssoni*.
Photograph from dead specimen by Herbert Lang.

Every specimen is adult, the males, on the whole, showing a little more white on the throat and abdomen, less clouded there with fuscous, than the females. A sort of gray bloom is noticeable on the feathers in the freshly killed birds, which is probably related to the extensive patches of down, as in *Kaupifalco* and *Terathopius*.

The eyes of *Machærhamphus* are relatively very large, the diameter of the cornea being 16 mm. The eyeball is not at all like an owl's in shape, but somewhat flattened, measuring 28 mm. across. At night the pupil is so large that the iris only appears as a narrow yellow ring.

In spite of a good average difference in size, the measurements of males and females overlap.

	WING	TAIL	CULMEN FROM CERE	META- TARSUS	MIDDLE TOE WITH CLAW
4 ♂ ad.	324-338 (average 333.5)	154-165(159.2)	16.0-16.7(16.5)	57-63(60.0)	56-58(57.5)
5 ♀ ad.	336-360(346.8)	160-188(173.7)	16.6-17.2(17.0)	58-64(60.5)	55-58(56.7)

DISTRIBUTION.—Though very scarce in Upper Guinea, the bat-catching hawk is known over a very large part of Africa, from Liberia, western Cameroon, the Upper Uelle, and Somaliland, south to Damara-land and Natal, as well as on the island of Madagascar. *M. a. alcinus* Westerman ranges from the Malay Peninsula to New Guinea.

At such widely separated places have I observed it in the Congo, that it must certainly be found everywhere in the Colony, save perhaps in the mountains of the eastern border. Within the forest districts it is usually encountered along rivers or about large clearings. In addition to the Uelle, Ituri, and Aruwimi districts, I also watched *Machæramphus* half a dozen times in the Lower Congo in December, 1914, and January, 1915, at Matadi, and on two occasions right over the "Plateau" at Boma, near the residence of the Governor General. This, of course, was in the late evening, and here is to be found the reason for this hawk having escaped observation, thus far, in so many parts of Africa. It is about as nocturnal as possible for a so-called diurnal bird of prey, and is generally seen under conditions which make recognition difficult unless one is acquainted with its habits. I cannot say whether it hunts all night, but it certainly is on the wing as long as it can be made out in the dusk.

It was one evening in November, 1909, at Avakubi, that I first became aware of the existence of such a bird, as it swept close by me in a grassy field on the bank of the Ituri. A few months later, another attracted attention in Banda's village south of Medje, by swooping around a tree where many small birds had gone to roost. But only ten months after our first meeting did we finally make a complete acquaintance. On some large dead trees left standing in the clearing atop the hill of Medje, a pair of these chocolate-colored hawks took post one evening, making swift flights out into the air, circling and returning to their station. The following evening they reappeared, and we were

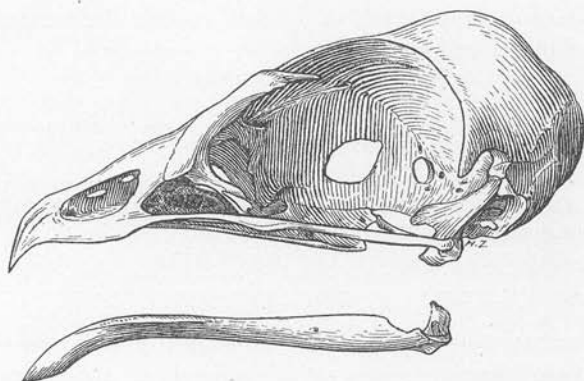


Fig. 196. Skull of *Machæramphus alcinus anderssoni*. $\times 1$.

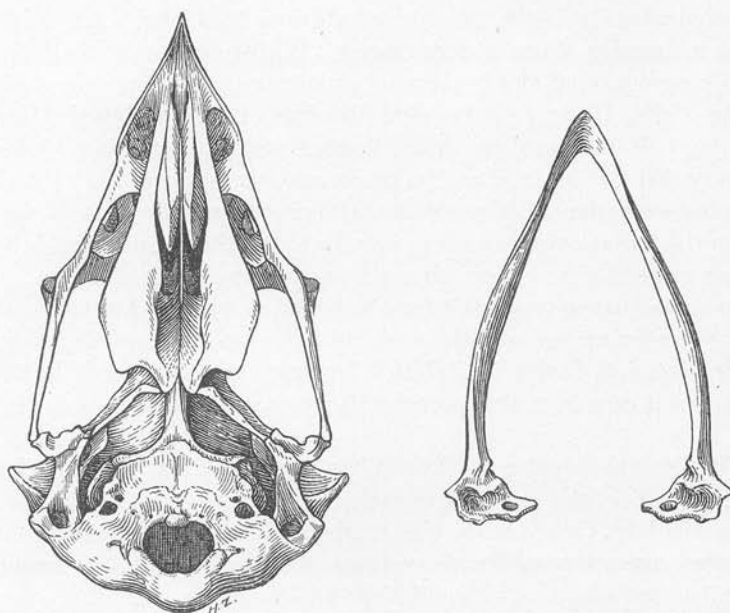


Fig. 197. Palatal view of skull of *Machæramphus alcinus anderssoni*, and mandible seen from above. $\times 1$.

delighted to secure a female specimen of *Machærhamphus*. Its stomach contained a passerine bird (ploceid?) and a small bat (*Mimetillus moloneyi*), the latter swallowed without the least mutilation. This seemed to explain the behavior of the birds, the other one of the pair returning a few evenings afterward, and being secured early one morning on almost the same tree. Again the stomach contained two bats (*Nyctinomus ochraceus*) and some feathers. We noted that these hawks flew swiftly and gracefully, often skimming along on set wings, the tail appearing relatively short.

Machærhamphus now eluded observation for a whole year, until one was noted at Faradje, flying by at dusk. The only specimen secured there was taken a few months afterward, by the luckiest accident. I was waiting one evening for bats, along the bank of the river Dungu, when something larger shot by in the gathering darkness. I risked a snap shot, and heard a splash in the shallow water. My delight can be imagined on finding it to be this hawk, with four bats in its crop and stomach. Each of these was of a different species,¹ three of which were later to be described as new from our collection. Five species at one shot! These bats all showed deep wounds, but were not torn up before eating; I feel convinced that they are caught in the bird's talons, and generally swallowed on the wing, a process which the very wide gape would facilitate.

Back once more at Avakubi we found *Machærhamphus* more common than we had previously suspected. In August and September, 1913, I saw it three times, only at twilight, sometimes alighting on large dead trees. Nekuma noticed that one was coming to a large tree covered with nests of weavers (*Textor cucullatus*), doubtless intending to catch the old birds in their nests, or to steal their young, so he awaited the raider one evening, with success.

The specimen from Akenge, Lang shot on a tall tree in the morning, but it should be noted that we observed only two examples in all by broad daylight.

One evening in early November, out on the Ituri River at Avakubi, we saw one of these hawks attacking a small pratincole (*Galachrysis nuchalis*) which had lingered on its way down to roost in the rapids. But the latter dodged each rush, dropping lower and lower, and finally escaped. After this, its pursuer started circling low over the river, making a round of about seventy-five yards in diameter, and I watched it do this seven times, wondering whether it was searching for bats, some

¹*Chærophon chapini*, *Allomops faradjius*, *Eptesicus ater*, and *Pipistrellus nanus*.

small species of which often fluttered close to the stream. The following evening we waited in a canoe. Twilight was well advanced when one of the boys spied our bird over the river, and presently it was going round and round, the same as before. Down we let our boat drift, the hawk still circling with an easy direct flight that one could hardly distinguish from a falcon's. This bird was wounded, and on picking it out of the water, I heard a note for the first time, a shrill "kee-ee-ee-ee!" Its stomach was still empty.

On the evening of January 21, I shot a *Machærhamphus* which had swallowed a bank-swallow (*Riparia riparia*), head foremost, without even removing any of its quills. At this season flocks both of bank-swallows and of *Hirundo rustica* went flying down the river every evening to roost; and on February 24 another hawk had two bank-swallows in its crop, three more filling the stomach, but in this case, most of the wing and tail quills had first been removed.

It was at this period, too, that peregrines (*Falco peregrinus calidus*) were flying near the post of Avakubi at dusk, and we sometimes found it difficult to distinguish between them and *Machærhamphus* in a poor light, because of the great similarity in flight.

The last specimen of this bat-catching hawk secured was flying very low, in the gloom, about a riverside village named Bombwa, above Banalia, and it had already eaten two bats and a small bird. In the Lower Congo the species is at least as common as in the Ituri. In the highlands along the eastern Congo border I have since spent a year without noticing a single individual; but at Kabalo on the Lualaba River, on August 6, 1927, one was seen circling about in the gathering dusk. At Lukolela on the middle Congo these hawks were seen nine times between August, 1930, and March, 1931, two specimens being collected. Other localities where I have recently observed them are Dembo, between Kisantu and Leopoldville, July 13, 1930, and Bolengi near Coquilhatville, March 13, 1931.

Where *Machærhamphus* nested we never learned, nor did our dissections even indicate the time of breeding, none of the specimens having reproductive organs enlarged. The pair observed in September was an unusual case, nearly every other bird being single.

In Nyasaland, Mr. C. C. Roberts¹ reported the finding of a nest in November in a wood in a "kloof" about five miles from Zomba. "The nest was placed in the largest tree in the wood, about thirty to forty feet up, and was constructed of large sticks, lined with smaller twigs and

¹1924, *Ibis*, p. 675.

decorated with green leaves. The spot selected was some distance from any habitation and not easy to find, the undergrowth of the wood being very dense. The eggs were two in number, of a pale bluish-green." Roberts' remarks as to the food of this hawk consisting mainly of beetles and larger insects, with probably a few small birds and reptiles, might lead one to question the identification; but I have since seen his skin of the bird shot at the nest. A second nest has been described by Carlisle¹ from 60 miles south of Bulawayo, Southern Rhodesia, likewise in November. The two eggs showed cloudings of pale purple, and one had small specks of brown. Dimensions: 64×47 and 61.5×45.4 mm.

Of eleven specimens examined by us, two had the stomachs empty, the others having eaten eleven bats, one palm-swift, six bank-swallows, and five other small birds. The food seems almost evenly divided between bats and birds, but a larger number of cases might increase the proportion of bats.

SUBFAMILY *Milvinæ*

KEY TO THE SPECIES OF *Milvus* IN THE CONGO

- Bill yellow in adult, horn-brown, dark gray, or dusky brownish in immature specimens; ground-color of crown and throat in adults brownish rather than whitish; blackish shaft-streaks on chest of adults scarcely wider than 1-2 mm.; pale streaks on chest of young not very white or conspicuous; wing-length (including immature) 380-446 mm., generally less than 440 mm. *M. ægyptius*.
 Horny sheath of bill quite black in both adult and immature birds; ground-color of crown and throat in adults more whitish; blackish streaks on chest of adults usually 3 mm. or more in width; pale streaks on chest of young broad and conspicuous; wing-length (including immature) 425-475 mm., generally exceeding 435 mm. *M. migrans*.

Milvus ægyptius parasitus (Daudin)

Falco parasitus DAUDIN, 1800, 'Traité d'Ornith.,' II, p. 150 (type locality: South Africa).

Milvus ætotius LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 407 (Lower Congo).

Milvus ægyptius SHARPE AND BOUVIER, 1876, Bull. Soc. Zool. France, I, p. 301 (Banana). DUBOIS, 1886, Bull. Mus. Roy, Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Tanganyika; Province Orientale; Banalia; Umangi; Lower Congo). DE SOUSA, 1886, Journ. Sci. Lisboa, XI, p. 77 (Tenke); 1886, in Capello and Ivens, 'De Angola a Contra-Costa,' II, p. 443 (Tenke). EMIN, 1894, Journ. f. Orn., pp. 163, 166 (Ndussuma; near Irumu). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 609 (Banana; Tenke; Mpala; Lugoma brook; Irumu); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III,

¹1929, S. Afr. Journ. Nat. Hist., VI, p. 286.

p. 263 (Ruasa-Mulera; W. of L. Tanganyika). NEAVE, 1907, Mem. Proc. Manchester Lit. Phil. Soc., LI, No. 10, p. 25 (Road to Ndola, Alala Plateau); 1910, Ibis, p. 104 (Bunkeya R.; Upper Lufupa R.). O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 441 (Mubuku Valley). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 360 (Usumbura; forest west of Tanganyika; Ukaika). MOURITZ, 1914, Ibis, p. 27 (Tshinshenda). SCHOUTEDEN, 1914, Rev. Zool. Afr., III, p. 263 (Kilo); 1918, idem, V, p. 233 (Kilo; Irumu; Pengé, Boga; Kaniki; between Semliki and old Mission Saint-Gustave; Baraka; Uvira; Ruzizi). CHAPIN, 1916, Amer. Mus. Journ., p. 545 (Ituri). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 15 (no locality). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 77 (Mswa; Tunguru; Buguera). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 263 (Bolobo; Lubumbashi R.; Kasepa R.; Lulombo).

Milvus migrans JOHNSTON, 1884, 'The River Congo,' pp. 357, 371 (up Congo to Bolobo). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Tanganyika; Province Orientale; Umangi; Lower Congo). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 151, 152, 156, 160, 161 (Kongolo).

Milvus parasiticus SCHALOW, 1886, Journ. f. Orn., p. 413 (Lufuku R.). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 406 (Makraka). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 3, p. 240 (Mundu).

Milvus forskalii SCHALOW, 1886, Journ. f. Orn., p. 425 (Lugoma R.).

Milvus aegyptiacus MATSCHIE, 1887, Journ. f. Orn., p. 148 (Mpala; Lugoma brook).

Milvus forskalii SCHALOW, 1887, Journ. f. Orn., p. 230 (Mpala).

Milvus forskalii EMIN, 1888, 'Emin Pasha in Central Africa,' p. 368 (Rimo).

?*Milvus korschun* OUSTALET, 1893, Naturaliste, VII, p. 60 (no exact locality).

Milvus aegyptius DYBOWSKI, 1893, 'La Route du Tchad,' p. 302 (Ngapou country, near headwaters of Shari R.).

Milvus migrans parasitus SWANN, 1920, 'Synop. List Accipitres,' 1st Ed., p. 97 (Africa S. of Sahara to Cape Colony). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 287 (Mt. Muhavura, 3000 m.). PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 66 (upper Kafue R. near Ndola). PAGET-WILKES AND SLADEN, 1930, Ibis, p. 439 (Ituri forest). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 227 (Congo R.). FRIEDMANN, 1930, in Strong, 'Afr. Republ. Liberia Belgian Congo,' II, p. 750 (Kibati).

Milvus migrans parasiticus BANNERMAN, 1922, Rev. Zool. Afr., X, p. 170 (Belgian Congo).

Milvus aegyptius parasitus SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 314, 387 (whole Kasai S. to Tshisika; Kwamouth); 1924, idem, XII, pp. 261, 408 (Kidada; Leopoldville; Eala; Bikoro; Ikengo; L. Tumba); 1925, idem, XIII, p. 5 (Mongende; Kunungu; Bolobo); 1926, idem, XIII, p. 186 (Lower Congo); 1930, idem, XVIII, p. 280 (Elisabethville).

Avakubi, ♀, June 27; ♂ im., October 18.

Bafwabaka, ♂ im., January 4.

Gamangui, ♂ im., February 15.

Medje, 4 ♂, January 14, 18, 21, September 11; 2 ♂ im., January 14, 21.

Dungu, ♂ im., January 27; ♂ juv., February 22.

Faradje, ♂, January 22; ♂ im., January 22; ♀ juv., March 16.

ADULTS OF BOTH SEXES.—Iris brown, not very dark; beak waxy yellow, cere, gape, and rims of eyelids yellow; feet yellow, claws black.

Immature birds have the cere greenish yellow, the horny part of bill dark gray or brown, the iris darker than in the adult.

Nestlings have the sheath of the bill black, iris dark brown, cere greenish yellow, feet yellow.

In the above series there are only six fully adult birds, all representing the race *parasitus*, to which I refer all the young *Milvus* from these same regions, except one differing markedly and evidently representing *M. migrans*. In view of the lack of evidence for intergradation between adults of *Milvus migrans* and *M. ægyptius*, I prefer to regard them as distinct species.

The variation in size is wide. Among our five adult males from the northeastern Congo, the shortest wing is 390 mm., the longest 425 mm. The variation in tail-length is as great. Four adult females from the Congo have wings varying from 415 to 446 mm.

The present series well illustrates the psychology of a collector. During my first year in the Congo I made very effort to secure specimens of the common kite, especially as I found them scarce. On reaching the Uelle, however, where they were abundant, I began to think that perhaps they were scarcely worth my time and my ammunition, with the natural result that our material is rather deficient.

DISTRIBUTION OF THE SPECIES.—Egypt, coasts of Red Sea to Aden, all Africa south of the Sahara, Madagascar, and the Cormoro Islands. The typical race inhabits Egypt, and perhaps also the Red Sea coasts, unless birds of southern Arabia are separable as *Milvus a. arabicus* Swann.¹ The remainder of the range is occupied by *M. a. parasitus*. This kite is to be found throughout the Belgian Congo, though scarcer in the forested parts, where it evidently finds difficulty in gleaning a living. Yet in the middle of the Ituri Forest, at Avakubi, we noticed that they were apt to turn up at almost any season, though perhaps most rarely during the short dry period towards January and February. This corresponded to the northern dry season, though we were here but one and a half degrees north of the equator. At Stanleyville, too, they never seemed to become common, not being noticed in August, 1909, but occasionally present in October and November, 1914.

MIGRATION—In East Africa, no one has called attention to any great seasonal variation in numbers; but in the savannas lying just north and south of the great Congo forests, this is one of the most striking lessons in bird phenology. Throughout the dry season, whether it be in

¹1922, 'Synop. Accipitres,' 2nd Ed., p. 153 (Lahy).

the north or the south, this is one of the commoner birds—no other bird of prey even approaching it in numbers. Then finally come the rains, and almost before one realizes it, all the kites have vanished. Where have they gone? After following up the migration of the pennant-winged nightjar, I asked myself whether the kites might not solve their seasonal difficulties in the same way, but it was soon apparent that this could not be the case.

In the first place, the yellow-billed kite of Egypt represents a distinct geographic race, which Mr. William Raw tells me, is not migratory, but resident in that country. We are told by Sclater¹ that *M. a. parasitus* is only found during the summer months in South Africa from October to March, and it nests there at that season, just when the same kites become most abundant in the Cameroon² and in the Uelle district, where they likewise nest. Even in the Upper Katanga, says Neave,³ they are apparently present only at the same time of year as in South Africa: from about the beginning of August to the end of March.

Now it is evident that these two bodies of migrating kites must come from some other areas of the continent; and that they do not, for the most part, come over the forest is indicated by the fact that just along the southern edge of the forest the season of greater abundance is the opposite of that in southern Africa, just as in Senegal it is the reverse of that along the northern border of the Cameroon and Ituri forests.

In the open country of the Kasai and the Manyema, for instance, I have been assured by several Europeans who have resided there, that kites are abundant only in the dry season, especially when the grass is being burned. This I have confirmed to my own satisfaction in the Lower Congo, for after seeing them in moderate numbers around Leopoldville and Noki in July, 1909, I have spent over a month between Kwamouth and Boma, in the rainy season, December, 1914, to January, 1915, without noticing a single kite.

Conversely, at Dakar, Senegal, the yellow-billed kite is abundant in June, when from the harbor I have counted thirty-six at one time, circling about over the town, whereas in February they were entirely lacking. At Freetown, Sierra Leone, no kites were to be seen on a call there in June, yet in February a few were noted as hovering over the harbor.⁴ And so, in view of their disappearance from the Uelle in the

¹1903, 'Birds of South Africa,' III, p. 337.

²Cf. Bates, 1909, *Ibis*, p. 11.

³1910, *Ibis*, p. 105.

⁴For Upper Guinea see especially the excellent notes in Bannerman, 1930, 'Birds of Tropical W. Africa,' I, pp. 228, 229.

rains, I should expect them to be migratory in the northern Sudan. In Darfur, however, Lynes¹ found them throughout the year, though hundreds passed through toward the north in June and July, returning southward again in August.

In Egypt, according to Heuglin,² *Milvus æ. ægyptius* breeds in February and March; and *parasitus* has been observed by Lynes nesting at Khartoum in December, at Lake No on March 1. Hawkes took downy young at Fashoda on April 2.

It is true, of course, that in these migrations of African birds there may be more straggling than in more severe climates, so that I have found it impossible to map the movements of the yellow-billed kites from the dates of occurrence in published reports. It is the "exceptional" birds that are most likely to be shot and to appear in print.

Let us return then to the savannas of the northeastern Congo, where, as we noted in three successive years, *Milvus æ. parasitus* is abundant from November to late in May. It spends a great deal of its time circling about over villages and camps,³ ever on the lookout for food below, refuse of any sort being seized in a graceful swoop, while domestic fowls are certainly somewhat disturbed by its presence, and it will attack their young.

The ordinary call is a protracted whining whistle, somewhat trilled, and lasting one or two seconds; but at times—particularly when disputing the ownership of a coveted tidbit—they emit shorter and less pleasant sounds. Around a hunter's camp in the bush they are apt to swarm—at the proper season—and they hover about the outskirts of a vultures' repast. They are always first among the birds attracted to the grass fires kindled by natives in the drier months, for many grasshoppers and other flying insects are carried far on high by the currents of heated air, up to where the yellow-billed kite and *Butastur rufipennis* are flapping and soaring in expectancy. Even such small prey is seized in the toes, the foot then held forward so the bill can be brought down to tear and swallow the insect.

In March, toward the end of the dry season at Faradje, when large winged termites begin to fly in great swarms, I have seen flocks of kites, numbering perhaps 250, busily engaged in capturing the termites on the wing. To get direct proof, I shot one of the birds and found its crop to be crammed with these delectable insects.

¹1925, Ibis, p. 398.

²1869, 'Orn. Nordost-Afr.' I, p. 98.

³Many remarkable observations on the soaring and change of direction in the case of the allied Indian species (*M. migrans govinde*) will be found in Hankin's 'Animal Flight,' 1913.

At this season, the kites do not seem very busy with family cares, and yet a certain proportion of them are breeding. Compared to the number of birds seen in the dry season, however, the number of nests is extremely small. Still, the ratio of immature birds is very large, and taking these two facts in conjunction it would seem that some of these kites may possibly build their nests somewhere else at a different season.

They show decided discrimination in the choice of nesting sites, never, so far as I saw, placing them in exposed situations near villages. Instead, they choose the trees along rivers where there is little or no canoe travel; and only on one occasion near Faradje (February 20, 1913) did I see a kite of this species sitting on a nest placed elsewhere. This was at a height of forty to fifty feet in a large tree standing in a wooded swamp.

The other nests we located were more readily accessible. On February 16, 1913, I found a set of two eggs on a nest in a tree leaning out over the River Dungu, at a height of only twenty feet over the water. It measured 68 cm. across, and was made of dry sticks, none thicker than my little finger. The upper surface was rather flat, and lined in the middle with rootlets, other soft vegetable material, and the fur of mammals, mixed with dry, powdered clay, a few lumps of which lay on the top also. The old bird deserted her eggs readily, and then sat peaceably on a dead tree at a distance. These eggs measured 53.3×42.8 mm. and 50.5×41.2 mm., the larger one being rather sparsely spotted and scrawled with dark brown, the smaller one with rather light rufous, the ground-color of both being bluish white. The inner surface of the egg shell, I may add, is light greenish-blue.

It is of interest to note that as long before as December 6, 1912, I had seen this very nest, practically finished, with one of its owners perched beside it, though from the appearance of all the kites' nests examined, it is clear that they build anew each season.

At Gangara-na-Bodjo, farther down the Dungu, on February 22, 1913, we took a single downy nestling which occupied a similar flat nest of sticks, 76 cm. wide, once more in a tree overhanging the river and at the same height above its surface. The lining of this nest, though containing a few dead leaves and other vegetable matter, consisted mostly of the dried excrement of hyenas, some of it mainly matted fur, but some also in hard limy lumps. There were, in addition, excrement of water-buck and some hard lumps of dark gray clay. Two small pellets were also noticed that had been ejected by the young bird, and a couple more

were disgorged during the three days I kept it alive. Needless to say, both nest and nestling had a most disgusting odor. This young kite made a squeaky chirping sound.

The down in which the nestling was clothed was by no means uniformly colored, and though whitish in the lightest parts, was of a decided smoky gray on the foreneck, back, and upper surface of wings, and darkest, perhaps, on the rump and just above and in front of the eye. On the crown and nape there are longer, silky down-feathers, white tinged distally with straw, almost forming a sort of crest, since they attain a length of 20 mm. These longer down-feathers are "pre-pennæ," for the contour feathers of the crown are beginning to sprout at their bases, while the shorter, grayer down of the crown is composed of "pre-plumulæ."¹

A second nest, found the same day in a precisely similar location, was covered on top with matted hair from mammal fæces, and also with hard bits of clay, in addition to excreta of hyena, elephant, and wart-hog, plus that of some small carnivore like a serval-cat. On this nest there also lay a single white, feathery tip of the grass *Imperata cylindrica*, which could not have come there by accident. This time there were two bluish-white eggs (52×41 mm.), rather soiled, one with only a few scattered brown spots, the other spotted with brown on the smaller end.

In both cases an old bird was on the nest, but flew off at the approach of our canoe, and displayed but little anxiety afterwards, one even sitting quietly on a tree across the river.

As late as March 2, 1913, along the Uelle River below Dungu, I discovered a set of two eggs in a nest on a tree on the river bank, which was again carpeted with hair, and decorated with hyena droppings and half a dozen lumps of clay. These eggs, measuring 51.9×41.3 mm. and 49.2×41 mm., were dull bluish-white, with scattered spots of brown, darker in the larger egg, lighter in the smaller.

While we never found any nests in the Medje region, the kites there frequent the clearings in the forest at the same season when they are most numerous in the savannas to the northward, and adult males taken in January showed enlargement of the sexual glands. To see four in an afternoon at Medje was unusual enough to warrant a special remark in our note-book, and at Bafwabaka two in a day was the most we could report. This northern edge of the Ituri Forest may well be compared with Bates' station on the river Ja, southern Cameroon, where

¹Cf. Pycraft, 1910, 'A History of Birds,' pp. 11, 12.

kites are only abundant, he writes,¹ during the months from November to April, inclusive, their movements being timed by the dry season of the northern Cameroon. Nor did Bates find any indication that kites bred at the Ja.

Now at Avakubi we lost this correlation; the birds usually came singly, appearing even in August and September, and these were evidently stragglers. This very fact, however, proves that the yellow-billed kite can cross the equatorial forest, and is of interest in connection with the migrating flocks of kites we also observed passing over at Avakubi.

On August 18, 1914, a flock of 70 passed over, at a height of 80 yards, circling round and round, very much as *Sphenorhynchus* does, then flying 400 yards or so due south, circling again, and finally resuming the southward direction. At 9 A.M. on August 21, another flock of 30 was circling high over the station in the same fashion, and then flew off to the south. It seems rather strange that Woosnam,² on Ruwenzori, observed a similar behavior of flocks of kites on March 7 and August 10, but noted that in both cases they were traveling north.³ On July 25, 1926, on the other hand, I watched a southward migration of at least 150 yellow-billed kites on the northeastern slope of Ruwenzori near Mt. Musandama. At least 200 more were again seen following the same route late in the afternoon of the following day.

We observed these migrating flocks not only on Ruwenzori and in the Ituri Forest, but also in the Uelle, where on several occasions, at Garamba and near Nzoro, from June to August such flocks were seen, numbering up to 100, and progressing in a more or less definite direction, usually southward.

At this season kites were rare in the Uelle, and yet they must have been *M. a. parasitus*, for not only is *M. m. migrans* a rarity in the Congo, but it should be breeding at this season from the Mediterranean countries northward.

FOOD.—A brief summary furnished by examinations of only ten individuals can give no adequate idea of the variety of food eaten by the yellow-billed kite in the Upper Congo. In one case, the crop and stomach were empty, in the others we found one rat, one shrew, two small birds (of which one was a young ploceid), one frog (or toad), fish remains (once), two grasshoppers, one caterpillar, four large winged driver-ants

¹Bates, 1909, *Ibis*, p. 11.

²1910. *Trans. Zool. Soc. London*, XIX, p. 441.

³At Wadelai on March 17, 1886, and again from March 16 to 20, 1887, Emin Pasha noted flocks of kites moving northward (see Schubotz, 1921, "Tageb. Dr. Emin Pascha," VI, part 2, p. 77). But in August I should expect the birds on Ruwenzori to be going toward the south.

(*Dorylus*), one other ant, and one hemipter. In one case, great numbers of large winged termites were found filling a crop; but the above list gives no hint of the great numbers of grasshoppers consumed, since no kites were shot at grass-fires, the other less common birds taking all our attention. Carrion is also eaten wherever available. So much for animal food—but an important item of food for kites in the Congo is supplied by the oil-palm (*Elæis guineënsis*). The fatty yellow pulp from around its fruit was found in three stomachs, and in another there was one of its hard kernels, still enclosed in the stony shell.

***Milvus migrans migrans* (Boddaert)**

Falco migrans BODDAERT, 1783, 'Tabl. Planches Enluminées,' p. 28 (type locality: France).

?*Milvus korschun* SHARPE AND BOUVIER, 1877, Bull. Soc. Zool. France, II, p. 472 (Banana). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 612 (Banana).

?*Milvus migrans* BOCAGE, 1881, 'Orn. Angola,' part 2, p. 533 (Banana). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Milvus ater SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 13 (near L. Bangweolo).

Milvus migrans migrans W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 57 (Uelle district). GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 72 (Uelle district).

Isiro, ♂ im., October 23.

Iris dark brown; cere yellowish, rest of beak black; feet yellow, claws black.

I consider this specimen as representing the black kite, not only because of its coloration, with very light head and broad whitish streaks below, differing from all our young *parasitus*, but especially because the horny sheath of both maxilla and mandible (in the dried specimen) is entirely black to the base, although the bird was plainly many months old. All the young of *M. æ. parasitus* except nestlings, while having a dark bill, not yellowish as in the adults, always show a brownish coloration there.

This immature specimen of *migrans*, furthermore, has larger feet, or at least a longer middle toe than our specimens of *parasitus*, measuring (without claw) 37 mm. as compared to 31–32 mm. for *parasitus*. The difference seems to be borne out by two adults of *migrans* from Europe. Our young bird has been compared with specimens of *migrans* in the same plumage in the British Museum.

DISTRIBUTION OF THE SPECIES.—Europe, Northwest Africa, and western Asia to Burma and the Shan States, lesser Sunda Islands, New Guinea, and Australia. The typical race, which migrates southward to

tropical and southern Africa, breeds from Finland and Archangel south through central and southern Europe to Northwest Africa, Palestine, and Afghanistan. In Africa it appears to travel south at least to the Zambesi and Ovampoland; but most of the older records are erroneous, being based on the young of *Milvus æ. parasitus*. Professor Dubois (1905) reported the black kite from much the same series of localities as he did the yellow-billed species, so the dark-billed young of the latter evidently deceived him.

I have examined quantities of kites in the Congo through a good prismatic field-glass, and have never seen a single bird in adult plumage with any but a yellow bill, though my attention was focussed especially on this point. The single immature specimen here listed was shot because of its unusual appearance; and the horny portion of its beak was noted as "black" on the label, whereas that of the young of *parasitus* at the same age is "brownish gray," "dark gray," or "grayish brown" in freshly-killed specimens. Its stomach contents comprised one large mantis and the pulp from palm-nuts.

The occurrence of *Milvus m. migrans* in tropical Africa is now substantiated by several adult specimens. One of these, a male taken by Emin at Lado on the Bahr-el-Jebel, April 15, 1884, is in the British Museum. The Royal Museum of Natural History in Brussels has another from the Zambesi presented by Dr. Holub. Recently the American Museum has received from Arthur Loveridge two adult males taken by him at Sagayo, Mwanza district, Tanganyika Territory, on October 28, 1922.

SUBFAMILY *Halietinae*

Haliaetus vocifer (Daudin)

Falco vocifer DAUDIN, 1800, 'Traité d'Ornith.,' II, p. 65 (type locality: Keurboom R., Cape Colony, ex Levaillant).

Haliaetus vocifer ANTINORI, 1868, Boll. Società Geogr. Ital., I, p. 117 (Niam-Niam country, near present Bafuka). PETERMANN, 1868, Petermann's Mitteil., p. 416 (Niam-Niam, as above). JOHNSTON, 1884, 'The River Congo,' pp. 312, 356, 371 (Congo R. up to Bolobo); 1908, 'George Grenfell and the Congo,' II, p. 927 (eastern Congo). SCHALOW, 1886, Journ. f. Orn., pp. 418, 420, 434 (Kaué R.; "Lualaba" [i. e., Luvua R.]; L. Upemba). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Tanganyika; Ituri). MATSCHIE, 1887, Journ. f. Orn., p. 148 (Lufuku; "Lualaba"; Lufira; Likulwe R.; L. Upemba). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 144 (N. end L. Albert, near Magungo). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 605 (Upper Lufuku R.; "Lualaba R." [i. e., Luvua]; Lufira R.; Likulwe R.; L. Upemba; "Ubangi R."); 1911, 'Wiss. Ergeb. D. Zentr.-Afr.

Exp. Mecklenberg,' III, p. 263 (Wau I. in L. Kivu; Usumbura). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 360 (Usumbura; L. Edward). MOURITZ, 1914, Ibis, p. 31 (S. E. Katanga, Luapula and Loömbwa Rivers). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 13 (near L. Bangweolo). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 14 (Kasindi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 233 (Kivu; Baraka; Kaniki; confluence of Talia and Semliki; S. of L. Albert; Kabaré; Molekera). EMIN, 1919, in Stuhlmann, 'Tageb. Emin Pascha,' II, p. 73 (Mahagi); 1922, in Stuhlmann, idem, III, p. 209, 211 (N. end of L. Albert). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 76 (Tunguru and Nsabe on W. shore of L. Albert). DE RIEMAECKER, 1927, Rev. Zool. Afr., p. 263 (Luapula R. at Kasenga).

Haliaetus vocifer EMIN, 1888, 'Emin Pasha in Central Africa,' p. 145 (near Magungo). OUSTALET, 1893, Naturaliste, VII, p. 60 (no exact locality).

Cuncuma vocifer SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 315, 388 (all along Kasai R.; Kwamouth); 1924, idem, XII, p. 409 (Eala; L. Tumba).

Haliaetus vocifer vocifer GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 287 (Ngoma).

Cuncuma vocifer clamans BANNERMAN, 1930, 'Birds of Trop. W. Afr.,' I, p. 268 (Loango Coast; Ubangi R.).

Avakubi, ♀, February 27.

Niagara, ♀, March 4.

Dungu, ♀, March 1.

Faradje, 2 ♂, March 16, December 6; ♀, February 7, ♀ im., April 26; ♀ juv., March 16.

ADULTS OF BOTH SEXES.—Iris dark brown (sometimes lighter on inner edge), eyelids, lores, and cere, bright chrome-yellow; maxilla black, a little gray at base, mandible bluish gray; feet light yellow, claws black.

YOUNG FEMALE.—Iris dark brown; bill, lores, and cere dark grayish; feet whitish gray, claws black.

The two adult males from the Uelle district have wings measuring 472 and 480 mm., the three adult females, 510, 513, 540. The female bird from Avakubi has the wing-tips badly worn, so that the measurement, 499 mm., is not very satisfactory. This shows that the fishing eagles of the northeastern Congo basin resemble, in their small size, those of Northeast Africa, which Brehm, Heuglin, and Zedlitz have separated from East and South African specimens as *H. v. clamans*.¹ Zedlitz² gave as the respective dimensions: *H. v. clamans*, wings, ♂, 500–505; ♀, 520–530; *H. v. vocifer*, wings, ♂, 520–550; ♀, 563–580.

An adult male in the American Museum labeled "Nubia (Verreaux Coll.);" is of the smaller size: wing, 490; and a female from Bissao, in West Africa, has the wing only 513. So *H. v. clamans* must extend across the continent.³

¹C. L. Brehm, 1853, Journ. f. Orn., p. 199 (type locality: Shoa).

²1910, Journ. f. Orn., p. 388.

³See also Friedmann, 1930, Bull. 153, U. S. Nat. Mus., p. 66; and Bannerman, 1930, 'Birds Trop. W. Afr.,' I, p. 268.

Dr. J. Bequaert noted that an adult female specimen shot at Kashioowe on the Luapula River, between Kasenga and Lake Moero, January 28, 1912, had a total length of 76 cm., the spread of wings being 200 cm.

Count Gyldenstolpe gave the wing-length of a male from Lake Kivu as 530 mm. and of three females from the same locality as 545, 570, 570 mm., so the eastern and southeastern Congo are evidently occupied by *Halizetus v. vocifer*. The validity of the two races is here accepted; but since they meet somewhere in the central or southern Congo, it would be all but impossible to unravel the synonymy. The species is therefore treated as a whole.

DISTRIBUTION OF THE SPECIES.—The whole of Africa south of the Sahara, northward in the Sudan to the Atbara River. Usually not very common in the Congo forests, and there occurring only along the large rivers, but more abundant in the outlying grass-countries and on the eastern lakes.

This is the true "Aigle pêcheur" known by name at least to every European in the Congo, though its title is very often erroneously applied in the Congo to *Gypohierax angolensis*. This is especially true on the lower Congo, where the vulturine eagle abounds and the true fishing eagle is rather scarce. Indeed, in ascending the Congo River, we did not observe it until we had passed Stanley Pool. During the next ten days (July 13–22), it was seen with some regularity, but never in numbers—only a bird or two on some conspicuous perch along the shore. After reaching Nouvelle Anvers we saw it no more all the way up to Stanley Falls. While I did not note a single individual on this same stretch of river in December, 1914, I nevertheless suppose that it must occur there.

Along the Ituri above Avakubi, the call of the fishing eagle was heard occasionally, and its nest found once, but it was along the northern edge of the forest region, on the rivers Dungu, Kibali, and Uelle, that we found the birds most numerous. Strangely enough, it is the handsome white-headed adults that one generally sees, sitting in repose on the tallest tree they can find, or circling high in the air, with occasional flaps of the wings, often in pairs, and advertising themselves with the loud cry that originally won the name of *vocifer*.

About Faradje, we heard these notes from October to March. They are uttered either from a perch or much more often in the air, the head being thrown back, and the sound repeated five or six times in a hollow, nasal tone that makes it somewhat difficult to perceive the direction from which it comes. Birds of a pair often answer each other. The first

syllable is higher and longer, succeeded by a slight pause, the others gradually dying down. The best rendering in words that I know is "claoû, clo-clo-clo-clo"¹; and the call carries to such a distance that its maker may be almost out of sight.

Along the Uelle between Niangara and Dungu, these eagles are common, and in several places the boatmen pointed out their bulky aeries, situated in high trees near the bank, and more or less concealed by the foliage. The birds were also conspicuous along the Kibali, and frequently left large fish lying along the shore, which my boatmen were very happy to appropriate for themselves. What has often surprised me is that I never actually saw *Halizætus vocifer* catch a fish, or even dive after one.

"The noise made by the rush of air between the pinions," says Carpenter,² "when one of these superb birds sees a fish at the surface and stoops to secure it, can be heard before one has actually seen the bird, and amounts to a loud roar. Sometimes the bird chooses a fish of such size that it cannot lift it.

"So far as I can remember, however, the eagle does not usually plunge quite into the water, but checks itself before the impact, neatly picking up the wriggling prey with its feet, and carrying it off to a favorite perch."

Most of the nests observed were so difficult to reach as to require a far better climber than I; but a pair of eagles that frequented the river Dungu below Faradje had a more accessible nest in the top of a leafy tree along an unfrequented part of the stream. They were reputed to occupy it year after year in the dry season, and in December, 1912, I climbed up to examine it. I found it a bulky structure about the size of an osprey's, composed of dry sticks measuring up to 2.5 cm. in diameter, and supported by stout forking branches, 13 meters from the ground. Its top was 1.25 meters across, and rather flat, with a few leaves probably placed there when green. I found only a dry, broken egg, its shell much soiled. Quite a little white down was clinging to the nest, indicating that the old birds had at least been sitting there. Although a lone nestling was taken from a nest near Faradje in March, 1911, sets of two eggs are said to be the rule. They are white, and measure approximately 70-76 mm. by 53-57 mm.

At Avakubi, nearer the equator, we heard the call of *Halizætus vocifer* in April and in August; and in February found that a pair was nest-

¹Dr. E. Gromier, 1913, *L'Illustration*, Paris, June 28.

²1920, '*Naturalist on L. Victoria*,' p. 160.

ing on a wooded island in the Ituri. They had built in some forks rather far out on a nearly horizontal limb, an inaccessible situation; and Nekuma reported that they had one or two young. Count Zedlitz has already called attention to the fact that this eagle always breeds at the period of low water, when fish are most easily caught.

Of the four specimens whose food was noted, three had the crops and stomachs gorged with fish; the fourth had eaten a monitor (*Varanus niloticus*), but the hard parts of many small insects also discovered in the same eagle's stomach must have been swallowed inside one of its victims.

In South Africa the fishing eagle is sometimes said¹ to feed on carrion, as do vultures and crows, to carry off wounded ducks, and to rob ospreys, pelicans, and kites of their prey. Besides fish, said Heuglin, its food includes lizards, and probably snakes and frogs as well.

SUBFAMILY *Aquilinae*

KEY TO THE SPECIES OF *Aquila* TO BE EXPECTED IN THE CONGO

- 1.—Wing less than 450 mm. long; adult plumage mainly chocolate-brown with some bronze or violet gloss; young similar, but lighter in color, feather-tips of upper surface pale. *A. wahlbergi*.
- Wing exceeding 450 mm. 2.
- 2.—Nostrils circular in outline, or nearly so; wing of males 460–490 mm., of females 495–525; adults earthy brown, but young darker brown with buffy spots on tips of upper wing-coverts, a small rusty nape-patch, and tawny spots or streaks on belly and flanks. *A. pomarina*.
- Nostrils elongated upward and forward; wing of males exceeding 485 mm., of females over 520 mm., upper wing-coverts never with small terminal spots of buff. 3.
- 3.—Plumage of crown and body, above and below, uniform earthy brown, rather dark, not variegated with lighter or more rufous streaks or wedges on scapulars or chest; only occasionally is there a tawny nape-patch; wing, males, 515–600 mm., females, 560–640. *A. nipalensis*.
- Body plumage not so uniform dark brown. Immature birds either more tawny or much lighter brown, sometimes bleaching to dirty whitish on cheeks and underparts; later the plumage becomes dark brown, but the chest and some scapulars, at least, are usually variegated with streaks or wedges of lighter rufous-brown²; wing, males, 490–502, females, 520–565. *A. rapax*

Aquila wahlbergi Sundevall

Aquila wahlbergi SUNDEVALL, 1851, Öfv. K. S. Vet.-Akad. Förh., Stockholm, VII (1850), p. 109 (type locality: "Caffraria superiori prope 25° lat.," i.e., Bechuana-

¹Stark and Sclater, 1903, 'Birds of S. Afr.,' III, p. 312.

²Some specimens of *Aquila rapax raptor* are said to be entirely dark brown, but there has undoubtedly been much confusion between this eagle and *A. nipalensis*.

land). NEAVE, 1910, *Ibis*, p. 103 (Dikulwe R.). BANNERMAN, 1930, 'Birds Trop. W. Afr.', I, p. 239 (Landana).

Aquila wahlbergii EMIN, 1888, 'Emin Pasha in Central Africa,' p. 183 (Kibiro).

Hieraetus wahlbergi REICHENOW, 1901, 'Vögel Afrikas,' I, p. 581 ("Marungu"). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 232 (Beni; Kivu).

Hieraetus wahlbergi DE RIEMAECKER, 1927, *Rev. Zool. Afr.*, XIV, p. 264 (Munama R. near Elisabethville).

DISTRIBUTION.—From Delagoa Bay and Transvaal north to the Congo mouth, Upper Katanga, East Africa, Lado, and Eritrea. Westward also, across the Sudan to Darfur, Bornu, and the Gambia. Absent from the Congo and Cameroon forests.

Within our limits Wahlberg's eagle is known only from the Katanga and the eastern border. It is seen rather frequently in the Semliki Valley and adjacent highlands. We never met with it in the Uelle. The adult is mainly dark brown with a noticeable pointed crest, while the immature plumage is described by Finch-Davies¹ as somewhat lighter brown, with pale tips to feathers of upperparts.

A nest found in Mashonaland was described by Marshall² as "a large structure of sticks in the strong fork of a large tree, about 20 feet from the ground, and lined with roots, grass, and a few green leaves. The single egg was dirty white, with large pale blotches and freckles of yellowish brown, and faint underlying blotches of brownish gray; it measured 60×48 mm." Another nest found by C. H. Taylor³ in Swaziland, in October, likewise contained but a single egg, dirty white with uneven splashes of reddish brown, 63×46 mm. In South Africa, according to Finch-Davies, Wahlberg's eagle breeds later than most eagles, from October to January, whereas most of the larger birds of prey usually nest during the winter months, May and June.

The notes are described as a clear plaintive whistle of two notes, and a very harsh scream, the latter given when the bird is driven from the nest.

[*Aquila pomarina* Brehm]

Aquila pomarina C. L. BREHM, 1831, 'Handb. Naturg. Vög. Deutschl.,' p. 27 (type locality: Pomerania).

The lesser spotted eagle of Europe and the Caucasus is known to migrate southward to the Sudan and the Ithanga Hills in Kenya Colony. In February, 1926, one which had been banded in East Prussia during

¹1920, *Ibis*, pp. 608, 609.

²1900, *Ibis*, p. 257.

³1907, *Journ. S. Afr. Orn. Union*, III, pp. 29, 30.

the preceding June was captured on the Loangwa River in Northeast Rhodesia.¹ The species may therefore be looked for along the eastern frontier of the Congo.

***Aquila rapax rapax* (Temminck)**

Falco rapax TEMMINCK, 1828, 'Planches Coloriées,' livr. 76, Pl. cccclv (type locality: South Africa).

?*Aquila melanætos* LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 407 ("Lower Congo").

Aquila rapax REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 262 (L. Mohasi; Mpororo). MOURITZ, 1914, Ibis, p. 34 (Mokambo Hills). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 13 (Rutshuru Valley). SCHOOTEDEN, 1918, Rev. Zool. Afr., V, p. 232 (Tsisilongo; Mai-na-Kwenda).

Aquila rapax rapax HARTERT, 1914, 'Vögel Paläarkt. Fauna,' II, p. 1097 (foot of Mt. Sabinyo).

DISTRIBUTION OF THE SPECIES.—Africa, with the exception of the western forest-region, to Morocco and Tunisia; also in the greater part of India. Two races occur widely in the Ethiopian Region: typical *rapax* from South Africa north to Angola, the Katanga, the Rutshuru plain, and Kenya Colony; and *A. r. raptor*, from southwestern Arabia, Somaliland, and Eritrea to Darfur, the Uelle district, and west to Senegal. The southern race is apt to be more tawny or rufous in all plumages than *A. r. raptor*, retaining more rufous in the adult plumage on head, neck, rump, and underparts. Hartert² records *A. r. belisarius* (Levillant) of Northwest Africa from Air. The Indian race is *A. r. vindhiana* Franklin.

Within our limits, typical *rapax* has been taken in the Kivu district and in southeastern Katanga. It is exceedingly doubtful whether Leach's record of "*Aquila melanætos*" from the Lower Congo refers to this species, or even to *A. wahlbergi*.

Hartert has remarked that one of Grauer's specimens from the base of Mt. Sabinyo is as uniform brown as many examples of *A. r. raptor*, although more typical birds were also secured in the same region. In the Congo Museum, I saw two adults taken by Pilette at Tsisilongo, March 13, which were rather dark brown, but streaked conspicuously with lighter brown on underparts and on the lanceolate feathers of the hind-neck. At Mai-na-Kwenda, on December 10, Pilette also secured a pale, worn bird, possibly immature, with new dark feathers appearing amid the scapulars.

¹Thienemann, 1931, Journ. f. Orn., p. 261.

²1924, Nov. Zool., XXXI, p. 13.

The tawny eagle is a courageous hunter of mammals, but feeds likewise upon carrion. Its nest is a great mass of sticks placed in the top of a tree, often an acacia; eggs are laid in southern Africa in June and July. The set is of one or two eggs, white with indistinct markings of gray, or with heavier blotches of rufous; dimensions, 68.8–71.6 mm. by 54.5–57.6.

***Aquila rapax raptor* Brehm**

Aquila raptor A. E. BREHM, 1855, Naumannia, p. 13 (type locality: Blue and White Nile).

Faradje, ♂ im., March 29.

DISTRIBUTION.—Southwest Arabia and Northeast Africa, west to Senegal. We have a rather ruddy specimen obtained by Lang at Elmenteita, Kenya Colony, which Professor Sushkin nevertheless regarded as nearer the northern than the southern form. Professor Sushkin also identified our very pale and worn example from Faradje. This bird was feeding on some leopard meat that we had thrown out near Maruka's village. Several kites, driven from their repast by the arrival of the eagle, were hovering overhead, but dared not alight again so long as he was feeding. This species seems to be rare in the Uelle, and we found no evidence of its breeding there. One brown eagle, presumably of this species, was seen near the hills north of Garamba on July 8, 1913.

In Darfur, where it is the commonest of the resident eagles, Admiral Lynes¹ describes the nests as placed in the tops of trees, and measuring about a yard across. Sets of one to two eggs were taken by Lynes in Darfur in February, at Jebelein in January, and at Erkowit in early April.

The crop and stomach of our example contained a large chameleon and a shrike, in addition to the carrion on which it had been feeding.

***Aquila nipalensis nipalensis* (Hodgson)**

Circaetus nipalensis HODGSON, 1833, Asiatic Researches, XVIII, part 2, p. 13, Pl. I (type locality: Valley of Nepal).

Faradje, ♂, January 2; 4 ♀, January 25, February 4, 20, March 29.

ADULT FEMALE.—Iris rather dark brown; bill black with base of mandible greenish gray, cere and corners of mouth yellow; feet yellow, claws black.

DISTRIBUTION OF THE SPECIES.—Southeastern Europe to Mongolia, migrating southward to tropical Africa, India, Burma, and China. Of the two races, typical *nipalensis* breeds in the eastern part of the range,

¹1925, Ibis, p. 406.

especially the Altai, Mongolia, and southeastern Siberia, and winters not only in China and India, but in northeast Africa, as far as the Uelle district, while four specimens of doubtful race are known from Damaraland.

Aquila nipalensis orientalis Cabanis differs but slightly from the preceding in color, and averages a little smaller. It is the western race—despite the name—and migrates to the Anglo-Egyptian Sudan. The four females listed above have been identified as typical *nipalensis* by Professor Sushkin, although the longest wing measures only 567 mm., so that, from Hartert's 'Vögel der Paläarktischen Fauna,' one would be inclined to call them *orientalis*. The bird taken on March 29 is very small, and I think it must have been wrongly sexed. The male of January 2, according to Sushkin, may be *A. n. orientalis*; its wing is 515 mm. long.

The brown steppe eagle seemed not to penetrate very far into the northeastern corner of the Congo basin, though it became rather common each year during the dry season about Faradje. Usually we saw these birds circling over the open bush-country. They seldom alighted, and were not often attracted by the fires that rage there during the dry months. On February 12, 1913, two of them were watched soaring round high above a fire, and yet they were not catching grasshoppers. Often after lighting the grass, the natives watch near by for the cane-rats (*Thryonomys harrisoni*), and it seemed as though the eagles might be doing the same, for *Thryonomys* furnishes one of their main sources of food in the Uelle district.

This large coarse-haired hystricoid, known locally as the "bindi," makes runways in the tall grass, leaving short sections clipped from the stalks that remind one of the runways of a *Microtus* on a greatly enlarged scale. Their flesh is tender and delicious, causing them to be eagerly hunted by the Azande and Logo with dogs and spears. *Aquila nipalensis* seems to have even more success in this hunting than mankind, for four of our five examples were secured either soon after eating of the "bindi," or while they were killing it. Under such circumstances, I have known one to be caught in the hand by natives, and it seems that when gorged with food this eagle can at times be very easily approached, so as to be speared or even killed with a stick. Towards man they do not exhibit much spirit. One that had been captured after over-eating and tied to a cord would even lie motionless on its back as though feigning death.

The crop or stomach of three out of five birds contained flesh and hair of *Thryonomys*; and we also noted the remains of one giant rat

(*Cricetomys gambianus*), one mole-rat (*Georhynchus*), and one more ordinary rat.

[*Aquila nipalensis orientalis* Cabanis]

Aquila orientalis CABANIS, 1854, Journ. f. Orn., p. 369, note (type locality: near Sarepta, S. E. Russia).

As explained above, this western race of the steppe eagle is certainly to be expected in the savannas of the northeastern Congo. It occasionally reaches Damaraland, and *Psammoaetus nipalensis bradfieldi* Roberts¹ is supposedly synonymous with *orientalis*.

***Polemaëtus bellicosus* (Daudin)**

Falco bellicosus DAUDIN, 1800, 'Traité d'Ornith.,' II, p. 38 (type locality: Great Namaqualand, between 28° S. lat. and the Tropics).

Spizaëtus bellicosus MOURITZ, 1914, Ibis, p. 30 (S. E. Katanga, east of Mts. Moposhi, Miuta, and Kampondo). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 264 (Katentania on Bianco Plateau).

DISTRIBUTION.—From the Gambia to Darfur, the Bahr-el-Ghazal Province, and Abyssinia, south through East Africa to Benguella, Damaraland, Cape Province, and Natal. Not in the heavy forests of West Africa or the Congo.

If judged by its spread of wings, this is the largest eagle found in the Congo. An immature female which died in the New York Zoölogical Park measured 2.15 meters between the tips of its extended wings. In the size of its talons, too, it rivals *Stephanoaëtus coronatus*, although its metatarsus is slenderer.

At the Congo Museum, I examined an immature specimen from the Plateau of Kapiri (Legros). Dr. Bequaert tells me that he saw another in the museum at Elisabethville, Katanga, in 1912, supposedly killed in that vicinity. Sclater and Mackworth-Praed² reported an example shot in the Bahr-el-Ghazal, where Butler informed them that it was common in the wooded regions (savanna forests). From a hill near Aba, northeastern Uelle, in December, 1911, I watched a large bird of prey fly over, which, from its size and color-pattern, must have been an adult *Polemaëtus bellicosus*. It may, therefore, be predicted that the martial eagle will be found along the Congo-Sudan border.

Since writing the above, I have visited the eastern Congo, and have seen the martial eagle near Irumu, as well as on the western slopes of Ruwenzori, up to 7000 feet, and on the Kivu Volcanoes, up to 12,000

¹1928, Ann. Transvaal Mus., XII, p. 301 (Okahandja, S. W. Afr.).

²1919, Ibis, p. 695.

feet. Furthermore, I have examined the skin of an immature example shot by Father D'Hossche on the hills west of the Semliki, near Beni, so there is no doubt of the regular occurrence of this splendid eagle throughout the highlands along the Albertine Rift.

In South Africa, the martial eagle preys on the smaller antelopes, hares, and small carnivores. It builds large stick nests in trees, breeding there from June to August, laying a single egg, white marked with reddish brown. Ayres found an egg to measure 83.8 by 64.7 mm.

In Darfur, where the species is not uncommon, Lynes¹ discovered a massive nest on January 27, in the top of a baobab tree, occupied by a single nestling in white down. This shows that both north and south of the equator breeding takes place in the dry season or "winter."

KEY TO THE SPECIES OF *Hieraaëtus* TO BE EXPECTED IN THE CONGO

- 1.—Tail shorter, less than 225 mm. in males, or 230 mm. in females; anterior feathers of scapular tract entirely white, forming a distinct white patch, though usually hidden by wings and adjacent feathers. 2.
 Tail longer, exceeding 225 mm. in males, or 230 mm. in females; anterior feathers of scapular tract only partially white at most, not forming a white patch. 3.
- 2.—A decided crest on occiput, its longest feathers measuring 40 mm. or more. Adults blackish-brown above, below white, heavily spotted and streaked with blackish; young browner above and tawny below, somewhat streaked on breast with blackish; tail 175–220 mm. *H. ayresii*.
 Head without noticeable crest; upperparts in adults and young brown (not blackish), underparts whitish, or light rufous, or brown, often with narrow dark shaft-streaks, or brown with white spots, or light brown streaks; tail longer, 200–230 mm. *H. pennatus*.
- 3.—Wing longer: 398–449 mm.; feathering of metatarsus less extensive, not reaching basal phalanges. Adult with white underparts streaked on breast and tibiae with blackish; young with crown and back very dark brown, breast tawny with but few narrow blackish streaks. *H. spilogaster*.
 Wing shorter: 333–385 mm.; feathering of metatarsus extending farther down, including basal phalanx of middle toe. Adult with breast and abdomen white, unmarked, only a black patch on flanks, tibiae spotted or mottled with black; young with more rufous edgings above, crown largely light rufous, breast whitish or light rufous heavily spotted with blackish.

H. africanus.

[*Hieraaëtus pennatus* (Gmelin)]

Falco pennatus GMELIN, 1788, 'Syst. Nat.,' I, part 1, p. 272 (no type locality).

The booted eagle breeds in southern Europe, North Africa, and eastward to Transbaikalia, migrating south to India, northeast Africa, and

¹1925, Ibis, p. 404.

supposedly to Natal. It has been reported from Nyasaland and North-west Rhodesia, but many of the African records are doubtless erroneous. Admiral Lynes has recently taken two specimens in Darfur¹ on the southward migration in October and November, and there is thus a possibility that it will occur in the northeastern or eastern parts of the Belgian Congo.

***Hieraaëtus ayresii* (Gurney)**

Spizaëtus ayresii GURNEY, 1862, *Ibis*, p. 149, Pl. IV (type locality: Natal).

Lophotriorchis lucani SHARPE AND BOUVIER, 1877, *Bull. Soc. Zool. France*, II, p. 471 (Landana.) C. GRANT, 1915, *Ibis*, p. 245 (Landana).

Hieraaëtus ayresi FINCH-DAVIES, 1919, *Ibis*, pp. 167-179, 560, 785, Pl. III (Belgian Congo). SCHOUTEDEN, 1923, *Rev. Zool. Afr.*, XI, p. 388 (Kwamouth). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.', part 1, p. 61 (Belgian Congo). BANNERMAN, 1930, 'Birds Trop. W. Afr.', I, p. 242 (Belgian Congo; Landana).

Hieraaëtus ayresii STRESEMANN, 1924, *Nov. Zool.*, XXXI, pp. 214-216 (Portuguese Congo); 1924, *Journ. f. Orn.*, pp. 432-435.

Hieraaëtus ayresi SCHOUTEDEN, 1926, *Rev. Zool. Afr.*, XIII, p. 186 (Ganda Sundi).

Niapu, ♀ juv., February 10.

Lang secured our single nestling from Pygmy hunters. I was never so fortunate as to observe this eagle alive. The identification of the young specimen, with wings and tail not quite full grown, would have given me a great deal of trouble but for the careful investigations of the late Lieut. Finch-Davies, and his notes in the *Ibis*, 1919.

This specimen agrees tolerably well with Gurney's plate of the type, but is somewhat less spotted on the cheeks, upper breast and abdomen. The crest, in the picture, is placed too far forward, but the presence in our specimen of a well-marked crest, and of the white patches at the anterior end of the humeral tracts make its determination certain. The feathering on the tarsi falls slightly short of the basal articulation of the toes. This will distinguish the young of *ayresii* from that of *africanus*. Moreover, the latter lacks the white shoulder-spot, and is much more heavily streaked and spotted below.

DISTRIBUTION.—As Finch-Davies has shown, Ayres' eagle appears to range from Abyssinia and from southern Somaliland on the east to Togoland on the west, as well as southward through eastern Africa to Port Elizabeth, and westward again to the Kasai district, Landana, and the Cunene River. Although our specimen came from the northern border of the equatorial forest, and Stresemann² lists one from Bebai in Spanish

¹1925, *Ibis*, p. 405.

²1924, *Nov. Zool.*, XXXI, p. 215.

Guinea, I am in doubt if this is really a forest bird. The records from more thinly wooded regions outside the rain-forest belt are far more numerous.

The British Museum has an adult (probably a female, wing 371 mm.) from Lusambo in the Kasai district (Torday), and the Congo Museum another adult with wing 344,¹ also said to be from the Kasai. The Congo Museum has a young individual with remiges and rectrices not fully grown, from Kinda, July 27 (Charliers), indicating that nesting takes place during the season of drought, as does ours from Niapu. Still another immature bird was taken by Dr. Schouteden in the Lower Congo.

The nest of Ayres' hawk-eagle, unfortunately without eggs, was found by Erlanger² in the woods along the bank of the lower Ganale River in southern Somaliland, on July 1. It was placed in a high tree, and both birds of the pair were secured near it.

***Hieraaëtus spilogaster* (Bonaparte)**

Spizaëtus spilogaster BONAPARTE, 1850, Rev. Mag. Zoöl., Paris, p. 487 (type locality: Abyssinia).

?*Spizaëtus spilogaster* SCHALOW, 1886, Journ. f. Orn., p. 418 (Lufuku R.). MATSCHIE, 1887, Journ. f. Orn., p. 148 (Lufuku; L. Itambe).

?*Spizaëtus* SCHALOW, 1886, Journ. f. Orn., p. 424 (L. Itambe).

?*Spizaëtus* sp. SCHALOW, 1887, Journ. f. Orn., p. 230 (Mpala).

?*Hieraaëtus spilogaster* REICHENOW, 1901, 'Vögel Afrikas,' I, p. 597 (Lufuku R.; L. Itambe).

Nisaëtus fasciatus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Katanga).

Hieraëtus spilogaster MOURITZ, 1914, Ibis, p. 30 (S. E. Katanga to the east of Mts. Moposhi, Miuta, and Kampondo; Musoshi Escarpment). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 264 (valley of Lubumbashi R.).

Hieraaëtus fasciatus spilogaster STRESEMANN, 1924, Nov. Zool., XXXI, pp. 214-216.

Faradje, ♀ juv., February 16.

The dark brown feathers of the back and upper surface of wings, even in such a young bird, with tail not fully grown, are without light edgings. The feathers of the nape are not markedly elongate, and while there are narrow dark streaks at the side of the chest, the throat, middle of breast, and abdomen are unmarked. All the lowerparts have a strong wash of tawny, darkest on the breast. Metatarsi and toes are longer

¹The wing-length is known to vary in males at least from 326 to 338 mm., and in females from 360 to 420 (Stresemann).

²1904, Journ. f. Orn., p. 185.

and relatively slenderer than in the young *H. ayresii*, the feathers extending just a trifle farther down.

In this determination I have been guided by the remarks of Finch-Davies,¹ yet I note that he does describe the young of *H. spilogaster* as "broadly streaked with dark brown on the breast, and more narrowly on the flanks and upper abdomen." In this respect the present example does not agree, nor do the immature specimens in the British Museum. Its wing already measures 328 mm., though by no means fully grown.

DISTRIBUTION.—While *Hieraaëtus spilogaster* is found over a very large part of the Ethiopian Region, from Abyssinia, Sennar, Darfur, the Gold Coast Hinterland, and Senegal, south to Cape Province, it seems certain that it does not occur in the denser equatorial forests.

Our single specimen was brought to us by natives near Faradje; but our impending departure for Niangara prevented us from going out to visit the nest from which it had been taken.

Elsewhere in the Congo, this eagle seems to be known only from the region of the Katanga. There is an immature example from the Katanga mounted in the Congo Museum, labeled *Nisaëtus fasciatus*, the name under which Dubois reported it in 1905. In the same museum, there is a skin of a female from Funda Biabo (Baillet-Latour) in nearly adult plumage, but with tibiae buff. I regard Böhm's sight record from the Lufuku River as extremely doubtful, although the species is to be expected in that region.

Erlanger² found a nest in northern Somaliland in the latter part of February, in one of the main forks of a large tree. The two eggs measured 67.5×51mm. and 67×53.5, respectively, and were white, washed, in one case, with clay-color and marked finely with light rufous on the blunt end, while the other egg bore light ash-gray shell-marks and a few faint rufous spots. In Nyasaland and Northeast Rhodesia Paget-Wilkes and Sladen³ found nests from June to August, the dry season.

Erlanger renamed this species *H. fasciatus minor* because he confused *H. ayresii* with *H. spilogaster*. Dr. Hartert regards *spilogaster* as a southern race of *H. fasciatus* (Vieillot), despite the rather wide difference in color between adults.

***Hieraaëtus africanus* (Cassin)**

Limnaetus africanus CASSIN, 1865, Proc. Acad. Nat. Sci. Phila., p. 4 (type locality: Ogobai River, Gaboon).

¹1919, Ibis, pp. 174, 175.

²1904, Journ. f. Orn., pp. 186, 187.

³1930, Ibis, p. 441, Pl. xiii.

Nisaetus spilogaster DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 ("Ituri").

Hieraaetus africanus CHAPIN, 1921, Amer. Mus. Novitates, No. 17, p. 15 (Niapu).

Cassinaetus africanus W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 61 (N. E. Belgian Congo). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 248 (Lower Congo forests; Niapu).

Spizaetus africanus STRESEMANN, 1924, Nov. Zool., XXXI, pp. 215, 216 (Niapu).

Niapu, ♀, December 22; ♀ juv., December 27.

ADULT FEMALE.—Iris yellowish brown; beak black, pale gray at base, cere and corner of mouth yellow; toes yellow, claws blackish.

YOUNG FEMALE.—Iris grayish brown.

Mr. Sclater has pointed out that his *Spizaetus batesi*¹ from Bitye, Cameroon, is synonymous with *Limnaetus africanus* Cassin. I have examined the two adult specimens still preserved in the Philadelphia Academy, one of which (No. 1778) is the type. They are alike in size and color, and, judging from their size, I believe both to be males. The black flank-patches are rather less conspicuous than in our female, but the outer side of the legs is heavily spotted, or even mottled. My measurements of these two Gaboon birds are: wing, 341, 333 mm.; tail, 225, 234; culmen from cere, 26; metatarsus, 70.

The species was first referred by Mr. Sclater to the genus *Spizaetus*, because in Bates' male specimen "the distance between the longest secondaries and the longest primary [is] about 50 mm., while the tarsus is about 75 mm." This is the point on which Dr. Sharpe and Prof. Reichenow both based the generic arrangement in this group of eagles; but Mr. Sclater expressed himself as by no means entirely satisfied. It is dangerous, beyond a doubt, to base such a distinction on a ratio which may depend upon whether the inner secondaries, in skinning, were left attached to the ulna or not; and even where they are still clearly attached, we note a considerable variation. In the type specimen, where the wing has not been "stripped," as taxidermists say, the longest primary was found to extend 83 mm. beyond the secondaries, the tarsus measuring approximately 70 mm. This should place it in the genus *Hieraaetus*, except that the second Philadelphia specimen has the tip of the wing reaching only 65 mm. beyond the secondaries. Since the longest primary in our adult female shows a corresponding length of 85 mm. beyond the inner secondaries, I have decided to refer the species to *Hieraaetus*, although Mr. Sclater has now made it the type of a new genus *Cassinaetus*.²

¹1919, Bull. Brit. Orn. Club., XXXIX, pp. 87, 93.

²1922, Bull. Brit. Orn. Club., XLIII, p. 76.

The other measurements of our adult female specimen are: wing, 381 mm.; tail, 262; culmen from cere, 30; culmen with cere, 41. The heel being heavily feathered, as is even the basal phalanx of the middle toe, it is very difficult to measure the metatarsus, which I judge to be about 73 mm. This very extensive feathering, with the great thickness of the metatarsi, is characteristic of the species, and renders the identification of our young example indisputable.

The natal down, where still retained on the throat, crown, rump, and the tips of remiges and retrices, is pure white. The juvenal plumage may be described as follows: Back and upper surface of wings dark grayish-brown, the feathers of the upper back with broad tawny edgings, which become paler on the wings, until finally the greater secondary-coverts and the secondaries are tipped with whitish. Entire head cinnamon-rufous, dusky on lores, and streaked on the throat and mid-line of crown with blackish. Breast russet, with half-concealed stripes of blackish, flanks and abdomen paler, with larger spots, tibiae pale cinnamon, more finely spotted, tarsi nearly white. Under wing-coverts white with a pale buff tint, spotted with blackish. Rectrices dark grayish-brown, with white tips, a dusky subterminal bar, and a second dark bar at 60 mm. from the tip, while others, no doubt, will appear basally. Long under tail-coverts white basally, tips with a cinnamon wash, and a large dusky spot on each.

The differences between the young and adult of *Hieraaëtus africanus* are nearly the opposite of these to be noted in *Stephanoaëtus coronatus*.

DISTRIBUTION.—From Togo, Cameroon, and Gaboon eastward across the equatorial forests to the southern Uelle district, the eastern edge of the Ituri Forest, and to the vicinity of Baraka on the northeast side of Lake Tanganyika. I examined two adults in the Congo Museum, one from Banalia on the Aruwimi (Nahan) which Dubois reported in 1905 as *H. spilogaster* from the "Ituri," the other from Baraka (collected by Pauwels).

Our two specimens from the southern Uelle were secured in a heavily forested region from Pygmy hunters, the adult being captured presumably at a nest, perhaps a different one from that which held the young bird. In October, 1926, a native hunter shot an immature example for me in the forest close to the new post of Beni.

Although I have hunted birds in these forests of the Upper Congo for some years, I cannot say with certainty that I have ever observed the present species in life. I do recollect that once, near Avakubi, a large white-breasted bird of prey departed precipitately from a high forest

tree; but more significant is the fact that from time to time in that same neighborhood and near Stanleyville, both in 1909 and in 1913-1914, I have seen a large gray-and-white raptorial bird, with an outline more or less like a *Buteo*, sailing high up over the forest. No true buzzard of such coloration is known from this region, and I suspect that it was this species of *Hieraaëtus*.

In the stomach of our adult female specimen, remains of a bird were found.

***Stephanoaëtus coronatus* (Linnæus)**

Falco coronatus LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., p. 124 (type locality: Coast of Guinea).

Spizaëtus coronatus REICHENOW, 1901, 'Vögel Afrikas,' I, p. 576 (Loango Coast). SCHOUTEDEN, 1925, Rev. Zool. Afr., XIII, p. 5 (Kunungu); 1928, Bull. Cercle Zool. Congolais, IV, p. 106 (vicinity of Basoko); 1928, idem, V, p. 17 (Lower Uelle District). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 264 (Munama R., near Elisabethville).

Spizaëtus coronatus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Itimbiri R.). CHAPIN, 1915, Amer. Mus. Journ., pp. 281, 286, 291 (equatorial forest, Congo).

Spizaëtus (coronatus?) SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 3, pp. 260, 268, 269 (Mangbetu country).

Stephanoaëtus coronatus CHAPIN, 1925, Natural History, New York, p. 459 (equatorial and southern Africa; Niapu; near Avakubi).

Avakubi, ♀, March 12; ♂, sub-ad., May 3.

Niapu, 4 ♂, November 22, 26, December ?, 23; 5 ♀, January 8, November 24, 27, December 5, 10; ♂ im., February 18; ♂ juv., December 12; 2 ♀ sub-ad., December 1, 5; 5 ♀ juv., November 11, 23, December 2, 4, 20.

Rungu, ♀ im., November 12.

ADULT MALE.—Iris light chrome-yellow; bill blackish, cere dusky greenish, corners of mouth and base of mandible cadmium-yellow; toes cadmium-yellow, claws black.

ADULT FEMALE.—Iris yellow, not very bright; bill black, upper part of cere dusky greenish, but near mouth becoming cadmium-yellow like corners of mouth and soft base of mandible; rim of eyelids and soft skin beneath supraocular shield dull greenish; toes cadmium-yellow, much soiled, claws black.

YOUNG (IN NATAL DOWN).—Iris brown, eyelids pale gray, corners of mouth yellowish; beak and claws black, the latter grayish at base.

This magnificent series of twenty crowned eagles contains birds of all ages, from the early nestling, clothed in short woolly down, pure white, and still retaining the "egg-tooth," through the white-headed juvenal plumage (either white or buffy on breast), then the darker intermediate stage where dark spots appear on the thighs, up to the adult stage with nearly pure black chest, and underparts heavily barred. There is a marked disparity in size between the sexes, but no constant sexual difference in color, even between fully adult examples. Four adult males have

wings 456–481 mm.; six adult females, 495–540 mm. We measured an adult male and an adult female in the flesh, and found the total length to be 790 and 857 mm., respectively, the spread of wings 1630 and 1795 mm. (64.1 and 70.6 inches).

The genus *Stephanoaëtus* was proposed for this species by Sclater¹ because of its relatively short metatarsus, more extensive feathering of the feet, and larger claws, as compared with the type of the genus *Spizaëtus* Vieillot, the Neotropical *S. ornatus*. Despite a marked similarity in color, the greater strength of the feet in the African species is sufficient for generic distinction; and it may be added that the crest of *Spizaëtus ornatus* is narrower, and longest in the mid-line.

DISTRIBUTION.—West and central African forests from Portuguese Guinea to Cameroon, Angola, most of the Belgian Congo, and thence to Mt. Kenia and Usambara, and southward in the more wooded districts as far as Natal and eastern Cape Colony.

In the Belgian Congo it is one of the most characteristic forest species, though seldom seen. As late as 1925, the only records from this whole area were those of a skin from the Itimbiri River in the Congo Museum, and of two or three young which Emin received from the Mangbetu country, and which he kept alive at Lado. There can be little doubt of the occurrence of the crowned eagle throughout the equatorial forest belt of the Congo, as well as in the more heavily wooded parts of the Kasai.

At Medje, early in 1910, we were shown one of this bird's enormous claws, worn by a native woman, and were told that this great bird, called "Netumu," inhabited the surrounding forests, and that monkeys provided its principal fare. None was observed either by us or by our native hunters at that time, however; and only on reaching Okondo's village did we see the first one, an immature bird which had been sent to this great chief from a little farther south. He was keeping it alive, for among the Mangbetu and associated tribes, this was one of the royal birds, whose feathers could only be worn by the nobility.² Okondo himself had several sets of the gray-and-black-banded quills, which are split down the shaft and tied in bunches to dangle from hats. In all the Mangbetu region, this bird's name is likewise "Netumu," while the smaller species of *Hieraaëtus* are apparently known to the people, and spoken of as its comrade: "Netumu-pambala."

¹1922. Bull. Brit. Orn. Club., XLII, p. 75.

²The others were the red remiges of plantain-eaters ("Nombo") the long white rectrices of the paradise flycatcher ("Mandalungwe"), and the feathers of the great fish-owl, *Scotopelia peli* ("Nébi"). Tail-feathers of the gray parrot were also highly esteemed, but perhaps not quite so severely reserved for the ruling clan.

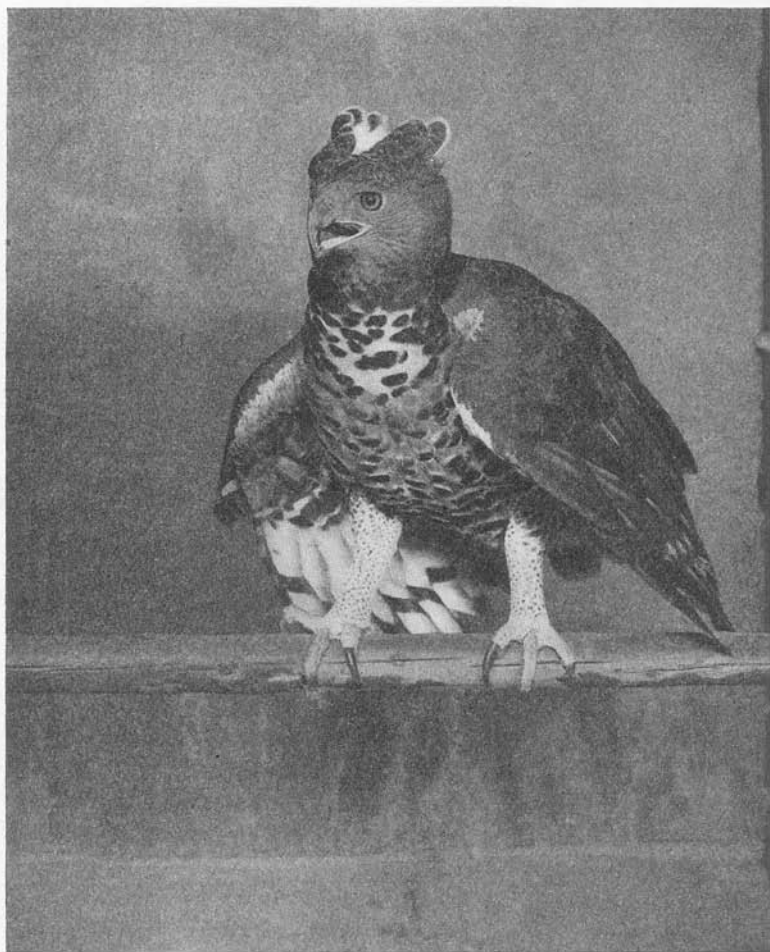


Fig. 198. Adult crowned eagle (*Stephanoaetus*), in defiant posture, at New York Zoological Park. Photograph by E. R. Sanborn.

Okondo generously parted with his captive, for a substantial "mata-bish"¹; and later we felt happy to have it, since no indication of its presence ever turned up in the neighborhood of Faradje. In this part of the continent it seems never to wander out into the savannas.

On coming south into the forest again, in July, 1913, I was shown a great tree in the forest, two hours from Rungu, bearing two enormous nests, well known to the natives, and stated to belong to this eagle; but it was not then their season for reproduction. Such nests are said to be occupied year after year. I was interested to see that a large colony of weavers had likewise built in the boughs of the same tree, for there were fully 120 abandoned nests, looking as though woven of moss or lichen, and of the general type of those of certain species of *Malimbus*. Of course, this reminded me of *Sitagra atrogularis* in the savanna, nesting near the home of vultures and other predatory birds. At Avakubi and on my way there, I made frequent inquiries concerning the noble bird, but for a long time without much encouragement. It was Lang who secured practically the entire lot of our splendid specimens.

Stephanoaëtus coronatus in the southern Uelle must begin laying in October, for in November, near Niapu, the Pygmy hunters of a Makere chief began to bring the young to Lang. He encouraged them with presents, and they then proceeded to trap some old birds on the nests, besides catching two adults on the ground, in traps baited with dead monkeys. Lang went out himself to see some of the nests, which were not far from his camp.



Fig. 199. A native of the southern Uelle, with a crowned eagle he had killed. Photograph by H. Lang.

¹A gift, from Portuguese: *matar o bicho*.

I have no doubt that this great monkey-eating eagle is of regular occurrence throughout the Ituri Forest, the remarkable fact is its ability to keep out of sight. On only a single occasion, I believe, during the Congo Expedition, I observed it flying high over a clearing in the forest. Lang's success showed it to be common near Niapu, and young have been brought in to the post of Poko. The Mabudu are well acquainted with it under the name "Inju"; the Wabali call it "Ndūa." I have seen feathers of one killed at Penge, and a flat native skin from the river Lenda. Mr. Bernard had had its young alive at Makala.

About Avakubi, the disobliging nature of the natives made it very difficult to locate the nests, exact knowledge of their situation was almost invariably disclaimed, in spite of my offering a substantial reward. Beginning in August, 1913, I continued my efforts until March of the following year, when Kalonga, the old chief of the Bangwana, finally announced that one of his men had located a nest and fired unsuccessfully at the bird. On March 9, we set out for the spot, some five hours to the southwest, spent the night in a tiny Mobali village, and early the next morning, we were standing under a gigantic tree in the forest, yet not directly touching any of those around it. While approaching, we had heard the call of a young bird, a prolonged series of high-pitched sounds, varying from "ki-ki-ki-ki-ki . . ." to kwě-kwě kwě . . . , often almost trilled, and found it practically full grown, sitting out on one of the boughs.

The nest was an enormous mass of dry sticks and pieces of lianas, placed right in the middle of the tree, which, by the way, was absolutely free of epiphytic plants. Later on, when I watched a man climb up beside it, I realized for the first time how large it was, and judged it must measure at least six feet across its top. The distance above the ground was about thirty-five yards. I was determined to shoot an adult eagle for myself, and since the young one seemed still attached to the nest, though flying occasionally to other trees, I spent most of the next three days, rifle in hand, seated in an elephant path which offered a view of the nest. The old eagles certainly came very seldom, and during the following day only once, just when I happened to be inspecting the ground at the base of the tree, and could not see upwards. Their flight I may add, is almost noiseless, this undoubtedly proving of great advantage in their hunting. Arriving at 6:30 the third morning, we found the young eagle alone on the nest, eating. As it sat in the tree it would call frequently, and was continually twitching its head. Through the glass I could see the reason for this: six to a dozen insects always

buzzing round its mouth. Perhaps they were honey-bees, which were likewise making it miserable for us on the ground below, for in these forests the bees are extremely fond of human perspiration, and love to crawl over one's face and hands.

The ground where we sat swarmed with tiny brown ticks, which climbed all over us. Finally at 4 o'clock in the afternoon the old female bird came to the nest. Her flight was so silent that I was only warned by the change of tone in the young bird's voice, raised excitedly as it joined her on the aerie. But as luck would have it, my shot dropped the old eagle right onto the nest, and not until 11 o'clock the next day did I succeed in getting a man up to it. So large was the base of this tree, though not buttressed, that at two yards above the ground it was still twelve feet in circumference, and tapered but gradually higher up. Poles had to be lashed to the bole for a distance of ten yards, then a man was able to climb with two cable-like loops around the tree, one supporting his right thigh, the other his left foot.

That we were not the first to shoot at the birds on this nest was proved when my climber pulled an old arrow out of the bottom of it. Natives had so often told me that the ground beneath the nest of these eagles would be littered with the bones of their victims that I was surprised to see no trace of anything here. Even on the top of the nest the only things found were a fore-leg of an adult monkey (*Cercopithecus*), a bleached tibia of another monkey, and a few large pellets of fur. I supposed there are enough mammals roaming the ground below to make off with anything that drops. Yet Du Chaillu described a nest¹ of a monkey-eating eagle in the Gaboon, evidently *Stephanoaëtus coronatus*, as having a litter of bones below.

In the present tree, no weavers had built their nests; but I noticed that small birds were continually feeding in its top, and showed not the slightest fear of the young eagle, even when it called. Two rather rare weavers were seen there: *Melanopteryx tricolor interscapularis* and *Malimbus rubricollis centralis*.

Furthermore, though it might be supposed that monkeys would come to fear the vicinity of such a nest, we nevertheless heard monkeys frequently during our wait, including the black mangabey, *Cercocebus albigena*, and once watched a band of guenons, composed of two common species, *Cercopithecus ascanius* and *Cercopithecus denti*, going by through the trees about eighty yards away.

It will have been noted that these eagles showed the usual preference of large forest birds for a tree set off slightly from its fellows, which might

¹1890, 'Adventures in the Great Forest of Equatorial Africa,' pp. 246, 247.

thus be better protected from climbing mammals; and yet they make monkeys their principal food, and are easily able to kill adult guenons, with their tremendously powerful feet and long claws, the largest of which measure 80 mm. in length. As the young eagle sat in the tree, its most prominent features were the enormous legs and talons, and its long tail. Sometimes it would sit on one foot, resting the other heel on the branch; or, occasionally, it would stretch one wing, one leg, and its tail, simultaneously, as storks and many other birds may be seen to do. I never saw it raise its crest, but Lang tells me that in captured adults it is erected so that there is a strong dip in the middle, the long feathers at each side standing higher, somewhat owl-like.

The man who brought down the old eagle told me that once he had come upon a *Stephanoaëtus* on the ground with a monkey it had slain. Setting a trap, he captured the bird coming back to its "kill." A few weeks later, I secured one that had been killed in somewhat the same way. On being surprised by a native as it was eating a monkey on the ground, it flew up into a tree, and was shot with an arrow.

On March 20, 1914, Nekuma secured specimens of the weaver that nests with *Stephanoaëtus coronatus*. He had been sent to look up another nest of this eagle reported by natives near Avakubi, but found it already abandoned. It was a very bulky structure in a high tree, but near it, this time, there hung about twenty weavers' nests, whose owners had not yet left. The species proved to be *Malimbus erythrogaster*; and then I recalled that during the preceding August, I had collected a male of the same weaver, building his nest on a tree already occupied by a nest of the great plantain-eater (*Corythæola cristata*) containing young birds. At Medje, on the other hand, in August and September, 1910, I had found nests of this weaver in trees unoccupied by any large bird. As with *Sitagra atrogularis* and *Textor cucullatus*, the habit is not invariable.

During my recent visit to the eastern Congo, I watched a crowned eagle soaring over the forest to the west of Kifuku on the upper Ituri River, September 28, 1926. Later in the same year, I purchased from a native the skin of the breast and thighs of an adult said to have been killed in the Semliki Forest, at the western base of Ruwenzori.

Near Lukolela on the Congo River, on August 1, 1930, I watched an adult crowned eagle sitting not far from a nest in a huge silk-cotton tree. Early in November it was reported that there were two young on this nest. At this locality, from August to February at least, crowned eagles were often seen soaring high over the forest and clearings. They frequently appeared in pairs, one bird making upward flights and then

suddenly dropping into steep swoops. These evolutions were accompanied by a reiterated 'kee-a-ree' of shrill and somewhat hollow tone, audible as far as the bird could be seen in the sky. The notes might be taken up again and again, the birds remaining in sight for five to ten minutes. The usual time of their appearance was in the middle of the day, between 10 A.M. and 1:30 P.M.

The nesting of the crowned eagle is best known in South Africa, where there is a historic nest near Grahamstown, Cape Province, described by Stark and Selater¹ and by Haagner and Ivy,² and now said to be seventy-five years old. Another nest in the Lower Albany district has been studied by Mr. Paget-Wilkes,³ who states that it is only thirty feet up in a large *Podocarpus* tree. The width of this nest is five feet, and its lining of yellow-wood leaves. Three sets, each of two eggs, taken by this writer, measured 65.9-72.5 mm. by 53.2-57.9 mm. All were practically pure white, save for a single egg with a number of small dark brown markings. These eggs were taken on August 29, October 10, and October 14, the same season at which Dr. Stark also found eggs. Paget-Wilkes describes the voice of the female when near the nest as a loud, pealing cry, "pee-ou," very rapidly repeated. On the nest he found two legs of a well-grown bushbuck and one or two small antelope skulls. Forty-eight skulls of mammals were once counted beneath the Grahams-town nest.

That the crowned eagle in the Congo forest is primarily a monkey-eater, the examinations of crop and stomach in eight cases clearly show. Five of them had been eating monkeys, of the genera *Colobus* and *Cercopithecus*; in four cases these remains were noted as of young monkeys, but, in at least one case, a full-grown *Cercopithecus* had been devoured, one foot and a tibia being contained in the crop and stomach of a female eagle. Other prey is of course not entirely neglected, for the forelimb of a mon-goose, and the remains of two unidentified birds were present in the three remaining cases.

G. L. Bates,⁴ in the Cameroon, records the eating of a hyrax (*Procarvia dorsalis*), and an attack upon *Cercopithecus cephus*. In South Africa⁵ it is credited with an even larger variety of prey, including also pigs, cats, lambs, and blue bucks.

¹1903, 'Birds of South Africa,' III, pp. 305-307.

²1923, 'Sketches of S. Afr. Bird-Life,' 3rd Ed., pp. 93-96.

³1924, *Ibis*, pp. 746-748, Pls. xxvii, xxviii.

⁴1904, *Ibis*, p. 599.

⁵Stark and Selater, 1903, 'Birds S. Afr.,' III, p. 305.

Lophaëtus occipitalis (Daudin)

Falco occipitalis DAUDIN, 1800, 'Traité élémentaire et complet d'Ornith.,' II, p. 40 (type locality: "Anteniquoi country," i.e., Knysna district, Cape Colony).

Lophoaëtus occipitalis SHARPE AND BOUVIER, 1877, Bull. Soc. Zool. France, II, p. 471 (Lukula R.). EMIN, 1894, Journ. f. Orn., p. 163 (Ndussuma). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 582 (Lugoma brook in Marungu; Lufua R.; Lukula R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 262 (Mubuku Valley, 6000 ft.). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Lower Congo; Mayombe). NEAVE, 1910, Ibis, p. 103 (Lualaba Valley). O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 442 (Mubuku Valley, 6000 to 10,000 ft.). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 360 (Usumbura; forest W. of L. Tanganyika; Beni). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 13 (L. Tanganyika). SCHOUTEDEN, 1914, Rev. Zool. Afr., III, p. 263 (Kilo); 1918, idem, V, p. 232 (Beni; Masidongo; Molekera; Makoko; Kabambaré; Kilo; Kivu); 1923, idem, XI, p. 315 (Kamaiembi); 1924, idem, XII, p. 409 (Eala); 1925, idem, XIII, p. 5 (Bolobo region). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 14 (Rutshuru). SCLATER AND M.-PRAED, 1919, Ibis, p. 695 (Meridi). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 286 (Birunga volcanoes, 3600 m; Rutshuru and Ruindi plains). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 264 (Elisabethville).

?*Spizaëtus spilogaster* SCHALOW, 1886, Journ. f. Orn., p. 425 (Lugoma R.).

Spizaëtus occipitalis SCHALOW, 1886, Journ. f. Orn., p. 430 (Lufua R.). MATSCHIE, 1887, Journ. f. Orn., p. 148 (Lugoma brook; Lufua R.). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 142 (Wadelai).

?*Spitaetus coronatus* RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' p. 151 (Bukama?).

Lophoaëtus occipitalis MENEGAUX, 1918, Rev. Française Orn., V, p. 257 (Zambi).

Lophaetus occipitalis BERLIOZ, 1921, Rev. Française Orn., VII, p. 7 (Kivu district).

Lophoaëtus occipitalis SCHOUTEDEN, 1926, Rev. Zool. Afr., XIII, p. 186 (Ganda Sundi; Temvo).

Avakubi, ♂, June 11.

Manamama, near Bafwabaka, ♂, December 28.

Medje, 2 ♂, March, July 29.

Faradje, 2 ♂, February 17, March 8; ♀, March 2; 2 ♀ juv., February 27.

ADULT MALE.—Iris yellow to orange; cere, corners of mouth, and base of mandible greenish yellow, edge of eyelids green; beak black, changing basally to light blue-gray; toes yellow, claws black.

DISTRIBUTION.—Practically the whole Ethiopian Region, from Senegal and Abyssinia to Cape Province, occurring even in the forest region of the Congo, haunting the clearings around farms and villages, where they sometimes circle in pairs. Specimens have been taken in practically every section of the Belgian Congo, even in the forested mountains of the east, where the British Museum Ruwenzori Expedition observed them up to 10,000 feet on Ruwenzori; and Count Gyldenstolpe noted them at almost 12,000 feet in the Kivu Volcanoes.

In the savanna region of the Uelle we found them more common, perching in conspicuous places with the body erect, and the long crest-feathers raised until they seemed to droop over forwards. Apparently, they always kept a sharp lookout for small mammals.

On the wing, the white patches which cover so much of the primaries are very conspicuous, while the crest is laid back and cannot be seen. The voice is a shrill, whining "kec-kec-kee-ee-ee," often imitated in native names for the bird, as "Bigi" and "Dingima," two names by which it is known among the Azande. The Mangbetu compare it to the "mă" of a goat, and call its author "Nariamémé" (= goat-bird).

Its flight may best be compared to that of a large *Buteo*, and occasionally the species is attracted by brush-fires, yet I have never seen them catching grasshoppers in the air. Their food appears to consist mainly of rats, remains of which were found in all the five stomachs we examined, including three specimens of the genus *Lophuromys*. Three small weaver-birds had likewise been eaten.

The nest of the long-crested eagle is built of sticks in a tree, and lined with green leaves. The set is of two eggs, white sparingly blotched and streaked with pale rufous, and spotted at the larger end with deep chocolate-brown. Dimensions 57.9–60.4 mm. by 44.7–49 mm.¹ In Darfur, Lynes² saw a pair of birds about their nest in May; at Fashoda Hawker³ took two sets of eggs in March; and we at Faradje obtained two young with remiges not fully grown on February 27. Their plumage is remarkably similar to that of adults. Van Someren⁴ reported a nest with eggs in Uganda or Kenya Colony in July.

SUBFAMILY *Circaëtinae*

Dryotriorchis spectabilis batesi Sharpe

Dryotriorchis batesi SHARPE, 1904, *Ibis*, p. 600 (type locality: Efulen, Cameroon). CHAPIN, 1921, *Amer. Mus. Novitates*, No. 17, p. 15 (Stanleyville; Avakubi; Medje; Niapu; Akenge).

Dryotriorchis spectabilis DUBOIS, 1905, *Annales Mus. Congo, Zoologie*, I, f. 1, p. 27 (Province Orientale; Ituri). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 232 (Beni; Bambili); 1925, *idem*, XIII, p. 5 (Kunungu).

Dryotriorchis spectabilis batesi SWANN, 1920, 'Synop. List Accipitres,' 1st Ed., p. 76 (Cameroon; Gaboon; Congo Region); 1922, *idem*, 2nd Ed., p. 125 (Aruwimi R.). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 63 (Aruwimi R.; Ituri district). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 255 (Aruwimi R.; Mayombe).

¹Oates, 1902, 'Catalogue Birds' Eggs Brit. Mus.,' II, p. 274.

²1925, *Ibis*, p. 404.

³1902, *Ibis*, p. 441.

⁴1916, *Ibis*, p. 223.

Dryotrorchis spectabilis batesi SCHOUTEDEN, 1926, Rev. Zool. Afr., XIII, p. 187 (Makaia Ntete).

Stanleyville, ♂, November 24.

Avakubi, 5 ♂, May 30, June 11, August 6, 24, September 24; ♀, August 4; ♂ im., August 29; 2 ♀ im., January 25, August 26.

Medje, ♀, July 14.

Niapu, ♀, December 2.

Akenge, ♀, October 16.

ADULT MALE.—Iris dull light yellow, rim of eyelids greenish gray; cere and corners of mouth cadmium-yellow, bill black with blue-gray base; feet light yellow, claws black.

ADULT FEMALE.—Iris dark brown, rim of eyelids dark grayish-green; cere, corners of mouth, and base of mandible yellow; feet same as in male.

IMMATURE MALE.—Iris buff.

IMMATURE FEMALE.—Iris brown, blackish exteriorly.

The sexual difference in size is much less marked than usual among birds of prey.

	WING	TAIL	CULMEN FROM CERE	METATARSUS
6 ♂ ad.	282–307mm. (average 295.8)	235–260(248.8)	25.6–27.5	67–73.5
4 ♀ ad.	300–307(303.8)	240–250(246.5)	28.0–29.0	70–73.0

The male with maximum wing- and tail-length was sexed by me, and it had the yellow iris characteristic of males, yet it is as large as a female, save in the bill. The smallest male in the series is, nevertheless, a fully adult bird. It was collected at Stanleyville. Western birds probably do not differ greatly in size from those of the Ituri, since Sharpe's type, a male, had the wing 292 mm. (closely approximating our average), tail, however, only 228.6, culmen 24.

The ten adult specimens are all without dark marks on the breast, but pale pinkish-buff, more or less soiled. The whole upper surface is much darker and more uniform than in the young, but the marginal coverts of the wing are very dark, with conspicuous white tips.

The spots on the chest of immature examples may be of two different shapes, representing perhaps two different plumages. In our youngest bird (♂, August 29), the breast is quite buffy, with large blackish spots, rounded or elliptical, 6.5–7.5 mm. across. The throat- and malar-stripes are not as black, nor do they begin so far forward as in an immature female, doubtless somewhat older (January 25) which has on its chest streaks instead of spots, averaging only 3 mm. in width. This bird is already assuming a few pale buff feathers, unspotted, on its breast;

while the third immature bird, likewise a female, is much further advanced in this respect.

DISTRIBUTION OF THE SPECIES.—Forests of western and central Africa, from Liberia, Gold Coast, Cameroon, Gaboon, and Mayombe, eastward to the southern Uelle district, the Semliki Valley, and southward to Luluabourg in the Kasai district. From the last-named locality Father Callewaert has sent us an adult specimen. The Berlin Museum has a specimen from Mayumba on the southern Gaboon coast.

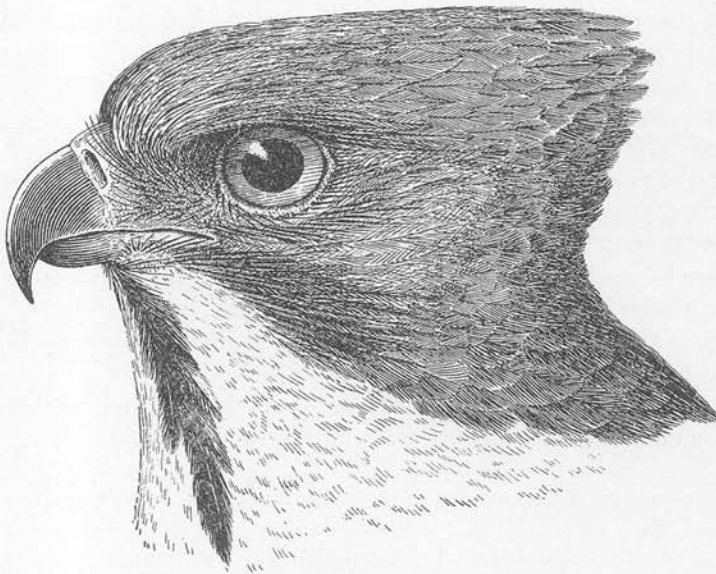


Fig. 200. Head of *Dryotriorchis spectabilis batesi*. $\times \frac{3}{4}$.

Typical *spectabilis* of Upper Guinea is more or less spotted on the breast when adult, and more barred on flanks and tibiae than *D. s. batesi* of Lower Guinea, from Mt. Cameroon eastward. The type of *batesi*, to be sure, is spotted on the lower breast and rather heavily barred on the tibiae; but other examples from Cameroon are more like those from the Congo, where adults have no more than a faint trace of spotting on the lower breast, and little barring, if any, on the tibiae.

Bates' serpent-eagle is truly a bird of the forest, which we never saw about clearings or open watercourses, but only within the heavy woodlands, perching on the larger boughs of the great trees and feeding, like the allied *Circaetus*, very largely upon snakes.

Relatively solitary in habits, it certainly would seldom be observed if it had not a loud voice, a prolonged series of mournful, nasal sounds, all in one key, which may be written "cow," and which are expressed by "lo" in the native name of the species, "Nalolo," current in the region of Niangara. This sound is slowly repeated, at intervals of one second or a little more, for a long enough period to enable the hunter to approach and locate the author. It is heard through a considerable part of the year, but the species is apparently quite silent in the Ituri during the short dry season in January, February, and March.

Of the adult birds, only three were noted as having the sexual organs of reduced size, certainly not breeding in December, May, and August. From the conditions recorded for the other specimens, it would seem that the breeding season, just north of the equator, extends from June to October or November, the same period at which their voices are heard.

Out of twelve individuals whose crops and stomachs were examined, nine had eaten snakes, sometimes large specimens, in one case two small ones, while very often only the scales remained as evidence. One had swallowed a toad (*Bufo*), another a lizard (*Agama*), and in two stomachs there was also hair, showing that small mammals, presumably rodents, may be eaten. Still it is possible that the mammals were swallowed within the bodies of snakes.

Among five birds dissected by Bates¹ four had eaten only snakes, the fifth a chameleon, with which were found fragments of insects.

KEY TO THE SPECIES OF *Circætus* TO BE EXPECTED IN THE CONGO

Adults Only

- 1.—Wing not longer than 420 mm.; tail brownish black with one very broad whitish band across the middle, a light tip, and sometimes a hidden white band at base; greater part of plumage gray or dark grayish-brown... *C. cinerascens*.
Wing exceeding 450 mm.; tail with more numerous bands..... 2.
- 2.—Whole plumage mainly dark brown, with bronze or purplish gloss in places, under surface of remiges largely whitish, under tail-coverts barred with white; rectrices blackish brown with 3 or 4 narrow light bars, often interrupted; wing 500–570 mm..... *C. cinereus*.
Underparts largely white; tail not blackish brown, but light brown or gray-brown with 2 to 4 dark bars..... 3.
- 3.—Chest dark brown, remaining underparts white without regular barring, or at most dark spots or imperfect bars; wing 510–540 mm..... *C. pectoralis*.
Chest not dark brown, lower breast barred with gray-brown or buffy brown on a white ground..... 4.
- 4.—Chest gray-brown with white edgings; wing shorter; 470–510 mm. . . *C. beaudouini*.
Chest light brown, or white with brown streaks or spots; wing longer: 500–530 mm..... *C. gallicus* (see p. 591).

¹1904, Ibis, p. 601.

***Circaëtus cinerascens* Müller**

Circaëtus cinerascens J. W. VON MÜLLER, 1851, Naumannia, part 4, p. 27 (type locality: Sennar). MATSCHIE, 1887, Journ. f. Orn., p. 148 (Sauga in Ufipa). SHELLEY, 1888, Proc. Zool. Soc. London, p. 46 (Kabayendi). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 573 (Kwango R.; Kabayendi). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Kisantu). NEAVE, 1910, Ibis, p. 105 (Bunkeya R.). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 315 (Tshikapa); 1932, Bull. Cercle Zool. Congolais, VIII, p. 45 (Katanga?). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 287 (Ngoma). PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 66 (upper Kafue R. near Ndola). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 261 (Kwango on Ubangi R.).

Circaëtus (zonurus?) SCHALOW, 1886, Journ. f. Orn., p. 141 (Sauga on E. shore of L. Tanganyika).

?*Circaëtus* sp. SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 3, p. 259 (Kabayendi).

Faradje, 2 ♀, Feb. 24, July 29.

ADULT FEMALE.—Iris dull yellow; cere and basal half of beak yellow, its tip black; feet yellow, claws black.

In spite of their sex, the two female specimens are of dimensions approaching the minimum as given in Reichenow's 'Vögel Afrikas.' Their wings measure 385, 387 mm.; tails 215, 208; culmen from cere, 31, 33; metatarsus, 78, 77.

As von Heuglin long ago pointed out,¹ the plumages of this serpent-eagle are decidedly variable, and our two adult females resemble neither of Heuglin's color-plates,² being grayer and darker, especially on the abdomen and tibiae, where the light barring is only faintly indicated. They do, however, agree well with a mounted specimen in the American Museum, purchased from Verreaux, labeled "Juv. ♂, Afrique Occidentale."

A second specimen from the Verreaux Collection resembles the young female figured by Heuglin, and is marked "♂, Bissao, West Africa."³ The very pale coloration of the head and breast can scarcely be due altogether to wear and bleaching. So our nestling *Circaëtus* from Faradje is far too dark brown to be the young of the present species.

DISTRIBUTION.—From Portuguese Guinea across the Sudan to Sennar, south through eastern Africa to the Zambesi, and westward to Angola and the Cataracts district of the Congo. Encircles the West African forests, but is not found in them. The Congo Museum had two adult examples: one from Kisantu (Goossens), the other from Beni (Borgerhoff); and Dr. Schouteden added one from Tshikapa.

¹1869, 'Orn. Nordost-Afr.,' I, p. 88.

²1860, Ibis, Pl. xv; 1872, 'Orn. Nordost-Afr.,' Pl. III.

³Verreaux erroneously regarded this as the fully mature plumage, see Ibis, 1862, p. 210.

We met with *Circaëtus cinerascens* only in the savanna country from the Uelle and Kibali rivers northward, including the vicinity of Niangara, Gangara na Bodjo, Nzoro, and Aba. Though never very common, its large size, and its habit of perching in the large trees along watercourses render this eagle conspicuous; but its wariness prevents easy approach. The voice consists of a series of loud monotonous notes, recalling slightly those of *Halixæetus vocifer*, but very mournful in tone.

The female collected in July had the ovary enlarged, as though breeding then; our February specimen, on the contrary, was not ready for reproduction.

In the stomachs of our two specimens, there were a green arboreal snake, lizard scales, and pieces of beetles. According to Heuglin,¹ the food of this eagle, in the Sudan, consists principally of tree-snakes, but includes also mice, rats, lizards, and fish, though the last-named may not be captured by the bird itself.

Circaëtus cinereus Vieillot

Circaëtus cinereus VIEILLOT, 1818, 'Nouv. Dict. Hist. Nat.,' XXIII, p. 445 (type locality: Senegal). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 571 (Kwango R.). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Kisantu).

Faradje, ♂ juv., March 9.

NESTLING.—Iris yellow; bill bluish gray with black tip; feet pale grayish-green, claws black.

I am unable to identify this specimen as anything but *Circaëtus cinereus*, although no adult of the species was collected in the Uelle district. Its tail is still only partially grown (110 mm. long), and the whole plumage brown, darkest above, with a distinct purplish gloss on the larger scapular feathers, alula quills, secondaries, and greater coverts. The crown and nape, throat, and breast show black shaft-streaks. No light bands are as yet visible on rectrices. Bill and feet are smaller than in adults of *cinereus*.

Though its underparts are somewhat more reddish brown than in adults of *cinereus*, it is far less rufous throughout than the young of *C. pectoralis*, with which I compared it in Berlin and Tervueren.

DISTRIBUTION.—From Senegal across the whole Sudan to northern Abyssinia, and south through eastern Africa to Cape Province. South of the equatorial forest, in which it is wanting, it ranges west to Angola and the Cataracts district of the Congo.

There is a mounted specimen in the Congo Museum from Kisantu (Goossens); and Father Callewaert has sent us an adult female taken at

¹1869, 'Orn. Nordost-Afr.,' I, p. 89.

Luluabourg on January 11. Reichenow's view that adults of this eagle remain dark brown was supported by W. L. Sclater¹ and Claude Grant,² and is now generally accepted.

Claude Grant calls this bird "very wild and difficult of approach, even to get within good rifle-shot. It breeds in the forks of the larger trees, and I discovered a nest near Legotot [Transvaal] in May so placed in a solitary tree on a hillside. It was a huge mass of sticks, and contained one young bird recently hatched." Our nesting from Faradje was brought in by natives, who claimed that it was the only occupant of a nest in a large tree.

Eggs of this eagle were described by Reichenow as coarse-grained and plain white, 76-81 mm. by 62-64.

Circaëtus pectoralis Smith

Circaëtus pectoralis A. SMITH, 1830, S. Afr. Quart. Journ., 1st Series, p. 109 (type locality: South Africa). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Upper Congo).

?*Falco circaetus* RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 151, 156, 160 (Kongolo).

DISTRIBUTION.—Abyssinia and the White Nile, south through eastern Africa to Cape Province and southern Angola. Stresemann³ regards this as a subspecies of *C. gallicus* (Gmelin), and gives similar subspecific rank to *C. beaudouini* Verreaux and Des Murs. The latter ranges from Senegambia eastward to the Shari River region, and may thus occur within our limits in the Ubangi district.

Circaëtus gallicus of the southern Palearctic Region migrates to the Sudan, where Lynes found it common in Darfur from October to March. Thus both *pectoralis* and *gallicus* might be expected to reach the savannas of the Uelle district; and on several occasions I did see raptorial birds of this description at Faradje soaring high overhead. Their chests were usually dark-colored; the lower breast and abdomen white.

I do not know of any adult specimen of *C. pectoralis* having been taken in the Belgian Congo, unless the reference by Dr. Rodhain to *Falco circaetus* was possibly based on one from Kongolo. There is, however, a young specimen of *pectoralis* in reddish-brown plumage in the Congo Museum, labeled "District de Stanleyville." This is doubtless the bird recorded by Dubois from the "Upper Congo"; but it is far more likely to have come from the upper Lualaba than from the forest

¹1912, Ibis, p. 9.

²1915, Ibis, p. 246.

³1924, Orn. Monatsber., pp. 165, 166.

country around Stanleyville. In the Katanga, this eagle is almost certain to be found.

It does occur, at any rate, on the Ruindi Plain southwest of Lake Edward, where on March 28, 1927, I myself saw an adult. Some months before I had collected the species in Kenya Colony, and I have no doubt as to the identification.

Neumann¹ found two nests near Lake Zwai in Abyssinia in November. Both were in the tops of small acacias, about three meters above the ground, and contained either a single nestling or one white egg.

***Terathopius ecaudatus* (Daudin)**

Falco ecaudatus DAUDIN, 1800, 'Traité élémentaire et complet d'Ornith.,' II, p. 54 (type locality: "Anteniquoi country," i.e., Knysna district, Cape Colony).

Helotarsus ecaudatus ANTINORI, 1868, Boll. Soc. Geogr. Ital., I, p. 117 (Niam-Niam Land, near present Bafuka). PETERMANN, 1868, Petermann's Mitteil., p. 416 (Niam-Niam Land, as above). SCHALOW, 1886, Journ. f. Orn., pp. 417, 432 (Lusinga in Marungu; Likulwe R.); 1887, idem, p. 230 (W. of L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 148 (Lusinga; "Lualaba"; L. Itambe; Likulwe). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 598 (Lusinga; Likulwe R.; "Lualaba," i.e., Luvua R.; L. Itambe). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 ("Without exact locality"). SALVADORI, 1907, Boll. Mus. Zool. Anat. Torino, XXII, No. 570, p. 2 (near Lukonzolwa, W. of L. Moero). O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 441 (Mokia). MOURITZ, 1914, Ibis, p. 28 (S. E. Katanga). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 14 (Kabaré). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 75 (Mswa). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 265 (Elisabethville).

Helotarsus SCHALOW, 1886, Journ. f. Orn., pp. 421, 423, 424 ("Lualaba," i.e., Luvua R.; L. Itambe).

Terathopius ecaudatus GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 287 (Rutshuru and Ruindi plains; L. Kivu). PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 66 (upper Kafue R. near Ndola). FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 63 (Belgian Congo).

Nzoro, ♂, April 13.

Faradje, ♂, January 16; ♂ im., March 8; ♀ im., February 13.

ADULT MALE.—Iris dark brown; lores, cere, and skin at base of mandible bright scarlet; beak blackish at tip, yellow basally; feet scarlet, claws black. (These are the colors during life, but the red of the cere, lores, and feet depends upon the presence of blood in the skin. The cere is not as hard as in other birds of prey, and the feet are covered with prominent rounded waxy scales. Both cere and feet may turn orange soon after death, though the cere will regain its bright color if the bird is hung up by the feet.)

IMMATURE FEMALE.—Iris bright brown, lores dirty grayish-white, cere and base of bill light grayish-green, tip of beak blackish; feet yellowish white, claws black.

¹1904, Journ. f. Orn., p. 361.

The light-backed form of bateleur has often been considered as the fully mature condition, but serious doubt has been cast upon this. A captive bird in Uganda is stated by the Van Somerens¹ to have molted from the light-backed plumage into the rufous-backed! Yet a bird in the zoölogical garden of Breslau is reported to have retained a white back for eleven years, and others in Berlin and Breslau to have maintained a rufous coloration throughout their lives. This makes it most probable that there are two color-phases, which interbreed without blending.

Bleaching and wear of the feathers are not involved, and the difference in color of the back, rump, and upper tail-coverts is correlated with a marked difference as to shade in the rectrices, and even the under tail-coverts. Both plumages may certainly be called adult, the uniform brown immature dress being worn a considerable time. Such a bird in our collection is renewing the interscapulars, and the new feathers are coming in, neither cream-colored nor white, but blackish brown, as they were before. This makes it very probable that young birds remain brown at least two years.

One of our adult males is rufous on the back, the other cream-colored; and both have the secondaries uniform slaty-black. The broad gray band sometimes crossing the secondaries is now proved to be the mark of females, and the American Museum has such a specimen from Abyssinia, marked female (with rufous back).

In life, as Brehm remarked, the plumage of the bateleur has a grayish bloom; we found this to be the case in adult male specimens, and there most conspicuous on the secondaries, where there is a gray patch, produced entirely by the dust that is shed from the extensive powder-down tract covering the base of the thighs and the sides of the lower back, down to the tail. When the wing is folded the powdered feathers lie directly over this spot.

The number of secondaries possessed by *Terathopius ecaudatus* is the greatest found in any bird of prey. Mr. W. DeW. Miller counted twenty-five in one specimen, and twenty-six in another. Only in *Gyps coprotheres* did he ever find as many as twenty-five, while *Cathartes aura*, in spite of its sailing much like the bateleur, he found to have but 18-19 secondaries. *Halixetus leucocephalus* has 18-19; *Gypohierax angolensis*, 16-17. The minimum number among Accipitres is found in the falcons, *Falco peregrinus* with 15, *Falco columbarius*, 14.

DISTRIBUTION.—Usually given as the whole Ethiopian Region, from Abyssinia and Senegal to the Cape, little attention being paid to the

¹1911, 'Studies of Birdlife in Uganda,' p. 12.

fact that it is unknown on the west coast between the mouth of the Congo and Sierra Leone,¹ or anywhere between the coast of the Gaboon and Irumu on the eastern border of the Congo, some 1400 miles.

Within the Belgian Congo, the bateleur eagle is known from the Uelle, the western shore of Lake Albert, vicinity of Lakes Edward and Kivu, Marungu, and Upper Katanga. There is no record from the Kasai, but this bird is not an easy one to capture. We did not see it in the Lower Congo, but there is an adult male in the Congo Museum labeled as coming from that district. Perhaps, however, this is the one which Professor Dubois reported as lacking exact locality.

The bateleur is a roamer over plains and savannas, and could no more find a living in the forests of equatorial Africa than could a vulture or a bustard. This is the key to its distribution in the Congo: it occurs wherever there are extensive open savannas. In going toward the Lado Enclave, we first met it at Niangara. From there to Garamba and Aba, it is commonly seen sailing high in the air, well above shot-gun range, with the beak pointing directly downward, as the ground passed over is closely scrutinized—but not backward, as has been claimed. The tips of the toes project slightly behind the end of the stubby tail; and the short tail, coupled with the long pointed wings, gives a crescentic outline so peculiar that the bateleur can be confused with nothing else.

The manner of flight is best compared with that of the American turkey-vulture, for both birds sail on motionless wings at great speed. But the American vulture elevates its wings "dihedrally" just a little more than the bateleur, and the African vultures and marabou keep them more horizontal. For just a year, I watched the bateleurs sailing aloft before ever seeing one perch, but I have never seen the tumbling flight described by Levillant, A. Brehm, and the Woodwards.² The bateleurs seemed almost to spend their lives on the wing, scouring the country for food, not simply soaring in circles, but traveling on whatever course they would, and appearing exceedingly strange, when—as happened very rarely—they flapped their pinions.

Finally, one morning, I found an adult bird sitting upright on a tree near our camp in the bush, and uttering the very loud "caw!" or "ka-ow!" which they sometimes repeat at intervals. Two brown immature examples were also seen to fly up from some meat thrown out near this camp to attract vultures, and there is abundant evidence that the

¹One doubtful record from Croboe, an open plains district east of the Gold Coast, is given, however, by Ussher, 1874, *Ibis*, p. 44. Bannerman (1930, *Birds Trop. W. Afr.*, I p. 264) mentions the bateleur as occurring on the Loango Coast, but I cannot find any record of an actual capture there.

²1900, *Ibis*, p. 519.

bateleur eats carrion as well as a variety of small game, although natives of the Uelle credit them with feeding habitually on the large rodent, *Thryonomys*, and even attacking small antelopes. Unless circling over some dead animal, they usually travel singly, and birds in adult plumage are seen as often, if not even more frequently, than the brown young ones. I cannot regard the creamy-backed individuals as representing more than a color-phase. In the northern Uelle, such birds may be somewhat less numerous than those with rufous backs, but are certainly not rare.

We noticed no sign of migration on the part of the bateleur, and yet neither we nor our natives ever discovered a nest. The four birds I was lucky enough to secure were all in non-breeding condition. In the neighborhood of Khartoum, however, Heuglin secured young; van Someren¹ describes a nest in Uganda, in a very high tree; and they have also been found in Nyasaland, Damaraland, and the Transvaal. Usually but a single egg is laid, plain creamy-white, or with scattered rufous spots, measuring 75–78 mm. by 60 or 60.5.

In addition to carrion, various observers state that the food of the bateleur consists of reptiles, especially snakes (Brehm), lizards, small mammals, birds and even grasshoppers (Heuglin), a duck (Antinori), snakes and mice (Fleck), a monitor (Böhm), "moles" and snakes (Ayres). "In captivity," said Layard, "it would continually steal hens' eggs."

From the crops and stomachs of our four specimens we took five shrews, pieces of a "bindi" (*Thryonomys harrisoni*), one rat, pieces of shell from several blue-green eggs (weaver-birds?), two legs of a small land-tortoise (*Kinixys belliana*) and a small snake, as well as pieces of flesh and bone from large mammals (carrion).

SUBFAMILY *Circinæ*

Gymnogenys typicus (Smith)

Poloboroides typicus A. SMITH, 1830, S. Afr. Quart. Journ., I, p. 107 (type locality: Eastern Cape Colony).

Polyboroides typicus SHARPE AND BOUVIER, 1876, Bull. Soc. Zool. France, I, p. 301 (Shiloango R.). SHARPE, 1884, Journ. Linn. Soc. London, Zool., XVII, p. 437 (Semio). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 531 (Semio); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 260 (Kisenyi). MOURITZ, 1914, Ibis, p. 37 (Musoshi R.). SCHOOTEDEN, 1918, Rev. Zool. Afr., V, p. 230 (Beni; Goma; N. of L. Kivu; Kwidjwi I.).

Gymnogenys typicus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 26 (Katanga; Ituri; Umangi; Mayombe; Lower Congo). SCHOOTEDEN, 1925, Rev.

¹1911, 'Studies of Birdlife in Uganda.' See also Pitman, 1928, Bateleur, I, pp. 6–8; and Paget-Wilkes, 1928, Ibis, p. 720.

Zool. Afr., XIII, p. 4 (region of Bolobo). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 265 (Elisabethville; Kongolo).

Gymnogenys typicus pectoralis SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 314 (Luebo; Basongo; Makumbi; Kabambaie). FRIEDMANN, 1930, Bull. 153, U. S. Nat. Mus., p. 93 (Buta; Avakubi).

Gymnogenys typicus graueri SWANN, 1925, 'Monograph of the Birds of Prey,' p. 101 (L. Kivu).

Gymnogenys typicus typicus HARTERT, 1925, Nov. Zool., XXXII, p. 271 (L. Kivu).

Stanleyville, ♀ im., January 10.

Avakubi, 2 ♂ im., February 1, 6.

Niapu, ♂ im., December 4.

Niangara, ♂, ♀, June 11.

Faradje, ♂, August 27.

ADULTS OF BOTH SEXES.—Iris blackish brown, cheeks yellow; cere and base of mandible whitish, horny part of beak black; feet bright yellow, claws black.

IMMATURE MALE.—Iris brown, orbits yellowish green; feet yellow.

The cere is soft, as in the bateleur eagle, and when one adult bird was hung up by the feet, its bare orbital skin became deep orange, and its cere dull purplish-red. The feet do not seem to change color in this way. The tarsal joint is very weak, and may be bent backward in the dead bird. It seems quite likely that the live bird can draw them backward a little, and perhaps this peculiarity aids in holding the long legs beneath the tail during flight, or is of use in seizing prey inside holes in trees. The sequence and variability of the brownish immature plumages have been discussed by Friedmann (1930).

DISTRIBUTION.—This is really a species inhabiting practically the whole of the Ethiopian Region from Sennar and the Gambia to Cape Province. In the wooded districts, it lives along the rivers and about clearings, although more characteristic, perhaps, of savanna country. Not reported above 6000 feet in the Congo. The closely related *G. radiatus* (Scopoli) is found on the island of Madagascar.

Specimens from South Africa have longer wings (420–480 mm., both sexes included) than those of West Africa (360–415 mm.), so the western form may be separated as *G. t. pectoralis* (Sharpe).¹ The geographic variation in color has been exaggerated by Kirke Swann,² who recognized four subspecies. Many specimens from the Congo are of intermediate size and difficult to assign to either race, so I have not attempted it in my synonymy. Our adult male and female from Niangara have wings 420 and 432 mm., respectively; whereas the male from Faradje has the wing 434 mm. long. They are closer to *typicus*

¹1903, Bull. Brit. Orn. Club, XIII, p. 50 (Efulen, Cameroon).

²1925, 'Monograph of Birds of Prey,' part 2, pp. 97–101.

than to *pectoralis*. But a female from Djugu, west of Lake Albert, has the wing only 421 mm. long; and immature specimens from Avakubi and Stanleyville are apparently *pectoralis*, with wings 388–400 mm. Three adult females from Coquilhatville and Lukolela show wing-lengths of 377, 379, and 398 mm.; a male from Lukolela 368 mm.

Thus *G. t. pectoralis* appears to occupy the equatorial forest of the Congo, as well as the Kasai district. *G. t. typicus*, ranging from the Cape Province to Abyssinia and the eastern Sudan, must inhabit the Katanga and the Kivu district.

This strange, long-limbed hawk is found throughout the Belgian Congo, except in the high mountains of the eastern border. During our Congo Expedition, we found it fairly common, and saw it at many localities where we could not collect it: namely, Medje, Nala, Rungu, and Boma, for it was usually too shy to allow an approach. In the northern Uelle district, it was usually met with singly, or, at most, in pairs, flying restlessly from tree to tree in the savannas. In the southern Uelle and Ituri, it was very often pursued by two or three tireless drongos (*Dicrurus modestus coracinus*), which would hover over it, trying continually to peck at it, and attracting attention by their rasping calls. The extremely broad wings and ample plumage of this hawk give a false impression of size, and their small heads add a vulturine appearance, the feathers of the nape almost forming a sort of ruff. The supra-ocular shield, too, is very small.

They progress with a slow, sailing, or leisurely flapping flight, stopping soon to hop about the branches of leafy trees, or clinging to the bark, even hanging on the under side of some rotten stub, as though in search of insects. At other times, they are seen clinging at knot-holes, beating their wings, and, beyond a doubt, searching for young birds or other weak prey; and this peculiar habit is responsible for the name of *Gymnogenys* in the language of the Amadi (Uelle district): "Nobwapungu," the beater of hollows, as Nekuma translated it.

At Faradje they were often observed in the large trees along the Dungu River, especially—it seemed to me—during the latter part of the rainy season (August to November), when the grass is very high and dense. Yet they are resident throughout the year in all this country. More likely they were there then because it was the breeding season for colonies of *Textor cucullatus femininus*, and raiding the nests of weaver-birds is one of their great specialities. I used to see them come again and again to certain colonies of *Textor cucullatus* and of *Melanopteryx nigerrimus*, in palms or other trees near villages. The adult weavers

seemed to know that this hawk was not active enough to catch them, and they would keep close by, even fluttering excitedly round their enemy, who, balancing himself awkwardly on the slender boughs, was trying to reach into the nests. Occasionally an old weaver would be caught, but they ran little risk.

The voice of *Gymnogenys typicus* is a weak but very shrill "pēēēē . . ." (more phonetically pīīī . . .), not apt to attract attention, yet audible up to two hundred yards, at least. Sometimes the bird giving this call will be seen to vary its normal sailing with a steep upward flight, followed by an abrupt descending swoop. This it may repeat many times, as if in amatory display.

Of the three adult specimens, none showed any indications of breeding, yet the two shot at Niangara on June 11 had come together to a nest built of sticks in a fork of a high tree. There were no eggs or young, only some old bones and palm-nuts, in the nest; moreover, the condition of the oviduct in the female seemed to indicate that her eggs had been laid quite some time previously. From the little that is known of the nesting of this hawk, it appears that sets are of two or three eggs, with their white ground-color almost concealed by mottlings of rich reddish-brown. Kirke Swann¹ gives the dimensions as 50-56 mm. by 42-44. Bates² has described a nest in the forested Cameroon, placed on a horizontal limb of a silk-cotton tree, in the midst of a growth of elk-horn ferns at least a hundred feet above the ground. Found in April, it contained one egg.

I do not know whence comes the name of "Schlangensperber," or snake-hawk, which Reichenow³ applied to *Gymnogenys*. It certainly does not merit it particularly, and its diet is decidedly varied. We examined the stomachs of seven specimens, of which three contained the greasy yellow pulp and fibres from palm-nuts (fruit of *Elæis guineënsis*),⁴ but one of these also held a rat, and a young nestling of a "mannikin" (*Amauresthes fringilloides*). Another bird's gizzard was filled with three young colies (*C. striatus leucophthalmus*) taken from the nest; still another individual had eaten an adult weaver-bird (*Textor cucullatus*); and the mate of this last hawk had swallowed an egg of perhaps the same weaver. Lastly, one immature *Gymnogenys* had swallowed a number of insects and a lizard.

¹1925, 'Monograph of Birds of Prey,' part 2, p. 99, Pl. 1, fig. 8.

²1927, *Ibis*, pp. 16, 17, Fig. 2.

³1901, 'Vögel Afrikas,' I, p. 531.

⁴The principal food of *Gypohierax angolensis*.

KEY TO THE SPECIES OF *Circus* OCCURRING IN THE BELGIAN CONGO

- 1.—Inner webs of the three outermost primaries emarginate, as are likewise the outer webs of three primaries beginning with the next-to-outermost. Adult males largely pale gray in color, though females and young are browner. 2.
 Inner webs of the four outermost primaries emarginate, as are the outer webs of four primaries beginning with the next-to-outermost. Both sexes largely dark brown in color. 3.
- 2.—Indentation of the inner web of the outermost primary begins 25–30 mm. beyond the tips of primary-coverts. *C. pygargus*.
 Indentation of the inner web of the outermost primary begins almost opposite the tips of the primary-coverts, or only 12 mm. at most beyond them. *C. macrourus*.
- 3.—Remiges and rectrices without distinct darker bands, though bases or inner webs of remiges may have extensive whitish areas. *C. æruginosus*.
 Secondaries and rectrices with dusky barring. *C. ranivorus*.

***Circus macrourus* (Gmelin)**

Accipiter macrourus S. G. GMELIN, 1771, Novi Comm. Acad. Sci. Petrop., XV, p. 439, Pls. VIII, IX (type locality: Voronezh, S. E. Russia).

Circus macrurus DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Karema). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 265 (Kafubu R.).

Circus macrourus LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 13 (Rutshuru). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., Stockh., (3) I, No. 3, p. 285 (Goma). FRIEDMANN, 1930, in Strong, 'Afr. Republ. Liberia and Belgian Congo,' II, p. 751 (Bumba).

Dungu, ♂, February 23.

Faradje, 2 ♂, March 2, 14; 2 ♀, February 16, December 21; ♂ im., February 27; 3 ♀ im., February 5, October 31, December 15.

ADULT MALE.—Iris chrome-yellow; cere greenish yellow, corners of mouth dark green, bill black with a little blue-gray at base; feet bright yellow, claws black.

ADULT FEMALE.—Iris yellow; bill black, cere greenish; feet yellow with black claws.

IMMATURE FEMALE.—Iris brown.

DISTRIBUTION.—Breeding from southern and eastern Europe to central Asia; and in winter through India, including Ceylon and Burma, and the greater part of Africa from the Gambia to Cape Town.

The pallid harrier reaches the northeastern savanna of the Congo basin every year in October and November, and is common there during the whole dry season, leaving again about March. The earliest date of arrival noted was October 18, 1912, this being a silver-gray adult male.

This species hunted not only over open marshes, but went flying everywhere low over the drier parts of the savanna, alighting occasionally on the ground or on termite hills, very seldom on trees. In short, its habits are very similar to those of our North American marsh-hawk; the

flight is equally buoyant, with wings slightly elevated while sailing. The brown females and young, of course, greatly outnumber the adult males, but even these latter are frequently to be seen.

While they visited the open country all along the northern edge of the forest and were common at Niangara, we never noticed either *C. macrourus* or *C. pygargus* in the forest of the Ituri district. There is, however, a single record from Bumba on the upper Congo River. Those that reach South Africa either go round the forest, or else they go over high above it, without any stop. Probably the first hypothesis is correct, for in the Lower Congo these northern harriers appear to be wanting; in December, 1914, and January, 1915, I did not see a single individual from Kwamouth to Boma.

The contents of crop and stomach were noted by us in five cases, and four times we found small birds to have been eaten, three of them identifiable as weaver-birds. The only other prey they contained consisted of three lizards and a single mouse.

***Circus pygargus* (Linnæus)**

Falco pygargus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 89 (type locality: England, ex Albin).

Circus pygargus DE SOUSA, 1886, Journ. Sci. Lisboa, XI, p. 76 (Tenke); 1886, in Capello and Ivens, 'De Angola a Contra-Costa,' II, p. 443 (Tenke). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Beni; Kasindi; Irumu; Kalégéla).¹

Niangara, ♂ im., May 6.

Faradje, ♂, March 5.

DISTRIBUTION.—Temperate Europe and western Asia to North Africa, migrating southward for the winter to China, the Indian Peninsula, and Africa, mostly the eastern half, south to Cape Province. Rather rare within our limits and undoubtedly occurring only in the savanna regions, where *C. macrourus* and *C. æuginosus* are far more common during the northern winter.

Our first specimen was a fully adult male which the natives had somehow contrived to capture, pulling out its quills, so that we preserved the skeleton and a flat skin. The second, shot on May 6, a very late date, was an immature male beginning to assume the gray adult plumage, but with sexual organs very small. Its stomach contained only the remains of large grasshoppers.

Two more males were seen, but not collected, in January, 1927, at the old post of Kasindi and at Katwe, Uganda. The rufous barring of the axillaries and the blackish band crossing the secondaries, above, are excellent field marks.

¹Some of these records may really refer to *C. macrourus*.

***Circus æruginosus æruginosus* (Linnæus)**

Falco æruginosus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., I, p. 91 (Europe; restricted type locality: Sweden).

Circus æruginosus SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Mai-na-Kwenda in Rutshuru Valley).

Avakubi, ♀, November 21; ♂ im., December 6; 2 ♀ im., December 13, 20. Faradje, ♂, February 19; ♂, December 26; ♀ im., January 26.

ADULT MALE.—Iris light chrome-yellow.

ADULT FEMALE.—Iris dark brown; bill black, a little bluish at base below; lores and corners of mouth green, cere greenish yellow; feet yellow, claws black.

The single adult male is in full plumage, comparable to that figured in Thorburn, 1915, 'British Birds,' II, Pl. xxx, yet darker on the tibiae and wing-coverts, and the upper tail-coverts not pure white, being mottled with brown and buff. Such birds were scarce in the Congo, so that we saw them only two or three times.

Our two adult females are quite dissimilar, one having only very fine streaks on the rich buff crown and nape, and a dark brown tail tipped with rufous. The other shows a decided approach to the male coloration, having the tail grayish brown, and the dusky streaks on crown and nape broader. The fore-neck and chest, however, are almost entirely dark brown.

The immature specimens show many differences in coloration: one (♀) having an irregular bar of chocolate across the white crown, above the eyes; another (♀) has the entire vertex dark brown, though streaked on forehead and nape with buffy white.

In all five females, adult and young alike, we found that both right and left ovaries were present. This is, of course, a rather frequent condition among the diurnal birds of prey.

DISTRIBUTION.—*Circus æ. æruginosus* breeds from southern Sweden and northern Russia to the Mediterranean, also in western Asia. In Morocco and Algeria, perhaps also in southern Spain, there nests another race with light areas purer white and more extensive, *C. æ. harterti* Zedlitz,¹ which must be less migratory, for it is not yet known from tropical Africa; whereas northern birds spend the winter in India, and in Africa, mostly in the eastern half, but also in southern Angola (Mossamedes) and south to the Transvaal.

In the Congo, the marsh-harrier must be restricted mainly to the eastern parts, and especially the more open regions, like the Uelle, where it usually arrives in November or December,² is common during

¹Cf. Hartert, 1914, 'Vögel Paläarkt. Fauna,' II, p. 1138.

²There is a specimen in the Rothschild Collection taken by Camburn at Mahagi on September 8.

the whole dry season, and departs by about early April. An exceptionally late one was seen on May 3, 1912, near Faradje, and the first one noted on return in that year was December 2. At Avakubi, however, in 1913, one was seen as early as November 16.

Even in the savannas we noted that the marsh-harrier had a special liking for open marshes, thus meriting its name, particularly as compared with the pallid harrier. Sometimes they would fly along the banks of the Dungu River; one so doing was seen to dart suddenly into the tall canes that fringed the shore, and a little later we shot it as it flew up from the ground. It was found to have eaten a small long-eared bat (*Nycteris pallida* Allen) which hangs during the day in papyrus or dense reeds, and this, no doubt, explained its abrupt deviation from its course. This is the only case where we found a bat eaten by any bird of prey save *Machærhamphus*.

Young marsh-harriers resemble the common African kite in color, but even without seeing the creamy crown-patch or the differently shaped tail, there is no danger of confusing them; they can be recognized at any distance by the slant of the wings as soon as they begin to sail, for a kite will hold its wings perfectly horizontal, harriers always elevating them slightly.

In the Ituri Forest, I had not expected to see any *Circus* whatsoever, having spent a year there without observing one; yet in November and December, 1913, single individuals of this form were seen quite often around the clearing and the river at Avakubi, where they found patches of long grass to their liking, and preyed largely on monitors (*Varanus niloticus*). One was even seen clinging to young oil-palms much after the fashion of *Gymnogenys*, after which it dropped down into a muddy hippo-path to eat its prize.

No marsh-harriers were observed in the Lower Congo during December, 1914, and January, 1915, so the forest of the Cameroon must be a decided barrier.

We examined the crops and stomachs of six individuals, with the following results: One old male marsh-harrier had eaten five or six eggs of small birds, most of them those of *Sitagra atrogularis*, a weaver-bird nesting in conspicuous places during the season of drought. These eggs would have to be pulled out of the nests from below. Another bird (as mentioned above) had eaten a small bat, but caught it in the daytime. Of the four remaining, three had eaten young monitors, and the fourth a lizard; one of them, in addition, a gallinule (*Porphyryla alleni*) and a large grasshopper.

***Circus ranivorus æquatorialis* Stresemann**

Circus ranivorus æquatorialis STRESEMANN, 1924, Orn. Monatsber., p. 48 (type locality: Kiraragua, on Kilimanjaro). SCHOUTEDEN, 1930, Rev. Zool. Afr., XVIII, p. 280 (near Elisabethville).

Circus ranivorus JOHNSTON, 1884, 'The River Congo,' p. 371 ("Congo R. up to Bolobo"). SCHALOW, 1886, Journ. f. Orn., p. 418 (Lufuku R.). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 540 (Tanganyika; Lufuku R.; Lufonzo Valley). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Goma; Kivu; Nya-Lukemba).

Circus æruginosus MATSCHIE, 1887, Journ. f. Orn., p. 148 (Lufuku R.; Lufonzo Valley).

Circus æruginosus æquatorialis STRESEMANN, 1924, Journ. f. Orn., pp. 262-269.

DISTRIBUTION OF THE SPECIES.—Southern and eastern Africa, from Cape Province to southern Angola, the Katanga, Kenya Colony, and Uganda. According to Dr. Stresemann, birds from the region north of the Zambesi have slightly shorter wings (345-373 mm.) than those to the southward (365-400 mm.), so he has separated them as *C. r. æquatorialis*. Further remarks on the marsh-harrier group, as a whole, by the same author will be found in Journ. f. Orn., 1924.

There is no recent evidence to support Johnston's statement that the African marsh-harrier was found on the Congo River up to Bolobo. However, specimens have been taken in the vicinity of Lakes Tanganyika and Kivu, and some of these I have seen in the Congo Museum. In the highland northwest of Lake Edward I secured an adult female, in an open marsh at 7160 feet.

This harrier has much the same habits as *C. æruginosus*, and is said to build its nest in South Africa during September or October among reeds near a marsh or river. Three or four chalky white eggs, tinged with bluish, are laid. These measure 45.5-48 mm. by 35-37 mm. (Kuschel).

SUBFAMILY Buteoninæ***Butastur rufipennis* (Sundevall)**

Poliornis rufipennis SUNDEVALL, 1851, Öfvers. K. Vetensk. Akad. Föhr. (1850), VII, p. 131 (type locality: near Khartoum).

Butastur rufipennis CHAPIN, 1916, Amer. Mus. Journ., p. 543 (Uelle).

Niagara, ♀, January 13.

Dungu, ♀, February 1.

Faradje, 2 ♂, January 31, December 1; 3 ♀, January 31, February 1, March 8.

Aba, ♂, December 21.

ADULT FEMALE.—Iris yellow; cere yellow, base of beak dull yellow, its outer half blackish; feet yellow, claws black.

Three males give the following measurements: wing, 290-294 mm.; tail, 164-168; culmen from cere, 17-18; metatarsus, 55-57. Those of

the five females: wing, 293-320 (average 311.6); tail, 172-183 (178.4); culmen from cere, 18.2-19.5 (18.8); metatarsus, 55-60 (57.5).

With but one exception, the females are distinctly darker than the males on the crown and ear-coverts; and the one female which resembles the males in color, though I determined its sex myself, is the one with the shortest wing and tail.

The width of the streaks on the breast is not an indication of sex, for the most finely streaked, as well as the most heavily marked, is a male. I cannot be sure that this character always depends upon age, all the specimens being apparently adult, though not one showed enlargement of the sexual organs.

DISTRIBUTION.—The grasshopper-buzzard, as Heuglin aptly called it, ranges from the vicinity of Khartoum, Darfur, Northern Nigeria, and Senegal, south to the northern border of the West African and Congo forests, and in the east to Morogoro and Dodoma in Tanganyika Territory. In the southern parts of its range, however, it is only to be seen from November to March, and there it never nests.

Heuglin rightly believed that *Butastur rufipennis* bred in the eastern Sudan, and noted that it arrived in Kordofan and Sennar in June and July, leaving again in November and December. There is a young bird in the Brussels Museum from "Khartoum" with the longer primaries not fully grown, and thus not long out of the nest. Between Khartoum and Kawa (White Nile), about the first of October, A. L. Butler¹ noted that it was very common, yet six weeks later not one was noticed there, so it was assumed to be migratory. Along the White Nile north of Fashoda, Hawker² found nests of this hawk, about a foot in diameter, made of sticks and lined with a few leaves. Sets were of three eggs, bluish white, with or without rufous speckling. Dimensions 42.1-50 mm. by 35.8-37.3 mm. From Kati in the French Sudan, Dr. Millet-Horsin has likewise brought two young birds, just out of the nest on August 2. They are much more rufous on the crown than adults, with rufous breasts almost unstreaked, only the shafts of the feathers blackish.

Their migratory habits were proved for us by their appearance in the Uelle district in three successive dry seasons. In 1910, we were not far enough north to fix the exact date of arrival, but in 1911, at Faradje, this occurred during the first days of November; in 1912 the first bird was observed on November 26.

¹1905, Ibis, p. 368.

²1902, Ibis, p. 442; Oates, 1902, 'Catalogue Birds' Eggs Brit. Mus.,' II, p. 378.

From the beginning of December to the end of March this is a very abundant bird of prey, second in numbers only to *Milvus æ. parasitus*; and though structurally it seemed somewhat intermediate between *Buteo* and *Milvus*, its habits are distinctive. Its flight is very buoyant, the wing-area being large, and the reddish primaries noticeable from afar; but it is not a soaring bird like a kite. It spends a great deal of its time perched on the trees that dot the dry savanna, and is perfectly mute. Its greatest delight is a bush-fire, and these are frequent enough during its sojourn in the Uelle. Then the grasshopper-buzzards gather in numbers, flapping and sailing above the smoke and flame, snatching in their talons the escaping grasshoppers as they are carried skyward in the column of heated air, and eating them on the wing.

In such pursuits they are of course not alone. Kites are usually among the first birds to arrive; but at such a fire, in January, 1912, I noted also twenty of these red-winged buzzards, several vultures (*Necrosyrtes*), two marabouts (*Leptoptilos*), two wool-necked storks (*Dissoura*), two hornbills (*Lophoceros n. nasutus*), a few rollers (*Coracias abyssinicus*), rosy bee-eaters (*Merops nubicus*), red-throated bee-eaters (*Melittophagus bullocki frenatus*), and many swallows (*Hirundo rustica*). With the possible exception of the storks, they were all engaged in catching insects.

The extent to which insects figure in the diet of this species of *Butastur* may be illustrated by our examinations of eight stomachs, of which seven contained grasshoppers, fifty of them in all, the majority of large size; but four mantises, fourteen stick-insects, several beetles and unidentified insects, as well as two spiders, were also found. The only vertebrate remains were the feathers of a small bird. In one stomach we found twelve stick-insects, a mantis, and a grasshopper, all without wings, so presumably these were not captured in flight.

The maximum distance this species might migrate would cover some 22° of latitude, as compared with about 40° for *Butastur indicus*. The movements of the latter have been described by McGregor¹ as extending from China, Ussuriland and Japan to Celebes and New Guinea.

***Kaupifalco monogrammicus* (Temminck)**

Falco monogrammicus TEMMINCK, 1824, 'Planches Coloriées,' livr. 53, Pl. cccxiv (type locality: Senegal).

Kaupifalco monogrammicus FINSCH, 1875, in Heuglin, 'Orn. Nordost-Afr.,' App. p. xxiv (Niam-Niam land). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 547 (Semio; Marungu; Kauè R.; Lufuku R.; Boma; Lukula R.; "Ubangi R.").

¹1910, Philippine Journ. Sci., V, pp. 199-200, Pl. 1.

SASSI, 1912, *Annalen K. K. Naturhist. Hofmus. Wien*, XXVI, p. 360 (Beni-Mawambi). LÖNNBERG, 1917, *Arkiv. f. Zool.*, X, No. 24, p. 13 (Beni). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 235 (Beni; Lesse; Pengé); 1923, *idem*, XI, p. 314 (Luebo; Kamai-embu; Makumbi). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 75 (Bellima; Tingasi; Djanda).

Asturina monogrammica SHARPE AND BOUVIER, 1877, *Bull. Soc. Zool. France*, II, p. 472 (Boma; Lukula R.). SHARPE, 1884, *Journ. Linn. Soc. London*, Zool., XVII, p. 437 (Semio); 1890, in Jameson, 'Story of the Rear Column,' p. 410 (Yambuya). SCHALOW, 1886, *Journ. f. Orn.*, p. 417 (Kauè R.); 1887, *idem*, p. 229 (Mt. forests of Marungu). MATSCHIE, 1887, *Journ. f. Orn.*, p. 148 (Kauè R.; Lufuku R.). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 405 (Monbuttu). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 406 (Monbuttu). SHELLEY, 1890, *Ibis*, p. 157 (Yambuya). FLOWER, 1894, *Proc. Zool. Soc. London*, pp. 599, 601, (Ipoto). DUBOIS, 1905, *Annales Mus. Congo, Zoologie*, I, f. 1, p. 26 (Tanganyika; Province Orientale; Ituri; Umangi; Kisantu; L. Leopold II). DUTTON, TODD, AND TOBEY, 1907, *Annals. Trop. Med. and Parasit.*, p. 288 (Lokandu; Lusambo). RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 151, 156, 160 (Niangwe). MENEGAUX, 1918, *Rev. Française Orn.*, V, p. 257 (Zambi). DE RIEMAECKER, 1927, *Rev. Zool. Afr.*, XIV, p. 265 (Elisabethville; Kafubu R.).

Asturina sp. JOHNSTON, 1884, 'The River Congo,' p. 371 ("most parts," Congo R. up to Bolobo).

Melierax monogrammicus DUBOIS, 1886, *Bull. Mus. Roy. Hist. Nat. Belgique*, IV, p. 149 (region of L. Tanganyika).

Asturina monogrammica OUSTALET, 1893, *Naturaliste*, VII, p. 60 (no exact locality).

Asturina monogrammica meridionalis AUBERT AND HECKENROTH, 1911, *Comptes Rendus Hebd. Soc. Biol. Paris*, LXX, part 1, p. 958 (Brazzaville).

Kaupifalco monogrammicus monogrammicus SCLATER AND M.-PRAED, 1919, *Ibis*, p. 695 (Yambio). SWANN, 1920, 'Synop. List Accipitres,' 1st Ed., p. 87 (Tropical W., central and E. Africa). BANNERMAN, 1922, *Rev. Zool. Afr.*, X, p. 172 (Belgian Congo); 1930, 'Birds Trop. W. Afr.,' I, p. 251 (Congo). SCHOUTEDEN, 1923, *Rev. Zool. Afr.*, XI, p. 387 (Kwamouth); 1924, *idem*, XII, pp. 261, 408 (Kidada; Kisantu; Leopoldville; Eala; Bikoro); 1925, *idem*, XIII, p. 5 (Kunungu).

Kaupifalco monogrammicus meridionalis PAGET-WILKES, 1926, *S. Afr. Journ. Nat. Hist.*, VI, p. 66 (Katanga border near Kafue R.).

Stanleyville, ♂, ♀, September 5.

Bafwaboli, ♂, September 11.

Avakubi, 2 ♂, October 17, November 14; ♀, June 15; ♂ juv., March 9; ♀ juv., February 20.

Bafwabaka, ♂, December 28.

Medje, 3 ♂, March 11, 26, July 28; ♀, January 14.

Niangara, 2 ♂, June 10, November 25; ♀, June 10.

Nzoro, ♂, August 9.

ADULTS OF BOTH SEXES.—Iris brown, edge of eyelids, cere, and gape orange; beak very dark bluish-gray; feet orange, claws black.

Comparison with three specimens from Portuguese Guinea shows that our series of specimens belongs largely to the northern race, *K. m.*

monogrammicus, with more lightly barred underparts and tibiae. Father Callewaert's specimens from Luluabourg (Kasai district), two from Lukolela, and three from the Semliki Valley more closely approach the southern form, *K. m. meridionalis* (Hartlaub).¹ The equatorial districts of the Belgian Congo are believed to mark the boundary between the two forms, but the variation in the barring of the tibiae is very considerable in the region of Avakubi and Medje, and in my synonymy it would be impossible to sort out the references to the two races.

DISTRIBUTION OF THE SPECIES.—From Senegal, the Bahr-el-Ghazal, Sennar, and Abyssinia south to Natal. Of the two subspecies, the southern *meridionalis* is supposed to range northward to northern Angola, the upper Congo River, Uganda, and Kenya Colony. Some specimens from the Ituri might be referred to it. There appears to be no record of the species in the highlands near Lake Kivu; but I have found it near Beni and the western base of Ruwenzori, up to an altitude of 4100 feet.

A rusty tip to the tail has been interpreted by Reichenow and by Sassi as a sign of age; but I should ascribe it rather to accidental staining. There is such a specimen in the American Museum from Kenya Colony.

The similarity between the adult plumage and that of the nestling bird is very remarkable. It has always seemed to me that *Kaupifalco* is most nearly allied to *Rupornis* of the American tropics. It also seems to be related to the buzzards (*Buteo*); and yet instead of being streaked, its first plumage differs only in being slightly darker gray above, somewhat browner on the chest, and in having the white bar that crosses the tail much less distinct on the outer webs of the rectrices. At this age, the iris is grayish brown, the bill black with chrome-yellow cere, the feet dull yellow shading to dusky brown on the front.

The "pendant goshawk," as it has sometimes been called, is a very good example of a bird that adapts itself both to forest and to plains environment. In the more open savannas, of the Uelle for example, it is found only where there are the most trees; in the equatorial forests, on the other hand, one meets it only about clearings. In the Ituri, it is a common bird; about Faradje and Garamba, less so. Usually a single bird is seen keeping silent watch from the branches of some dry tree, but taking no interest in the smaller birds. Neither do the latter evince any fear of the hawk, so that weavers and bulbuls will even alight in the same tree with it.

¹1860, Proc. Zool. Soc. London, p. 109 (Ambriz, Angola).

Its call is one of the characteristic sounds about Congo villages, and consists of a descending series of half a dozen notes, which Dr. Böhm wrote "klüh,klü-klü-klü-klü." These are remarkably musical for a bird of prey, and uttered with the head slightly raised while perching. So pleasant was this sound that for months I did not even suspect that it came from a hawk, and especially since a very different whining note was even more commonly uttered by *Kaupifalco*. Although occasionally circling like a *Buteo*, the flight is more commonly an alternation of flapping and gliding.

The breeding season would seem to extend throughout the year, yet more than half the specimens were shown by dissection not to be in breeding condition. Birds with enlarged sexual organs were taken in January, June, September, and December. An unfinished nest was found near Stanleyville, September 5, in a crotch between four branches of a tree standing in a clearing, fifty-five feet from the ground.

At Avakubi, a nest was reported on December 1 by Nekuma, and in February another was located in a tree overlooking the rubber plantations. Built in typical buzzard style, this flattish mass of dry sticks, a foot and a half across, was placed in a fork about forty-five feet up, and well hidden by the foliage. Its lining consisted solely of the green leaves which were continually being laid upon it by the parent birds, small stiff leaves of the tree in which it was situated, a *Cynometra*. Some pellets of hair lay upon it, and also a skull of a large lizard, *Agama*,—good indices of the birds' food.

The parent birds exhibited but little spirit, although one was observed in courageous pursuit of a marsh-harrier; and they never approached when we climbed to the nest. At first the two nestlings were clothed in white down. By February 20, one had a tail 6 cm. long. As they crouched on the nest, they were assailed by a swarm of small flies that crawled down between their feathers, sucked their blood, and then emerged with distended red bellies, flying off. On March 5, the second young bird was found sitting outside the nest, and was able to fly. At this age, it would utter the typical whining call of the species.

Three nests of *K. m. meridionalis* found by Sheppard¹ in the vicinity of Beira, Mozambique, were placed in forks of trees near the outskirts of woods, twenty to thirty feet up. The dates were between September 14 and November 16. The color of the eggs was either a dirty creamy-white with a few streaks and scrawls of rust-color at the smaller end only, or pale greenish-white with a few scrawls of blood-color around the larger

¹1910, Journ. S. Afr. Orn. Union, VI, p. 38.

end. One nest held only a single well-incubated egg, in the other cases, two were laid. An egg of *K. m. monogrammicus*, taken from the oviduct on March 27 by a friend of A. L. Butler¹ in the Anglo-Egyptian Sudan, was very light blue, unmarked, and measured 42.5×35.5 mm.

In the nine stomachs of which we noted the contents, no bird-remains were present. In five cases, there were rats; in three, large grasshoppers; and in two, lizards; one stomach held a mantis and two large winged termites. This parallels very closely von Heuglin's and Bates' statements as to their food. Böhm and Reichenow give reptiles as the principal prey, while Count Zech is said to have found fish-bones. In South Africa Marshall observed a special partiality for scorpions and centipedes, and once found a small viperine snake. In another case, he noted that the crop was crammed with large winged termites, proving that even *Kaupifalco*, given sufficient temptation, can become a "fly-catcher."

Bates has proposed the excellent name of "lizard buzzard" for this bird; and it is known to the Bangwana or Arabisés of the eastern Congo as "kabemba," a name readily extended to almost any other hawk. The Baluba of the Kasai district know it as "kabembé," using the same name for a number of other birds of prey. The Mangbetu name is "netendé."

KEY TO THE CONGO SPECIES OF *Buteo*

- 1.—Culmen from cere exceeding 25 mm., wing-length exceeding 390 mm. *B. rufofuscus*.
- 2.—Culmen from cere less than 25 mm., wing-length less than 390 mm. 2.
- 2.—Front of metatarsus bare for only 35 mm. or less; wing-length seldom exceeding 350 mm.; whole plumage virtually without rufous, tibiae barred with whitish and dark brown. *B. oreophilus*.
- Front of metatarsus bare for at least 40 mm.; wing-length (except in *auguralis*) exceeding 350 mm.; some part of plumage usually rufous (either rectrices or margins of feathers on back or chest), tibiae not barred, but more or less uniform white, buff, rufous-brown, or umber. 3.
- 3.—Abdomen and under tail-coverts buff or white, occasionally with a few umber spots; tibiae uniform whitish or light buff, only occasionally with a few umber spots or incomplete bars; rectrices of adult rich rufous with concealed white at bases and one or two dark subterminal bars. *B. auguralis*.
- Abdomen and under tail-coverts more thickly streaked or spotted with umber, if not mainly brown or rufous; tibiae dark brown or rufous-brown, with a little pale mottling at most; rectrices may be more or less rufous, but always bear indications of numerous dark bars. *B. vulpinus*.

¹Ibis, 1908, p. 253. See also Bucknill and Grönvold, 1910, Journ. S. Afr. Orn. Union, VI, p. 31, Pl. II, fig. 9.

***Buteo oreophilus* Hartert and Neumann**

Buteo oreophilus HARTERT and NEUMANN, 1914, Orn. Monatsber., p. 31 (type locality: Koritscha, near Abera in Djamdjam, S. Abyssinia. Also from forest W. of Tanganyika, 2000 m.; Kivu Volcanoes, 2700 m.; Rugege forest; foothills of Kivu Volcanoes, 6000-7000 ft.; Mubuku Valley on Ruwenzori). SASSI, 1916, Annalen K. K. Naturhist. Hofmus. Wien, XXX, p. 239 (forest W. of L. Tanganyika). SCLATER, 1919, Ibis, p. 254 (Ruwenzori); 1924, 'Syst. Avium Ethiop.,' part 1, p. 66 (Ruwenzori). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 286 (Mt. Muhavura, 3000 m.; Mt. Sabinyo, 2500 m.). SWANN, 1926, 'Monograph of the Birds of Prey,' part 4, p. 376 (Kivu Volcanoes). CHAPIN, 1928, Natural History, New York, XXVII (1927), p. 623 (W. Ruwenzori).

Buteo auguralis O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 442 (Mubuku Valley, 6000-7000 ft.). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 262 (Mubuku Valley).

Buteo desertorum SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 360 (forest W. of L. Tanganyika).

DESCRIPTION.—Above dark brown with little or no rufous admixture, but with a gray wash, light feather-margins, and hidden white barring, especially in scapulars. Below white, with large rounded spots of dark brown, which change to bars on flanks and tibiae. Tail, seen from above, dark brown with light tip and six or seven lighter bars of gray-brown. Ninth primary (second from outside) not more than 15 mm. longer than the fifth (sixth from outside). Wing, 330-372 mm.; tail, 176-195; culmen from cere, 20-24 mm.; metatarsus, 64-69.

DISTRIBUTION.—Mountains of central and northeastern Africa, including Kenia, Kilimanjaro, Elgon, and Ruwenzori, as well as the high forests northwest of Lake Tanganyika, and in the Kivu district. Possibly also as far south as the Transvaal.¹ Has been collected on the eastern side of Ruwenzori, in the Mubuku Valley, by the British Ruwenzori Expedition, and I have also secured it on the Congo side. It is also known from several localities within our limits in the Kivu district, where Grauer secured six specimens, in March and June. Count Gyldestolpe likewise collected two on the Kivu Volcanoes, in February, but found the species not at all abundant.

On the western slopes of Ruwenzori, we observed this buzzard from 6500 feet to about 14,900 feet, and on the central Kivu Volcanoes from about 7200 feet to 12,400. Not infrequently it was in pairs, and called "keer, keer, keer. . . ." in a mewing tone, or, less often, "kee-you, kee-you, kee-you . . .," almost exactly like *Buteo lineatus* in eastern North America. But a similar likeness could be claimed to the voice of *B. b. buteo* in Europe, and there may be good reason for regarding this as the resident race of the European species in equatorial Africa.

A large proportion of its food consists of chameleons. In the crops and stomachs of three individuals I have found the remains of nine small

¹See W. L. Sclater, 1919, Ibis, p. 255.

chameleons, one frog, one small shrew, two grasshoppers, and a large green beetle.

Dr. van Someren¹ has reported a nest at an altitude of 7000 feet on Mt. Elgon, March 27, containing two chalky white eggs with pale, indistinct blotches. From the oviduct of a female on west Ruwenzori, December 8, I took a broken egg which was white, with the faintest tinge of bluish green, but distinctly spotted with light rufous, especially at one end. The condition of the ovary showed clearly that two eggs in all would have been laid.

***Buteo vulpinus vulpinus* (Gloger)**

Falco vulpinus GLOGER, 1833, 'Abänd. Vög. durch Einfl. des Klima's,' p. 141 (type locality: Southeast Africa).

Buteo desertorum DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Tanganyika). JACKSON, 1906, Ibis, p. 512 (Ruwenzori). O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 442 (Mubuku Valley, 5000 ft.). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 263 (Kisenyi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 233 (Kivu).

Buteo buteo ruftwenter W. L. SCLATER, 1919, Ibis, p. 253 (Sudan to Cape Province).

?*Buteo* sp. SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 315 (Luebo).

Buteo vulpinus GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 69 (Ruwenzori; L. Kivu; W. of Tanganyika).

Avakubi, ♀, December 20; ♂ im., October 22.

Dungu, ♀, March 2.

ADULT FEMALE.—Iris dark brown or dull buff; cere and corners of mouth chrome-yellow; bill black, bluish gray at base; feet chrome-yellow.

IMMATURE MALE.—Iris light brown.

These three specimens differ markedly from each other, and yet I feel almost sure that they represent a single race. The adult female from Avakubi agrees closely with Jerdon's plate,² and has a tail of a dilute rufous, but with nine or ten narrow dark bars, often interrupted, the subterminal one widest. Wing, 373 mm.; tail, 190; bill from cere, 23; metatarsus, 75. We have an adult male from Southern Rhodesia (R. Douglas Collection) agreeing closely with this female in color, but smaller, wing 360.

The identification of the other two Congo specimens seems less certain. The adult female from Dungu is a much darker bird with very little rufous above, the tail is duller and browner though similar in pattern. Wing, 365 mm.; tail, 198; bill from cere, 23; metatarsus, 74. The immature male, from Avakubi, likewise has only a few rufous edgings

¹1922, Novit. Zool., XXIX, p. 42.

²1847, 'Ill. Indian Orn.,' Pl. xxvii.

on the scapulars and wing-coverts, and is creamy white on throat, breast, and abdomen, broadly streaked with umber, the flanks heavily blotched with the same dark brown, which covers nearly the whole outer surface of the "thighs," the tail gray with eight or nine dusky bars.

This last bird might be compared with the figure given by Erlanger,¹ which is referred to *Buteo oreophilus* by the describers of this African buzzard;² but it differs in its much darker flanks and thighs, besides being edged with slightly more rufous above, and is too large: wing, 355 mm.; tail, 198; bill from cere, 21; metatarsus, 74. It is certainly not *oreophilus*, and many possibly be *B. vulpinus intermedius*.

DISTRIBUTION OF *B. v. vulpinus*.—Southeastern Russia to the Altai Mountains and Issik Kul, also southwest to Asia Minor, Palestine, and Egypt. Winters in Arabia, India, and the Malay Peninsula, as well as in Africa, southward to the Cape Province. A duller brown, western subspecies, *Buteo v. intermedius* Menzbier,³ breeds from eastern Sweden through central Russia to Bulgaria, and is said to migrate to western India, Arabia, East Africa, and the Sudan.⁴ So this race, too, may reach the northeastern Congo.

Buteo vulpinus is nowhere common in the Congo, it would seem; and yet it comes not only to the savannas of the Uelle and eastern frontier, but even to clearings in the equatorial forest, at least in the east of the colony. I am sure that I never saw more than a half-dozen individuals, they were generally perched on trees or stumps; and neither their actions, nor their dates of occurrence, nor post-mortem examinations gave any suggestion that they might breed in the region. Nor were they ever seen during the period of northern summer.

In the crops and stomachs of three individuals, we found one rat, one large lizard (*Agama*), feathers of a small bird, and two grasshoppers.

Buteo auguralis Salvadori

Buteo auguralis SALVADORI, 1865, Atti Soc. Ital. Sci. Nat., Milan, VIII, p. 377 (type locality: Abyssinia). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Mayombe). CHAPIN, 1916, Amer. Mus. Journ., p. 543 (Uelle distr.). W. L. SCLATER, 1919, Ibis, p. 253 (Sudan to Sierra Leone, and Gaboon and Angola). SCLATER AND M.-PRAED, 1919, Ibis, p. 700 (Yambio). SCHOUTEDEN, 1926, Rev. Zool. Afr., XIII, p. 186 (Ganda Sudi; Makaia Ntete). SWANN, 1926, 'Monograph of Birds of Prey,' part 6, p. 388 (Gaboon; Angola). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 275 (Portuguese Congo).

Buteo augur MENEGAUX, 1918, Rev. Française Orn., V, p. 257 (Zambi).

¹1904, Journ. f. Orn., Pl. xi (lower fig.).

²Hartert and Neumann, 1914, Orn. Monatsber., p. 31.

³1888, 'Orn. Turkestan,' p. 197 (Russia).

⁴Stresemann, 1925, Journ. f. Orn., pp. 295-309.

Faradje, 2 ♂, March 11, April 12; 8 ♀, February 10, 11, March 3, 10, 11, 12, 19, April 3; 2 ♂ im., April 14, December 18; 3 ♂ juv., March 11, 12, April 12; ♀ juv., March 30.

Aba, ♀, December 22.

ADULT FEMALE.—Iris rather dark brown; bill black with a little bluish gray at base, cere yellow above, light green at sides; feet yellow, claws black.

DISTRIBUTION.—From Darfur and northern Abyssinia to the Uelle, Cameroon,¹ Togo, and Sierra Leone, also from Gaboon and the Lower Congo to Angola, but rare or wanting in the forested sections of the Cameroon and of the Congo basin. While occurring at Lukolela on the middle Congo River, it is not common there.

In the northeastern part of the upper Uelle district, this is the common species of *Buteo*, almost the only one; but we never noticed it as far southwest as Niangara; and even about Faradje and Garamba it was absent each year during most of the rainy season, from the latter part of April to the second half of November. In 1911, it reappeared only in this latter month, and in 1912, it was first noticed again on November 26.

I came to consider this red-tailed buzzard as a migrant from the Sudan, yet the captures there are far from abundant. Two records are cited by Sclater and Mackworth-Praed²: in Sennar during July and September; and Lynes³ records it from western Darfur in February, July, and October.

During their stay in the Uelle, these birds are to be seen perched upon the larger trees scattered over the savanna, or circling aloft as buzzards so frequently do everywhere, and uttering cries that recall faintly the red-shouldered hawk of North America or the common buzzard of Europe.

Our dissections, in addition to their actions, indicated that this was the breeding season—most of the large birds of prey nested during the period of drought. In March, the natives of Chief Maruka began bringing us the young, for the most part still covered with white down, which, when they are very young, is faintly washed with cinnamon on the wings, back and rump, with gray on the crown and around the eyes. The tips of the down-feathers are particularly long and silky over the whole crown. The eyes at this early age are dark gray, the feet greenish yellow.

The first of the two descriptions of young birds in Reichenow's 'Vögel Afrikas' applies well to the first definitive plumage following the down. This is characterized by the rufous edgings of the upperparts, and the rich, tawny color of breast, belly, and thighs, with scattered

¹Even recorded from Bitye in the forest. See Bannerman, 1921, *Ibis*, p. 105.

²1919, *Ibis*, p. 700.

³1925, *Ibis*, p. 408.

spots on mid-breast and flanks. The rectrices in a young male just assuming its first plumage are decidedly rufous, with three to four dusky bars, distally. Prof. Reichenow's suggestion in 'Vögel Afrikas' that Salvadori's plate¹ showed an immature bird is not borne out by our large series. Instead, it is certainly an adult, though somewhat bleached at the side of the head.

Though Erlanger² claimed that *Buteo anceps* Brehm was an earlier name for this same species, I cannot match his figures with any specimens in this considerable series, for none of my birds has rufous on its thighs, and no immature bird is so heavily spotted below. Yet neither of his specimens was adult, for they lacked the dark chest-patch, varying from reddish brown to chocolate. All our adults have the rectrices clear rufous with a single subterminal bar, and even the latter is obsolescent in two cases.

When the immature birds come back to the Uelle in their second year, they are much worn and whitish on the chest and abdomen. The rectrices are a bleached rufous shade, with several dark bars. The thighs are white.

NESTING.—In March, 1911, several nests containing young had been found in forks of the larger savanna trees in valleys. On January 26, 1912, I found one with eggs near one of our camps in the bush, sixteen miles northwest of Faradje. It was placed at a height of twenty-five feet, between four or five forking branches, in a *Kigelia*. This very common tree, bearing large, pendent, woody fruit, shaped like a "French loaf" of bread or a huge sausage, stood near the borders of a long marshy depression. The nest was bulky, only slightly concave above, and composed entirely of dry sticks, save for a lining of green leaves, such as hawks the world round are fond of adding. The two eggs were greenish white, unspotted, and undoubtedly constituted the full set. They measured 56.9×45 mm. and 58.5×47.3 . The old bird sat very close, and after being frightened off, came back and flew round uttering a call almost like that of *Buteo lineatus*.

Some yellow weavers (*Sitagra atrogularis*) had taken advantage of the protection the buzzards would offer, and on the smaller branches a yard or two higher up, they had hung from twelve to fifteen of their nests. The weavers had built after the buzzards, for while the latter's eggs were slightly incubated on January 26, all the weavers' nests were still empty, save one with a single light blue egg. A week later, the

¹1873, Annali Mus. Civ. Stor. Nat., Genova, IV, Pl. I.

²1904, Journ. f. Orn., p. 196, Pl. XI.

weavers had laid many eggs, two eggs in each set. This species, which frequently, but by no means always, builds near the nests of large birds of prey, differs from the great majority of the Ploceidae in choosing the drier months for its nesting.

The following season, on February 10, 1913, a native brought me a female of *Buteo auguralis* which he had trapped on the nest, and with her one of her eggs. This was dull whitish, with small, pale specks of rufous, and measured 57.2 mm. by 43.8 mm.

FOOD.—It is quite exceptional for this red-tailed buzzard to be attracted to grass fires, yet on one occasion in February I did note that one was capturing insects high in the air in the smoke of one of these fires. Its tastes, nevertheless, are very varied, as may be judged from examinations of crop and stomach made in eleven instances, which disclosed the following: five rats or mice (including one striped *Arvicanthis*), one small warbler (*Phylloscopus* sp.), scales of one lizard and of one snake, also one frog, three large winged termites, three large grasshoppers, other unidentified insects (in two stomachs), one large hairy caterpillar, and one fresh-water crab.

Buteo rufofuscus augur (Rüppell)

Falco (Buteo) augur RÜPPELL, 1836, 'Neue Wirbelthiere Fauna Abyss., Vögel,' p. 38, Pl. xvi (type locality: Abyssinia).

Buteo augur var. *nigra* SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 182 (Kibiro on L. Albert). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 184 (Kibiro). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 3, p. 287 (L. Albert).

Buteo augur O.-GRANT, 1908, Ibis, p. 315 (Mfumbiro volcanoes, 5000 ft.); 1910, Trans. Zool. Soc. London, XIX, p. 442 (Mubuku Valley, 6000 ft.). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 262 (L. Mohasi; Nyundo near Kisenyi; Kisenyi; Mt. Sabinyo; N. W. Ruanda). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 359 (Kisenyi; Rutshuru Plain). SALVADORI, 1914, Annuario Museo Zool. Napoli, IV, No. 10, p. 13 (Mt. in Kagera Valley). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 14 (Rutshuru; Kabaré). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 232 (Beni; Kivu; Kwidjwi; Kisenyi; Rutshuru; Kibati; Busuenda; Tsisilongo). BERLIOZ, 1921, Rev. Française Orn., VII, p. 7 (Kivu Volcanoes). GYLDESTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 285 (Tamohanga; Goma; Lulenga). PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 67 (upper Kafue R. near Ndola).

Buteo jakal augur W. L. SCLATER, 1919, Ibis, p. 251 (Plateau of central Africa).

Buteo augur augur SWANN, 1926, 'Monograph of Birds of Prey,' part 6, p. 385 (Equatorial and Central Africa).

DISTRIBUTION OF THE SPECIES.—Eastern and southern Africa, from Eritrea and British Somaliland to Damaraland and the Cape of Good

Hope. Three races are distinguished: typical *rufofuscus* south of the Limpopo River; *augur* from Southern Rhodesia through eastern Africa to Eritrea and Abyssinia; and *archeri*¹ in British Somaliland.

Within the limits of the Belgian Congo, *B. r. augur* is known from the savannas and highlands east of the equatorial forest, but not quite within the Katanga district, though certainly to be expected there. The supposed record from Zambi on the lower Congo River by Menegaux surely refers to *Buteo auguralis*.

Though avoiding the Uelle district, the augur buzzard is a common sight on the Lendu Plateau. We found it frequenting the grassy slopes below the mountain forest on the northeastern and southern flanks of Ruwenzori. The same was true in the Kivu district, but we did not observe the species on the western side of Ruwenzori, nor did it visit the more open alpine zones of these mountains, as it does on Mt. Kenia.

In eastern equatorial Africa, the augur buzzard is largely, if not exclusively, a bird of the open highlands, though it descends to 3000 feet in the Albertine Rift. Besides the common form with lower breast, abdomen, and tibiae white, there is a melanistic phase with most of the plumage black, save for the rufous tail and gray-and-white remiges. Melanistic birds are somewhat less numerous than white-bellied ones. Young birds exhibit the dark coloration as well as adults.

The voice is quite unlike that of *B. auguralis* or *B. oreophilus*, being a reiterated nasal "owng-owng-owng—. . .," or "k-hang, k-hang, k-hang, . . .," often given on the wing. The birds soar gracefully and buoyantly. Their food consists largely of rats, but includes lizards and, occasionally, small birds.

Van Someren² has described a nest as "a deep structure, composed of twigs, clumps of grass, and leaves, and lined with fresh green leaves. The clutch consists of two eggs of a creamy ground-color with large brown spots and blotches." The usual nesting site in East Africa is a fork near the top of a fair-sized thorn-tree. I have found occupied nests in the Kidong Valley, Kenya Colony, in June, one of the dry periods of the year.

SUBFAMILY *Accipitrinæ*

KEY TO THE CONGO SPECIES OF *Meliæraz*

- Wing exceeding 270 mm. in length, tail exceeding 200 mm. *M. metabates*.
 Wing less than 220 mm. long, tail less than 190 mm. *M. gabar*.

¹W. L. Selater, 1918, Bull. Brit. Orn. Club, XXXIX, p. 17 (Waghar, Somaliland).

²1916, Ibis, p. 223.

***Meliërax metabates metabates* Heuglin**

Melierax metabates HEUGLIN, 1861, *Ibis*, p. 72 (type locality: Upper White Nile, between 6° and 7° N. lat.).

Astur polyzonus SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 141 (Wadelai). EMIN, 1888, 'Emin Pasha in Central Africa,' p. 142 (Wadelai).

Melierax metabates metabates SCLATER AND M.-PRAED, 1919, *Ibis*, p. 701 (Yei).

Nzoro, ♂ im., April 11.

Faradje, ♂, March 11; 3 ♀, March 15, April 11, December 5; ♂ im., April 19; 3 ♀ im., February 3, April 12, November 22.

Garamba, ♂, July 5; 2 ♀, May 22, June 26.

ADULT MALE.—Iris brown; bill black, cere and base of mandible bright orange; feet orange-red, claws black.

ADULT FEMALE.—Iris brown, sometimes with an irregular whitish line near outer rim; bill black, cere, base of mandible, and feet bright orange-red; claws black.

IMMATURE MALE AND FEMALE.—Iris yellow with blackish outer edge; bill black with grayish base and brownish yellow cere and gape; feet dull orange, claws black. This change of color in the iris from yellow to brown with increasing age is unusual for a bird of prey.

Hartert (1914, 'Die Vögel der Paläarkt. Fauna,' II, p. 1164) says, "adult female like the male, only somewhat larger." From an examination of the adults of the present series, however, it is clear that there is a constant sexual difference in color, the males always having the general color of upper wing-coverts and secondaries much lighter, with far more extensive white vermiculation, the latter markings being almost obsolete in some of our females. These female birds thus approach *Meliërax m. mechowii* in color, and special account must be taken of sex in judging intergradation. Moreover, a male of *M. m. metabates* molting into the first adult plumage already shows the white vermiculation in its full development.

A color-plate especially designed to show the differences between the forms of *Meliërax* will be found in the *Journ. f. Orn.*, 1904, Pl. v. Erlanger and several later writers have reduced *metabates* and *mechowii* to subspecies of *M. musicus* (Daudin). For the present I shall consider *metabates* as a distinct species, with upper tail-coverts barred, whereas in *M. musicus musicus* of South Africa and *M. musicus poliopterus* of East Africa, they are wholly white.

DISTRIBUTION OF *Meliërax metabates*.—From Senegal to Eritrea and southern Arabia, also in western Morocco, East Africa, and from Angola to Mashonaland.

The typical subspecies ranges from Abyssinia and Gallaland across the southern Sudan and the northeastern edge of the Belgian Congo to Haussaland, the Gambia, Senegal, and even the districts about Mogador

in Morocco. Its range has been said to adjoin that of a desert form, *M. m. neumanni* Hartert¹ (with secondaries and wing-coverts more clearly barred with black and white), which extends from northern Nigeria across the northern Sudan to the Blue Nile and Red Sea Province. Admiral Lynes² questions the distinctness of *neumanni*. The birds of the Aden Protectorate have been separated as *M. m. ignoscens* Friedmann because of their small size, with maximum wing-length 305 mm. Though rare or lacking entirely in the Lake Region proper, *M. m. metabates* does extend south to East Africa, whence we have an adult female specimen from Njamusi River, Kenya Colony, collected by Lang, August 6; and another from the Mwanza District, Tanganyika Territory, taken by Loveridge in November. Reichenow also records it from Unyanyembe, east of Lake Tanganyika. If not merely a migrant in this latter region, it would come in contact with the southern race, *M. m. mechowii*, with which it probably intergrades.

The species is clearly an inhabitant of the savannas, and does not penetrate very far over the northern border of the Congo. We never found it in the vicinity of Niangara, nor to the southward, though it does extend to Dungu and Nzoro in the dry season, and was then rather common at Faradje, especially about the month of March. The earliest arrivals at the latter station, after the rainy periods of 1911 and 1912, were noted on November 22 and December 4, respectively, and in both years it disappeared in the latter part of April.

From the subspecific distribution, it is plain that these migrants must come from the north; and, indeed, in 1912 we found that their migration is not a very extensive one, since the species is found regularly in the rainy season at Garamba, just astride the Congo-Sudan border, only about eighty miles from Nzoro, which seemed the southern limit. Of the three adults collected at Garamba from May to July, none was in breeding condition; yet their season of reproduction must fall in the rains, for in the dry season at Faradje they were always in non-breeding condition. Lynes² reports this hawk as resident in Darfur, breeding in spring. A nest of sticks, twenty feet up in a tree, was lined with dry mud and camel dung. On May 6, it contained one pale blue-green egg, evidently the full clutch. Nehrkorn's measurement of an egg from Senegal is 55×41 mm.

In the Sudan at the beginning of the summer rains, Heuglin says that *Meliërax metabates* utters a remarkably prolonged, musical piping

¹1914, 'Vögel Paläarkt. Fauna,' II, p. 1165 (Merowe, Dongola).

²1925, *Ibis*, p. 410.

note, produced evidently with decided exertion. We did not hear this call in the Uelle district. There the adults, or the more numerous brown immature birds, would be seen perching in a rather erect posture on the outer limbs of the dwarfed trees in the dry savanna, ever on the lookout over the ground or tilled fields near them, perfectly quiet and not very wary, taking only the flights necessary to pounce upon their small prey. Occasionally they were noticed also on the rocks of granite hills where lizards are very numerous; one immature bird shot in such a place had its talons decidedly worn and blunted upon the stones, and had been eating lizards.

The contents of crop and stomach were noted for nine individuals, and comprised in all: nine lizards, with some of their eggs, one frog, three rats, two waxbills (*Estrildinæ*), two other small birds, and three large grasshoppers.

***Meliëraz metabates mechowii* Cabanis**

Meliëraz mechowii CABANIS, 1882, Journ. f. Orn., p. 229 (type locality: Malanje, Angola).

Meliëraz mechowii DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 265 (Elisabethville).

?*Ierax musicus* LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' p. 407 (Lower Congo).

Meliëraz musicus mechowii SWANN, 1923, Ibis, p. 609 (eastern Belgian Congo); 1925, 'Monograph of the Birds of Prey,' p. 170 (eastern Belgian Congo). PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 67 (upper Kafue R. near Ndola).

The American Museum has two adults (sex given as males) and one immature female from Southern Rhodesia (R. Douglas Collection). One of the adults shows a trace of white vermiculation on the outer webs of some of the secondaries, the upper greater tail-coverts are broadly tipped with white, and the lower tail-coverts also white-tipped. The second adult lacks these peculiarities. The immature specimen has the brownish upperparts, especially wings and tail, of a far more grayish cast than any of our young *metabates* from the northern Congo.

ADULT MALE.—Iris brown; bill black with reddish-orange cere and base; feet reddish orange (from Douglas' labels).

A female from Capelongo, southern Angola, is more heavily barred with gray below, especially on the tibiae, and the upper tail-coverts are gray with narrow bars, almost vermiculation, of whitish. No light vermiculation on upper surface of wing.

DISTRIBUTION.—Northern Damaraland and Angola, east to Mashonaland, and north to Unyamwezi in East Africa. Occurs in the Upper Katanga, where De Riemaecker has obtained it, although Neave and

Mouritz failed to observe it, and in Marungu. At Kasoko, in the latter district, Messrs. Rockefeller and Murphy collected an adult female on March 16.

Leach's reference to *Ierax musicus* from the Lower Congo cannot be accepted with any assurance for this form of *Meliëraz*, and may conceivably have been based upon *Kaupifalco monogrammicus*. Leach says that the "Acoli" of Levaillant, a bird resembling *Melierax musicus*, was taken by Cranch on the lower Congo. I am unable to identify it.

***Meliëraz gabar gabar* (Daudin)**

Falco gabar DAUDIN, 1800, 'Traité élémentaire et complet d'Ornithologie II, p. 87 (type locality: interior of South Africa).

Melierax gabar DE SOUSA, 1886, *Jorn. Sci. Lisboa*, XI, p. 77 (Tenke); 1886, in Capello and Ivens, 'De Angola a Contra-Costa,' II, p. 443 (Tenke). O.-GRANT, 1910, *Trans. Zool. Soc. London*, XIX, p. 443 (Mokia, S. E. Ruwenzori).

Micronisus gabar REICHENOW, 1901, 'Vögel Afrikas,' I, p. 565 (Tenke). SASSI, 1912, *Annalen K. K. Naturhist. Hofmus. Wien*, XXVI, p. 359 (Kasindi). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 232 (Baraka; Luvungi).

DISTRIBUTION OF THE SPECIES.—Senegal, Damergu, Darfur, Eritrea, and southern Arabia, South to Cape Province, but not in forests of western and central Africa. Dr. Hartert agrees with Kirke Swann that specimens from north of the forest belt and northern Abyssinia are paler than those from the remainder of the range—aside, of course, from the black individuals found throughout the entire range. The northern race must then be called *M. g. niger*.

Meliëraz g. gabar has been taken along the eastern border of the Congo from Kasindi to Baraka, as well as at Ntenkwe, near the Katanga border. It is not known from the Kasai, but as Hartert¹ mentions a black specimen from the Gaboon, it may occur in the Lower Congo.

This species is described as more fond of concealment in the foliage of trees than the larger chanting goshawks, but utters similar melodious whistles. The nest is made largely of fine twigs, and may be placed as high as fifty or sixty feet in a tree. The set is usually of three eggs, plain white, measuring about 40–45 mm. by 31.5–33.5.

[*Meliëraz gabar niger* (Bonnaterre and Vieillot)]

Sparvius niger BONNATERRE AND VIEILLOT, 1823, 'Tabl. Encycl. Méthod., Ornith.,' III, p. 1269 (type locality: Senegal).

Birds of this species have been taken in the vicinity of Lado by Emin, and at Meridi, in the southern Bahr-el-Ghazal, by Christy.²

¹1921, *Nov. Zool.*, XXVIII, p. 96; 1924, *idem.*, XXXI, p. 15.

²Sclater and M.-Praed, 1919, *Ibis*, p. 701.

They are possibly to be referred to the northern subspecies, which may thus be expected along the northern boundary of the Uelle district. While I looked for it there in vain, there is also a possibility that it will be found along the Congo border near Mahagi.

On the other hand, these specimens from Bahr-el-Ghazal and Bahr-el-Jebel may well belong to the typical southern race, for W. W. Bowen¹ now believes that the paler northern race must be restricted to the drier northern part of the Sudan. Friedmann, Bannerman, and Peters do not recognize its validity.

***Urotriorchis macrourus batesi* Swann**

Urotriorchis macrourus batesi SWANN, 1922, 'Synop. Accipitres,' 2nd Ed., p. 29 (type locality: Bitye, S. Cameroon); 1925, 'Monograph of the Birds of Prey,' p. 161 (Ituri district). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 73 (Portuguese Congo; Aruwimi and Ituri districts).

Urotriorchis macrurus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Banalia). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 232 ("Kivu").

Urotriorchis macrourus CHAPIN, 1921, Amer. Mus. Nov., No. 17, p. 15 (Avakubi).

Urotriorchis macrurus batesi SCHOUTEDEN, 1924, Bull. Cercle Zool. Congolais, I, p. 54 (vicinity of Bolobo); 1925, Rev. Zool. Afr., XIII, p. 4 (Kunungu).

Avakubi, ♀ im., November 7.

IMMATURE FEMALE.—Iris brown; beak dark bluish-gray, cere light green, corners of mouth yellow; feet grayish green, claws black.

This single immature specimen is still brown above, somewhat banded with buff on wings and scapulars, the long graduated tail barred broadly with blackish, the underparts whitish, heavily barred on the flanks with brownish black, and with large rounded spots on the breast. At the sides of the white throat there are dark streaks, and there is also a narrow, dusky median line. Wing 306 mm., tail 349. A few scattered feathers of a rich, uniform maroon show on breast and under wing-coverts.

DISTRIBUTION OF THE SPECIES.—Heavy forests of western and central Africa from the Gold Coast, Cameroon, and Gaboon, east to the Ituri River and Semliki Valley. Dubois reported it from Banalia on the Aruwimi River, and Sclater gives the range as extending south to the Portuguese Congo.

The individual mentioned above was seen to alight in some densely leaved rubber trees at the station of Avakubi. The only other example I have seen alive was an adult bird, sitting in a fair-sized tree overlooking dense second-growth near Maraünde in the Semliki Valley, on November 7, 1926. Its long graduated tail, with light-tipped quills,

¹1931, Proc. Acad. Nat. Sci. Phila., LXXXIII, p. 268.

gave the bird an extraordinary cuckoo-like appearance. In the southern Cameroon, Bates tells us,¹ the long-tailed hawk is mainly restricted to the forest, though it does also come to the neighborhood of villages, and may even attack poultry. Specimens shot there in July and August were breeding.

At Lukolela on the middle Congo, December 27, 1930, my black hunter secured a fine adult male in second-growth woods. Its wing measured 263 mm., tail, 335 mm. Iris scarlet. The stomach contained only some hair from a rodent.

Whether the separation of a Lower Guinea race, *batesi*, is justified or not, I am not in a position to decide. Swann claims that it is darker gray above, darker chestnut below, and has shorter wings and longer tail than *U. m. macrourus* (Hartlaub) of the Gold Coast.

KEY TO THE CONGO SPECIES OF *Astur*

Adults only

- 1.—Metatarsus less than 50 mm. long; median pair of rectrices always without any white, save at very tip. 2.
 Metatarsus more than 50 mm.; in the smallest species of this group (*castanilius*) the median rectrices have a few large spots of white on their inner webs. . . . 3.
- 2.—Upper breast uniform light rufous, or light rufous barred with white.
 A. badius sphenurus.
 Upper breast barred with gray or gray-brown and white. . . *A. badius polyzonoides*.
- 3.—Wing-length 190 mm. or less; sides of breast and tibiae rufous, middle of breast more or less barred with gray and white. *A. castanilius*.
- Wing-length more than 190 mm. 4.
- 4.—Outer side of tibiae black, as are crown, cheeks, and back; underparts largely white, coarsely barred at sides with black, or heavily blotched with black; wing of male at least 251 mm. long, of female at least 290. . . *A. melanoleucus*.
 Outer side of tibiae never black; crown and back slate-color to very dark brown; upper breast rufous, or white barred with gray or rufous; maximum wing-length 217 mm. for male, 265 for female. 5.
- 5.—Tibiae light gray or rufous without barring; middle of breast occasionally barred, but its sides uniform light rufous. *A. toussenelii*.
 Tibiae barred with gray and white, or with some rufous as well; middle of breast may be plain whitish or barred, but its sides are barred with gray or rufous, often washed with rufous as well, especially in males. *A. tachiro*.

Astur badius sphenurus (Rüppell)

Falco (Nisus) sphenurus RÜPPELL, 1836, 'Neue Wirbelthiere Fauna Abyss., Vögel,' p. 42 (type locality: Dahlak I., near Massaua, Red Sea).

Nisus sphenurus HARTLAUB, 1882, Abhandl. Naturwiss. Verein Bremen, VIII, p. 214 (Magungo).

¹1907, *Ibis*, p. 426.

Astur sphenurus SHARPE, 1884, Journ. Linn. Soc. London, Zoöl., XVII, p. 437 (Semio). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 557 (Sassa; Semio).

Scelopspizias sphenurus EMIN, 1894, Journ. f. Orn., p. 163 (Ndussuma).

Astur sphenurus sphenurus BANNERMAN, 1922, Rev. Zool. Afr., X, p. 174 (N. Belgian Congo?); 1923, Ibis, p. 742 (Congo region).

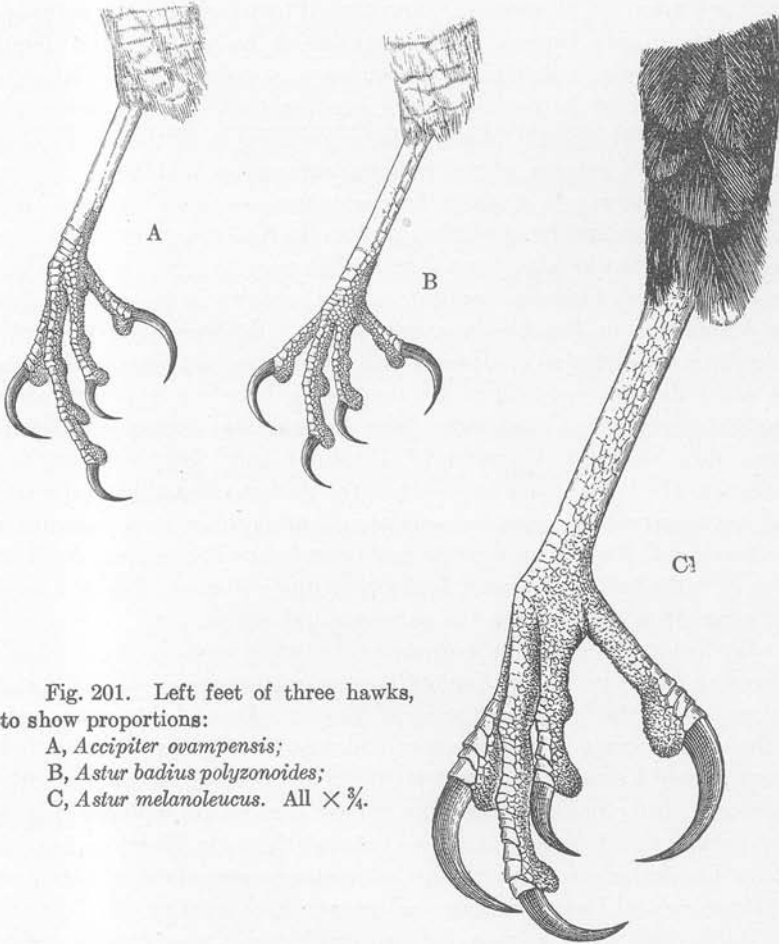


Fig. 201. Left feet of three hawks, to show proportions:

A, *Accipiter ovampensis*;

B, *Astur badius polyzonoides*;

C, *Astur melanoleucus*. All $\times \frac{3}{4}$.

Niagara, ♂, April 25; ♀, November 22.

Dungu, ♂ im., February 27.

Faradje, ♂, November 20; ♂ juv., March 22.

Aba, ♂ im., December 19.

Garamba, ♂, July 10.

ADULT MALE.—Iris orange-red to deep orange; cere lemon-yellow, rim of eyelids yellow; bill black, with a little blue-gray at sides; feet deep yellow, claws black.

ADULT FEMALE.—Iris orange-red; bill black with bluish base, cere yellow; feet yellow, claws black.

YOUNG MALE.—Iris grayish green.

DISTRIBUTION OF THE SPECIES.—Most recent writers treat *Astur sphenurus* as an African race of *A. badius* (Gmelin), the type locality of which is Ceylon. The species is represented by nearly related subspecies from Hainan and Burma through India to Baluchistan and Persia. Since Reichenow¹ states that *sphenurus* was collected in Arabia, its range may almost be considered as meeting that of the Indian *A. b. dussumieri*. The juvenal plumage is very similar in all these forms, and likewise in *A. b. polyzonoides* of eastern and southern Africa.

Within the range of *Astur badius sphenurus*, which extends from Northeast Africa and Kenya Colony across the Sudan to Senegambia, two nearly related hawks have been described in recent years: *A. riggenbachi* Neumann,² from Gassam, Senegal; and *A. sphenurus obscurior* Reichenow,³ from Bosum, French Equatorial Africa. Both agree in the darker, more slaty upperside as compared with *sphenurus*, yet they are of much the same dimensions. Since Reichenow in his description mentions "typical specimens of the species from Senegambia, Portuguese Guinea, Togo, and Northern Cameroon," I cannot help feeling—even after examining the type of *obscurior*—that the darker coloration in question does not represent geographic variation, but perhaps only abrasion of the feathers. One of our adult male specimens (Niagara, April 25) being in rather worn plumage, looks very much darker on crown, back, and wings than others from the same general region.

We found *Astur badius sphenurus* occurring regularly in the Uelle; at least as far south as the Gada River near Niagara, but it certainly does not reach the forests of the Ituri district. Around the eastern edge of the Ituri Forest it extends south along the western shore of Lake Albert, where I have collected it at Kasenyi. Dubois,⁴ indeed, reported a specimen from Lake Tanganyika, where it must be replaced, for the most part, by *A. b. polyzonoides*. I doubt this identification, but Mr. Arthur Loveridge informs me that he has taken specimens of *sphenurus* at Morogoro and Dar-es-Salaam in Tanganyika Territory.

In the region of Niagara, Dungu, and Faradje, we noted the species only from November to late April, and suspected that it might be a dry-season migrant from the Sudan. At Garamba, however, it is found in the rains; and its case is not exactly comparable to that of *Meliæra meta-*

¹1901, 'Vögel Afrikas,' I, p. 557.

²1908, Bull. Brit. Orn. Club, XXI, p. 69.

³1916, Journ. f. Orn., p. 161.

⁴1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 26.

bates, since it nests here along the southern limit of its range during the dry season. This was proved by post-mortem examinations as well as by a nestling with tail half-grown, which a native brought in in March.

In life, *Astur b. sphenurus* has almost the appearance and habits of a small *Accipiter*, except that the tail of the former is more rounded, and the wing-tips longer, with a visible effect on the flight, and that it is more apt to perch on exposed, even dead, branches of trees.

In such a situation, I have watched one being vigorously scolded by a sunbird, not without reason, for of the five examples whose crops and stomachs contained food, three had eaten small birds (one identifiable as a weaver). In two cases, however, the stomach contained only the remains of a mouse; one had eaten a lizard, and another, caught in a trap baited with live winged termites, had already swallowed a few of these insects so pleasing to birds.

***Astur badius polyzonoides* (Smith)**

Accipiter polyzonoides A. SMITH, 1838, 'Ill. Zool. S. Afr. Aves,' Pl. XI (type locality: South Africa, north of 26° S. lat.).

?*Astur sphænur* JOHNSTON, 1884, 'The River Congo,' p. 357 (Congo R.).

?*Astur sphenurus* DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Tanganyika).

Astur polyzonoides REICHENOW, 1901, 'Vögel Afrikas,' I, p. 556 (Tanganyika). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Stanley Pool). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Baraka). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 264 (Elisabethville).

ADULT MALE.—Iris orange; bill grayish black with yellow base; feet yellow (from label of specimen in R. Douglas Collection, Southern Rhodesia, March 20, 1908).

DISTRIBUTION.—Replaces *A. badius sphenurus* in the southern savannas, and is found from the Zanzibar Coast across to the Lower Congo, and southward to the Orange River. Within our limits, it is known from the region of Lake Tanganyika; and Dubois recorded it from Stanley Pool, so it is to be expected all across the southern Kasai region, and in the Katanga. In the Congo Museum, I saw immature specimens from Kisantu and Baraka, and adults from Baraka and from Baaba in the Kwango district. Rockefeller and Murphy obtained an adult female at Mukuli, Marungu, on May 7, 1929.

While immature examples of *polyzonoides* and *sphenurus* look very much alike, I have not noticed any tendency toward intergradation between the adults.

The nest of *Astur b. polyzonoides* is built of sticks, and placed in the fork of a small tree. The set consists of three or four eggs, dull white with

variable blotches of Vandyke-brown, and underlying markings of lilac-gray. Size about 38×30 mm.¹

***Astur castanilius* (Bonaparte)**

Accipiter castanilius BONAPARTE, 1853, Rev. Mag. Zool. Paris, p. 578 (type locality: erroneously given as South America; corrected by Gurney² to Gaboon). STRESEMANN, 1923, Journ. f. Orn., p. 524 (Landana); 1924, Orn. Monatsber., p. 6 (Angu; Beni); 1926, idem, p. 73 (Beni). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 289 (Landana; Angu; Ituri R.).

?*Astur macroscelides* EMIN, 1894, Journ. f. Orn., p. 166 (Irumu).

Astur tachiro var. *castanilia* DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 26 (in part. Ituri).

Accipiter beniensis LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 13 (Beni). SWANN, 1920, 'Synop. List Accipitres,' 1st Ed., p. 115 (E. Congo).

Accipiter erythropus SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Lesse).

Astur castanilius CHAPIN, 1921, Amer. Mus. Novitates, No. 17, p. 15 (Gamangui; Medje). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 70 (Portuguese Congo; Ituri district); 1930, idem, Appendix, p. 840 (Beni). SWANN, 1925, 'Monograph of the Birds of Prey,' p. 210 (Ituri district).

Accipiter sharpei beniensis SWANN, 1922, 'Synop. Accipitres,' 2nd Ed., p. 60 (E. Congo).

Accipiter minullus beniensis STRESEMANN, 1923, Journ. f. Orn., p. 520 (Beni).

Astur castanilius ?beniensis GYLDENSTOLPE, 1926, Archiv. f. Zool., XIX A, No. 1, p. 88 (Beni).

Gamangui, ♂, February 15.

Medje, 2 ♀ im., March 27, October 5.

ADULT MALE.—Iris red, eyelids and lores yellow; cere yellowish green, beak bluish black; feet yellow, claws black.

IMMATURE FEMALE.—Iris brown, other soft parts much as in adult male.

DISTRIBUTION.—Forests of Lower Guinea, from southern Cameroon and Portuguese Congo east to the Semliki Valley. Great confusion resulted from Professor Reichenow's use of the name *castanilius* for the representative of *Astur toussenelii* (with barred breast) in Upper Guinea and part of Cameroon. This explains also how Lönnberg came to re-name the species *beniensis*.

Our adult male has been compared with a series of eight specimens in the British Museum all more or less adult; and I have examined a male from Lesse, Semliki Valley and an adult female from Poko, Uelle district, in the Congo Museum, as well as a bird of each sex from Cameroon in the Museum of Comparative Zoölogy. Recently I have collected another adult male at Lukolela on the middle Congo River. My measurements for the species are: wing, ♂ 152–167 mm., ♀ 172–190;

¹Stark and Sclater 1903 'Birds of S. Afr.,' III, p. 359.

²1875, Ibis, p. 363.

tail ♂ 135-140, ♀ 158-169; culmen from cere, ♂ 12-14, ♀ 15-16; metatarsus, ♂ 51.5-55, ♀ 56-59. This small hawk has very much the appearance of an *Accipiter*, and the middle toe is decidedly long and slender. Yet the tip of the inner claw does reach beyond the base of the median claw, so that if this character is used the species belongs in *Astur*.

Of the several specimens reported by Dubois as *A. tachiro* var. *castanilia*, only that from "Ituri" seems to be really *castanilius*. It is a young female from Banalia, obtained by Nahan. I have found no difference between birds from the western and the eastern parts of the range, such as might give subspecific value to the name *beniensis*.

This hawk is to be expected anywhere in the heavy lowland forest of the Congo, but, in my experience, is very seldom seen. It keeps amid the dense vegetation—sometimes in second-growth—and is only secured by luck when one happens to alight near the hunter.

Two of our specimens had empty stomachs, and the adult male from Gamangui had only eaten some large insects. The male from Lukolela had killed a lizard and a small bird. Birds must often be included in the diet, and Bates¹ has told of one which was taken in a snare and then devoured by this hawk.

***Astur toussenelii toussenelii* (Verreaux and Des Murs)**

Nisus toussenelii VERREAUX AND DES MURS, 1855, Journ. f. Orn., p. 101 (type locality: Gaboon).

?*Astur tachiro* var. *castanilia* DUBOIS, 1905, Annales Mus. Congo Belge, Zoologie, I, fasc. 1, p. 26 (in part. Stanley Pool; Mayombe).

Astur toussenelii toussenelii SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 387 (Kwamouth). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 70 (Portuguese Congo).

Accipiter tachiro toussenelii STRESEMANN, 1923, Journ. f. Orn., p. 524 (Landana; Chinchoxo).

Astur tousseneli tousseneli SCHOUTEDEN, 1926, Rev. Zool. Afr., XIII, p. 186 (Ganda Sundi).

DISTRIBUTION OF THE SPECIES.—Forests of Upper and Lower Guinea, from Casamance and Sierra Leone to southern Cameroon, Fernando Po, Portuguese Congo, and eastward to the Uelle and Ituri districts. I would recognize four races: *A. t. macroscelides* Hartlaub, of Upper Guinea and western Cameroon, with barred breast; *A. t. lopezi* Alexander, of Fernando Po, dark rufous beneath; *A. t. toussenelii* of southern Cameroon, Gaboon, and Lower Congo, with breast and tibiae nearly uniform rufous; and *A. t. canescens* of the Upper Congo, paler and with tibiae almost entirely gray.

¹1911, Ibis, p. 493.

It has often been supposed that these forms are conspecific with *Astur tachiro* (Daudin), and the resemblance between *A. toussenelii macroscelides* and *A. tachiro unduliventer* (Rüppell) of Abyssinia cannot be denied. Neither in the Uelle nor in the Kasai, however, is there any indication of intergradation between the representatives of *A. toussenelii* and *A. tachiro*.

Besides the type and a male from Landana in the British Museum, I have seen an adult female of *A. t. toussenelii* from Chinchoxo in the Berlin Museum, and another from the Fernand Vaz district in the U. S. National Museum. This form occurs in the Mayombe forest, and has been reported from Kwamouth by Schouteden.

***Astur toussenelii canescens* Chapin**

Astur toussenelii canescens CHAPIN, 1921, Amer. Mus. Novitates, No. 7, p. 1 (type locality: Medje, Ituri district).

Astur tachiro var. *castanilia* DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 26 (in part. Umangi).

Astur toussenelii canescens W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 71 (Ituri and Uelle districts). SWANN, 1925, 'Monograph of the Birds of Prey,' p. 209 (Ituri; Avakubi; Medje; Uelle; Niangara).

Accipiter tachiro toussenelii BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 288 (Ituri district).

Lukolela, ♀ im., July 18.

Avakubi, ♂, January 20; ♀ sub-adult, June 4; 3 ♀ im., January 12, May 12, 30.

Medje, ♀, June 28 (type).

Niangara, ♀ im., December 1.

ADULT MALE.—Iris bright reddish-orange; eyelids, lores, and cere yellow; bill black, blue-gray at base; feet cadmium-yellow, claws black.

ADULT FEMALE.—Iris bright orange, soft parts otherwise as in male.

IMMATURE FEMALE.—Iris yellow.

This eastern race of *Astur toussenelii* is characterized by its paler coloration, especially of the "thighs," which are pale gray, sometimes with a faint trace of pale rufous. Of course, young birds cannot be distinguished from those of the western form. As distinguished from the young of *Astur castanilius*, however, those of *A. toussenelii* are much whiter below, the whole throat and middle of breast being completely unmarked, and the dusky bars of the flanks may, or may not, extend to the tibiae. Not infrequently a telltale ruddy feather appears on the breast, as in *castanilius*, and our sub-adult female has nearly completed the molt to the first adult plumage. In one immature female, the black bands on the rectrices (all but the outermost), normally transverse, have become markedly oblique, some even forming large V's.

DISTRIBUTION.—*Astur t. canescens* inhabits the forests of the Upper Congo, and probably reaches eastern Cameroon. In the British Museum there is an immature female from the Gurba River, Uelle district (Alexander), and a fine adult female from Bompona in the Lulonga district (Rev. H. M. Whiteside). The Congo Museum has an adult male from Poko, Uelle district (Dr. C. Christy), and an immature specimen from Banalia. In 1930 I collected an adult male and female at Lukolela. The male has the gray tibiae of *canescens*, but those of the female are more rufous than in females from the Ituri. Along the middle Congo River *canescens* and *toussenelii* may be expected to intergrade, but I should expect *canescens* to occur in the forest-patches of the northern Kasai, near Luebo and Basongo.

It is one of the typical sylvan birds of prey, seldom appearing even in the clearings made by man. I shot my first adult specimen after it flew by me and alighted well up in a tree in the densest kind of forest along a brook. On another occasion, one was found perching on a shaded bough projecting out over the bank of the Ituri, and a snap-shot brought it down as it tried to dart back into cover. Still another attempted to cross a narrow wooded part of the same stream, as I was passing in a canoe.

On an old rotten log in the forest, near Avakubi, Nekuma once found the body of a long-tailed hornbill (*Tropicranus a. cassini*), an adult male, with nearly all its feathers plucked and lying about, and a hole torn in its breast. After a very long wait, its assailant, proving to be one of these hawks, came back and was shot. I was offered a fully adult specimen in December, 1910, at Okondo's village, near Niangara. A well-meaning Mangbetu had trapped it, and pulled out all the quills for personal millinery purposes, expecting then to sell the bird to me; but, in a burst of malarial ill-nature at his stupidity, I threw his bird in his face—only to regret it later.

No nest ever came to our notice, and examination of the reproductive organs furnished little information as to a possible nesting season. None of the immature birds showed any sexual activity. Of the two fully adult birds, the male (January) had rather large gonads; the female (June) slightly less so. It would seem that the white-breasted plumage of young birds is not worn much over one year, after which the complete adult plumage, including wings and tail, is assumed at a single molt.

Examination of six specimens after death showed that, in addition to the hornbill mentioned above, they had eaten (one mouse, one unidentified mammal (only hair left), one other bird (only feathers found),

a lizard, and three frogs (one of them clearly a large tree-frog, with broad toe-discs, another a ground-living *Rana*, of the long-legged, "ribbed-back" group, containing *R. madagascariensis*).

***Astur tachiro sparsimfasciatus* Reichenow**

Astur sparsimfasciatus REICHENOW, 1895, Orn. Monatsber., p. 97 (type locality: Zanzibar).

Astur tachiro nyansæ NEUMANN, 1902, Orn. Monatsber., p. 138 (Fort Portal).

?*Astur tachiro* var. *castanilia* DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (in part. Tanganyika).

Astur tachiro SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Goma).

Astur tachira benguellensis SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 314 (Ngombe in Kasai; Tshikapa).

Faradje, ♀ im., October 8.

Aba, ♀, December 17.

ADULT FEMALE.—Iris bright yellow; orbit yellow, cere green; bill black with bluish base; feet yellow, claws black.

IMMATURE FEMALE.—Iris greenish gray.

DISTRIBUTION OF THE SPECIES.—Southern, eastern, and northeast Africa, from Cape Province north to the Kasai district, Uganda, Kenya Colony, northeast Uelle district, and Abyssinia. Despite numerous attempts at subdivision, it is unlikely that more than three races are to be distinguished: *A. t. tachiro* (Daudin), Cape Province to eastern Transvaal; *A. t. sparsimfasciatus*, southern Angola and Mashonaland north to southern and eastern Congo (outside heavy forests), Uganda, and Kenya Colony; *A. t. unduliventer* (Rüppell), Shoa and Abyssinia.

I have examined the types of *sparsimfasciatus*, *nyansæ*, *aceletus*,¹ *orienticola*,² and *tenebrosus*,³ as well as birds from Angola which might be referable to *benguellensis*.⁴ The differences in size and coloration depending on sex are very important. Females have much less rufous on flanks and tibiae, or often none at all. My measurements of 23 adults of *sparsimfasciatus* are: wing, ♂ 201–217 mm., ♀ 242–265; tail, ♂ 162–185, ♀ 204–225; culmen from cere, ♂ 15–17.5, ♀ 18–25; metatarsus, ♂ 59–66, ♀ 64–73; hind claw (above) ♂ 16–20 mm., ♀ 21–26.5.

The differences between *sparsimfasciatus* and typical *tachiro* are not very great. There is less rufous on the flanks in *sparsimfasciatus*, especially in females; and typical *tachiro* may average slightly smaller, as indicated by the following measurements of six adults: wing, ♂ 208–209 mm., ♀ 235–252; tail, ♂ 164–167, ♀ 190–213; culmen from cere,

¹Oberholser, 1905, Proc. U. S. Nat. Mus., XXVIII, p. 829 (Taveta, E. Afr.).

²Oberholser, 1906, Annals Carnegie Mus., III, p. 495 (Mombasa).

³Lönnerberg, 1917, Arkiv. f. Zool., XI, No. 5, p. 2 (Londiani, Kenya Col.).

⁴Swann, 1922, 'Synop. Accipitres,' 2nd Ed., p. 34 (Kabisombo R., Benguela).

♂ 15.5–16.2, ♀ 18.5–20; metatarsus, ♂ 61–62, ♀ 66–71; hind-claw (above), ♂ 18.8–19, ♀ 25–26.5.

Astur tachiro unduliventer (Rüppell) of Abyssinia and Shoa is more heavily barred with rufous below than either of the foregoing. Immature birds of all three races of *tachiro* are more spotted or streaked on the breast than those of *toussenelii* (from the Congo, at least). Our young female of *sparsimfasciatus* from Faradje is almost like a large edition of the young of *Astur castanilius*, with a blackish median stripe on the throat, but lacking the large rounded spots on the middle of the breast, which is, nevertheless, boldly streaked at the sides.

Our specimens of *A. t. sparsimfasciatus* came from patches of trees in the uplands, but these hawks are not common in the Uelle district. One of them had just eaten a thrush. Father Callewaert has sent us three skins from Luluabourg, including an adult male and adult female. In Kenya Colony, this hawk is often found in mountain forests at 5,000 and 6,000 feet, and I have recently collected it at 6900 feet on the western slope of Ruwenzori.

In South Africa, *Astur t. tachiro* is known to build a stick nest in thick-foliaged trees, lining it with green leaves, and laying two creamy-white eggs. These measure 45.7–46.7 mm. by 36.3–39.4.

***Astur melanoleucus* (Smith)**

Accipiter melanoleucus A. SMITH, 1830, S. Afr. Quarterly Journ., I, part 3, p. 229 (type locality: Baviana's River, Cape Colony). O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 443 (Mubuku Valley, 6000 ft.).

Astur melanoleucus LÖNNBERG, 1907, Arkiv. f. Zool., III, No. 21, p. 3 (Mukimbungu). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr., Exp. Mecklenburg,' III, p. 261 (Mubuku Valley). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Nya-Lukemba; "Sibatwa forest").

Medje, ♂ juv., ♀ juv., August 26.

These are two half-grown nestlings, brown, edged with rufous-tawny above, below light buff and whitish streaked with brownish black on the breast, and more or less spotted on flanks and thighs. The throat has a single median stripe. The claw of the inner toe extends beyond the base of the middle claw, so the species is to be referred to the genus *Astur*, if recognized.

Kleinschmidt regards this hawk as the Ethiopian race of the goshawk (*A. gentilis*), and there is certainly a marked resemblance in the plumage of the young. In addition to the widely different adult plumage of *melanoleucus*, however, its metatarsus and toes are relatively much longer and thinner, so that Ogilvie-Grant, Kirke Swann, and W. L. Slater even separate it generically from the goshawk.

DISTRIBUTION.—From Senegal and the Gold Coast, Sennar, and Shoa, south to Cape Province; nowhere abundant, it would seem, yet found even in the forests of the southern Cameroon, and, as it now appears, in the forests of the Nepoko drainage. Stresemann¹ has shown that specimens from Upper Guinea and Cameroon have slightly shorter wings (♂ 251–273, ♀ 290–308 mm.) than those of Abyssinia, Uganda, and southern Africa (♂ 267–298, ♀ 309–347 mm.). The former are thus to be known as *A. m. temminckii* Hartlaub. It is to be expected that Congo specimens will often exhibit intermediate dimensions, and certainly exact limits cannot be fixed at present between the ranges of the two forms. A male from Nya Lukemba on Lake Kivu in the Congo Museum has wings 275 mm. long, and may thus be referred to the typical race.

The record from "Sibatwa forest" seems to be based on a misidentification, so scarcely five specimens are known from the whole Congo. Several times, on the mountains of the eastern Congo, and at Lukolela as well, I have seen hawks apparently of this species, but they were always so quick as to elude me.

Our two young birds, together with the nest in which they had been hatched, were brought to us alive by some Medje people. The nest was about 56 cm. in diameter, and composed principally of old dry pieces of creepers, and had been placed, they said, on a horizontal branch of a high tree. A good native hunter carrying the young birds in a basket was dispatched to secure their parents. In this he failed, though he saw at least one, and described it as black.

KEY TO THE CONGO SPECIES OF *Accipiter*

Adults only

- 1.—Wing-length exceeding 183 mm. 2.
 Wing-length less than 183 mm. 3.
- 2.—Breast thickly barred with dark gray and white, without rufous; median pair of rectrices with three or four whitish spots in the mid-line, along shaft.
 A. ovampensis.
 Breast not regularly barred with gray and white, but often uniform light rufous; or, if rufous-and-white more or less mottled and barred, then feathers of upper breast have narrow dark shaft-streaks; no whitish spots on median rectrices. *A. rufiventris*.
- 3.—Breast light rufous at sides, often grayer in middle, not barred, or at most only faintly barred with gray and white in mid-line. *A. erythropus*.
 Breast and tibiae regularly and distinctly barred with dusky brown on a whitish ground, the dark bars often edged with rufous, and a wash of rufous at sides of breast. *A. minullus*.

¹1924, Orn. Monatsber., p. 86.

***Accipiter ovampensis* Gurney**

Accipiter ovampensis GURNEY, 1875, Ibis, p. 367, Pl. vi (type locality: R. Okavango and Elephant's Vley, in Ovampo Land). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 26 (Tanganyika). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 359 (Moera). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 264 (Elisabethville).

?*Accipiter nisus* DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Garamba, ♂, July 21.

Iris bright brown; cere and base of mandible bright yellow, bill black with a little light gray posteriorly; feet orange, claws dusky.

The present specimen agrees very well with Gurney's original description and plate, though slightly smaller than the specimen he took for an adult male, and measures: wing, 213 mm.; tail, 149; culmen from cere, 12; metatarsus, 45. The general resemblance of this hawk to *Astur badius polyzonoides* has often been remarked. Its much longer middle toe, square tail, and clearer gray barring below render specimens easily distinguishable.

DISTRIBUTION.—From northern Gold Coast Colony and Abyssinia south to Ovampo Land and eastern Transvaal, but not in the forests of western and central Africa. In addition to the published records, there are two specimens in the Congo Museum, from the northern shore of Lake Kivu (Derche) and Kimbundji in western Katanga (Baillet-Latour). Storms' specimen from "Lake Tanganyika" may have come from the vicinity of Mpala. I cannot suppress a doubt as to the identification of the young specimen reported by Sasai from Moera. This village is surrounded by forest, whereas *ovampensis* is distinctly a savanna bird.

From Gallaland two specimens of a blackish hawk are known. This hawk was named *Accipiter hilgerti* Erlanger. Dr. Stresemann¹ has shown that these are melanistic examples of *A. ovampensis*. Such black mutants of this species have been found in no other part of Africa.

We saw the Ovampo sparrow-hawk only once, on the very border of the Uelle district. This bird was perched on a rather small tree in a native farm.

***Accipiter erythropus zenkeri* Reichenow**

Accipiter zenkeri REICHENOW, 1894, Orn. Monatsber., p. 125 (type locality: Yaunde, Cameroon).

?*Accipiter minullus* OUSTALET, 1893, Naturaliste, VII, p. 60 (no exact locality).

Accipiter erythropus SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 359 (Beni).

¹1924, Journ. f. Orn., p. 85.

Accipiter sharpei SWANN, 1920, 'Synop. List Accipitres,' p. 36 (W. Africa, Cameroon to Benguela). CHAPIN, 1921, Amer. Mus. Novitates, No. 17, p. 15 (Bengamisa; Banalia; Bafwasende; Avakubi).

Accipiter hartlaubi sharpei W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 68 (Avakubi). SWANN, 1926, 'Monograph of Birds of Prey,' part 5, p. 301 (Cameroon to Benguela).

Accipiter minullus sassii STRESEMANN, 1924, Orn. Monatsber., p. 109 (Beni). SCLATER, 1930, 'Systema Avium Æthiop.,' Appendix, p. 838 (E. Belgian Congo).

Accipiter hartlaubi beniensis SWANN, 1926, 'Monograph of Birds of Prey,' part 5, p. 302 (Ituri Forest).

Accipiter minullus zenkeri SCLATER, 1930, Appendix, p. 839 (Congo forest E. to Avakubi). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 281 (Congo forest).

Bengamisa, ♂, September 27.

Banalia, ♂, September 23, ♂ im., September 25.

Bafwasende, ♀ im., September 23.

Avakubi, ♂, February 8.

ADULT MALE.—Iris bright orange-red to bright scarlet; rim of eyelids and corners of mouth orange, cere yellow; bill black; feet cadmium-yellow, claws black.

IMMATURE MALE.—Iris yellowish green, eyelids, etc., duller

IMMATURE FEMALE.—Iris yellow.

DISTRIBUTION OF THE SPECIES.—Forests of Upper and Lower Guinea, from the Casamance River to Togo, and from Cameroon and Gaboon east to the Semliki Valley. Once reported by Bocage¹ from Quibula in Benguela.

Accipiter e. erythropus (Hartlaub)² inhabits Upper Guinea; *A. e. zenkeri* Lower Guinea, unless it proves necessary to recognize *A. e. sassii* Stresemann for the eastern Congo forest. All three of these names were based on immature specimens, of very different appearance from adults. Of the names proposed later for adult specimens, *Nisus hartlaubi* Verreaux is synonymous with *erythropus*; *Accipiter sharpei* Reichenow and *A. batesi* Sharpe with *zenkeri*. Young birds from the eastern Congo are certainly less heavily marked with black on the breast than those of the Cameroon; but as I can see no difference between adults, I prefer not to separate them subspecifically.

Typical *erythropus* when adult differs from *zenkeri* in being paler on the underparts, less rufous at sides of breast; and all the specimens of *erythropus* of both sexes in the British Museum lack white spots on the middle pair of rectrices.

I do not regard these small hawks as belonging to the species *A. minullus* (Daudin), for I have seen no intermediate specimens among adults, and the immature plumages are unusually distinct. This case parallels that of *Astur toussenelii* and *tachiro*.

¹1892, Journ. Sci. Lisboa, (2) II, No. 7, p. 158; idem, No. 8, p. 249.

²1855, Journ. f. Orn., p. 354 (Rio Boutry, Gold Coast).

The measurements of our three adult males of *zenkeri* are: wing, 153–156 mm.; tail, 112–115; culmen from cere, 10.2–11.3; metatarsus 41.5–43. The immature male has the wing 146 mm. long, the immature female 169. An adult female from Cameroon (type of *batesi*) was described as having the wing 180 mm., tail 132.

Along the Aruwimi, Lindi, and Ituri rivers we saw these small hawks only occasionally, and but few of them offered a chance for a shot. They made their appearance more often about the second growth bordering roads and clearings than in the absolutely virgin forest, and were active in the early morning or very late in the afternoon, even at sunset, when we saw one (at Banalia) hotly pursuing a tiny bird.

None of the three adult males had the gonads even moderately enlarged; that of September 27 only slightly; and the others not at all. On September 25, however, the immature male had not been out of the nest very many days.

The digestive organs of four individuals were opened, their evidence consisting of three small birds, and insect-remains in two of the stomachs.

***Accipiter minullus intermedius* Erlanger**

Accipiter minullus intermedius ERLANGER, 1904, Journ. f. Orn., p. 173, Pl. VIII (type locality: Abela, Lake District of Abyssinia).

Accipiter minullus tropicalis REICHENOW, 1901, 'Vögel Afrikas,' I, p. 562 (Mpala; Lufuku R.); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 261 (Mpala). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Baraka); 1930, idem, XVIII, p. 280 (Kafubu R. near Elisabethville).

Nisus minullus SCHALOW, 1886, Journ. f. Orn., p. 412 (Mpala); 1887, idem, p. 229 (W. shore L. Tanganyika). MATSCHIE, 1887, Journ. f. Orn., p. 147 (Lufuku R.).

Accipiter minullus NEAVE, 1910, Ibis, p. 103 (Bunkeya R.).

DISTRIBUTION OF THE SPECIES.—Southern, eastern, and northeastern Africa, from Cape Province to Angola, Lake Tanganyika, Lake Kivu, Kenya Colony, Abyssinia, and Sennar. The typical race¹ is usually stated to extend north to the Zambesi and Kwanza rivers; *Accipiter m. tropicalis*² of eastern Africa, as far as South Somaliland, being paler; and *A. m. intermedius* of the Abyssinian region intermediate in color between the two foregoing. It seems, however, that *tropicalis* is largely restricted to the eastern coastlands, and that specimens from the south-eastern Congo are to be referred to *intermedius*, which was stated by its describer to range southward to the northern end of Lake Nyasa.

An adult male, which I collected at Luvundi on the northeast shore of Lake Tanganyika, is somewhat lighter in color than one from

¹*Falco minullus* Daudin, 1800, 'Traité d'Ornith.,' II, p. 88 (Gamtoos R., Cape Colony).

²Reichenow, 1898, Journ. f. Orn., p. 139 ("East Africa").

Natal, yet by no means so pale as Erlanger's plate of *tropicalis* (Journ. f. Orn., 1904, Pl. VII). We have no adult of *tropicalis*, and I must rely on Mr. Sclater's approval of its validity.

It may be only chance, but our immature specimens show striking differences, which appear to be geographic. A young female from Nainasha, Kenya Colony, possibly referable to *tropicalis*, is very white below, the breast with blackish streaks not exceeding 4 mm. in width, but broader and bar-like on the flanks. A young bird of the same sex from Kisenyi, Lake Kivu, presumably *intermedius*, has the ground-color of the breast whitish, but with very large round blackish spots there, attaining a diameter of 9 mm. Flanks boldly barred. Three young males of typical *minullus* from Natal are strongly washed with buff below, and the dark markings of the breast are streaks rather than spots, but many of them 5 or 6 mm. wide. This does not agree with Erlanger's statement that the young of these races are indistinguishable.

This small hawk frequents dense groves of trees, and is said to be extremely courageous in the pursuit of other birds. The nest is of sticks, placed in a tree at moderate height, and usually contains three eggs, white more or less blotched and spotted with dark brown and grayer shell-markings. Dimensions of a set of eggs of *A. m. tropicalis* taken by Hilgert¹ in Gallaland on April 6 are 35.5–36 mm. by 29.5–30. On October 13, a nest of *minullus* was found on the Limpopo River by Eriksson's collector, but I know of no nesting dates for the Belgian Congo.

Accipiter rufiventris rufiventris Smith

Accipiter rufiventris A. SMITH, 1830, S. Afr. Quart. Journ., (1), p. 231 (type locality: Baviana's R., South Africa). NEAVE, 1910, Ibis, p. 103 (Kambove, 4500 ft.). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 359 (forest W. of L. Tanganyika). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 231 (Baraka).

Accipiter rufiventris rufiventris SWANN, 1921, 'Synop. Accipitres,' 2nd Ed., p. 59 (S. Africa, N. to Katanga); 1926, 'Monograph of Birds of Prey,' part 5, p. 321 (Katanga). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 68 (Katanga).

DISTRIBUTION OF THE SPECIES.—Southern Africa, north to Damara-land, Mossamedes, Katanga, the vicinity of Baraka and Rutshuru, highlands of Kenya Colony, Shoa, and Abyssinia. The Abyssinian race, *A. r. perspicillaris* (Rüppell), is smaller and darker in color than the typical form.

At the Congo Museum I examined a specimen, apparently immature, from Rutshuru (Derche). In the eastern Congo, as in Kenya Colony, the species seems to be restricted to highlands above 4000 feet.

¹Erlanger, 1904, Journ. f. Orn., p. 177.

I, too, have shot a male, on July 17, amid the bamboos of the mountains west of the Ruzizi Valley, at 9,350 feet.

Professor Reichenow has reported a single immature specimen from Togoland, but this bird is regarded by Dr. Stresemann as *ovampensis*.

Nests have been found in South Africa in October, in yellow-woods or other trees. These were built of sticks and sometimes lined with lichen. Clutches are of four eggs, white with splashes of sepia and light brown. Dimensions are variously given as 39.1–43.5 mm. by 31.5–36.4.

FAMILY FALCONIDÆ. FALCONS

KEY TO THE GENERA OF FALCONIDÆ AS REPRESENTED IN THE CONGO AND ADJACENT DISTRICTS

- 1.—Metatarsus longer than middle toe with claw.....2.
Metatarsus shorter than middle toe with claw.....6.
- 2.—Wing less than 150 mm. long, underparts plain white.....POLIHIËRAX.
Wing longer than 150 mm.....3.
- 3.—Only one outermost primary with inner web emarginate toward tip.....4.
Two outermost primaries emarginate toward tip.....5.
- 4.—Back rufous or barred with rufous and black, but without gray....CERCHNEIS.
Back slate-gray with or without darker barring, or brownish gray margined with buff, some rufous barring occasionally, but then only on anterior part.
ERYTHROPUS.
- 5.—Plumage largely gray, rump gray or whitish, and whole underparts slate-gray or brownish gray.....DISSODECTES.
Plumage largely rufous, especially the upperparts, usually spotted, streaked, or barred with brown or black.....CERCHNEIS.
- 6.—Wing more than 250 mm. long.....FALCO.
Wing less than 250 mm. long.....7.
- 7.—Two outermost primaries emarginate on inner web toward tip; crown rufous, sometimes streaked or spotted with black; lower breast with numerous cross-bars of brown or black.....TINNUNCULUS.
Only one outermost primary emarginate toward tip; if crown is rufous, then lower breast is not dark-barred.....8.
- 8.—Metatarsus at least 32 mm. long, usually considerably longer; claws always black.
FALCO.
Metatarsus never longer than 30 mm.; claws not black, but horn-brown or pale buff.....ERYTHROPUS.

[*Polihiërax semitorquatus castanonotus* (Heuglin)]

Hypotriorchis castanonotus HEUGLIN, 1860, Ibis, p. 407 (type locality: Méré Belenia, i.e., near Gondokoro, Upper White Nile).

The African pygmy falcon inhabits southern, eastern, and north-eastern Africa, from the Orange River to Abyssinia. The typical form,

described by Smith from Bechuanaland, is said to be slightly paler than birds from Tanganyika Territory northward, so the latter are separated under Heuglin's name. Females of both races have, of course, the chestnut back.

P. s. castanonotus is recorded from the Bahr-el-Jebel and from Kazeh (= Tabora) in Tanganyika Territory, so that we have reason to expect it in Congo territory either near the northern end of Lake Albert or in Urundi.

KEY TO THE SPECIES OF *Erythropus*

- 1.—Breast ashy or slaty-gray, uniform or with only very fine shaft-streaks; tibiae and under tail-coverts rufous (adult males).....2.
Breast rufous without noticeable darker markings, or rufous, buff, or whitish, striped or spotted with brown or black (females and young).....3.
- 2.—Under wing-coverts white, only faintly tinged at most with gray. *E. amurensis* ♂.
Under wing-coverts very dark gray, almost or quite blackish....*E. vespertinus* ♂.
- 3.—Crown and breast rufous, with narrow shaft-streaks at most; or crown rufous-brown more heavily streaked with blackish, while breast is buff to light rufous, with broad stripes or tear-shaped spots of brown.
E. vespertinus ♀ and im.
Crown slaty-gray often finely streaked with black, and its feathers margined in young birds with light gray-brown, but not with rufous; breast buffy white to white, striped or mottled with black.....*E. amurensis* ♀ and im.

Erythropus vespertinus (Linnaeus)

Falco vespertinus LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 129 (type locality: Ingria, i.e., Province of Petrograd).

Erythropus vespertinus DUBOIS, 1905, Annales Mus. Congo Zoologie, I, f. 1, p. 26 (Banalia).

Erythropus vespertinus vespertinus SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 315 (Tshikapa).

Falco vespertinus vespertinus GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 65 (Kasai).

Avakubi, ♀ im., October 19.

Niangara, ♀, April 6.

ADULT FEMALE.—Iris dark brown, rim of eyelids yellow; bill horn-blue with light greenish base, cere dull yellow; feet cadmium-yellow, claws light gray.

DISTRIBUTION.—The western red-legged kestrel breeds in eastern Europe and western Siberia, migrating to Africa as far south as Damara and Namaqualand. We only saw occasional birds in the Upper Congo, never flocks; and they were anything but common.

At the Congo Museum, I examined the adult female from Banalia reported by Dubois, and also a young *Erythropus* from Kinda in the Lulua district (Baillet-Latour), which I identified at the time as *vesper-*

tinus, though I cannot be positive that it was not *amurensis*. Dr. Schouteden has since loaned me a male of *vespertinus* in adult plumage from Macaco near Luebo. This specimen appears to have been omitted from his report.

Falco pyrrhogaster Reichenow,¹ described from the Uam district of French Equatorial Africa, is simply an adult female of *E. vespertinus*, as has been pointed out by Grote.² The length of wing was originally given as 150 mm., doubtless a misprint for 250.

Erythropus amurensis (Radde)

Falco vespertinus var. *amurensis* RADDE, 1863, 'Reisen süd von Ost-Sibir.,' II, p. 102, Pl. I, fig. 2 (type locality: "Dseja-Münding," i.e., Blagowestchenk, on the middle Amur).

Cerchneis amurensis MOURITZ, 1914, Ibis, p. 31 (Inkosakapenda).

DISTRIBUTION.—Breeding from Lake Baikal to Manchuria, migrating south to India and eastern and southern Africa, from Kenya Colony to Benguella and Cape Province. Mouritz reported that a large flock of eastern red-legged kestrels put in an appearance one day near the village of Inkosakapenda on the Loömbwa River, Katanga, and roosted in a large bare tree close to the river. This seems to have been in October or November, 1911. Neave did not observe the species, but it may be expected as a regular migrant in the southeastern corner of the Katanga.

KEY TO THE SPECIES OF *Cerchneis* TO BE EXPECTED IN THE CONGO

Immature Males often Resemble Females in Color

- 1.—Back uniform rufous; crown and upper tail-coverts blue-gray, though crown may be washed with light rufous; claws not black.....*C. naumanni*. ♂.
- Back rufous, but banded, streaked, or spotted with dark brown or black.....2.
- 2.—Crown and back rufous, both boldly streaked with black; tail rufous, with only narrow blackish bars which are often interrupted.....*C. alopec* ♂ ♀.
- Back spotted or barred.....3.
- 3.—Crown blue-gray or brownish gray, more or less streaked with blackish.....4.
- Crown light buff, rufous, or brown, streaked with dusky or blackish.....6.
- 4.—Back rufous, heavily barred with black; tail usually barred with blackish on a gray ground.....*C. tinnunculus rufescens* ♂.
- Back rufous with more widely separated spots of black, and often a few fine streaks near hind-neck; tail with or without dark bars.....5.
- 5.—Breast pale buff, streaked with black, the streaks going over to spots toward the flanks; tibiae usually a little deeper buff than breast.

C. tinnunculus tinnunculus ♂.

Breast deeper buff or cinnamon-rufous, more narrowly streaked, spots on flanks smaller and more widely separated; thighs of same rufous color as breast.

C. rupicola ♂ ♀.

¹1915, Orn. Monatsber., p. 25 (Bosum).

²1923, Orn. Monatsber., p. 38.

- 6.—Claws not blackish, but pale yellow; underparts buffy-whitish, breast and flanks streaked or spotted with blackish.....*C. naumanni* ♀.
 Claws always blackish; underparts buffy-whitish or often deeper buff, with streaks or spots, or even barred on flanks.....7.
- 7.—Wing shorter: maximum about 230 mm. in males, 240 in females; breast buff, heavily streaked or spotted with black, flanks often barred; black bars on back often wider than rufous ones, the latter relatively deep-colored.
C. tinnunculus rufescens ♀.
- Wing longer, usually exceeding 235 mm. in males, or 240 in females; breast lighter buff or whitish, more narrowly streaked with brown or blackish, flanks sometimes barred; black barring of back usually narrower, so that the light bars predominate, and these are pale rufous.....8.
- 8.—Dark bars on rectrices (with the exception of subterminal one) relatively narrow and numerous; outermost rectrices with at least 9 bars; under wing-coverts distinctly streaked and spotted with black; few, if any, dark bars on flanks.
C. tinnunculus tinnunculus ♀.
- Dark bars on rectrices fewer and broader, only 6 or 7 on outermost rectrices; under wing-coverts unmarked, or with very fine shaft-streaks; flanks often barred with blackish.....*C. rupicoloides* ♂ ♀.

***Cerchneis naumanni naumanni* (Fleischer)**

Falco naumanni FLEISCHER, 1818, in Laurop and Fischer, 'Sylvan,' part 5, Art. 10, p. 174 (type locality: Southern Germany).

Cerchneis tinnuncula SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 234 (N. of L. Kivu).

Avakubi, ♂, November 29; ♂ im., November 25.

Aba, ♂ im., December 15.

The adult male is in clean, fresh plumage, and has a strong reddish wash on crown and nape, also a few of the middle wing-coverts with gray stripes.

DISTRIBUTION.—From southern Europe and Morocco eastward at least to Persia. This is the summer range of the typical race of lesser kestrel, an eastern form of which, *C. n. pekinensis*, ranges at that season from Turkestan to northern China. Both subspecies are known to reach South Africa during the northern winter, the Asiatic race seemingly restricted to the eastern edge of the continent, so that only the typical one of Europe is known from the Congo. Our specimens from Avakubi prove that it occurs in clearings of the forest as well as in the savannas. A female or young male of this species from north of Lake Kivu in the Congo Museum was erroneously reported as *C. tinnuncula*.

We never found them common anywhere, the specimen from Aba was attracted by a grass-fire raging on a hill-top, and those at Avakubi were single wanderers. Two of the birds had eaten grasshoppers and a beetle, the third a young striped rat (*Arvicanthis*).

***Cerchneis tinnunculus tinnunculus* (Linnæus)**

Falco tinnunculus LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 90 (Europe; restricted type locality: Sweden).

Tinnunculus alaudarius DUBOIS, 1905, *Annales Mus. Congo, Zoologie*, I, f. 1, p. 26 (Kisantu; Ituri).

Cerchneis tinnuncula REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 264 (N. W. base of Ruwenzori).

Cerchneis tinnuncula carlo SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 235 (in part. Irumu).

Tinnunculus tinnunculus tinnunculus SCLATER AND M.-PRAED, 1919, *Ibis*, p. 686 (Meridi).

Cerchneis tinnunculus SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 80 (Tingasi; Lokaya Mts.).

Falco tinnunculus tinnunculus GROTE, 1930, *Mitteil. Zool. Mus. Berlin*, XVI, p. 66 (Ruwenzori district).

Avakubi, ♀, January 2.

Dungu, 2 ♂, January 26, February 24; ♂ im., January 26.

Faradje, 2 ♂, December 6, 7; 5 ♀ March 8, October 30, November 5, 6, December 11; 3 ♂ im., March 12, November 6, 30.

Aba, ♂, December 11; ♀, December 16; ♂ im., December 14.

DISTRIBUTION.—The typical race of *Cerchneis tinnunculus* breeds from Scandinavia, Russia, and northern Asia southward to North Africa, and extends in autumn and winter to northwestern India and central Africa, though many individuals winter in England, France, and Germany. While in East Africa it reaches the northern edge of Nyasaland, the forests in the west bar its southward migration rather effectively, and its occurrence in clearings, as at Avakubi, is almost purely accidental.

Nevertheless, the Congo Museum has an immature male from Banalia on the Aruwimi and a female from Penge on the Ituri, as well as a female from Irumu, and a male not quite adult from Kisantu.¹ In the eastern Congo, I know of no occurrence south of Beni.

A very common bird during the dry season in the open grass regions of the northern Uelle, the kestrel arrives from the north about a month before the rains are to cease. In 1911, we noted the first comer on October 30, and the following year on November 4. Their departure took place in the latter part of March.

Though not habitually flocking, kestrels may be attracted in numbers to a grass-fire, but at other times they scatter over the savannas, perching on trees, and hunting mainly lizards and insects, particularly large orthoptera, although termites are captured in flight. Of fifteen

¹I have not compared this specimen with *C. rupicola*, which might be expected to reach the Lower Congo.

stomachs, eight were found to contain grasshoppers, two had large termites, and in the crop of one bird there was a large spider. Only in one case were there remains of a rat, but eight stomachs contained lizard-remains representative of nine individuals (mostly skinks of the genus *Mabuia*).

***Cerchneis tinnunculus rufescens* (Swainson)**

Falcon rufescens SWAINSON, 1837, 'Birds of W. Afr.,' I, p. 109 (type locality: presumably Senegal).

Cerchneis tinnunculus carlo REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 264 ("Nyander" near Kisenyi = Nyundo). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 235 (in part. N. of L. Tanganyika; Goma; Ruzizi; Kaniki). SWANN, 1920, 'Synop. List Accipitres,' 1st Ed., p. 147 (Blue Nile to Tanganyika).

Cerchneis tinnunculus carlo SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 360 (Uvira).

Falco tinnunculus carlo HARTERT, 1913, 'Vögel Paläarkt. Fauna,' II, p. 1086 (Tanganyika and L. Kivu).

Bafwabaka, ♂ im., January 10.

Medje, 2 ♂, January 21, July 26; ♀, September 23.

ADULT MALE.—Iris very dark brown; cere, naked skin around eye, and corners of mouth yellow; bill black at tip, blue-gray posteriorly, and changing to light greenish-gray close to the cere; feet yellow, claws black.

This bird would seem specifically distinct from the kestrel of Europe, were it not that intergradation between them is practically complete in northeast Africa and southwest Arabia, as well as through the Canary and Cape Verde Islands. In our specimens from the northern Ituri district, the sexes are surprisingly alike in color, the adult male grayer on the crown than the female, but its gray tail banded with blackish. The adult female has the tail bluish gray, more broadly banded with dusky, though there is a strong tinge of cinnamon on the outer rectrices. The upper tail-coverts are bluish gray, heavily banded in the female, but only very narrowly streaked in the male. Our immature male has light rufous bars on the tail instead of bluish, but the feathers of the rump and upper tail-coverts are already slate-blue, without dark bars.

Dimensions of our specimens: wing ♂ ad., 212, 216 mm.; ♂ im., 220; ♀ ad., 241; tail, ♂ ad., 140, 149, ♂ im. 144.5, ♀ ad., 153.5; culmen from cere, ♂ ad., 12.6, 13, ♂ im., 13, ♀ ad., 15; metatarsus, ♂ ad. 38, ♂ im., 37, ♀ ad. 41.

These examples agree far more closely with the original description of *Falco rufescens* Swainson than with that of *Cerchneis tinnunculus carlo* Hartert and Neumann.¹ The principal difference from *rufescens*

¹1907, Journ. f. Orn., p. 592 (Bissidimo near Harrar, Abyssinia).

is the absence of rufous spots on the outer webs of the alula quills and of all but the inner secondaries. From Swainson's description, it would also seem that the color of the crown is the same in both sexes of *rufescens*.

Several writers have already suggested that material from the region of Senegal might prove the identity of *carlo* with *rufescens*. Four specimens have been collected in the Beledugu district of the French Sudan by Dr. Millet-Horsin, who showed them to me at the Paris Museum. They are strikingly similar to ours from the Ituri, but not quite so dark or so broadly barred above with blackish. Two of them are males, but neither of these is completely adult, and the crown is of the same color as in the females. Even new feathers appearing in the crown of the older of the two males are rufous—not grayish—streaked with black. Wings, ♂ 223, 227, ♀ 235, 240; tails, ♂ 156, ♀ 155, 164.

Such slight differences may yet be invoked to separate the Upper Congo birds subspecifically, but I do not care to do so at present. Certainly they cannot be united with *carlo* of Abyssinia, which is a much lighter bird, less barred above, and intermediate between *rufescens* and typical *tinnunculus* in about the same degree as *canariensis* of the Canary Islands and Madeira.

From the eastern border of the Congo, I have seen two male specimens which I also refer to *rufescens*. One of these in the Vienna Museum from Uvira (Grauer) has the gray crown and cheeks finely streaked with blackish, and all barring on the rectrices except the broad subterminal bar confined to the inner webs. This is a slight approach to *carlo*. The wing is long, measuring 235 mm.

Another male in the Congo Museum from the north end of Lake Tanganyika (Derche) is somewhat lighter above than our adult male from Medje, less broadly barred on the back, but rectrices regularly barred. The ground-color of the underparts is everywhere more rufous, though heavily streaked. Wing 231 mm., tail 158.

There are also two females of *rufescens* in the Congo Museum from Kaniki on Lake Edward (Pilette) and Goma on Lake Kivu (Derche). The dark barring of the back is not quite so broad as in our female from Medje. Wings 241, 227 mm.; tails 150, 155.

At the British Museum, I examined two males from Narossura and Elgoni, Kenya Colony, with dark bars even on middle rectrices, which I regard as nearer *rufescens* than *carlo*; and two females from Gofa and Lake Ganjule in southern Abyssinia could possibly be separated from *carlo*. The occurrence of *rufescens* in Angola is rather doubtful. The British Museum has an immature male *Cerchneis* from the Loge

River and a female from St. Paul de Loanda. Both are lighter than northern Congo birds, or even some southern Abyssinian specimens, though rather heavily streaked below. But these two examples do not seem to be related to *rupicola*.

DISTRIBUTION.—From Kenya Colony and Mt. Elgon westward through the northern Congo to northern Cameroon and Nigeria, and at least as far as Kati in the French Sudan. Southward also along the eastern Congo border to Lake Tanganyika, and perhaps to Morogoro in Tanganyika Territory¹ and northern Angola. Just to the east of the Congo forest, kestrels of this race are found at all seasons. I have observed them on the western slope of Ruwenzori at 7000 feet (December), and in the Ruzizi Valley (July).

This dark-colored kestrel of tropical Africa is non-migratory, and, from our experience in the Congo, apparently very local. We never found it either to the north or to the south of the Nepoko region; there are no records from the Bahr-el-Ghazal²; and its home in the northern Congo apparently consists of a narrow band along the edge of the forest. The Museum of Comparative Zoölogy has recently received a female taken at Buta by Brother J. Hutsebaut.

We saw it occasionally about the post of Medje, which is on a hill largely cleared of forest; and in general behavior it is exactly like the European kestrel. On one occasion, we watched a bird dusting itself on the ground. The specimen labeled "Bafwabaka" was sitting on a tall oil-palm in a native village. Only two stomachs contained food, amounting to three lizards, feathers of a small bird, and one grasshopper.

From the state of the sexual organs, it seemed that the breeding season there fell in the dry period toward January or February. In the mountains north of Kumbo, Cameroon, Bates³ found a number of these kestrels visiting the crevices of a rocky cliff, in September. They were not breeding at the time.

Cerchneis rupicola (Daudin)

Falco rupicolus DAUDIN, 1800, 'Traité élémentaire et complet d'Ornithologie,' II, p. 135 (type locality: Cape of Good Hope).

Tinnunculus rupicolus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Katanga).

?*Cerchneis rupicola* MOURITZ, 1914, Ibis, p. 28 (S. E. Katanga).

¹Mr. Arthur Loveridge has a kestrel from this locality identified as *C. t. carlo*.

²Lynes (1925, Ibis, p. 395) records *C. t. carlo* from the mountains of Darfur. Were it not for the mention of barring on the tail, I should assume that his specimens could not be *rufescens*.

³1924, Ibis, pp. 14, 211, 525.

DISTRIBUTION.—Southern Africa from Cape Province north to Nyasaland, the Upper Katanga, Angola, and, according to Reichenow, the Loango coast, where Falkenstein is said to have collected it. It may thus be expected near the mouth of the Congo, but the only specimen known from the Congo is that reported by Dubois. Although no specimen was secured, Mouritz noticed a number of kestrels in the Katanga, especially over the natives' lands and in the more hilly regions, and took them to be *rupicola*.

The adult female of the South African kestrel differs but little from the male, except that its tail is usually barred; and both sexes recall the male of the European form, though they are deeper cinnamon-rufous below, and more finely marked. I have seen no evidence of intergradation between *C. tinnunculus* and *rupicola*, and therefore do not follow Mr. Sclater in regarding them as representative races.

In habits *rupicola* is said to resemble the European kestrel. It nests in clefts of precipices or in trees, occasionally even on buildings, and lays three eggs. These are cream-colored, spotted and blotched with brown and red-brown, measuring 40–42 mm. by 32.5–33.5.

[*Cerchneis rupicoloides arthuri* (Gurney)]

Tinnunculus arthuri GURNEY, 1884, 'List of the Diurnal Birds of Prey,' p. 156 (type locality: Mombasa).

?*Cerchneis arthuri* SASSI, 1909, Orn. Monatsber., p. 107 (Ujiji).

DISTRIBUTION OF THE SPECIES.—Southern and eastern Africa, from the Karroo district to Damaraland, Kenya Colony, the Turkwell River, and Somaliland. Besides the typical form south of the Zambesi, two races are admitted: *arthuri*, of East Africa north to Lake Rudolf, being darker but with narrower black bars on rectrices; *fieldi*, of northern Somaliland, smaller, lighter and more narrowly barred above.

Cerchneis r. arthuri is to be looked for in the drier regions along the eastern border of the Congo, but the specimen reported from Ujiji by Sassi may really have been *C. tinnunculus rufescens*, for in Reichenow's 'Vögel Afrikas,' the two forms are confused.

***Cerchneis alopes* (Heuglin)**

Tinnunculus alopes HEUGLIN, 1861, Ibis, p. 69, Pl. III (type locality: Gallabat, eastern Sudan).

Cerchneis alopes alopes SWANN, 1920, 'Synop. List Accipitres,' 1st Ed., p. 150 (Redjaf).

Cerchneis alopes SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 80 (Mangbetu country).

Aba, 3 ♂, December 15, 16; 2 ♀, December 16.

ADULT MALE.—Iris pale buff, orbits and cere light greenish-gray; bill bluish gray at base, black at tip; feet yellow, claws black.

All are apparently adult birds, the females, of course, larger: wing 282, 289 mm.; tail, 192.5, 200 mm.; culmen from cere, 17 mm.; metatarsus, 46, 47 mm. The width of the streaks, especially on the breast, is variable, but offers no indication of sex. We find, however, that our females can be immediately distinguished by their more regularly barred rectrices, the outer feathers in the males having only a few broken bars or spots.

Measurements of three males: wing 270–278 mm.; tail 185–190; culmen from cere, 16; metatarsus, 44–46.

DISTRIBUTION.—*Cerchneis alopex* ranges from the coast of the Red Sea at 16° N. lat., southward to Lado on the White Nile, and westward to Darfur, the northern Cameroon, the hinterland of the Gold Coast, and Kati in French Sudan. Birds from northern Togoland and Gold Coast hinterland were separated by Reichenow as *C. a. deserticola*¹ because of their supposedly paler coloration. This subspecific name has since been altered to *eremica* by Oberholser,² but the race seems not to be valid. Dr. Millet-Horsin showed me two males and a female collected at Kati, French Sudan, which seemed no paler than Uelle specimens. The paler color of the type of *deserticola* was probably the result of wear or of immaturity. Selater and Mackworth-Praed³ record a similar specimen from Jebelein on the lower White Nile.

This very large fox-colored kestrel, sharply streaked with blackish, is known in the Congo only from the northeastern corner of the Uelle district, where we found it in some numbers in the early part of the dry season, about the rough granite hills rising in such profusion along the Congo-Nile watershed. We had failed to find it on these same hills during our visit in the previous July, and a year later, in July, it was not to be seen on the hills at Garamba. Although Heuglin considered it resident in the northern part of its range, I think it quite likely that it extends slightly more to the southward during the period of drought. Emin found it at Redjaf in December and January, and Butler collected it on Redjaf Hill in April. West of Faradje, it was seen only once, at the hill of Piagga, on February 20, 1913.

There can be no doubt that it is very much attached to bare rocky hills, even when not breeding, for none of our Congo specimens showed enlargement of the sexual organs. At first we found these falcons very

¹1899, Orn. Monatsber., p. 190 (Mangu, N. Togoland).

²1917, Proc. Biol. Soc. Wash., XXX, p. 76.

³1919, Ibis, p. 687.

wary, whether perched on trees, upon cliffs, or bare rocks. Their flight and call are kestrel-like, though the latter is hoarse.

However, one of our gun-bearers soon showed me how to bring them within range by starting a fire up on the top of a hill in the high grass, now thoroughly dried, and thus in one day we secured four specimens. In company with kites (*Milvus æ. parasitus*) and common kestrels, they boldly came to catch the grasshoppers fleeing the flames, and always alighted in a tree to swallow their insect quarry, whereas the kites ate on the wing. In one day near Aba, I have seen up to ten individuals of *Cerchneis alopex*, but in the more level savanna close to Faradje, they never appeared at the grass-fires that raged there annually. The only food found in the stomachs of our specimens was grasshoppers.

KEY TO THE AFRICAN SPECIES OF *Dissodectes*

- Upper tail-coverts gray like the back, median rectrices of the same color, nearly or quite uniform. *D. ardosiaceus*.
 Upper tail-coverts grayish white, unlike the blackish-slate back; median rectrices banded with whitish gray and blackish. *D. dickinsoni*.

Dissodectes dickinsoni (Sclater)

Falco dickinsoni P. L. SCLATER, 1864, Proc. Zool. Soc. London, p. 248 (type locality: Chibasa, Shiré River, Nyasaland).

Falco dickinsonii DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Dissodectes dickinsoni DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Tanganyika).

Cerchneis dickinsoni DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 263 (Elisabethville; Lubumbashi R.; Kasapa R.).

DISTRIBUTION.—From eastern Transvaal north to southern Tanganyika Territory, Lake Tanganyika, the Katanga, and Angola. Besides the specimen listed by Dubois from the vicinity of Tanganyika (Storms), I saw two females of this falcon in the Congo Museum from Kinda in the eastern Lulua district, both collected by Charliers.

Dickinson's falcon has been said to prey on small birds as well as upon insects put up by grass-fires. In Nyasaland Whyte¹ reported it nesting amid the fronds of tall palms.

Dissodectes ardosiaceus (Bonnaterre and Vieillot)

Falco ardosiaceus BONNATERRE AND VIEILLOT, 1823, 'Tabl. Encyclop. Méthod., Ornithologie,' III, p. 1238 (type locality: Senegal).

Cerchneis ardesiaca SHARPE AND BOUVIER, 1877, Bull. Soc. Zool. France, II, p. 472 (Landana). SHARPE, 1884, Journ. Linn. Soc. London, Zool., XVII, p. 438 (Ndoruma). MENEGAUX, 1918, Rev. Française Orn., V, p. 258 (Lukanga R.; Paso-Konité).

¹Shelley, 1897, Ibis, p. 549.

Falco concolor DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Cerchneis ardosiacea REICHENOW, 1901, 'Vögel Afrikas,' I, p. 636 (Ndoruma); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 264 (Usumbura). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 360 (Sultanate Kissaka). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 234 (Beni; Bioga; Kivu; Bigoisagua; Sanghé-Ruzizi). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 79 (Okello's village of Fanigoro on L. Albert).

Dissodectes ardesiacus DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Tanganyika; Upper Congo).

Dissodectes ardosiaceus SCLATER AND M.-PRAED, 1919, Ibis, p. 688 (Yei).

Dissodectes ardosiaceus SWANN, 1922, 'Synop. Accipitres,' 2nd Ed., part 4, p. 230 ("Senegambia to Angola").

Falco ardosiaceus BANNERMAN, 1922, Rev. Zool. Afr., X, p. 167 (Belgian Congo).

Niangara, 2 ♂, April 27, May 22; ♀ juv., April 26.

Faradje, ♀, November 20.

ADULTS OF BOTH SEXES.—Iris dark brown; orbits, cere, and corners of mouth cadmium-yellow; beak horn-blue with black tip; feet chrome-yellow, claws black with bluish-gray bases.

FEMALE IN JUVENAL PLUMAGE: Cere and orbits pale greenish, feet greenish yellow.

No difference in color is noticeable between the sexes, and the young bird in first plumage is almost exactly like the adults, except that it is of a very light gray on the abdomen. Its tail is but two-thirds grown, so it had not been long out of the nest.

DISTRIBUTION.—From Eritrea, Abyssinia, and Darfur through the Sudan to the lower Senegal, also inner East Africa south to Kakoma, westward to Mossamedes and the southern Gaboon. It has not yet been found in the Congo or Cameroon forests, and probably is lacking there, although on the northern edge of the forest region, along the Uelle and Dungu rivers, we usually saw them only on the larger trees bordering watercourses. Silent, swift-flying birds, they nevertheless take much the same small prey as kestrels, for in the crops and stomachs of four individuals we noted: one frog, some hair of a small mammal, several beetles, a grasshopper, a large cricket, and a termite (whose wings had just been shed).

Raven procured two of these gray falcons for the U. S. National Museum at Nyanza on the northeast shore of Lake Tanganyika, I obtained one at Albertville, and Father Callewaert sent us one from Lulua-bourg in the Kasai District.

***Tinnunculus ruficollis ruficollis* (Swainson)**

Falco ruficollis SWAINSON, 1837, 'Birds of W. Afr.,' I, p. 107, Pl. II (type locality: Senegal). SHARPE, 1884, Journ. Linn. Soc. London, Zool., XVII, p. 438 (Semio). OUSTALET, 1893, Naturaliste, VII, p. 60 (no exact locality). REICHENOW, 1901

'Vögel Afrikas,' I, p. 631 (Semio). SASSI, 1912, *Annalen K. K. Naturhist. Hofmus. Wien*, XXVI, p. 360 (Kisenyi). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 234 (Bigoisagua; Kivu).

Dungu, ♂, ♀, June 24.

Aba, ♀, July 19.

ADULTS OF BOTH SEXES.—Iris dark brown; orbits, cere, and base of beak bright yellow, tip of beak blue-black; feet bright yellow, claws black.

DISTRIBUTION OF THE SPECIES.—The greater part of Africa, from Senegal and Abyssinia southwards to the Cape, with the exception of the western and central African forests. Specimens from south of the Zambesi are larger (wing 211–241 mm.) and somewhat lighter in color, so they are separable as *T. r. horsbrughii* (Gunning and Roberts).¹ Our Uelle specimens and three collected by Raven at Nyanza on Lake Tanganyika have wings of males 188–198 mm., of females 215–221 mm. *T. chicquera* Daudin of India is a paler geographic representative of this immediate group, but I do not consider it conspecific.

Tinnunculus r. ruficollis is known only in the northern and eastern savannas of the Congo. We did not meet with it in the Lower Congo, and it was rather scarce in the northeastern Uelle district. I have also found it at Kasenyi on Lake Albert.

Both in the Sudan and in East Africa the red-necked falcon is known to be fond of borassus or doleib palms, and it was in July, about Aba, where some stately examples of this tree are found, that we saw the most of these spirited little birds of prey. They resemble kestrels in their flight, and commonly keep in pairs. Not only did they perch on trees, though we did not notice them on the palms, but one was also sitting at the edge of a pool on a high rock, as though bathing. At Faradje the species was never observed, and the pair secured about a large tree near Dungu were the only others noticed in the Uelle.

Our three examples had all been eating small birds, in one case identifiable as a weaver. This agrees with Heuglin's and Böhm's statements as to its food, though the former also found rats, lizards, and grasshoppers.

According to Heuglin, the nest is placed between the bases of the leaves on borassus palms, but Hawker² found three young and an addled egg in an old kite's nest at Fashoda on the White Nile, April 24. This egg was plain white, 42.7×32.5 mm. Emin³ also took a pure white egg from the oviduct of a bird killed in the country near Lado on February 13, and collected a young bird just able to fly on March 13. The species,

¹1911, *Annals Transvaal Mus.*, III, p. 110 (Pretoria).

²1902, *Ibis*, p. 443.

³Schubotz, 1921, 'Tagebücher von Dr. Emin Pascha,' VI, part 2, p. 79.

therefore, breeds during the dry season. Reichenow has described eggs as yellowish, thickly spotted with red-brown.

KEY TO THE CONGO SPECIES OF *Falco*

- 1.—Wing-length exceeding 290 mm. 2.
 Wing-length less than 290 mm. 3.
- 2.—Posterior half of crown, at least, rufous or buff, narrowly streaked at most with blackish; a blackish patch usually in middle of nape. *F. biarmicus*.
 Practically the whole crown slate-gray, very dark brown, or blackish; nape often with an admixture of buffy white or pale rufous at sides. *F. peregrinus calidus*.
- 3.—Tibiae rufous, with or without dark streaks; under tail-coverts rufous. 4.
 Tibiae whitish or light buff, usually with dark bars or streaks; under tail-coverts not rufous. 5.
- 4.—Breast and flanks rufous, often streaked, but not broadly, with black; wing 210–245 mm. *F. cuvierii*.
 Breast and flanks whitish or pale buff, more broadly streaked with black; wing 245–287 mm. *F. subbuteo*.
- 5.—Feet much stronger; metatarsus exceeding 40 mm. in length, middle toe without claw more than 38 mm. long; nape almost uniform blackish like crown in adult, varied with buff in young. *F. peregrinus perconfusus*.
 Feet much smaller; metatarsus less than 36 mm. long, middle toe without claw less than 35 mm. long; nape varied with pale buff or whitish. *F. subbuteo* im.

Falco cuvierii Smith

Falco cuvierii A. SMITH, 1830, S. Afr. Quart. Journ., (1), p. 392 (type locality: Kei River, E. Cape Colony).

Falco cuvieri OUSTALET, 1893, Naturaliste, VII, p. 60 (no exact locality). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 630 ("Ubangi"). MENEGAUX, 1923, 'Voyage Ba-bault Afr. Orient.,' Oiseaux, p. 57 (Brazzaville).

?*Falco cuvieri* SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 234 (Beni; Kwidjwi I.; Zambo; Lufungula).

Falco subbuteo cuvieri SCLATER AND M.-PRAED, 1919, Ibis, p. 685 (Mt. Baginzi). Niangara, ♂, May 6.

ADULT MALE.—Iris dark brown, orbit and cere chrome-yellow, beak bluish shading to black at tip, and light yellowish-green at base; feet cadmium-yellow, claws black.

DISTRIBUTION.—From Southern Abyssinia through East Africa (including eastern Congo border) to eastern Cape Province, also westward along the northern edge of the equatorial forest to the Gold Coast and Gambia. Not known to occur within the Congo forest, nor to be expected there.

While the African hobby doubtless represents *F. subbuteo* in Africa, *Falco cuvieri* is a very much smaller bird, and I am not ready to unite them specifically. The tail of this male bird measures only 106 mm., less than the minimum in 'Vögel Afrikas.'

The only example I saw during the Congo Expedition I shot from a tall tree on the edge of a wood south of Niangara. Schouteden has reported both *Falco subbuteo* and *cuvieri*, the latter with a question mark, from the island of Kwidjwi in Lake Kivu and from Lufungula in the valley of the Semliki. A mounted specimen in the Congo Museum from the region of Lake Kivu (Derche) is certainly *cuvieri*, with much cinnamon below and in bars of wing and tail. Its wing measures 229 mm., tail 110.

During a recent visit to the eastern Congo, I obtained specimens in the Semliki Valley, at 5000 ft. on Mt. Karimia at the south end of the Ruwenzori Range, and at 7880 feet in the mountains northwest of Lake Edward.

Dr. van Someren¹ has told of an African hobby feeding on winged termites high in the air; and Loveridge² shot one in the act of eating a yellow wagtail (*Budytes flavus flavifrons*). Of three individuals which I have examined, one had eaten a passerine bird, probably a bulbul; another, ten cicadas; and the stomach of the third held pieces of grasshoppers.

Falco subbuteo subbuteo Linnæus

Falco subbuteo LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 89 (Europe; restricted type locality: Sweden). DE SOUSA, 1886, Journ. Sci. Lisboa, XI, p. 77 (Tenke); 1886, in Capello and Ivens, 'De Angola a Contra-Costa,' II, p. 443 (Tenke). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 628 (Tenke); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 264 (Kisenyi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 234 (Goma; Kwidjwi I.; Kibati; Lufungula); 1930, idem, XVIII, p. 280 (Kafubu R. in Katanga). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, p. 78 (Tunguru; Mswa). EMIN, 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 406 (Tunguru on L. Albert). DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 263 (Lubumbashi R. near Elisabethville).

?*Falco subbuteo* SCHALOW, 1886, Journ. f. Orn., p. 427 (Lugoma R.).

Falco subbuteo subbuteo GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 64 (L. Kivu; Katanga).

Faradje, ♀ im., October 23.

Iris dark brown, eyelids yellow, orbits light greenish-gray, cere light green, corners of mouth and the beak light blue, the latter shading to black at tip; feet lemon-yellow, claws black.

DISTRIBUTION.—The breeding range of the typical subspecies of hobby includes almost the whole of Europe, eastward to western Siberia, other races of more or less uncertain status occupying North Africa, central Asia, and northeast Siberia. The European form migrates to

¹1918, Nov. Zool., XXV, p. 266.

²1922, Proc. Zool. Soc. London, p. 854.

northwest India, also southward in Africa to Cape Province, but it shows a marked preference for the plains region, and is not yet known from the forested part of the Congo.

Our single specimen was circling over the station of Faradje at sunset, accompanied by one other; and the species had also been observed ten days earlier. Its stomach was filled with insect-remains, including one large dragon-fly.

***Falco biarmicus biarmicus* Temminck**

Falco biarmicus TEMMINCK, 1825, 'Pl. Col.,' livr. 55, Pl. cccxxiv (type locality: Caffraria, and Cape of Good Hope). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 624 (Chinchoxo). NEAVE, 1907, Mem. Proc. Manchester Lit. Phil. Soc., LI, No. 10, p. 26 (Near Chiwali's, Alala Plateau); 1910, Ibis, p. 105 (Chambezi Valley). SASSI, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 360 (Kisenyi).

Falco biarmicus abyssinicus HARTERT, 1913, 'Vögel Palaäarkt. Fauna,' II, p. 1057 (Kisenyi; Rutshuru).

Falco biarmicus biarmicus HARTERT, 1915, Nov. Zool., XXII, p. 177 (Kisenyi; Rutshuru Plain).

DISTRIBUTION OF THE SPECIES.—Most of the African continent except the western forested districts, also in the Italian and Balkan peninsulas, and east to Mesopotamia. Of the five races recognized by Hartert, only two are believed to reach the Belgian Congo.

The typical race extends from Cape Province north at least to Angola, the Katanga, and perhaps the vicinity of Lake Kivu, also to Kitui in Kenya Colony. A young example is said to have been obtained by Falkenstein at Chinchoxo in Portuguese Congo, so the South African lanner may be expected in the Lower Congo. At Mukuli in Marungu, Rockefeller and Murphy collected three adults which have no spotting on the middle of the underparts, though the markings on the flank-feathers may be a little heavier than in South African specimens. *Falco b. biarmicus* certainly occurs in the southeastern Katanga, for Neave took specimens on the adjacent Alala Plateau and in the valley of the Chambezi. He remarked that it was not very rare, occurring singly or in pairs, and having an extremely swift flight. In South Africa the breeding season is stated to be from June to August, and the nest usually placed on a cliff. The eggs are described as straw-colored or white, blotched with reddish, 50.8–54.6 mm. by 40.6–42.7.

From Abyssinia across the southern Sudan the species is represented by *F. b. abyssinicus* with black dots on the breast, which are wanting in adults of typical *biarmicus*. In eastern equatorial Africa, there is apt to be variation, if not intergradation, in this character, so that the correct

name for specimens taken in the Kivu district is in doubt. Hartert first cited two adults taken by Grauer at Kisenyi and on the Rutshuru Plain as *abyssinicus*, but two years later he reversed his opinion, calling them *F. b. biarmicus*, because the middle of the breast and abdomen was unspotted, yet the flanks were a little more barred and spotted than in South African specimens.

Schouteden reported specimens from Kivu and Kabambare as *tanypterus*, so one might expect them to be spotted below, and to belong with *abyssinicus*.

***Falco biarmicus abyssinicus* Neumann**

Falco biarmicus abyssinicus NEUMANN, 1904, Journ. f. Orn., p. 369 (type locality: Turrabolonko in Shoa).

?*Falco biarmicus tanypterus* SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 234 (Kivu; Kabambaré).

Faradje, ♀, March 11.

ADULT FEMALE.—Iris dark brown, eyelids and cere yellowish; bill greenish gray at very base, farther out bluish gray, and at tip black; feet yellow, claws black.

This example agrees well in color with Hartert's description,¹ having fine dark spots even on the middle of the breast, short bars on flanks and tibiae. However, the dark band of the forehead is represented in the mid-line only by dark streaks. The wing is much shorter than Hartert's measurements for females, only 343 mm., though the sex of this bird was determined by me.

DISTRIBUTION.—From Abyssinia and Gallaland to the Blue Nile and White Nile, thence westward to Haussaland and northern Ivory Coast; southward to Uganda and the Uelle district, and possibly to northern Tanganyika Territory and Kabambare in the Manyema district.

In the spotting of the underparts, adults of this race approach *F. b. tanypterus* Schlegel, of Nubia, Egypt, and Arabia; but they have darker upperparts, as in the typical South African race.

The Abyssinian lanner is unknown from the forested sections of the Congo, and very rare even in the Uelle district, where we certainly never saw more than three individuals. The breeding season falls in the drier part of the year, for Admiral Lynes² took a set of three eggs from an old stick nest in a tree at Fashoda on March 6. However, our female at the same season showed only slight enlargement of the ovaries—a vestigial right ovary being visible, as in so many birds of prey.

¹1913, 'Vögel Palaarkt. Fauna,' II, p. 1056.

²1925, *Ibis*, p. 393.

Falco peregrinus calidus Latham

Falco calidus LATHAM, 1790, 'Index. Ornith.,' p. 41 (type locality: India).

Falco minor DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 26 (Landana).

Falco peregrinus leucogenys KLEINSCHMIDT, 1917, 'Berajah, Falco Peregrinus,' pp. 54, 57 (Chinchoxo).

Falco peregrinus calidus GROTE, 1930, Mitteil. Zool. Mus. Berlin, XVI, p. 63 (Congo; Cameroon coast).

Avakubi, 2 ♂, January 4, November 16.

ADULT MALE.—Iris dark brown, cere and orbit cadmium-yellow, bill blue-gray or horn-blue, becoming black at tip and light green at base; feet bright chrome to cadmium-yellow, claws black.

In dimensions these two birds equal males of the European peregrine: wing, 307, 320; tail, 139, 143; culmen from cere, 20, 20.5; tarsus, 50, 48; middle toe without claw, 47, 47.5. They are, however, somewhat lighter and bluer above, especially on the crown. The chest is only very finely streaked, and the bars on the flanks are much narrower than in west European specimens, so that the whole effect is that of a paler bird. While the whitish cheek mark is broad and only separated from the eye by 7 or 8 mm. of gray, I cannot see that the blackish malar stripe is so remarkably narrow and pointed as in Hartert's figure,¹ nor is such the case in the two adult females of *calidus* from Tsingtau, China, and Gichiga, northeastern Siberia, which I have had for comparison.

In Reichenow's 'Vögel Afrikas,' (1901, I, p. 622), there are records of *Falco peregrinus* from localities as far south as Quilimane (Mozambique), Chinchoso (Portuguese Congo), Koroka River (Mossamedes), and Natal. Some of these must refer to *F. p. calidus*, for *F. p. peregrinus*, according to Hartert, never migrates to tropical Africa. Finch-Davies thought² that the South African records were probably based on slightly aberrant specimens of *Falco p. perconfusus*. In this opinion I do not concur, for the American Museum has an adult male of *F. p. calidus* taken at Duff's Road, Natal, in January, the wing of which measures 310 mm. I have no doubt indeed that *calidus* migrates regularly to southern Africa.

DISTRIBUTION OF THE SPECIES.—*Falco peregrinus* is almost cosmopolitan, ranging from the Holarctic Region to southern South America, the Cape of Good Hope, Madagascar, and Australia. Of the numerous races of peregrine, only two reach the Belgian Congo.

Falco p. calidus breeds from the Kirgiz Steppes to Anadyr in northeastern Siberia, migrating southward through China and as far as New Guinea, but also into eastern Europe and a large part of Africa. Selater

¹1913, 'Vögel Paläarkt. Fauna,' II, p. 1047, Fig. 175.

²1920, Ibis, p. 627.

and Mackworth-Praed¹ report one specimen from Khartoum, and the present examples extend the winter range from the northern Sudan to the Ituri Forest within a degree and a half of the equator. But we now know that the migration extends south to Natal, and there are other specimens from tropical Africa. One was secured by Riggenbach on the Wuri River near Mt. Cameroon,² and the bird reported from Landana by Dubois as *Falco minor* is in reality *calidus*. I examined it at the Brussels Museum, and found it to be a light-colored male, with wing 304 mm. and tail 142. The wing-length of *perconfusus*, including both sexes, is given by Hartert as 270–287 mm.

That *Falco p. calidus* is not simply accidental in the northeastern Congo is shown by the frequency with which it was observed during the season of 1913–1914 along the Ituri River. In November, for the first time, we twice saw one perched on a very tall tree up the stream from Avakubi, and also watched it passing over this station at dusk. Our first specimen was shot as it sat in the dry top of a tree above a brook. On December 21, one was again noticed along the river; and two weeks later, going down by canoe to Bosobangi, we came upon a single bird, which alighted in the top of a tall, thinly-leaved tree, on the river's edge as usual, and was collected.

During the couple of months following, we saw these falcons more or less regularly along the Ituri, and also at dusk about the station of Avakubi, where one seemed to like to roost at night on a certain large tree near the cemetery. Here Nekuma and I used to wait for it, but we never succeeded in shooting it, so wary did it prove itself. On the other hand, this gave us an excellent opportunity to compare the flight of the nocturnal *Machærhamphus* with that of a true falcon, and to note the very great similarity. After the middle of March, no more peregrines were noted.

At Lukolela on the middle Congo River another specimen of *calidus* was collected on December 6, 1930. It was a female molting into adult plumage, but retaining the outermost primaries and most of its rectrices from the immature plumage; wing, 318 mm., tail 160.

In our experience, these noble birds quite justified their reputation for speed, as was proved by our finding in the stomach of one a large short-tailed swift, *Neafrapus cassini*, which is no mean flier itself, and could not have been struck otherwise than on the wing. The other food-remains were likewise restricted to birds, including a marsh tern (*Chlidonias*), a medium-sized barbet, and two green bulbuls (*Eurillas virens*).

¹1919, *Ibis*, p. 683.

²Grote, 1923, *Orn. Monatsber.*, p. 37.

Falco peregrinus perconfusus Collin and Hartert

Falco peregrinus perconfusus COLLIN AND HARTERT, 1927, Novit. Zool., XXXIV, p. 52 (type locality: mountains of the Cape of Good Hope).

Falco communis minor SCHLEGEL, 1844, 'Abhandl. Geb. Zool. Vergl. Anat.,' Heft 2, part III, p. 20 (Cape of Good Hope).

Falco minor LÖNNBERG, 1907, Arkiv. f. Zool., III, No. 21, p. 5 (Mukimbungu).

Falco peregrinus minor HARTERT, 1915, Nov. Zool., XXII, p. 173 (Stanley Pool).
GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., Stockh., (3) I, No. 3, p. 288 (Nzuru, N. of L. Kivu).
KLEINSCHMIDT, 1927, Berajah, p. 101, Pl. xli, fig. 2 (Stanley Pool).

DISTRIBUTION.—From Cape Province north to Sennar, the Gold Coast Colony, and possibly Senegal; but apparently wanting in the equatorial forests, and elsewhere very local in tropical Africa.

Gyldenstolpe's specimen from the vicinity of Lake Kivu is doubtless identified correctly, as its wing measures only 281 mm. The example collected by Laman at Mukimbungu was immature and was taken in February. The rocky eminences along the Congo cataraacts might well attract the African peregrine, but confirmation is needed.

There is a small, dark peregrine in the American Museum from the Verreaux Collection, labeled Senegal. In color and size (wing 283 mm.) it closely resembles *radama* of Madagascar, but the locality may be open to doubt. An immature specimen of *perconfusus* from Natal, doubtless a male, has the wing only 275 mm. long.

Little is on record of the habits of the African peregrine. Gyldenstolpe found a pair on some lava boulders south of the Nzuru Volcano, and I believe that it will be found to use cliffs as resting and breeding places.

ORDER GALLIFORMES

FAMILY NUMIDIDÆ. GUINEA-FOWLS

KEY TO THE GENERA OF NUMIDIDÆ IN THE CONGO

- 1.—Crown without feathers, but covered by a horny helmet which may be prolonged upward or backward; spotting of the plumage pure white. NUMIDA.
Crown with a strip of feathers in the mid-line, or a tuft arising from anterior crown and forehead. 2.
- 2.—Plumage over the greater part of body with small rounded spots which are white in the middle but appear to be bordered with blue; a tuft or patch of rather long, black feathers arising from forehead and middle of anterior crown.

GUTTERA.

Plumage mainly brownish black, or dark brown vermiculated with black, without white or blue spotting; a strip of short velvety black feathers extends from the forehead through the middle of the crown almost to the occiput.

PHASIDUS.

Phasidus niger Cassin

Phasidus niger CASSIN, 1857, Proc. Acad. Nat. Sci. Phila., VIII (1856), p. 322 (type locality: "a few miles in the interior, at Cape Lopez"). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Ituri). JOHNSTON, 1908, 'George Grenfell and the Congo,' II, p. 927 (Upper Ituri). BEQUAERT, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 309 (Ngayu). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 95 (Ituri district). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 356 (Loango; Congo forest E. to Ituri R.).

Phasidus GHIGI, 1910, Mem. Accad. Sci. Bologna, Classe Sci. Fisiche, (6) VII, pp. 346, 347, Fig. 5 (Belgian Congo). CHAPIN, 1915, Amer. Mus. Journ., p. 281 (equatorial forest, Congo).

Ngayu, 4 ♂, December 12, 20; ♀, December 12.

Babeyru, ♂, ♂ juv., July 29.

Gamangui, ♂, February 7.

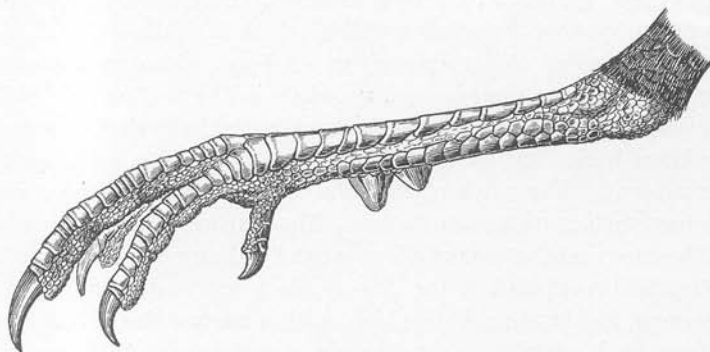


Fig. 202. Left foot of *Phasidus niger*, male. $\times \frac{2}{3}$.

Colors of soft parts the same in both sexes. Iris brownish gray; naked skin on sides and back of head light red, that on throat pinkish gray; bill dull greenish gray; feet dull bluish gray.

CHICK.—Iris dark brown; bill pale brownish-gray, blackish on middle part of maxilla; feet pale brownish-gray.

That *Phasidus* really belongs with the guinea-fowls is proved by an examination of its metacarpus, the second metacarpal having no backward process tending to bridge the gap between it and the third metacarpal, such as is always present in the true Phasianidæ.

Cassin's type, in the Philadelphia Academy, although marked male, is without spurs and probably immature, for the feathers of the belly are whitish. I have compared our single female with it; and while the color of the plumage, as well as the arrangement of the feathers about the head, are very similar, the wing of the type is 10 mm. shorter than in our female, and the tail also about 10 mm. less than this adult female's.

Her measurements are: wing, 218 mm.; tail, 144; culmen from cere, 16; metatarsus, 74.

Five adult males from the Ituri give the following measurements: wing, 210–230 mm.; tail, 136.5–155; culmen from cere, 16.5–17.

Our single female specimen has a blunt spur, 5 mm. high, on the left foot (metatarsus), but none on the right. The immature male, with abdomen still soiled whitish, has a slight bump on each metatarsus, showing that the spur was beginning to develop. All five adult males have spurs. These never exceed 7.5 mm. in length, and are single (one on each metatarsus) in three individuals, while the two remaining have two spurs on each foot. These spurs are peculiar in being laterally compressed and grooved (Fig. 202).

The chick, although its wing is already 90 mm. long, retains enough of the down to show the whole pattern, which is similar to that seen in the downy chick of *Guttera plumifera schubotzi*, although there is less light mottling above the eye, and no white in the feathers of the hind-neck. The general rufous color of the back is decidedly darker, especially on the lower back; but the buff line on each side of the lower back is of course present. The chick of *Phasidus* has no wattle at the corner of the mouth, such as we find in *Guttera*. The texture of the natal down, in both *Phasidus* and *Guttera* is fluffier, much less hairy than in *Numida*.

The full description of the downy chick of *Phasidus* follows: forehead, crown, and hind-neck blackish, with a narrow line of buff running back from each nostril to above the eye, a median spot of the same color between the eyes, and two conspicuous stripes of buff running from the vertex down the nape and hind-neck, one on each side. Upper back and wings uniform dark rufous, lower back dark maroon, indistinctly barred with black. Throat and cheeks rich buff with a slight rufous cast, this color extending up as mottlings on the lores and behind the eyes; chest rufous buff. Remaining underparts whitish, with a slight rufous wash, becoming darker on the flanks, which are separated from the middle of the lower back by an ochraceous stripe on each side.

The new feathers of the juvenal plumage, beginning to appear in the lateral tracts of the breast, the scapular and interscapular tracts, as well as the lesser and middle wing-coverts, are black, with broad ochraceous tips. The greater wing-coverts and secondaries are dark grayish-brown, with narrower buff tips, and the outer webs finely mottled with rufous. The primaries are lighter and grayer, slightly mottled with pale rufous only toward their tips.

DISTRIBUTION.—Forests from the neighborhood of the Cameroon River southward to Landana (Falkenstein) and eastward across the

Congo to the eastern Ituri forest (Ihuru River, often misspelled Epulu). In this district, from which it had already been recorded by Dubois and Johnston, we did not find it north of the Nepoko River. Up to the present time I know of no other records from Congo territory. The black guinea-fowl was unknown to native hunters at Lukolela.

HABITS.—The difficulty of finding or observing the black guinea-fowl in its forested haunts makes it difficult to say much about its habits. Our first specimens, from Ngayu, were shot by a native soldier who was exceptionally successful at hunting forest guinea-fowl, probably because he could call them up. We found that *Phasidus* is even more particular in the choice of its haunts than *Guttera plumifera*, for so far as I know, it is found nowhere save in extensive virgin forests. The two specimens from Gamaugui were trapped in the forest by our Medje carriers. One male they brought in alive uttered rapidly repeated "peeping" notes, sometimes run together so as to sound like a trill, and giving the impression that several birds, rather than a single one, were making them. The whole external appearance of the birds is decidedly chicken-like, the more so because of the relatively long tail, though I cannot say whether it is ever held erect.

Near the Ihuru River, on April 21, 1914, while hunting in the forest with Corporal Bazinga, a Babua, I heard the voice—a short, soft whistle, low in tone, and repeated over and over. This is very different from the usual calls of the spotted guinea-fowls; but the following day he proved the identification correct, for by imitating the same whistle he brought the birds up very close. Nekuma killed one of them, but at such short range that it was completely spoiled.

At Babeyru, on July 29, Nekuma shot an immature but full-sized male and a chick from a flock of about six full-grown birds and perhaps double that number of chicks, which could of course already fly. It seems strange that the parents do not keep alone with their brood. The specimens collected in December and February all had the gonads of resting size, so perhaps there is a particular time of year for breeding. The data are insufficient to decide.

The flesh of both *Phasidus niger* and *Guttera plumifera schubotzi* is rather dry eating, but unlike that of *Numida meleagris* it has in addition a peculiar strong flavor, due possibly to something they eat, such as the ants usually found in the crop. Yet the francolins of the same region, *Francoelinus lathamii schubotzi* and *F. s. squamatus*, have no such disagreeable taste.

FOOD.—Of the seven specimens examined, four had belonged to a single flock, and each of them had partaken of the same thick green

leaves, as well as ants. One of them had eaten driver-ants, and another a small white millipede as well as other insects. The fifth specimen had in its crop some large ants and a small frog. The two remaining birds had both combined vegetable with insect food, the former consisting in one case of fungi, while among the insects driver-ants were again found.

KEY TO THE SPECIES OF *Guttera* IN THE CONGO

- Plumage at base of neck black, unspotted; feathers of topknot rather curly; skin of throat (in adult) usually red. *G. edouardi*.
 Plumage at base of neck with spots of white, bordered with blue, rather larger than on remainder of body; feathers of topknot almost straight; skin of throat slaty blackish. *G. plumifera*.

Guttera edouardi seth-smithi Neumann

Guttera cristata seth-smithi O. NEUMANN, 1908, Bull. Brit. Orn. Club, XXIII, p. 13 (type locality: Budongo Forest, Unyoro. Also from Beni). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 257 (forest near Beni). SASSI, 1916, Annalen K. K. Naturhist. Hofmus. Wien, XXX, p. 239 (Moera; Ukaika). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 228 (Beni). GHIGI, 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 18 (W. of Lakes Albert and Edward).

Numida vulturina JUNKER, 1890, 'Reisen in Afrika,' II, pp. 516, 517 (near present station of Surunga); 1891, idem, III, p. 240 (N. of Uelle R. between Yakoma and Bondo).

Numida cristata DYBOWSKI, 1893, 'La Route du Tchad,' p. 318, Fig. 117 (region of Bangui). OUSTALET, 1893, Naturaliste, VII, p. 128 ("French Congo").

Numida pucherani EMIN, 1894, Journ. f. Orn., p. 164 (Bumanja).

Guttera sclateri REICHENOW, 1901, 'Vögel Afrikas,' I, p. 452 (?Ubangi R.).

Guttera cristata DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (in part. "Bumba"). O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 453 (20 miles N. W. Fort Beni). SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien XXVI, p. 348 (Moera: Beni; Ukaika).

Guttera seth-smithi GHIGI, 1915, Rivista Ital. Ornitologia, III (1914), p. 158 (W. of Lakes Albert and Edward).

"*Acryllium vulturinum*" SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, p. 267.

Guttera pallasi BEQUAERT, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 309 (Belgian Congo).

Guttera edouardi seth-smithi CHAPIN, 1923, Rev. Zool. Afr., XI, part 1, pp., 74, 77, map in Fig. 4 (Bangui; "Bumba"; Rungu; Beni); 1927, Bull. Amer. Mus. Nat. Hist., LIII, p. 475 (food). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 99 (Uganda west to Mangbetu country). SCHOUTEDEN, 1928, Bull. Cercle Zool. Congolais, V, p. 47 (N. Congo).

Numida edouardi schoutedeni HACHISUKA, 1928, 'Variations among Birds,' p. 9 (Beni).

Rungu, 2 ♂, June 27; 2 ♀, June 26, 27.

ADULT MALE.—Iris dark brown; maxilla dull light-greenish, mandible light blue; orbits and lores dusky bluish, throat and fore-neck vermillion, rest of head and neck blue; feet dusky gray, darkest on toes, becoming bluish about tarsal joint.

ADULT FEMALE.—Colors of bill, eyes, and head the same as in the male; feet a little browner.

Both sexes have the trachea looped into the hollow of the furcula.

There is a hanging fold of skin on the back of the neck, in both sexes, but instead of disappearing almost entirely after death, as in *Guttera plumifera*, in the present case it persists even after skinning. This fold was said by Reichenow¹ to be apparently lacking in *G. edouardi sclateri*, but I find it to be well developed in a male from Sakbayeme, Cameroon, in the Museum of Comparative Zoölogy. The wattles of the gape, in *G. e. seth-smithi*, are small, hanging down from 3 to 3.5 mm. in the males, less in the females. This would be a point of distinction from *G. e. sclateri*, according to Reichenow; but in the above-mentioned specimen of *sclateri* the wattle is nearly as large as in *seth-smithi*.

The crest of *seth-smithi* is well developed on the forehead, where the feathers are 23 mm. long in an adult male; on the back of the crown of the same bird the longest curly feathers, straightened out, measure 42 mm. Considerable variation in this character is indicated by the fact that in the other male, from the same flock, the longest feathers are only 33 mm. In the two females they measure 36 and 37 mm.

In *G. e. sclateri*, on the contrary, the crest feathers are only lengthened behind a point over the eyes. In an adult male example, those on the forehead do not exceed 7 mm., and the nostril is plainly exposed, because its lower edge is unfeathered. The long curly feathers on the back of the crown, however, attain a length of 46 mm.

DISTRIBUTION OF THE SPECIES.—Sierra Leone to Cameroon, the Uelle district, and Kavirondo country; south to Angola, the Zambesi, and Natal; also eastward to the coast of Tanganyika Territory. In the forest area of Lower Guinea it is limited mainly to the borders of the heavily wooded region. At least eight races are to be admitted, of which two or three occur in the Belgian Congo. *G. pucherani* Hartlaub of Kenya Colony may yet prove to intergrade with the present species.

G. edouardi seth-smithi ranges along the northern and eastern borders of the Congo forest, from the Ubangi to the Upper Uelle and the Semliki and Rutshuru Valleys, and eastward across Uganda to the Nandi district and Mau. Along the northern border of the Cameroon forest it is replaced by *G. e. sclateri* Reichenow, and along the southern border of the Congo forest by *G. e. schoutedeni*.

¹1901, 'Vögel Afrikas,' I, p. 453.

Junker was the first to report this blue-spotted guinea-fowl from the Uelle, but he confused it with the vulturine guinea-fowl of East Africa. Schouteden's reference to *Acryllium vulturinum* from Karimi,¹ on the other hand, was not based upon specimens of *Guttera*, but upon skins of *Acryllium* secured by Dr. L. Bayer in the region of Tsavo, Kenya Colony. There is a very remarkable specimen of *seth-smithi* in the Congo Museum from Beni (Bonnieville), with a large patch of cobalt-blue, narrowly streaked with blackish, covering the middle of the lower breast and anterior abdomen. At the Paris Museum, I examined an adult and an immature example of *seth-smithi* obtained by Dybowski at Bangui on the Ubangi River.

HABITS.—*Guttera e. seth-smithi* is much less a bird of the forest than *G. plumifera*. Instead, it seems more fond of gallery-forests, or the borders of large forests; and I believe this to be the blue-spotted guinea-fowl reported by our friend Judge Smets and other sportsmen as occurring in many of the isolated strips of forest so frequent in the Uelle district, even as far north as Bafuka, although I personally never met with it save near Rungu, where a flock of eight or ten was found on two successive days. They were feeding along the border between some swampy woods and a neglected plantation of bananas and manioc, now grown up with a great deal of other vegetation. They rose from the ground with a great noise of wings, scattered, and perched high in trees. I was told that they were usually very difficult to flush unless one has a dog, as we did. The voice, heard after they had taken refuge in the trees, resembled the longer nasal cackling of *Numida meleagris major*, but was drier, and not so loud.

The preference for restricted areas of forest, already mentioned, may explain the distribution of *G. edouardi*, for if it were a true bird of the dense equatorial forest, like *G. plumifera*, we should hardly expect it to be so widely distributed in East and southern Africa. About Medje and Avakubi, in the Ituri Forest, we never found any indication of the presence of *Guttera e. seth-smithi*; yet both species occur together in the region of Beni, where Pauwels procured two adults of *G. plumifera schubotzi* for the Congo Museum. In the same museum there are mounted specimens of *seth-smithi* and *schubotzi* labeled "Bumba"; and although I have felt some doubt of the occurrence of *seth-smithi* at this locality, it must not be forgotten that there are said to be some extensive tracts of grassland to the north of Bumba.

FOOD.—Three birds' crops and stomachs were examined: two of the birds had been eating nothing but manioc root, but the one taken on the

¹1918, Rev. Zool. Afr., V, p. 228.

first day had a more varied meal, consisting of many fruits, some of them starchy, four small snails, two millipedes, one small spider, two hemiptera, three large termites, and one large ant.



Fig. 203

Fig. 203. Head of *Guttera edouardi schoutedeni*, male. $\times \frac{1}{2}$.

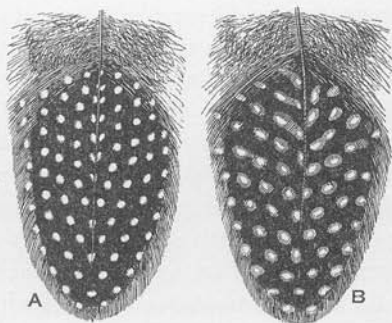


Fig. 204

Fig. 204. Feathers from lower rump of males of two races of *Guttera edouardi*; A, *schoutedeni*; B, *sethsmithi*. $\times \frac{3}{4}$.

Guttera edouardi schoutedeni Chapin

Guttera edouardi schoutedeni CHAPIN, 1923, Rev. Zool. Afr., XI, pp. 72-77, Figs. 1, 4 (type locality: Kwamouth, Belgian Congo. Also from L. Tumba; Bolobo). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, pp. 315, 388 (Kamaiembi; Kwamouth); 1924, idem, XII, p. 409 (Bikoro); 1925, idem, XIII, p. 5 (Bolobo; Kunungu; Mongende); 1928, Bull. Cercle Zool. Congolais, V, p. 47 (central forested Congo; Kasai). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.', part 1, p. 98 (S. Belgian Congo). BANNERMAN, 1930, 'Birds Trop. W. Afr.', I, p. 354 (Kwamouth; Kasai district; L. Leopold II).

?*Numida cristata* HARTLAUB, 1857, 'Syst. Orn. Westafr.', opp. p. lix ("Congo").

Numida cristata JOHNSTON, 1884, 'The River Congo,' pp. 360, 367 (Bolobo).

Guttera cristata DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (in part. L. Leopold II). GHIGI, 1910, Mem. Accad. Sci. Bologna, Classe Sci. Fisiche, (6) VII, pp. 337, 344 (basin of the Congo).

Guttera cristata schoutedeni GHIGI, 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 20 (S. Congo basin).

Similar in the form of crest and in most other respects to *G. e. seth-smithi*, but the spotting of plumage less blue, more as in *G. e. sclateri* and *G. e. edouardi*. According to Father Callewaert's labels the head is blue-black with throat and fore-neck red, the bill lighter gray.

DISTRIBUTION.—From Kwamouth and Lake Tumba to the eastern Kasai district. Possibly it extends across the Congo River to the French Congo, but records are lacking; and it might likewise be expected to reach the Lualaba River in the neighborhood of Kasongo.

At Luluabourg, Father Callewaert has procured three adults and a young bird with head and neck still clothed in natal down. The latter was taken on December 1, so eggs must be laid in that vicinity about October. It is to be noted that the color-pattern about the head in this chick is intermediate between that seen in the young of *Guttera plumifera* and of *Numida*, the black and buff lines above the eye being more regular and continuous than in *Guttera plumifera*. The median blackish stripe on the occiput is, however, much broader than in *Numida*. The plumage immediately following the down on the body is without blue spotting; beneath dusky, broadly margined with buff, above browner, barred with dusky and rufous, each feather tipped with buff and many with a bluish wash basally. The juvenal secondaries are dark gray and brown flecked with blackish, tipped with buff, the innermost somewhat barred with blue at the base. The juvenal rectrices are brownish distally, but the outer ones diffusely spotted with blue. A number of new feathers coming in on back, sides of chest, and flanks are mainly blackish barred with blue, while similar new feathers among wing and tail-coverts have blue bars tending to break up in spots. Similar chicks of *Guttera e. seth-smithi* from Uganda have been described by Seth-Smith¹ and by van Someren.²

The habits of Schouteden's blue-spotted guinea-fowl are like those of *seth-smithi*. It inhabits the heavier patches of forest in the Kasai district, as well as the southern border of the great forest near Lukolela and Lake Tumba. Here *G. plumifera* seems to be wanting. One evening in July, 1909, our steamer tied up along the wooded eastern bank of the Congo near Lisha (between Stanley Pool and Kwamouth). On the ground in these woods I noted many guinea-fowl feathers and spots where the birds had been dusting, and now have no doubt as to the presence of *schoutedeni* at that point.

¹1910, Bull. Brit. Orn. Club, XXVII, p. 14.

²1922, Nov. Zool., XXIX, p. 26.

Some race of this species was to be expected in Angola, though no specimen seems to have been collected in recent years. Bocage¹ mentioned live specimens that had been brought to Lisbon, probably from the interior of Benguella. Dr. F. Frade² has recently sought for the three specimens which Bocage acquired for the Lisbon Museum. One is still in existence; and as it differs from *schoutedeni* in the reduced number of spots on the rump-feathers, as well as the straight form of the crest-feathers, it has been named *G. e. chapini*. The type locality is Benguella.

Another specimen of *Guttera* in the Lisbon Museum, without indication of origin, has also been named *G. bocagei* Frade. It is exceptionally brownish; and accessory brown spots, interposed between the white-and-blue spots, are found on the underparts as well as on the back.

[*Guttera edouardi edouardi* (Hartlaub)]

Numida edouardi HARTLAUB, 1867, Journ. f. Orn., p. 36 (type locality: coast of Natal).

Collected by Neave in the Loangwa Valley, who noted that it was absent from the plateau of the Katanga.³ Paget-Wilkes,⁴ however, reports it from the upper Kafue River near Ndola, close to the Katanga frontier, and adds: "By no means uncommon; is certainly not confined to the Zambesi basin as Neave suggests."

If such a guinea-fowl does extend into the Katanga, as seems probable, it remains to be proved that it belongs to the typical race. The birds of the Zambesi Valley were separated as *G. e. lividicollis* by Ghigi⁵ because they have dark throats, and he believed that the typical form from Natal had a red throat. There is no mention of red on the throat in the original description of *edouardi*; and specimens from the Karkloof District of Natal agree in the colors of the head with Neave's note from the Loangwa River: "Bill, horn-colour, greyish at base; iris deep red; feet dark grey in male, blue-grey in female; bare skin of head and neck blackish, except the fold on the nape, which is a dirty white." This roughened whitish skin, extending from ear to ear around the upper hind-neck, readily distinguishes *edouardi* from *schoutedeni* and *seth-smithi*.

***Guttera plumifera plumifera* (Cassin)**

Numida plumifera CASSIN, 1857, Proc. Acad. Nat. Sci. Phila., VIII, p. 321 (type locality: Cape Lopez, Gaboon).

¹1881, 'Orn. Angola,' II, p. 399.

²1924, Bull. Soc. Portug. Sci. Nat., IX, pp. 138-140.

³Neave, 1907, Mem. and Proc. Manchester Lit. Phil. Soc., LI, part 3, p. 6; 1910, Ibis, p. 85.

⁴1926, S. Afr. Journ. Nat. Hist., VI, p. 67.

⁵1905, Mem. Acc. Bologna, (6) II, p. 196.

Guttera plumifera O.—GRANT, 1893, 'Cat. Birds Brit. Mus.,' XXII, p. 384 (Landana).

DISTRIBUTION OF THE SPECIES.—From the coast of Cameroon, Gaboon, and Portuguese Congo across the Lower Guinea forest to the Semliki Valley. The northern limit is marked approximately by Yaunde (Cameroon), Bangui (on Ubangi R.), Koloka (Lower Uelle district), and the region about Medje. The southern limit is less well known, but since it was collected by Petit at Landana we may certainly expect the typical subspecies in the Mayombe forest.

G. p. plumifera occupies the western portion of the range, from the coast at least to the river Ja in southern Cameroon. It lacks the roughened orange patches of skin near the ears and on the hind-neck. There are occasional traces, at most, of yellow spotting on the skin of these parts, whereas specimens from the Ubangi have well-marked orange patches, and are to be referred to the eastern race, *schubotzi*.

Guttera plumifera schubotzi Reichenow

Guttera plumifera schubotzi REICHENOW, 1912, Journ. f. Orn., p. 320 (type locality: Koloka, Lower Uelle District). GHIGI, 1915, Rivista Ital. Ornitologia, III, (1914), p. 170 (Koloka in Uelle Dist.); 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 30 (Koloka). BEQUAERT, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 309 (Belgian Congo). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 99 (N. E. Belgian Congo). CHAPIN, 1927, Bull. Amer. Mus. Nat. Hist., LIII, p. 475 (Avakubi). SCHOUTEDEN, 1928, Bull. Cercle Zool. Congolais, V, p. 47 (forest N. of Congo R.). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 355 (Uelle R.).

Numida plumifera DYBOWSKI, 1893, 'La Route du Tchad,' p. 318, Fig. 117 (region of Bangui). OUSTALET, 1893, Naturaliste, VII, pp. 125, 128, Fig. 1 (Bangui).

Guttera plumifera DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Bumba). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 229 (Beni).

Guttera CHAPIN, 1915, Amer. Mus. Journ., XV, pp. 281, 292 (equatorial forest, Congo).

Avakubi, 2 ♂, November 9; 3 ♀, February 25, November 9.

Penge, ♂, April 20; 2 ♀, April 21, 27; ♂ im., April 20.

Ngayu, 8 ♂, December 13, 14, 15, 21, 22; 5 ♀, December 14, 15, 17.

Gamangui, 3 ♂, January 29, February 2; 4 ♀, January 29, February 4, 7, 8.

Medje, ♀, September 7; ♂ juv., April 6; 3 ♀ juv., April 6, October 6.

ADULTS OF BOTH SEXES.—Iris dark brown; bill bluish gray, naked skin of head and neck grayish black, with an orange patch in front of each ear and on back of neck; feet bluish gray, claws black. Female very similar, with regard to these colors, to the male.

In the dried skins of *G. p. schubotzi* no fold is seen on the hind-neck that might represent the conspicuous flap characteristic of *G. edouardi*. The living birds of both sexes do, however, show a homologous fold of skin, projecting over the upper edge of the orange area on the back of

the neck. Very soon after death, the neck usually stretches out and obliterates this wrinkle, which skinning destroys entirely.

The trachea in adults of both sexes is looped into the furcula.

The sexes may best be distinguished by the length of the lappets at the corners of the mouth—about 13 mm. in an adult male, and 4 mm. in a female. They are of the same dark gray color as the adjoining skin. The crest is not markedly shorter in females than in males, nor is there any noticeable difference in the reduced feathering of the neck and throat.

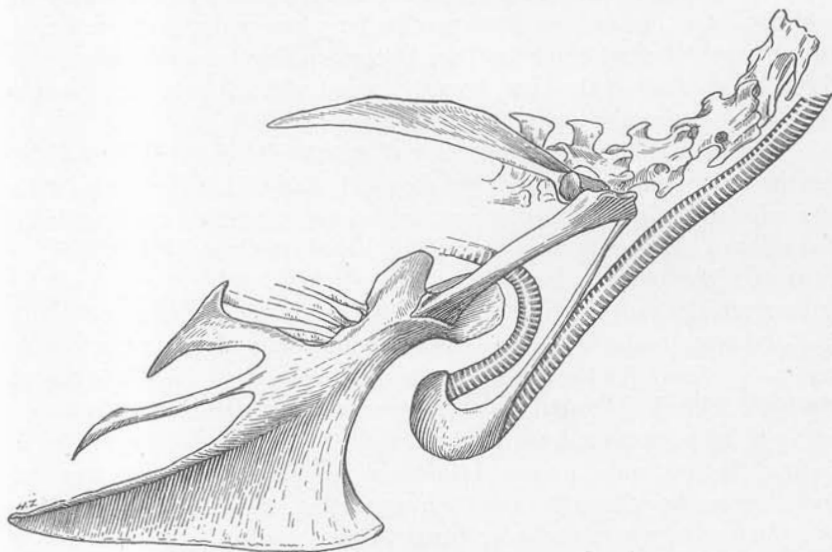


Fig. 205. Sternum and shoulder-girdle of *Guttera plumifera schubotzi*, to show looping of trachea into furcula. $\times \frac{2}{3}$.

Every one of our adults has the large roughened orange patches of naked skin on cheeks and hind-neck, characteristic of this race. They vary slightly in size and shape, and are somewhat warty in appearance; but are indicated even in immature birds with many short black feathers covering the neck.

The type of *G. p. plumifera* (Cassin), which I have examined at the Philadelphia Academy, is an immature bird, with blackish feathers on neck, nape, and throat, some on throat 13 mm. long, and tipped with buff. An adult male from the Fernand Vaz region (near the type locality), in the U. S. National Museum, collected by Aschemeier, has no more feathering on the head and neck than specimens from the Ituri. It has

a few slight traces of yellow skin-spots on the neck, and the longest feathers of the crest measure 44 mm. Another adult from the same locality has practically no sign of skin-patches.

A few feathers remaining in some of the immature examples show that the immature plumage, as in *Numida*, is very different from the adult. Feathers of the back are grayish green, barred with blackish, the secondaries and their coverts similar but only vermiculated with dusky, while the feathers of the breast are dusky, with spots or bars and a broad margin of whitish gray, and often a wash of greenish blue in addition. On the head the down persists for a long while, and is replaced by a growth of short black feathers, except on the fore-neck, where the feathers are black at the base, broadly tipped with whitish. It is at this time that the frontal topknot develops.

The color of the downy chicks of *G. p. schubotzi* is decidedly ruddy, for the wings and back are a rich chestnut, darkest on the rump, with two whitish-buff lines starting just behind the wings and running down the sides of the back almost to the tail. Each of these light lines is indistinctly bordered, on both sides, with blackish. The chestnut of the back gradually fades to a rich rufous buff on the tibiae and chest, while the abdomen and throat are paler, approaching white. The malar region is colored like the chest, but the ground-color of the whole top of the head is black. Around the eyes, lores, and nostrils there are mottled areas of light orange-rufous; and a line of the same color, beginning in front of the eye, runs up toward the middle of the crown, nearly meeting its fellow on the other side; and then separating again, they run back to the hind-neck, where the color turns to pure white. There are also a few white feathers at the side of the neck.

Iris gray; bill light buff, with a broad blackish patch at base of culmen, and a small yellow wattle at the corner of the mouth. Feet yellowish, a dusky line down each side of metatarsus and toes, claws pinkish white.

In young of this size, as might be expected, the trachea is normal and does not loop into the furcula as in adults. The bases of the feathers on the forehead, as seen from inside the skin, form a dense dark patch in just the spot where the tuft arises from the heads of adults.

DISTRIBUTION.—The transition from typical *plumifera* to the more eastern *schubotzi* appears to take place in the region of the Sanga River. The latter race then extends to the vicinity of Beni, where Pauwels obtained two adults for the Congo Museum. There is also an immature bird from Bumba in the same museum. Boyd Alexander secured a

young female at Molegbwe on the Ubangi, and two specimens taken by Schubotz at Duma in the Ubangi district (in Berlin and Frankfort) have well-marked yellow patches on hind-neck and near the ears.

Thus far there seem to be no records in the Upper Congo from south of the equator, but this tufted guinea-fowl is the common species of the northern and central parts of the Ituri Forest. It is very different from the horned guinea-fowls of the open country, both in habits and voice. Yet it is decidedly gregarious—save perhaps when nesting—and roams through the forest in flocks of twenty to forty containing both sexes, not alone in the virgin, uncut sections, but also in the extensive patches of “magongo” (*Sarcophrynium Arnoldianum*) which probably mark the site of some ancient clearing. They betray their presence, especially during the short dry season, by scratching up the leaves in the elephant-paths, or scooping hollows in the dry earth to dust themselves, leaving a few blue-spotted feathers here and there which prove their identity.

Sometimes one sees them running off quietly when alarmed by hunters, but more likely one is to be attracted by their notes, for at intervals the flock will utter a confused chorus of discordant sounds like “ka-ka-ka-ka-ka . . .” continuing for several seconds, not shrill or very loud, and quite unlike the notes I have heard from *Numida meleagris* or even *Guttera edouardi*. You make your way toward this sound, and with good luck you may come across them, or, if still more fortunate, cause them to fly up into the trees. There they scatter, and depart with whirring wings, one or two at a time, as they feel that they have been discovered. No vocal sounds are uttered then.

Native hunters, however, are able to call the forest guinea-fowls as they call the forest duikers. Once between Penge and the river Ihuru, we came upon a large flock of *Guttera p. schubotzi*, ran after them, and finally lost them, when Corporal Baginza, who was with me, said he would call them. Closing both nostrils with his fingers, he gave a loud, nasal “kow!” (=kau), repeated it several times, and then waited. Up to this time, the birds had not made a sound, yet they responded almost immediately with a confused chorus of a loud nasal “kāk!” When this had ceased Bazinga called again, and the birds answered as before. He now stationed us a little to one side, and withdrawing a short distance, he proceeded to call the whole flock up past us. It took considerable calling back and forth, but finally we spied them, dodging along beneath the undergrowth, directly toward their deceiver. They had the rounded backs and smooth plumage of all the typical guinea-fowl.

A shot brought down two, but the rest only ran the faster, till they came within a couple of yards of the soldier. Seeing him, some took to the trees and scattered, the rest making off on the ground.

It must not be overlooked that the call which *Baginza* was giving ("kow!") did not resemble the "kāk" with which most of the birds responded. Yet among the latter there were one or two which did give the same call as the man, and I believe this to be a special note indicating guidance or defiance. One night along the Ituri River I heard a guinea-fowl repeat such a note in series of four syllables.

Dissection of the birds to determine their sex showed adults in the non-breeding condition in November, December, January, February, and April. Yet a set of ten eggs was brought to us near Medje on March 14, with feathers of the sitting bird. The bird had been trapped, but then devoured by some animal. These eggs are of a pale buff color with finely pitted surface, and in some cases a browner deposit that fills the pores or even forms light brown shell-markings. Dimensions: 50.1–53.3 mm. by 38.6–39.9. A female with enlarged ovary was taken at Medje on September 7, and downy chicks on April 6 and October 6. This shows merely that there is not a definite short breeding season, and that laying probably seldom takes place in the dry season.

On the river Ja, where the season are much the same as in the northern Ituri, Bates¹ secured chicks of *G. p. plumifera* in November, and a setting hen in August. The eggs of the latter numbered nine and were laid on dry leaves in the forest. They were whitish but much stained, with pitted shell, pointed at one end and very blunt at the other, and measured 47.5–49 mm. × 37–38.5 mm.

The mixed diet of the species is shown by the results of examination of crop and stomach in fifteen individuals. In most cases, of course, vegetable food predominated, one of the most characteristic things eaten being a bright blue, three-chambered seed-capsule which Dr. Bequaert thinks may come from a *Dracæna*. So far as I could learn, they never come into plantations to dig up manioc or sweet potatoes.

Among the animals eaten, foremost come the snails, many with hard shells, but others, the helixarions,² with softer chitinous ones. Slugs were far fewer. Ants were more frequently found than insects of any order, while among the grasshoppers were noted the small brown grouse-locusts, with high keeled back, which are found among dead leaves of the forest floor.

¹1911, *Ibis*, p. 492.

²Genus *Helixarion* and allies of subfamily Helixarioninae. The slugs eaten were mostly of family Vaginulidae, though perhaps also of Urocyclidae, which are found in the same region.

	Number of Cases in which Found	Number of Individuals Eaten
Seeds, both hard and soft.....	12	..
Seed capsules.....	6	..
Other fruits.....	4	..
Leaves.....	1	..
Unidentified vegetable matter.....	1	..
Snails.....	8	53+
Slugs.....	3	5
Millipedes.....	2	2
Spider.....	1	1
Roaches.....	2	2
Grasshoppers.....	2	2
Cricket.....	1	1
Hemiptera.....	4	5
Beetles.....	4	4
Beetle larva.....	1	1
Termites.....	1	3
Ants.....	8	16+
Undetermined insect larvæ and pupæ.....	2	5

KEY TO THE RACES OF *Numida meleagris* OCCURRING IN OR NEAR THE CONGO

- 1.—White bars on the outer webs of the middle secondaries extend to the very margin of the feathers; few if any horny "bristles" at base of culmen.....2.
 White bars on the middle secondaries do not reach the outer margin of the feathers, which is of a uniform, finely speckled pattern; a patch of horny "bristles" usually present on base of culmen.....6.
- 2.—Plumage at base of neck dull bluish or brownish lilac, either uniform or with some fine whitish barring.....3.
 Plumage at base of neck not bluish or brownish lilac, but barred or speckled with blackish and white.....4.
- 3.—Fore-neck dull bluish or lilac without white barring; wattles broad, nearly oval in form, entirely red.....*marchei*.
 Fore-neck dull bluish or lilac with fine whitish barring, though these markings may not be conspicuous; wattles narrower, more pendent, only the distal half red.....*callewaerti*.
- 4.—Helmet largely yellowish or orange, with rather blunt horn curving backward.....*marungensis*.
 Helmet brown or red-brown, its horn straighter and slenderer, though often inclined backward.....5.
- 5.—Gape-wattles oval, broader than they are long.....*intermedia*.
 Gape-wattles very narrow, much longer than broad.....*mitrata*.
- 6.—Sides of upper neck thickly covered with small, stiff, black feathers; plumage at base of neck finely barred with blackish and white, sometimes with a superficial gloss of blue; nasal "bristles" usually well marked.....*major*.
 Sides of upper neck only sparsely clothed with fine black feathers.....7.

- 7.—Plumage on lower fore-neck not bluish, but gray, finely barred with whitish and often with blackish, fine whitish shaft-streaks may be present; nasal "bristles" usually present. *toruensis*.
 Plumage of lower fore-neck largely bluish or violaceous, but little barred or vermiculated with whitish; nasal bristles often scanty. *strasseni*.

***Numida meleagris marchei* Oustalet**

Numida marchei OUSTALET, 1882, Annales Sci. Nat. Zool. Paris, (6) XIII, Art. 1 bis (type locality: Ogowé River, Gaboon); 1893, Naturaliste, VII, p. 128 (interior of Gaboon and of Congo).

Numida cornuta JOHNSTON, 1884, 'The River Congo,' p. 367 ("Upper river," Stanley Pool to Bolobo).

Numida meleagris marchei NEUMANN, 1898, Orn. Monatsber., p. 19 (Lower Congo; Kwango R.).

Numida meleagris var. *marchei* GHIGI, 1910, Mem. Accad. Sci. Bologna, Classe Sci. Fisiche, (6) VII, p. 339 (Lower Congo).

Numida galeata marchei SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 388 (Kwamouth); 1925, idem, XIII, p. 5 (Mongende; Kunungu; Bolobo).

DISTRIBUTION OF THE SPECIES.—In view of the intergradation we now know to take place in the regions of the Ubangi, Kasai, and southern Uganda, it is impossible to retain *galeata* and *mitrata* as binomial species. One would be at a loss to know where to place such a race as *strasseni*, or the specimens we have received from the eastern Kasai. The only solution is to reduce *galeata* and *mitrata* to subspecific rank, so that the range of *Numida meleagris* extends from Senegal, Asben, Darfur, Nubia, and Yemen in southwest Arabia south to eastern Cape Province, except for the rain-forests of western Africa. *Numida sabyi* Hartert, of Morocco, and *Numida papillosa* Reichenow, of Southwest Africa, in my opinion, are scarcely distinct enough from *meleagris* to rank as species.

The subspecific characters distinguishing *marchei* from *galeata* of Senegal were given thus by Oustalet: a lower horn on crown, smaller gape-wattles, unspotted area of fore-neck more violaceous, ground-color of plumage generally blacker, so that the white spots stand out more distinctly. I have examined the type and another specimen from the Ogowé River in the Paris Museum, and found them but little different from *galeata* of Upper Guinea. Slight variations in the vinaceous gray or brown of the fore-neck are of no great weight, and the gape-wattles in *marchei* have the broad form of *galeata*, though perhaps they are shorter.

The range of *N. m. marchei* doubtless extends from the savannas of the Gaboon to the lower and middle Congo River; and specimens from the lower Niger to Cameroon are often referred to this race, although it is

not known to occur in the heavy forest area of southern Cameroon. I have not been able to examine specimens from the Lower Congo, but in Tuckey's 'Narrative of an Expedition to Explore the R. Zaire,' 1818, pp. 329, 357, there are several mentions of guinea-fowl, and during my stay at Boma I scoured the vicinity for them. Finally I came upon a flock of half a dozen on a steep hillside, fired at one on the wing, and then lost all trace of them. At Mistandunga, on the Congo River above Bolobo, Franklin Edson obtained a male of *marchei* in July, 1930; and the Paris Museum has a female collected by Dybowski at the village of "Youmba," supposedly Yumba on the lower Ubangi.

Just how far inland *marchei* extends is still doubtful. Somewhere along the lower Kasai River, presumably, it begins to show a narrowing of the gape-wattles, which become bluish at the base, while the cheeks are blue. Faint barring appears in the lilac area of the fore-neck. The region of Luluabourg is inhabited by a race which I find to be distinct.

***Numida meleagris callewaerti* Chapin**

Numida meleagris callewaerti CHAPIN, 1932, American Museum Novitates, No. 570, p. 1 (type locality: Luluabourg, Kasai District, Belgian Congo).

Numida galeata marchei SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 316 (Macaco; Kamajambi; Luebo; Dumbi; Kabambaie; Ngombe in Kasai; Basongo).

Numida meleagris marchei BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 349 (Luluabourg).

The horned guinea-fowl of the eastern Kasai district, of which we have a series of more than a dozen collected by Father Callewaert near Luluabourg, stands about midway between *Numida m. marchei* and *N. m. marungensis*, having the plumage of the base of the neck strongly washed with brownish lavender or bluish, but finely barred, for the most part, with whitish. The outer webs of the secondaries have broader white bars than in *galeata*, and the wattles are narrower and usually only tipped with red. The horny helmet is low, and of a reddish-brown color. There is no trace of horny bristles above the nostrils, so these specimens cannot be referred to *strasseni*. At Tring I saw a very similar specimen from Duque de Bragança, northern Angola (Ansorge), and it seems possible that specimens from the Kwango River may belong here rather than with *marchei*.

The eggs, near Luluabourg, must be laid toward the beginning of the rains, for Father Callewaert sent us two newly hatched chicks taken on December 9, and a somewhat older one, with wing 145 mm., captured on January 14.



Fig. 206. Head of *Numida meleagris callewaerti*, from specimen taken near Luluabourg, Kasai district. $\times \frac{2}{3}$.

***Numida meleagris strasseni* Reichenow**

Numida strasseni REICHENOW, 1911, Orn. Monatsber., p. 82 (type locality: Duma on the Ubangi R.).

Numida marchei DYBOWSKI, 1893, 'La Route du Tchad,' p. 318, Fig. 117 (region of Bangui).

Numida meleagris marchei REICHENOW, 1901, 'Vögel Afrikas,' I, p. 437 (Ubangi R.).

Numida galeata stresseni W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 96 (Ubangi region).

Numida ptilorhyncha strasseni GHIGI, 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 42 (Ubangi R.).

Numida meleagris strasseni BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 350 ('lower' Ubangi R. to Shari R. basin):

DISTRIBUTION.—Grasslands just north of the equatorial forest in the region of Bangui and the southward bend of the Ubangi River, and northward for a considerable distance into French Equatorial Africa.

As indicated in the original description, *Numida m. strasseni* is an intermediate form between *Numida m. galeata* and *N. m. major*. Its affinity to the former is indicated by the bluish wash on the feathers of the base of the neck, but the bristles above the nostrils and the "pepper-and-salt" edgings of the secondaries recall the northeastern races of helmet guinea-fowl.

Professor Reichenow was scarcely justified in announcing this as a guinea-fowl of the true forest area, for Duma is just north of the border of solid forest on the Ubangi. I know of no specimens of *Numida* from the banks of the Ubangi farther south, until they reappear at Yumba on the right bank, a half-degree north of the equator, where Dybowski obtained an example of *Numida m. marchei*.

***Numida meleagris major* Hartlaub**

Numida ptilorhyncha var. *major* HARTLAUB, 1883, Abhandl. Naturwiss. Verein Bremen, VIII, p. 216 (type locality: Wakkala, Mongalla Province, Anglo-Egyptian Sudan).

Numida ptilorhyncha SHELLEY, 1888, Proc. Zool. Soc. London, p. 48 (Tingasi). O.-GRANT, 1893, 'Cat. Birds Brit. Mus.,' XXII, p. 379 (Tingasi). EMIN, 1894, Journ. f. Orn., p. 164 (Ndussuma). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 445 (in part. Tingasi). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, pp. 70, 243 (Mangbetu country; Dongu).

?*Numida ptilorhyncha* var. *major* DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, pp. 18, 27, text-fig. (Province Orientale).

Numida ptilorhyncha var. *inermis* DUBOIS, 1905, idem, p. 19 (Province Orientale).

Numida ptilorhyncha toruensis REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 256 (Semliki Plain on L. Albert). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 228 (in part. L. Albert; Kilo).

Numida ptilorhyncha toruensis SCHOUTEDEN, 1914, Rev. Zool. Afr., III, p. 262 (Kilo).

Numida ptilorhyncha major GRANT, 1915, Ibis, pp. 26, 30 (in part. Tingasi; Poko). BEQUAERT, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 309 (Faradje).

Numida CHAPIN, 1915, Amer. Mus. Journ., p. 285 (Uelle district).

Numida meleagris inermis W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 98 ("Uelle and Upper Congo valleys"). CHAPIN, 1927, Bull. Amer. Mus. Nat. Hist., LIII, p. 476 (Uelle savanna).

Numida ptilorhyncha inermis GHIGI, 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 42 (Uelle Valley; Upper Congo).

Rungu, 3 ♂, 2 ♀, October 30.

Niangara, ♂, November 13; 3 ♂ juv., November 7, 9, 23; 6 ♀ juv., November 7, 20, 27, December 7.

Faradje, 2 ♂, February 28, December 16; 4 ♀, March 2, 3, September 10, December 2.

ADULTS OF BOTH SEXES.—Horny crown dark brown in middle, lighter around edges; orbit dark brown slightly purplish, skin on back of neck dusky, on throat a dark flesh-color, wattle at corner of mouth light blue, a few blue spots on the side of the head near ear; maxilla rather bright reddish-brown with light buff tip, a tuft of light brown bristly papillæ over the nose, mandible light grayish-buff; iris brown; feet very dark brown.

DISTRIBUTION.—From the Upper White Nile near Lake No, and southern Abyssinia as well, to the eastern Ubangi-Shari district, the savannas of the Uelle, of Uganda, and of the northeastern Congo border south to the mouth of the Semliki River. Along the border of the forest in the southern Uelle the helmet is always very low, and to the westward this form intergrades with *strasseni*. To the north of Lake Edward, on the other hand, there is a reduction of the nasal bristles, a backward inclination of the horn, and a slight approach in the color of the secondaries to the races of southeastern Africa. On these characters Neumann based his subspecies *toruensis*, which I find to be a valid race.

The type of *inermis*, described as coming from the Province Orientale and now labeled "District de Stanleyville," is a bird such as one finds in the Uelle or the vicinity of Lake Albert. This race has far less claim to recognition than *toruensis*. There are two specimens in the Congo Museum from Buta (Hutereau) which I would refer to *major*; also two labeled "Umangi" which agree in every particular with Uelle birds. I still have some doubt of the occurrence at Umangi in the Bangala district, but they may, of course, have found their way in from the north through native clearings.

None of our specimens from the Uelle has more than a very low conical horn on the head, while the broad pepper-and-salt border of the secondaries is conspicuous, and the light spotting on the inner webs of the primaries is much reduced. There are a great many more small black feathers on the neck than in the *mitrata*-group, those on the nape being curly.

While the feathers of the fore-neck and chest do show a bluish luster, there is no approach to the uniform dull blue or lavender-brown coloration as in *N. m. galeata*, and consequently these birds are not to be referred to *N. m. strasseni*. I have compared the Uelle specimens with others from the Bahr-el-Jebel and northern Uganda, and find no difference which would justify the separation of *inermis*. In 1926 I collected specimens at Kasenyi on Lake Albert and found them to belong with *major*.

PLUMAGES.—The newly hatched chick of *N. m. major* is clothed with rather coarse, hairy down, and is conspicuously streaked about the head with blackish, on a background of rich buff. The broadest stripe is median; beginning at the base of the culmen, it widens on the back of the crown, and stops on the hind-neck. At each side of this there are approximately five narrower black streaks, occasionally interrupted, and some joining posteriorly. The more central pair extend down as indistinct dark marks on to the upper back, which is otherwise ochraceous. The upper side of the wings is ochraceous, with a rufous area at the elbow and a blackish spot on the forearm. The lower back is rufous in the middle, has two stripes of yellowish buff at the sides, more or less outlined with blackish. Lores and throat whitish, chest ochraceous, middle of abdomen whitish, flanks washed with pale rufous-buff. Iris grayish brown, bill and feet buff.

The first plumage after the down, i.e., the juvenal plumage (of Dwight), as in all the members of this group of guinea-fowl, is quite unlike the adult plumage, being brown and buff above, buff and light gray below, with pointed lunulate markings of blackish. The inner secondaries are blackish, with rusty vermiculations toward the tip, and barred with ochraceous, the other secondaries gray, vermiculated on the outer web with ochraceous. The down is retained meanwhile on the head, and the appearance of the juvenal plumage on the neck is retarded. Here the feathers have light shaft-streaks.

The first black-and-white feathers to appear are barred rather than spotted, but they seem not to constitute a definite, complete plumage, for by the time the young are fully grown, they have a plumage similar to that of the adult, and are molting the first remiges and rectrices.

HABITS.—These horned guinea-fowls, while avoiding the unbroken forests, may be found almost anywhere in the open country of the Uelle, running on the ground in grassy situations, scratching in the native farm-lands, or calling in harsh nasal tones as they perch in the tall trees of bottomlands along some watercourse. During the breeding season, which begins in the latter part of the rains, they pair off; but as soon as the brood begins to roam, flocks are formed, of considerable size, which remain together for eight or nine months.

Thus at Rungu on October 30, we found detached pairs in fields of sweet potatoes, where they fed in the bare patches of earth between the hillocks hoed up around the vines. From there, when approached, they would fly up with harsh cries and heavy flight, to take refuge in the trees. From such perches the more typical nasal call "kääää-k-k-k-k . . ." would be uttered.

About a week later, at Niangara, the natives began to bring us small chicks, easily recognized by their relatively coarse hairlike down, and five more or less continuous black stripes on each side of the head. We soon had the pleasure of meeting a family in a field of millet (*Eleusine*). There were two old birds and ten or a dozen young, the latter just beginning to fly. The heads of the parents, bobbing anxiously about in the vegetation, were first seen; then one flew off noisily, and a moment later the second arose, and made for the nearby trees, the rest of the family following in the air as best they could. The young stopped in the first small tree they came to, but when approached continued their flight, one by one, and finally disappeared, as though they had dropped down again into the tall, dense grass.

On November 20, a set of thirteen eggs was brought to us by a native. The eggs were heavily incubated, and had very thick shells, with finely pitted surfaces. The color was brownish white, irregularly spotted and blotched with brown, probably as a result of soiling.

At the end of January, great flocks were observed between Dungu and Faradje, composed largely of immature birds, and very noisy when disturbed. During the months of June and July, flocks of moderate size were still to be observed, and it is at this season that another note is most frequently heard, a rather musical "tüt-wě, tüt-wě, tüt-wě . . ." repeated rather slowly from a perch in a tree, and interpreted by natives generally as a love-note or mating-call. It seemed to correspond to the harsher "pot-rack" of the domestic breed.

During the next two years we passed in the Uelle, the same cycles of behavior were gone through by the guinea-fowl, their period of nesting being determined by the seasons with the usual regularity of a country that undergoes a long period of drought. I believe that only one brood is raised in a year.

Food.—Small stones are commonly found in the gizzard; and the food most often observed was the native millet, called "malu" by the Mangbetu, and by botanists *Eleusine coracana*, the ragi millet of India. These small round seeds, of ruddy color, were found abundantly in the crops of five birds, in fact one of them had eaten it while still unripe, in September. This grain is harvested, as a rule, in November and December. Sweet potatoes, among other crops, also suffer from these omnivorous birds.

Various other vegetable substances and seeds are consumed, as well as insects, snails, and other invertebrates; but it is rather surprising to find most numerous among the insects eaten the large, black, termite-

hunting ant, *Megaponera fœtens*. The result of an examination of crops and stomachs of ten adult birds is tabulated below.

	Number of Cases in Which Found	Number of Individuals Eaten
<i>Eleusine</i> millet.....	5	..
Grass seeds.....	2	..
Other seeds.....	5	..
Sweet potato.....	2	..
Green vegetable material.....	1	..
Small snails.....	1	6+
Millipede.....	1	1
Weevil.....	1	1
Other beetles.....	2	4+
Chrysalis.....	1	1
Hemiptera.....	2	2
Large termites.....	2	7+
Large ants (<i>Megaponera</i>).....	4	11+
Other ants.....	1	1
Unidentified insects.....	2	Number not determined

Numida meleagris toruensis Neumann

Numida ptilorhyncha toruensis NEUMANN, 1904, Journ. f. Orn., p. 410 (type locality: Mokia River, southeast base of Ruwenzori. Also from Holulu R. in Semliki Valley). REICHENOW, 1905, 'Vögel Afrikas,' III, p. 813 (Holulu R.); LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 12 (Kasindi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 228 (in part. L. Edward; Lisasa; confluence of Talia and Semliki; Old Mission St. Gustave). GHIGI, 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 39 (Holulu R.).

Numida toruensis JACKSON, 1906, Ibis, p. 507 (Katwe; Kangao's).

Numida ptilorhyncha O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 453 (Mokia). HARTERT, 1900, Nov. Zool., VII, p. 30 (Holulu R., tributary of Semliki). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 445 (in part. Holulu R.).

Numida ptilorhyncha var. *toruensis* GHIGI, 1910, Mem. Accad. Sci. Bologna, Classe Sci. Fisiche, (6) VII, p. 342 (Holulu R.).

Numida ptilorhyncha var. *major* GHIGI, 1910, idem, (6) VII, p. 342 ("Ruwenzori").

Numida ptilorhyncha major C. GRANT, 1915, Ibis, pp. 26, 29 (in part. Semliki R.; Ruwenzori). GHIGI, 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 38 ("Ruwenzori").

Numida meleagris major W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 97, footnote (Mokia R.).

Although few recent writers have admitted the validity of this race, it may, nevertheless, be recognized. It exhibits the first stages in the transition between the *meleagris* group (formerly called *ptilorhyncha*) and the *mitrata* group. The nasal bristles are reduced in size and number,

the feathering on the sides of the upper neck has dwindled, and the white bars on the outer webs of the outer secondaries are beginning to approach the margin. But the wattle is still short and wide, and entirely blue, like the patches which (in life) extend from the lower lores almost to the nape. *Numida m. toruensis* is more closely allied to *intermedia* than to *major*.

DISTRIBUTION.—Upper Semliki Valley and northern shore of Lake Edward, around the southern base of Ruwenzori, and eastward towards Lake Wamala. At Mitiyana, Uganda, I have shot specimens which show an approach to *major*.

Around the southern base of Ruwenzori it is a common bird, but I have never seen it above 4500 feet. The habits are the same as those of *major*. So close to the equator the breeding season may not be very short. Two specimens taken at Mitiyana near Lake Wamala were in non-breeding condition in July, a female from the lower Butahu Valley was laying on November 13. Yet an adult male from the Mbondwe River (southern Ruwenzori), January 22, was not breeding.

***Numida meleagris intermedia* Neumann**

Numida marungensis intermedia NEUMANN, 1898, Orn. Monatsber., p. 21 (type locality: west shore of Victoria Nyanza, south to Kagera).

Numida intermedia SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 348 (Sultanate Kissaka).

Numida ptilorhyncha toruensis SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 228 (in part. Burunga).

?*Numida intermedia* SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 228 (Kaniki).

Numida mitrata intermedia GHIGI, 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 49 (W. of L. Victoria).

This race is intermediate between *N. m. toruensis* and *mitrata*. In some specimens, there are vestiges of nasal bristles; and while the wattles are still rather broad, and blue basally, they are usually tipped with red or red-brown. The "horn" may be bent backward somewhat more than in *mitrata*, but is not so thick at the base (from front to rear) as in *marungensis*. The white bars on the outer webs of the secondaries reach the margins, but there is much white speckling on the intervening black bars.

DISTRIBUTION.—Country west of Lake Victoria, and thence to the Rutshuru Plain and south shore of Lake Edward. Derche is said to have collected it at Burunga, possibly the village of that name at the base of the central Kivu Volcanoes, which is a little above 6,000 feet. Pilette's specimen from Kaniki on the northwest shore of Lake Edward may really

belong with *toruensis*. The occurrence in the Kissaka district suggests that this guinea-fowl may also extend into Urundi and Ruanda. But no race has been found directly around the shores of Lake Kivu, and only *marungensis* in the Ruzizi Valley.

I have myself collected three adults of *intermedia* at Kitehe, north-east Rutshuru Plain, in early May. A female was then in condition to breed.

[*Numida meleagris mitrata* Pallas]

Numida mitrata PALLAS, 1767, 'Spicilegia Zoologica,' I, fasc. 4, p. 18, Pl. III (type locality: Madagascar). GHIGI, 1910, Mem. Accad. Sci. Bologna, Classe Sci. Fisiche, (6) VII, p. 340 (L. Tanganyika).

This race of guinea-fowl, besides inhabiting Madagascar and some of the adjacent islands, has an extensive range in East Africa, especially along the coast from Mombasa to southern Mozambique, but extending inland to the Loangwa Valley and the eastern shore of Lake Tanganyika. Whether it occurs within our limits is doubtful, it probably does not cross Tanganyika.

Its wattles are long and narrow, with the distal half or more red; helmet with pointed horn; outer margins of secondaries boldly barred with black and white.

***Numida meleagris marungensis* Schalow**

Numida coronata marungensis SCHALOW, 1884, Zeitschr. Gesammte Orn., Budapest, I, p. 105 (type locality: Marungu, S. W. of Lake Tanganyika).

Numida coronata SCHALOW, 1886, Journ. f. Orn., p. 412 (Mpala). MATSCHIE, 1887, Journ. f. Orn., p. 147 (Mpala; Lufuku; Manda; Lufua R.; Lulenge brook; Tongo; Likulwe; Mbuga Viano). GHIGI, 1910, Mem. Accad. Sci. Bologna, Classe Sci. Fisiche, (6) VII, p. 345 (L. Tanganyika).

Numida coronata var. SCHALOW, 1886, Journ. f. Orn., p. 430; (Lufua R.); 1887, idem, p. 228 (Marungu Mts.).

Numida marungensis NEUMANN, 1898, Orn. Monatsber., pp. 17, 18, 20 (W. shore of L. Tanganyika; Lufuku; S. W. of Tanganyika; Lufua); 1899, idem, p. 26 (Marungu). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 443, footnote (Marungu; Lufua R.; Lulenge R.; Likulwe R.; Manda; Mpala; Lufuku R.). NEAVE, 1907, Mem. and Proc. Manchester Lit. Phil. Soc., LI, No. 10, p. 6 (E. bank of Kafue, near Ndola); 1910, Ibis, p. 85 (Dikulwe R., 4000 ft.; Bunkeya R., 3000 ft.). NEAVE, 1910, Geogr. Journal, XXXV, p. 142 (Katanga Plateau).

?*Numida frommi* KOTHE, 1911, Orn. Monatsber., p. 13 (Uanda on L. Rukwa; Kitungulu in Urungu; Mbuga Ufile in Ufipa).

Numida ptilorrhyncha RODHAIN ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' pp. 150, 152, 156, 158 (Sankisia; valley of the Muanza).

Numida sp. MOURITZ, 1914, Ibis, p. 32 (Luapula R.).

Numida mitrata marungensis W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 96 (Katanga, to S. end of L. Tanganyika). GHIGI, 1927, Pubbl. Staz. Sper. Pollicolt. Rovigo, II, p. 52 (Katanga; S. end of L. Tanganyika).

Numida mitrata PAGET-WILKES, 1926, S. Afr. Journ. Nat. Hist., VI, p. 67 (upper Kafue R. near Ndola).

Numida ? marungensis DE RIEMAECKER, 1927, Rev. Zool. Afr., XIV, p. 266 (between Elisabethville and Kasenga).

Numida meleagris marungensis SCHOUTEDEN, 1930, Rev. Zool. Afr., XVIII, p. 280 (Elisabethville).

DISTRIBUTION.—From the Kafue River in Northern Rhodesia across the Katanga to the southern end of Lake Tanganyika, Marungu, down the Lualaba to the vicinity of Kasongo, to the northern end of Tanganyika and the lower Ruzizi Valley.

For many years after the Marungu guinea-fowl was described from Böhm's notes, there were no specimens from the region where it had been discovered. Neave was the first to send them home, and to show that the casque and horn are really yellowish or orange, the cere and ridge above the eye red, lappets cobalt-blue tipped with red, the sides of the head being pale greenish-blue, and the nape and hind-neck black, spotted with greenish blue at the sides. The helmet is curved backward, but not so compressed nor so long as in *N. m. coronata* Gurney of South Africa. The plumage-pattern is similar to that of *N. m. mitrata*, but more spotted on the upper chest.

Dr. J. Bequaert has shown me a sketch he made from a guinea-fowl killed at Kongolo, February 9, 1911, with notes as to the colors of the head. These agree rather closely with those of *marungensis*; and while the casque is noted as "dirty yellowish white," this is very different from the brown casque of specimens from Luluabourg. The horn is rather low, and deflected posteriorly as in *marungensis*. This example was a male, one of a flock of about a dozen, running on the ground amid the grass and sometimes perching in trees.

Mouritz found this guinea-fowl numerous in the southeastern Katanga, but extremely wary, probably because of the approach of the breeding season (this was about November). In the northern Katanga, Böhm secured his first *Numida* eggs on December 18, and noted a hen with about twenty chicks on January 17.

Before 1927 there was no record of *marungensis* from the northern end of Tanganyika. In July of that year, I met Mr. H. Preumont at Luvungi; and he informed me that he had seen guinea-fowls at only one spot in the Ruzizi Valley, near the Lubirizi River. The following day, when I visited his camp at that place, he presented me with four

specimens, freshly killed. One was a young bird about four months old. These examples from the Ruzizi have the helmet less markedly swollen than others from Marungu, but in other respects the agreement is close.

Numida meleagris maxima Neumann, of the highlands of southern Angola, is closely allied to *marungensis*, but its helmet bears a longer horn which is often strongly bent backward and downward.

FAMILY PHASIANIDÆ. QUAILS,

PARTRIDGES, FRANCOLINS

KEY TO THE GENERA OF PHASIANIDÆ OCCURRING IN THE CONGO

- 1.—Throat, as well as skin before and behind eye, naked; tiny scattered feathers sometimes grow on throat, but do not cover the skin; adult males with spurs
PTERNISTIS.
Throat feathered; whole face feathered, or sometimes a bare space around or behind eye.....2.
- 2.—Wing less than 110 mm. long.....3.
Wing more than 110 mm. long.....4.
- 3.—Smaller: wing less than 85 mm. long; male with dark slate-blue breast, female with upper breast and flanks barred with black on a buff ground, the bars somewhat crescentic in shape.....EXCALFACTORIA.
Larger: wing more than 85 mm. long; breast usually buff or rufous, but plain black in male of one species, otherwise any dark markings on upper breast and flanks are spots or streaks, not regular bars.....COTURNIX.
- 4.—Tail two-thirds as long as wing, and wing not longer than 130 mm.; a small naked space around eye; a patch of buff on middle of breast, remaining plumage darker; male without spurs.....PTILOPACHUS.
Tail about half as long as wing, or less.....5.
- 5.—Adult male without spurs; breast black with spots or streaks of white at sides of feathers; but throat white, often spotted posteriorly with blackish; skin around eye bare; wing not more than 151 mm. long.....ACENTROTYX.
Adult male almost always with one or two pairs of spurs¹; breast not black with white spots unless throat is wholly black; generally only a spot of skin behind eye is bare.....FRANCOLINUS.

Excalfactoria adansonii (Verreaux)

Coturnix adansonii J. AND E. VERREAUX, 1851, Rev. Mag. Zool. Paris, (2) III, p. 515 (type locality: Gaboon).

Excalfactoria adansonii O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 451 (Mokia, 3400 ft.). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 260 (Kisenyi). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 230 (Kalembélembe); 1923, idem, XI, p. 316 (Ngombe in Kasai district). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 94 (Uelle district). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 343, Pl. ix (eastern Belgian Congo).

¹The male of *Francolinus streptophorus* is apparently without spurs, while the female of *F. hildebrandti* regularly has them.

Excalfactoria adansonii GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 318 (Ngoma). CHAPIN, 1927, Bull. Amer. Mus. Nat. Hist., LIII, p. 476 (Belgian Congo).

Boma, ♀, January 14.

Medje, ♀, June 25.

Faradje, 5 ♂, January 8, March 10, November 27, December 23; 2 ♀, January 26, November 24.

Aba, ♂, juv., December 14.

ADULT MALE.—Iris creamy-white, washed with light red; or bright red (carmine), lighter on outer edge; upper part of maxilla blackish, its lower edge, like mandible, dark blue; feet yellow.

ADULT FEMALE.—Iris reddish brown; bill blackish above, light blue or blue-gray below; feet yellow.

Buffy shaft-streaks are present on the interscapular feathers of one male, but these are feathers remaining from the juvenal plumage; in three fully adult males there are conspicuous black spots on the interscapular feathers; a fourth has this region uniform slaty blue.

DISTRIBUTION.—Africa generally, from the Gold Coast (Accra), the Uelle district, and southern Abyssinia, south to Natal and the eastern part of Cape Province, but not occurring in the equatorial forests. Within our limits it is found in the grasslands north, east, and south of the forest, but has not been taken in the Katanga. Father Callewaert has sent us a series of skins from Luluabourg.

HABITS.—We generally found the blue quail in rather tall grass, knee-high to waist-high, but never in swamps, though frequently near their borders on dry ground, yet once on a high hill at Boma. They are not very sociable, for they go only in pairs, and sometimes are put up singly. It is only natural that in such cover they should take wing with great reluctance, but the flight is swift and strong, like that of *Coturnix*.

Whether or not they migrate I cannot say; probably not, for though we took them in the Uelle from November 24 to March 10, the grass was evidently too high to flush them at other seasons, and a female was taken at Medje on June 25. A half-grown chick, already beginning to assume the rufous and bluish feathers of the male plumage, was caught at Aba on December 14; yet none of our specimens from that district showed any great enlargement of the gonads. In the Lower Congo, breeding may take place at much the same period, for a female that had been laying was shot on January 14.

In the Cameroon, Reichenow¹ found a nest in November, which was placed in a slight hollow of the ground, built of dry grass-stalks, and sheltered by an overhanging tussock. The eight eggs were light yellowish, blunt, and not shiny, measuring 21–22 mm. × 17–18.

¹1901, 'Vögel Afrikas,' I, p. 510.

Although Reichenow states that the call is like that of the European quail, we never heard any note whatsoever.

FOOD.—Of the eight individuals whose crops and stomachs were examined, every one had eaten small seeds. In five this was all that was found; and three remaining had each eaten some small insects as well, in one case these were termites. One bird had swallowed a tiny snail, and small bits of stone were occasionally found in the stomach. This shows the species to be much less insectivorous than is *Coturnix*.

KEY TO THE AFRICAN SPECIES OF *Coturnix*

Outer webs of primaries plain dark gray-brown, without buffy markings; adult male with middle of breast black, flanks rufous striped with black. . . *C. delegorguei*.
Outer webs of primaries dusky brownish, mottled or barred with buff; male in full plumage with a brown or black mark on middle of throat, but middle of breast not black. *C. coturnix*.

Coturnix coturnix coturnix (Linnaeus)

Tetrao coturnix LINNÆUS, 1758, 'Syst. Nat.,' 10th Ed., p. 161 (Europe, Asia, Africa; restricted type locality, Sweden).

Coturnix coturnix REICHENOW, 1901, 'Vögel Afrikas,' I, p. 505 (Mahagi).

Niangara, ♀, April 13.

ADULT FEMALE.—Iris brown; bill dark gray, with base of maxilla brown; feet yellowish buff.

DISTRIBUTION OF THE TYPICAL RACE.—According to Dr. Hartert¹: Europe to the Yenisei and Lake Baikal, south to Morocco, Algeria, Tunisia, Egypt, and Persia; also nesting in small numbers in northwest India. Winters chiefly in northern tropical Africa, south of the Sahara (south to Gambia and Abyssinia), in Arabia and India. There is but one previous record in the Congo, at Mahagi (Emin), and the present one from Niangara seems to mark the southern limit of its winter distribution. It is the only individual we ever saw, and was feeding in some dry weed-grown fields frequented at the time by *C. delegorguei*. It rose on the wing alone, and uttered low rasping notes as it flew off. The ovary showed no indication of breeding. The characteristic call of *Coturnix coturnix* was never heard by us in the northern Congo.

FOOD.—The crop of this single bird contained twenty-one grasshoppers (many of them young), and six winged ants. The stomach was also filled with insect-remains.

Coturnix coturnix africana Temminck and Schlegel

Coturnix vulgaris africana TEMMINCK AND SCHLEGEL, 1850, 'Fauna Jap.,' Aves, p. 103 (type locality: South Africa).

¹1917, Nov. Zool., XXIV, p. 424.

Coturnix coturnix africana REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 259 (Rugege forest; Kahama). HARTERT, 1917, Nov. Zool., XXIV, p. 422 (foothills of Karisimbi volcano). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 93 (L. Kivu). JACKSON, 1926, 'Notes on Game Birds of Kenya and Uganda,' pp. 68, 70 (Kasenyi in Toro). MURPHY AND CHAPIN, 1929, Amer. Mus. Novitates, No. 384, p. 6 (N. W. of L. Edward; Kasai district).

General coloration darker than in *C. c. coturnix*, in the male breeding plumage the anchor-shaped throat patch is usually not bordered with white posteriorly, and the female has the breast more thickly spotted with black.

DISTRIBUTION.—Eastern and southern Africa, Madagascar and the Cormoro Islands. On the eastern side of the continent it is found as far north as Mt. Kenia and Uganda;¹ on the western side it reaches the Cunene River. In the Congo it was known previously only from the Kivu district; but it was to be expected in other parts of the southeastern Congo, and Father Callewaert has secured two males at Luluabourg, June 23 and July 6.

Jackson's record from Kasenyi may refer to Kasenyi on Lake Albert, which was formerly within the limits of Toro. In the eastern Congo, however, this species is usually met with in the highlands. At Kalongi, 6900 feet, on the western slope of Ruwenzori, I saw a single quail that may have been *africana*. On the mountains northwest of Lake Edward it is numerous; and when we passed through there in March, the males were calling loudly. Their notes were exactly like the reiterated "wet-my-lips" or "paye-tes-dettes" of quail in Europe. This seemed to be the beginning of their breeding season, and the birds were living in open grassy fields and plots of tilled land at an elevation of about 7,700 feet.

In South Africa the species is migratory. Layard² stated that they arrive in the neighborhood of Cape Town about the middle or end of August; Wood reported that they reach the vicinity of East London, as a rule, early in September. In the Cape Province they breed soon after their arrival, by the middle of November the young are on the wing. In the northwestern Transvaal, Eriksson found a nest on March 3. Van Someren, in Kenya Colony, shot a male in January which, from its large testes, was probably breeding. Other specimens were taken by him at Embu and Kyambu, Kenya Colony, December 28 and April 24, and Lönnberg took two males with enlarged gonads near Nairobi in early January. The species is probably less migratory near the equator than in South Africa, yet the examples from Luluabourg may be migrants from the south.

¹The resident race in Abyssinia is *Coturnix c. erlangeri* Zedlitz.

²1867, 'Birds of S. Afr.,' p. 274.

Coturnix delegorguei delegorguei Delegorgue

Coturnix delegorguei DELEGORGUE, 1847, 'Voyage Afr. Australe,' II, p. 615 (type locality: Oury, upper Limpopo River). PELZELN, 1881, Verhandl. Zool. Bot. Ges. Wien, p. 154 (Mahagi). HARTLAUB, 1881, Abhandl. Naturwiss. Verein Bremen, VII, pp. 85, 118 (Mahagi); 1891, idem, XII, p. 41 (Mswa). DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika); 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Tanganyika; Lower Congo). SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 156 (Mahagi). O-GRANT, 1893, 'Cat. Birds Brit. Mus.,' XXII, p. 243 (Landana); 1910, Trans. Zool. Soc. London, XIX, p. 451 (southern Ruwenzori, 3000 ft.). SHELLEY, 1901, Ibis, p. 167 (E. shore of L. Moero). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 507 (Mahagi; Mswa); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 260 (Mahagi; Mswa). RODEHAIN, ET AL., 1913, 'Rapp. Miss. Sci. Katanga,' p. 150 (no exact locality, doubtless Katanga). EMIN, 1919, in Stuhlmann, 'Tageb. Emin Pascha,' II, p. 78 (Mahagi). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 388 (Kwamouth).

Coturnix histrionica JOHNSTON, 1884, 'The River Congo,' p. 367 ("Lower river and coast").

Coturnix delegorguei delegorguei BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 341, Fig. 114 (Landana; Ruwenzori district).

Medje, ♀, May 10.

Niangara, 7 ♂, March 30, April 16, 17, 20; 5 ♀, March 30, April 6.

Faradje, 2 ♀, March 11, May 6.

Iris rather light brown; bill black (♂), or maxilla dark brownish-gray, and mandible bluish gray (♀); feet very light brown, or buff.

DISTRIBUTION OF THE SPECIES.—From Cape Province north to Landana and the Island of São Tomé on the west, also to the Bahr-el-Ghazal, Darfur, and on the east to 15° N. latitude in Arabia. Birds of both sexes on São Tomé are a little more richly and deeply colored than the typical form of the mainland, and are to be separated as *C. d. histrionica* Hartlaub. Those of Southern Arabia are unusually pale, and have been named *C. d. arabica* by Bannerman.¹

In spite of its wide range, the harlequin quail is not very common within our limits, for it shuns forested country. Positive records are lacking from the highlands of the Kivu and Katanga, but the species occurs in the other grasslands of the Congo. Father Callewaert obtained five examples at Luluabourg.

In the Uelle district, where our specimens were mostly taken, the species was far from common, even decidedly local, and seen only between March 11 and May 6. Only one specimen, a male taken on May 6, showed any enlargement of the reproductive organs. No characteristic call was ever heard from them, and it seemed that they must be seasonal visitors, not breeding in the region.

¹1929, Bull. Brit. Orn. Club, XLIX, p. 109 (Lahej).

At Faradje they were found singly, in dry and rather open grassy spots. The specimen from Medje was trapped by natives. Near Niangara, two or three miles to the southeast of the station, there were some dry fields where the natives sowed *Eleusine* millet and other crops in the rainy season, but in March and April they were rather bare, with some millet-stubble, short grass and weeds of various kinds, offering but scanty cover, so that when put up the birds usually sought refuge in the denser green grass, only knee-high, of the neighboring untilled portions. The whole vicinity was unusually open, practically treeless.

With the harlequin quail were found a few hemipodes (*Turnix s. lepurana* and *Turnix nana*) and only once a single European quail. In a morning's hunt one might see twelve to twenty-four quail and six to eight hemipodes. The quail seldom rose more than three at a time, often singly, they would sit close, and then shoot off in a swift, whirring flight that might carry them a hundred yards. Sometimes they could be flushed a second time, and once nine or ten flew up from the same spot. Though silent on the ground, they might give low sounds, on the wing, midway between rasping and peeping, but so weak as scarcely to be noticed above the whir of their wings.

The crops and stomachs of fifteen individuals were examined; and insect food was found to predominate, though five had eaten millet (*Eleusine*), and four, other seeds. Grit or small stones are also swallowed. Eleven had eaten insects. Of these, grasshoppers and beetles were commonest, each being found in four cases; one rather large beetle-larva, one mantis, and one small hemipter were also noted. One quail had eaten thirty winged ants, another, a single ant; but termites were greater favorites. Small termites (workers and soldiers) were found in the crops of two, in two others were found large termites that had just shed their wings, in one case as many as thirty-nine of them. These had flown from their homes the night before, had dropped their wings, and were probably found hiding on the ground. Great numbers of such wings were seen lying at the bases of some small dead trees, as well as beside a steep termite hill. Winged termites, in this region, are found to be an almost irresistible bait for bird-snares.

These quail were found in the Uelle only in the latter part of the dry season; where were they in the rains? Heuglin¹ stated that in Northeast Africa the harlequin quail is undoubtedly migratory and disappears from the region in March, returning probably in the summer rains. In eastern Kordofan in October he found coveys of half-grown young,

¹1872, 'Orn. Nordost-Afr.,' II, p. 908.

hence the breeding season must come in August and September. On the middle and upper White Nile and Bahr-el-Ghazal he collected and observed the species in January, February, March, and likewise in October. From all these indications, I believe that they perform a regular annual migration, and merely "winter" in the Uelle district. Further weight is added to this theory by Lynes' experience in Darfur,¹ where he observed Delegorgue's quail only in July but noted that they were becoming sexually active, and probably moving a little to the north. At Kasenyi on Lake Albert, on the other hand, I secured a female on September 6, which showed slight enlargement of the ovary.

In the southern part of its range the harlequin quail is known to be migratory, arriving about in April and remaining until August²; but its movements there, while dependent on the rains, are independent of the northern birds. Father Callewaert's specimens from Luluabourg were all collected between May 25 and July 5.

In Uganda and British East Africa it is probably resident, and breeds, according to van Someren,³ in May, June, July, and also in December. "The males call incessantly when the season is on; the call is a loud piercing 'twee twit,' repeated five or six times at short intervals.

"These Quails lay quite large eggs: the color varies from a sandy to buff or almost whitish cream, with very fine to large raised black spots" (van Someren). Dimensions of eggs, as given by Bannerman, are 27-30 mm. by 21.5-25 mm.

***Ptilopachus petrosus emini* Neumann**

Ptilopachys petrosus emini O. NEUMANN, 1920, Journ. f. Orn., p. 79 (type locality: Fadibek, east of Nimule on northern border of Uganda).

Ptilopacus ventralis ANTINORI, 1868, Boll. Soc. Geogr. Italiana, I, p. 116 (Niam-Niam land, near present Bafuka). PETERMANN, 1868, in Petermann's Mitteil., p. 416 (Niam-Niam land).

Ptilopachys ventralis SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 317 (between Biti and Buhi in Lado Enclave).

?*Ptilopachys ventralis* EMIN, 1919, in Stuhlmann, 'Tageb. Emin Pascha,' II, p. 77 (Mahagi).

Aba, ♂, December 14.

ADULT MALE.—Iris brown; feet, orbits and base of bill carmine, tip of bill brown.

DISTRIBUTION OF THE SPECIES.—*Ptilopachus petrosus* occurs all across Africa from Senegal to Abyssinia (never north of 17°) and south-

¹1925, Ibis, p. 586.

²Stevenson-Hamilton, 1917, 'Animal Life in Africa,' III, p. 21.

³1916, Ibis, p. 221.

ward almost to Tsavo in Kenya Colony. The western half of its range is bounded on the south by the forest region, while in East Africa the more open, hilly country is responsible for the extension south of the equator. In the Congo, it is restricted to the northeastern edge of our territory, where the resident subspecies is *P. p. emini*.

The species is divided into six races, of which *P. p. petrosus* (Gmelin) was described from the Gambia; *P. p. major* Neumann is the representative in Eritrea; and *P. p. florentiae* O.-Grant in northern Kenya Colony. *P. p. emini* ranges from the Nile Province of Uganda to the eastern Bahr-el-Ghazal Province.

Ptilopachus p. butleri Sclater and M.-Praed¹ is said to be a rufous form, which may extend to the Shari River region, and possibly will be found on hills just north of the Ubangi River.

Our single specimen is to be referred to *P. p. emini*. It has only a slight trace of rufous on the feathers of the upper back, and none on the head. The underparts are relatively dark, with rather dark rufous streaks at the sides of the breast, but the buff breast-spot much restricted in size. Its wing measures 116 mm.; tail, 76; exposed culmen, 14; tarsus, 28.

I consider *P. p. ladoensis*² (type locality: Mvolo, between Bahr-el-Ghazal and Lado Enclave) as equivalent to *P. f. emini*, especially since I have examined a specimen of the latter from Nimule, collected by Loring, and now in the U. S. National Museum. This bird has been compared with ours from Aba, and the agreement is so close that they surely belong to the same race.

Emin's stone-bantam is a characteristic bird of the granite hills on the Congo-Nile watershed, along the northeastern border of the Congo. Not that it seeks high altitudes, though it is never to be seen in the adjoining lowland savanna; it simply haunts the neighborhood of rocks and cliffs, like many of the other typical hill-birds of the same region. A covey of four was flushed from among the bushes on the crest of a hill near Aba in July, 1911; and in the December following, two isolated pairs were discovered in similar situations nearby, where there was much high grass between the boulders, and many stunted trees. The tail appeared to be slightly folded, and held aloft after the manner of domestic fowl; but they were difficult to observe, and seldom or never perched. The vernacular name proposed by Lynes, stone-bantam, is peculiarly appropriate.

¹1920, Ibis, p. 842 (Buval, near Wau, Bahr-el-Ghazal).

²Sclater and Mackworth-Praed, 1920, Ibis, p. 843.

At Garamba, a little farther to the northwest, Lang observed a few more in May-July, 1912. It is probable that they inhabit the similar country about Mt. Gaima and Nzoro, to the south of the Kibali River, but my short visit there in August, 1911, failed to disclose any.

Although we never heard any call which we would ascribe to this species, Heuglin¹ stated that in the pairing season in northeast Africa, during and after the summer rains, the cock gives a reiterated flutelike call, of great carrying power, that may be represented "dūī dīū, dūī dīū, dūī dīū, dūī dīū, dī." In the Djur region of the Bahr-el-Ghazal he found a nest, merely a slight hollow lined with dry leaves, and hidden by the surrounding vegetation, at the base of a termite hill. The eggs, four in number, were dull ochreous yellow, measuring 31-32.2×23 mm. In Darfur Lynes found eggs on February 21 and April 2, which he describes as pale uniform stone-color, and average size 33.5×25.5 mm. From the behavior of the birds near Aba, I expect them to nest in December and January.

***Acentrortyx nahan* (Dubois)**

Francolinus nahan DUBOIS, 1905, Ann. Mus. Congo, Zool., (IV) I, fasc. 1, pp. 17, 27, Pl. x (type locality: Popoïe, Aruwimi River). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 229 (Lesse). M.-PRAED, 1922, Ibis, p. 107 (forests of Uganda and Ituri R.). VAN SOMEREN, 1922, Nov. Zool., XXIX, p. 31 (Ituri). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 78 (Ituri R. district). JACKSON, 1926, 'Notes on Game Birds of Kenya and Uganda,' p. 56 (Uganda).

Francolinus (Peliperdix) nahan VAN SOMEREN, 1926, Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 25, p. 31 (Ituri R.).

Acentrortyx nahan CHAPIN, 1926, Auk, p. 235.

Gamangui, ♂, February 9.

ADULT MALE.—Iris dark brown, orbit and base of bill rose-red, outer part of bill brownish black; feet rose-red, claws blackish.

DISTRIBUTION.—From the Aruwimi and Nepoko rivers, east to the Semliki Valley and the forests of Uganda.

The type locality, Popoïe, is not properly in the Ituri district, as has often been stated, but is a region on the south side of the Aruwimi River, between Panga and Banalia, inhabited by a native tribe of that name, often spelled Popoi.

Nahan's partridge, heretofore referred to the genus *Francolinus*, is not to be regarded as congeneric with *Francolinus francolinus* (Linnaeus), and I have proposed for it the new generic name *Acentrortyx*. The absence of spurs in the adult male is its most conspicuous character.

¹1872, 'Orn. Nordost-Afr.,' II, p. 881. See also Lynes, 1925, Ibis, pp. 586-588.

The type specimen was described by Dubois as young, doubtless because of the lack of spurs; but I could find nothing to indicate that it was not fully adult. A very similar specimen, also in the Congo Museum, was taken by Lieutenant Bonnevie at Lesse in the Semliki Valley. Jackson and van Someren have collected a series in the Mabira, Bugoma, and Budongo forests of Uganda. Of these, I examined two in the British Museum, two at Tring, and eleven in Sir Frederick Jackson's collection. A female from the Budongo forest, obtained by Raven for the U. S. National Museum, lies before me.

All these specimens are strikingly blacker beneath than our male from Gamangui, though the latter locality is only about ninety miles distant from Popoi. The breast-feathers in our bird have large black centers, but the white lateral margins so broad as to give a "scaly" pattern, in which the black scarcely predominates. All the other specimens I have seen give the impression of being merely spotted or streaked beneath with white on a black ground, the chest still blacker than the remaining underparts. The lighter color of our bird cannot be ascribed to immaturity,

for a young bird from the Bugoma forest is not very different from adults taken in Uganda, and the underparts just about as dark. Its pattern is more diffuse, and the feathers of breast and flanks have brownish markings and edgings, as well as white spots.

My measurements of seven adult males and eight adult females: wing, ♂ 135-148 mm., ♀ 135-151; tail, ♂ 60-77, ♀ 65-79; exposed culmen, ♂ 14-15.5, ♀ 14-16; metatarsus, ♂ 36-38, ♀ 35-38. The middle toe with claw approximately equals the metatarsus.

At Gamangui this partridge was trapped in the forest, presumably in the same situation as *Francolinus lathami schubotzi*, but I can say nothing of its habits. Dr. van Someren¹ reports that it is "found in pairs, usually in the company of guinea-fowl; it is shy and difficult to procure." In Uganda it is found only in the heaviest forests.



Fig. 207. *Acentrortyx nahani*. Head of the male from Gamangui, Ituri district. $\times \frac{3}{4}$.

¹1916, *Ibis*, p. 219.

KEY TO THE SPECIES OF *Francolinus* TO BE EXPECTED IN OR NEAR THE CONGO

- 1.—Throat black, a gray or rufous area on side of head extending to side of neck; upper breast with round or heart-shaped spots of white or light buff on a black or brownish ground, wing not more than 152 mm. long. *F. lathamii*.
Throat not black. 2.
- 2.—Feathers of back and scapulars with distinct shaft-streaks of buff or whitish, which are often bordered with black. 3.
No clear-cut shaft-streaks of buff or white on back and scapulars, though shafts alone may be of such color, or feathers may be vermiculated with buff, broadly striped with rufous in the middle, or bearing a longitudinal stripe of buff on each web. 13.
- 3.—Chest, breast, and flanks all regularly barred or at least vermiculated with black or brown on a white or buff ground; barring often absent from middle of belly. 4.
Underparts not barred; or barring, if present, does not extend over the whole area mentioned above. 5.
- 4.—Wing-length exceeding 150 mm., crown not rufous. *F. natalensis*.
Wing-length less than 150 mm., crown rufous. *F. coqui*.
- 5.—Throat spotted with black or dusky brown, underparts largely variegated with buff and black or brown in a mottled or zig-zag pattern. *F. natalensis*.
Throat plain white, buff, or rufous, without spots. 6.
- 6.—A continuous black line enclosing throat, though its outline may be slightly irregular, due to whitish or rufous spotting. 7.
No continuous black line around throat, though there may be a series of blackish markings, or an area with dark gray markings. 8.
- 7.—Wing-length exceeding 145 mm.; exposed culmen at least 24 mm. *F. shelleyi*.
Wing-length less than 145 mm.; exposed culmen less than 24 mm. *F. coqui*.
- 8.—No black marking on neck or chest, but triangular rufous or maroon spots on fore-neck and sides of neck. *F. sephaena*.
Black spotting or barring present on sides of neck, fore-neck, or chest. 9.
- 9.—Wing-length less than 145 mm. *F. coqui*.
Wing-length exceeding 145 mm. 10.
- 10.—Chest boldly barred with black and white; but this area forming a patch very distinct from lower breast and flanks, which are grayish buff, spotted or striped with blackish. *F. streptophorus*.
Chest without a distinct patch of black-and-white barring, though there may be such bars on fore-neck. 11.
- 11.—Feathers of middle of breast light buff, rufous at sides, but in the center a rounded black marking enclosing one or more small buff spots; primaries dusky brown with wavy marks of buff. *F. bicalcaratus*.
Feathers of middle of breast varied with buff or often rufous, but with no such distinct black pattern as above. 12.
- 12.—Primaries largely rufous, though browner at tips; fore-neck barred with black and white, chest mottled with rufous; but lower breast and flanks buff, sparsely spotted (or sparsely barred on flanks) with brownish black.
F. levaillantii.

- Primaries largely gray-brown, becoming rufous on the base of inner web, but only speckled or vermiculated on their middle portion with rufous; chest with rufous markings; but lower breast and flanks light buff with many bars of blackish..... *F. shelleyi*.
- 13.—Throat spotted with black.....14.
Throat plain white, buff, or rufous, occasionally somewhat spotted with gray; fore-neck may be black-spotted.....15.
- 14.—Upper breast with broad stripes or large spots of blackish on a whitish ground. *F. hildebrandti*.
Blackish pattern of upper breast finer, with small spots, or more often irregular bars and zig-zags of black.....*F. natalensis*.
- 15.—Wing-coverts with whitish or buff margins, or a distinct pale line on each side close to margin.....16.
Wing-coverts not so marked, though there may be irregular marks of buff...17.
- 16.—Feathers of back with rufous centers; rufous on breast-feathers, if present, likewise in mid-line.....*F. griseo-striatus*.
Feathers of back without rufous; breast-feathers have rufous at sides, a rounded mark of black, with buff inside, on middle of feather....*F. bicalcaratus*.
- 17.—Chest boldly barred with black and white; this area distinct from lower breast and flanks, which are grayish buff, spotted or striped with blackish. *F. streptophorus*.
No distinct patch on chest with black and white bars.....18.
- 18.—Breast and flanks almost uniform gray, brown, or rufous; or with feathers darker in mid-line, gradually becoming lighter at sides.....19.
Underparts buff or grayish, with more sharply defined black or rufous markings.....20.
- 19.—Underparts much more rufous than back; fore-neck with blackish spots or lunulate marks; under tail-coverts buff or rufous with irregular darker bars. *F. hildebrandti*.
Underparts not more rufous than back; fore-neck without black; under tail-coverts not barred.....*F. squamatus*.
- 20.—Breast buffy with very distinct black spots, streaks, or crescentic markings. *F. icterorhynchus*.
Breast without distinct black markings, but centers of feathers rufous or dusky; if blackish these marks have diffuse edges.....21.
- 21.—Wing-length less than 170 mm.; sides of neck varied with rufous; rump brownish, vermiculated with black.....*F. griseo-striatus*.
Wing-length exceeding 180 mm.; sides of neck gray with dusky feather-centers; rump more grayish, with little or no vermiculation..*F. nobilis*.

Francolinus lathamii lathamii Hartlaub

Francolinus lathamii HARTLAUB, 1854, Journ. f. Orn., p. 210 (type locality: Sierra Leone). SHARPE AND BOUVIER, 1878, Bull. Soc. Zool. France, III, p. 79 (Condé). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 498 (Ngombe). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (in part. Lower Congo). SCHOUTEDEN, 1926, Rev. Zool. Afr., XIII, p. 187 (Ganda Sundi).

Francolinus lathamii lathamii M.-PRAED, 1922, Ibis, p. 106 (probably part of Belgian Congo).

DISTRIBUTION OF THE SPECIES.—From Sierra Leone to Cameroon, Gaboon, and Lower Congo, then eastward to the Uelle River, the Ituri Forest, and the Bugoma, Budongo, and Mabira forests of Uganda.

The typical race extends from Upper Guinea to the Cameroon, Gaboon, and Lower Congo. *F. l. schubotzi* occupies the remainder of the range to the eastward, and differs from the foregoing in that in the male the white spotting of the underparts continues to the under tail-coverts, where the black ground-color still predominates. In the female of *schubotzi* the cheeks are rufous, not gray.

***Fringilla lathami schubotzi* Reichenow**

Fringilla lathami schubotzi REICHENOW, 1912, Journ. f. Orn., p. 320 (type locality: Angu, Uelle district). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, part 3, pp. 269, 278 (Mangbetu country). MACKWORTH-PRAED, 1922, Ibis, p. 106 (forests of the Upper Congo watershed and Uganda). VAN SOMEREN, 1922, Nov. Zool., XXIX, p. 31 (Belgian Congo). BANNERMAN, 1922, Rev. Zool. Afr., X, p. 200 (Uelle R. district). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 78 (Upper Congo valley). JACKSON, 1926, 'Notes on Game Birds of Kenya and Uganda,' pp. 53, 54 (Belgian Congo).

Fringilla lathami DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, fasc. 1, p. 27 (in part. Ituri). BEQUAERT, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 309 (Belgian Congo).

Fringilla (Peliperdix) lathami schubotzi VAN SOMEREN, 1926, Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 25, p. 29 (Uelle R.).

Avakubi, ♀, May 30.

Gamangui, 5 ♂, February 5, 10, 11, 16; 6 ♀, February 5, 7, 8, 11, 15, 16; ♀ juv., February 5.

Medje, ♂, April 9.

Akenge, ♂, October 14.

ADULTS OF BOTH SEXES.—Iris dark brown or dark grayish-brown; feet bright yellow (cadmium); bill of male grayish black, of female dusky brown.

DISTRIBUTION.—This eastern race of *F. lathami* had previously been recorded only from the type locality on the Uelle River, and from the forests of Uganda. It ranges southward at least to the center of the Ituri Forest, and probably still farther.

HABITS.—Not an uncommon bird in the dense virgin forest, but very difficult to observe. I have several times put them up; they were found singly or in pairs, and rose with a swift, whirring flight; but I believe that they never perch, save perhaps if hunted with dogs. Only on a single occasion did I see one before it left the ground; and it was always impossible to flush them a second time, especially as one could only guess where they might have alighted. This francolin gives a prolonged series of rather uniform, high-pitched whistles, a trifle hoarse; Nekuma said it also made clucking sounds.

Almost all our specimens were secured by trapping, especially with the assistance of our Medje carriers at Gamangui. In secluded parts of the forest, where the undergrowth was traversed in all directions by game-paths, they would clear up short sections of the paths, and build little fences across them, opening only at the middle, where a trap was set. This was so arranged that the bird, having dislodged a small twig placed across its path, was caught and held fast—either by its legs or neck—in a noose jerked taut by a bent stick serving as a spring. About these traps, as bait, were placed broken pieces of termite nests. The principal species of birds thus captured were *Francolinus l. schubotzi*, *Phasidus niger*, *Guttera p. schubotzi*, *Calopelia p. brehmeri*, *Himantornis h. whitesidei*, *Bleda s. woosnami*, and *Bleda e. ugandæ*.

Record was kept of the contents of only three stomachs of *F. l. schubotzi*. One held ants and small seeds, another small berries, and the third had the heads of hundreds of tiny termites (workers), as well as remains of other small insects.

Our single chick (female), taken on February 5, is about half grown, and resembles the adult female, though there is much more white on the middle of the breast, and the secondaries are bright rufous. The feathers of the crown have broad black tips. None of the adults taken at that season, however, showed indications of breeding. In the Mabira forest (Uganda) van Someren took breeding birds in June, and young a month old in September.

Sjöstedt,¹ at Ekundu (Cameroon) found downy young of *F. l. lathamii* in June, and on March 2 a nest with three eggs. These lay directly upon the same dry leaves that covered the ground round about, and the nest—if such it can be called—was at the foot of a silk-cotton tree, between two of its projecting roots.

Bates, also in the Cameroon, found that the typical race of this species breeds at all times of the year, laying two eggs.² These are uniform light brown or even rusty, of slightly coarse texture, somewhat pointed in shape, and measure 36 to 42.5 mm. × 25 to 27 mm.

***Francolinus coqui coqui* (Smith)**

Perdix coqui A. SMITH, 1836, 'Rep. Exped. Centr. Afr.,' p. 55 (type locality: near Kurrichane, W. Transvaal).

Francolinus schlegeli SCHALOW, 1886, Journ. f. Orn., p. 424 (L. Itambe).

Francolinus coqui MATSCHIE, 1887, Journ. f. Orn., p. 147 (Luvule R.; L. Itambe). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 492 (in part. L. Itambe; Luvule R.;

¹1895, K. Svenska Vet. Akad. Handl., Stockh., XXVII, p. 38.

²1907, Ibis, p. 417; 1908, idem, p. 563; 1909, idem, p. 10.

Marungu). DUBOIS, 1905, *Annales Mus. Congo, Zoologie*, I, f. 1, p. 27 ("Upper Congo"). MOURITZ, 1914, *Ibis*, p. 36 (Mousoshi). DE RIEMAECKER, 1927, *Rev. Zool. Afr.*, XIV, p. 266 (Lubumbashi R.; Kafubu R.).

Francolinus coqui coqui MACKWORTH-PRAED, 1922, *Ibis*, p. 107 (Tanganyika Territory). SCHOUTEDEN, 1930, *Rev. Zool. Afr.*, XVIII, p. 280 (Kimilolo R. near Elisabethville).

DISTRIBUTION OF THE SPECIES.—From Natal and the Orange River north to Angola, the Kasai district, Uganda, central Kenya Colony, and Mombasa. Also north of the forest belt from the Bahr-el-Ghazal province west to the Uam district of French Equatorial Africa, the Gold Coast, and the Mossi country in the French Sudan.

The typical race ranges from South Africa to Lake Tanganyika and Mombasa, but is replaced in the highlands of Kenya Colony by the very distinct *F. c. hubbardi* O.-Grant, with middle of underparts unbarred, and the female far less rufous. *F. c. ruandæ* of the region west of Lake Victoria is similar to the typical form, but more richly colored.

F. c. angolensis is likewise close to the typical form, but usually has the wing-coverts more grayish, and the underparts often more finely barred. *F. c. schlegelii* Heuglin, known from a very few specimens from the Bahr-el-Ghazal and French Equatorial Africa, has the greater wing-coverts, outer webs of secondaries, and rectrices more uniform rufous, less barred. Bates¹ has named an additional race, *F. c. spinetorum*, from seventy miles west of Say, on the Niger River. His type, a male, has barring on chest and flanks only; but it remains to be proved that it is distinct from *F. c. buckleyi* O.-Grant of the Gold Coast, described from the female alone.

All the specimens from the Katanga and Marungu are believed to belong to *Francolinus c. coqui*. Neave reported that he very rarely saw this francolin in the Katanga, but that its shrill cry, many times repeated, was not infrequently heard in the woodland toward evening. Neave wrote this note "Jessee," but to my ears the words "ně-né, ně-né, ně-né . . ." are more appropriate; and Fred Carnochan tells me that among the Wanyamwezi the species is known as "kanene." In the southeastern Katanga, according to Mouritz, it is widely distributed but somewhat more plentiful on the higher ground. My friend Dr. Bequaert found a nest at Sankisia on April 6, 1911, and captured the female. This nest was in a dry spot on the ground, amid high grass, of dry grass-stalks loosely laid together, and contained five whitish eggs.

¹1928, *Bull. Brit. Orn. Club*, XLIX, p. 33.

***Francolinus coqui ruandæ* van Someren**

Francolinus (Ortygornis) coqui ruandæ VAN SOMEREN, 1926, Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 25, p. 34 (type locality: Ankole, S. W. Uganda).

Francolinus coqui O.-GRANT, 1905, Ibis, p. 203 (Mulema in S. W. Uganda); 1908, idem, p. 317 (S. W. Uganda, 4800 ft.). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 259 (N. E. Ruanda). SASSI, 1912, Ann. Nat. Hist. Hofmus. Vienna, XXVI, p. 348 (Urundi).

DISTRIBUTION.—Savannas west of Lake Victoria, sometimes as high as 5000 feet. Not yet known from the Belgian Congo proper, but twice reported from the Mandated Territories of Ruanda and Urundi. Sassi first called attention to the bright ochre-yellow color of the breast, between the black bars; and Mackworth-Praed¹ likewise commented on the rather bright coloring of specimens from Southwest Uganda. Some examples have white throats, some are light rufous there. Dr. van Someren has now provided them with a name. I believe that "*ruahdæ*" in the original description must be a misprint for *ruandæ*.

In Ankole, according to Jackson, this francolin appears to be very local, and to confine itself to the open grassy hillsides freely dotted with ant-heaps and bushes. The coveys would be difficult to find, were it not for their shrill call-notes which are very distinctive.

***Francolinus coqui angolensis* Rothschild**

Francolinus coqui angolensis ROTHSCHILD, 1902, Bull. Brit. Orn. Club., XII, p. 76 (type locality: Bailundu, Angola).

Francolinus coqui REICHENOW, 1901, 'Vögel Afrikas,' I, p. 492 (in part. Kwango R.).

DISTRIBUTION.—Angola north to the Kwango River and perhaps Luluabourg, where Father Callewaert has obtained two males and a female of the species, which seem slightly aberrant.

Specimens collected by Lang and Boulton at Capelongo, Chitau, and Cassongue, Angola, agree with Rothschild's description. The males are narrowly barred with black below, and have considerable gray on upper wing-coverts. Black barring of back much less conspicuous than in typical race. Wings of three males, 144.5–148.5 mm.; of two females, 141.

Two males from Luluabourg resemble the Angolan specimens in coloration of the upperparts, but the ground-color of their rectrices is deeper rufous, the barring less black. One male shows narrow bars on the breast and flanks (1–1.5 mm. on flanks), while the other has relatively broad bars (2.5–3.0 mm.). The female from Luluabourg has

¹1922, Ibis, p. 108.

relatively narrow and dilute barring on the underparts. These Kasai specimens have relatively short wings: males 135, 140.5 mm.; female 134.

[*Fracolinus coqui schlegelii* Heuglin]

Fracolinus schlegelii HEUGLIN, 1863, Journ. f. Orn., p. 275 (type locality: Bongo R. in Bahr-el-Ghazal province).

DISTRIBUTION.—Bahr-el-Ghazal west at least to Bosum in the Uam district of French Equatorial Africa, where Tessmann obtained a single female.¹

Heuglin obtained two males in the Bahr-el-Ghazal, which are preserved in the Stuttgart Museum; but since his time this francolin has almost invariably escaped collectors. It would not be a great surprise to find that it occurs in the Lado district, or along the northern border of the Uelle district.

[*Fracolinus sephaena grantii* Hartlaub]

Fracolinus grantii HARTLAUB, 1866, Proc. Zool. Soc. London (1865), p. 665, Pl. XXXIX, fig. 1 (type locality: Unyamwezi country, Tanganyika Territory).

Fracolinus granti HARTLAUB, 1891, Abhandl. Naturwiss. Verein Bremen, XII, p. 40 (Ussambiro). O.-GRANT, 1893, 'Cat. Birds Brit. Mus.,' XXII, p. 148 (Lado). JACKSON, 1910, Journ. E. Afr. Uganda Nat. Hist. Soc., I, p. 11 (E. shore of L. Albert).

Fracolinus pileatus EMIN, 1922, in Stuhlmann, 'Tageb. Emin Pascha,' III, p. 387 (Kibiro on E. shore of L. Albert).

Fracolinus sephaena granti MACKWORTH-PRAED, 1922, Ibis, p. 111 (Tanganyika Territory).

DISTRIBUTION OF THE SPECIES.—Eastern and southern Africa from Abyssinia to Natal and the Orange River. Of the seven races admitted by Selater,² only *grantii* is likely to occur within our limits, as it has been taken in the Lado district, on the eastern shore of Lake Albert, and in Usambiro southwest of Lake Victoria. It may yet be found, therefore, in the vicinity of Mahagi or in eastern Urundi.

[*Fracolinus streptophorus* O.-Grant]

Fracolinus streptophorus OGILVIE-GRANT, 1891, Ibis, p. 126 (type locality: Mt. Elgon).

A rare species, long known to range from the Kavirondo District to the base of Mt. Elgon and the Acholi country in northern Uganda, but

¹Grote, 1925, Journ. f. Orn., p. 96.

²1924, 'Syst. Avium Ethiop.,' part 1, pp. 79, 80.

recently collected by C. Grant¹ at Kibondo in northeast Tanganyika Territory, and by Bates² in the Cameroon highlands, 30–40 miles west of Fumban, between 3500 and 4000 feet.

There is reason to hope, therefore, that it may be found along the Congo-Nile watershed, bordering the Upper Uelle District, where the vegetation is often strikingly similar to that of the southern base of Elgon. Kibondo is very near Urundi, where we may thus expect it too. A colored plate of the species will be found in Ogilvie-Grant, 1893, 'Catalogue Birds Brit. Mus.,' XXII, Pl. I, or in Jackson, 1926, 'Notes on Game Birds of Kenya and Uganda,' Pl. III.

[*Francolinus shelleyi shelleyi* Ogilvie-Grant]

Francolinus shelleyi OGILVIE-GRANT, 1890, Ibis, p. 348 (type locality: Umfuli River, S. Rhodesia); 1905, Ibis, p. 203 (Mulema in S. W. Uganda). NEAVE, 1907, Mem. Proc. Manchester Lit. Phil. Soc., LI, No. 10, p. 1 (Ulungu Mt., W. Loangwa); 1910, Ibis, p. 83 (no locality given).

DISTRIBUTION OF THE SPECIES.—Mt. Elgon and southwestern Uganda south to Nyasaland, Mashonaland, and Natal. *F. s. elgonensis* O.-Grant is a very distinct race, but specimens from southwestern Uganda are not separable from typical *shelleyi*. This fact casts doubt on the distinctness of *F. s. trothæ* Reichenow,³ described from a single example from the interior of Tanganyika Territory. In the highlands northwest of Lake Nyasa, however, there is a well-marked race, *whytei*, which seems to extend to the Katanga and Marungu.

Francolinus s. shelleyi, therefore, approaches the Congo border in the vicinity of Ruanda, of Lake Tanganyika, and also of the Katanga. Raven collected two specimens on the Kafue River in Northern Rhodesia. Neave also secured the species at Ulungu Mountain, west of the Loangwa River; and his remark that it differs from its allies in not being an inhabitant of river valleys, but of woodland on hills and plateaus, suggests that he may also have seen *F. s. whytei* in the Katanga.

***Francolinus shelleyi whytei* Neumann**

Francolinus whytei NEUMANN, 1908, Bull. Brit. Orn. Club, XXI, p. 76 (type locality: Nyika Plateau, W. of L. Nyasa, between 7000 and 8000 ft.). SCHOUTEDEN, 1925, Bull. Cercle Zool. Congolais, II, p. 4 (vicinity of Elisabethville). DE RIEMAECK-ER, 1927, Rev. Zool. Afr., XIV, p. 266 (Elisabethville).

?*Francolinus* sp. MOURITZ, 1914, Ibis, p. 36 (Musoshi).

Francolinus shelleyi whytei SCHOUTEDEN, 1930, Rev. Zool. Afr., XVIII, p. 280 (Kafubu R.).

¹1924, Bull. Brit. Orn. Club, XLIV, p. 99.

²1927, Ibis, p. 13.

³1901, 'Vögel Afrikas,' I, p. 490 (Ugalla).

DISTRIBUTION.—Only known with certainty from the Nyika Plateau, the Upper Katanga, and Marungu. Mr. J. De Riemaeker first obtained a specimen near Elisabethville, which was identified as *whytei* by Mr. Bannerman. Mouritz had reported that in the south-eastern Katanga there was another species of *Francolinus* besides *F. coqui*. By elimination this would seem to be *shelleyi* or *whytei*.

According to Neumann, *whytei* is distinguished from typical *shelleyi* by the entire absence of white on the sides of the neck and by the yellowish buff (not white) throat. The black markings of the lower breast are also narrower. Wing 162 mm. Neumann had, however, only a single female specimen. Mackworth-Praed was also inclined to think that *whytei* would prove specifically distinct from *shelleyi*.

In August, 1927, I was introduced by Mr. De Riemaeker to Judge Michaëlis at Elisabethville, who invited me for an afternoon's shooting with his excellent bird dogs. We were lucky enough to discover a covey of five *whytei*, as well as another single bird, and secured a pair.

These examples differ very markedly from typical *shelleyi* in having no black line encircling the throat, only scattered black spots at the sides of the neck, and dark gray bars or crescents on the fore-neck. Their crowns are strikingly gray. The male is very narrowly barred with black below, and has the wing 171 mm. long. The female is like the male, but more heavily marked with black on the lower breast; wing 172 mm.

We found these francolins about four miles west of Elisabethville, at 4200 feet, in rather thick grass in wooded savanna close to the edge of a "dembo," or open grassy meadow. Without the dogs we should never have seen them, for they sat very close, and never took wing in a body.

At Kampia, Marungu, 4500 feet, Messrs. Rockefeller and Murphy have recently collected another adult, labeled as female, but with short spurs. In color it resembles our female from the vicinity of Elisabethville.

***Francolinus levaillantii kikuyuensis* O.-Grant**

Francolinus kikuyuensis OGILVIE-GRANT, 1897, Bull. Brit. Orn. Club, VI, p. xxiii (type locality: "Kikuyu district," since corrected to Eldoret).

Francolinus adolfi-friederici REICHENOW, 1908, Orn. Monatsber., p. 48 (N. E. Ruanda).

Francolinus mulemæ O. GRANT, 1903, Bull. Brit. Orn. Club, XIV, p. 30 (Mulema, S. W. Uganda). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 259 (N. E. Ruanda; N. slope of Mt. Sabinyo).

Francolinus levaillanti mulemæ MACKWORTH-PRAED, 1922, Ibis, p. 121 (Ruanda). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 83 (Ruanda).

DISTRIBUTION OF THE SPECIES.—Uganda and the highlands of Kenya Colony south to Nyasaland, Benguella, and Cape Province.

F. l. levaillantii (Valenciennes), the Cape red-wing, ranges from Cape Province to the Transvaal, and two other races are found in the highlands of Benguella and of Nyasaland, while *kikuyuensis* extends from Nandi and Mau across Uganda to the Kivu Volcanoes, the highlands southwest of Lake Edward, and the southern end of Ruwenzori.

Dr. van Someren¹ has shown that *mulemæ* is synonymous with *kikuyuensis*. Furthermore, a comparison of our two specimens from the eastern Congo with one of *benguellensis* Neumann from Mombolo, northern Benguella, convinces me that the last-named form is very close to *kikuyuensis*, though possibly a trifle richer in color. It remains to be seen whether *kikuyuensis* is surely separable from *crawshayi* O.-Grant, of the highlands west of Lake Nyasa.

These red-wing francolins are perhaps more numerous than we realize in the grasslands of the eastern Congo border. Heller secured a male at Kisolo (6500 feet) north of Mt. Muhavura, which is now in the Field Museum; and I saw two pairs, of which I collected the cocks. The first were in the long grass of the Lubilia Valley, just below the new post of Kasindi, on January 27. They were seen to alight, but had to be almost stepped on before they rose again. The second pair was on a grassy slope near Luofu, at 6070 feet, and surprised me by jumping up from my feet as I was retrieving a dead waxbill. The date was March 27. According to Jackson, the breeding seasons in Ankole are during September and from January to February.

[*Fracolinus natalensis neavei* M.-Praed]

Fracolinus natalensis neavei MACKWORTH-PRAED, 1920, Bull. Brit. Orn. Club, XL, p. 140 (type locality: E. bank of Loangwa R., Northern Rhodesia).

This is a northern race of *F. natalensis*, known only from the Loangwa and Kafue rivers, and possibly extending to Congo territory, although Neave² remarked that he saw it only in the low ground of the Loangwa Valley, and never to the west of the Mchinga Escarpment.

F. n. neavei is a little smaller than typical *natalensis*, a little grayer above in the male, more boldly and sparsely marked beneath. The female of *neavei* is duller in color beneath, more washed with brownish rufous.

The range of *F. n. natalensis* is from the Orange River and Natal to Southern Rhodesia.

¹1926, Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 25, p. 46.

²1907, Mem. Proc. Manchester Lit. Phil. Soc., LI, No. 10, p. 2; 1910, Ibis, p. 83.

[*Francolinus bicalcaratus ogilvie-granti* Bannerman]

Francolinus bicalcaratus ogilvie-granti BANNERMAN, 1922, Bull. Brit. Orn. Club, XLII, p. 132 (Jang, Cameroon highlands).

The range of this species of francolin includes the savannas of Upper Guinea, and extends on the one hand to Morocco, on the other, to the highlands of the Cameroon and the upper Benue River. Its subspecies *ogilvie-granti* has been collected by Tessmann in the region of the upper Kadei River in eastern Cameroon,¹ but I do not think it likely to reach the Ubangi district. The ranges of *bicalcaratus* and *icterorhynchus* are perhaps complementary. According to Professor Neumann² specimens from the eastern frontier of the Cameroon are very dark, and possibly different from *ogilvie-granti*. In the color of their back they resemble *F. icterorhynchus dybowskii*.

***Francolinus icterorhynchus dybowskii* Oustalet**

Francolinus dybowskii OUSTALET, 1892, Naturaliste, VI, p. 232 (type locality: Bangui, Ubangi River); 1893, idem, VII, p. 128 (Bangui).

Francolinus icterorhynchus ANTINORI, 1868, Boll. Soc. Geogr. Italiana, I, p. 116 (Niam-Niam land, near present Bafuka).

Francolinus schlegelii or *Francolinus icterorhynchus* PETERMANN, 1868, in Petermann's Mitteil., p. 416 (Niam-Niam land, near present Bafuka).

Francolinus icterorhynchus HARTLAUB, 1881, Abhandl. Naturwiss. Verein Bremen, VII, pp. 85, 118 (Mahagi). SHELLEY, 1888, Proc. Zool. Soc. London, p. 48 (Tingasi). O.-GRANT, 1893, 'Cat. Birds Brit. Mus.,' XXII, p. 163 (Tingasi; Langomeri); 1910, Trans. Zool. Soc. London, XIX, p. 452 (N. Ruwenzori, 2000 ft.). REICHENOW, 1901, 'Vögel Afrikas,' I, p. 476 (Tingasi; Mahagi). SCHUBOTZ, 1921, 'Die Tagebücher von Dr. Emin Pascha,' VI, p. 73 (Mahagi; Mangbetu country; southern Makraka). BEQUAERT, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 309 (Belgian Congo).

Francolinus sp. DYBOWSKI, 1893, 'La Route du Tchad,' p. 332 (Upper Kemo R.).

Francolinus icterorhynchus dybowskii REICHENOW, 1901, 'Vögel Afrikas,' I, p. 477 (Bangui). NEUMANN, 1922, Orn. Monatsber., p. 136 (lower Ubangi; Ituri; Uelle); 1927, Ibis, p. 503 (Libenge on lower Ubangi R.). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 85 (N. E. Belgian Congo). BOWEN, 1926, Sudan Notes and Records, IX, p. 111 (N. E. Belgian Congo).

Francolinus icterorhynchus emini NEUMANN, 1907, Orn. Monatsber., p. 198 (W. of L. Albert; Mahagi; Tingasi, Langomeri); REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 258 (W. of L. Albert; N. Ruwenzori, 2000 ft.). C. GRANT, 1915, Ibis, p. 15 (Tingasi; Ruwenzori).

Francolinus griseus MEARNS, 1911, Smithsonian Misc. Coll., LVI, No. 20, p. 3 (upper Bahr-el-Jebel near L. Albert).

Francolinus icterorhynchus icterorhynchus M.-PRAED, 1922, Ibis, p. 126 (upper Uelle and Ubangi Rivers). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 324 (Uelle R.).

Francolinus (Chaetops) icterorhynchus emini VAN SOMEREN, 1926, Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 25, p. 48 (Lado Enclave).

¹Grote, 1925, Journ. f. Orn., p. 96.

²1927, Ibis, pp. 502, 503.

Niagara, 5 ♂, November 7, 8, 12, 14; 2 ♀, November 18, December 6; 4 ♂ juv., November 24, December 5, 7; 2 ♀ juv., November 23, 24.

Faradje, 3 ♂, August 22, 25, September 15; 4 ♀, April 19, 24, August 11, September 19.

ADULTS OF BOTH SEXES.—Iris dark brown, rim of eyelids yellowish, bare space behind eye dirty light yellowish; bill orange-yellow with dusky culmen; feet bright yellow.

DISTRIBUTION OF THE SPECIES.—From the Bahr-el-Ghazal west to the Shari River region, and south to the Ubangi, the savannas of the Uelle district, Uganda, and the grasslands from Mahagi to just north of Ruwenzori.

The typical race occupies the northern section of the range from the Bahr-el-Ghazal to the Shari, while specimens from along the northern and northeastern border of the equatorial forest are supposedly darker, and more heavily marked with black on the upper breast. These are separated as *F. i. dybowskii*.

DISTRIBUTION OF *F. i. dybowskii*.—From the upper Uam River and the great bend of the Ubangi eastward to the Uelle and Lado districts, then southward to Unyoro, the grasslands west of Lake Albert, and the adjacent part of Uganda. In the Berlin Museum there is an immature specimen from Baté in French Equatorial Africa (Houy); and during the Second Mecklenburg Expedition Dr. Schubotz obtained other examples at Fort Sibut, Duma, and Libenge, in the region of the Ubangi, and at Api in the Uelle. The range terminates abruptly at the edge of the unbroken forest; and though we saw and heard this francolin at Pawa in the northern Ituri, it did not reach Medje. The wings of eight males from the Uelle measure 167–179 mm.; those of four females 156–168.

A male with wing 180 mm., which I collected at Irumu, west of Lake Albert, has more light markings above, especially on the wing-coverts, and narrower black markings on the chest than specimens from the Uelle. This is of interest, since the type locality of *emini* is "West of Lake Albert." Possibly *emini* will be distinguishable from *dybowskii*, wings of some Uganda specimens are said to reach 188 mm. *F. grisescens* Mearns from Rhino Camp on the Bahr-el-Jebel is based on females of the present race, and shows no approach to *F. clappertoni*. I have examined six specimens in the U. S. National Museum.

In northern Uganda, together with birds like those of the Uelle, are found individuals with conspicuous margins of maroon on many of

the flank-feathers. Such is *Fracolinus ugandensis* Neumann.¹ Those familiar with it in life are sure that it is not a distinct species; its calls and its haunts are the same as those of *dybowskii* or *emini*; and possibly the maroon markings are the result of occasional hybridization with some race of *F. clappertoni*. No specimen of "*ugandensis*" has yet been taken west of Lake Albert or the Nile.

HABITS.—The very first day that we came out of the Ituri Forest into the high-grass country at Pawa, we made the acquaintance of the yellow-billed francolin, and everywhere we traveled in the Uelle district this was the common francolin, indeed almost the only one. It is much given to feeding in the plantations of the natives, but is found everywhere in upland savanna. Frequently it perches in trees, from which its loud call is often given, as well as from the ground, or the summit of a termite hill. Throughout the whole year this is one of the common sounds of the morning or late afternoon, a harsh, slowly repeated "k-rack-k-k, k—rack-k-k-, . . .," but the present species does not share the habit of *F. squamatus* of calling before dawn. Even the female may mount a tree while her mate is calling from aloft. The flight is heavy, with much beating of wings, and not protracted.

The crops and stomachs of eight individuals were examined, with the following results: one had eaten the native millet (*Eleusine*); five, other seeds; five, fruits or berries; one, bits of grass; three, from one to three small beetles; one, two hemiptera; three, termites; two, ants; one, a small millipede. In a typical case the crop contained: a few green fruits, very many small green seeds, three beetles, two hemiptera, two large termites, twenty-four ants.

The breeding season was very well defined, for the reproductive organs began to enlarge in August, and in late November and early December, at Niangara, we took chicks of varying sizes, half-grown ones down to those still clothed almost entirely in down. It should be remarked that the breeding time thus falls within the latter part of the rainy season. In Uganda, which is closer to the equator, van Someren² took nests and eggs in May and June, and young about two weeks old, in July. It may be added that July is in one of the dry seasons in Uganda.

¹1907, *Orn. Monatsber.*, p. 199 (Mondo, Uganda).

²1916, *Ibis*, p. 217.

[*Fringilla icterorhynchus icterorhynchus* Heuglin]

Fringilla icterorhynchus HEUGLIN, 1863, Journ. f. Orn., p. 275 (type locality: Bongo, Bahr-el-Ghazal).

It is doubtful whether the typical subspecies reaches the northern border of the Uelle district, but Sclater and Mackworth-Praed¹ reported one specimen from Tembura in the Bahr-el-Ghazal province, only thirty miles from the Congo frontier.

Fringilla squamatus squamatus Cassin

Fringilla squamatus CASSIN, 1857, Proc. Acad. Nat. Sci. Phila., VIII, p. 321 (type locality: vicinity of Cape Lopez, within 60 miles). O.—GRANT, 1893, 'Cat. Birds Brit. Mus.,' XXII, p. 169 (Landana). DUBOIS, 1905, Annales Mus. Congo, Zoologie, I, f. 1, p. 27 (Ituri; Stanleyville; Landana). LÖNNBERG, 1907, Arkiv. f. Zool., III, No. 21, p. 5 (Mukimbungu). BEQUAERT, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 309 (Belgian Congo). SCHOUTEDEN, 1923, Rev. Zool. Afr., XI, p. 388 (Kwamouth). CHAPIN, 1927, Bull. Amer. Mus. Nat. Hist., LIII, p. 476 (food).

Fringilla sp. SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 229 (Zambo).

Fringilla squamatus squamatus M.—PRAED, 1922, Ibis, p. 131 (Cameroon to Portuguese Congo). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 88 (Ituri district). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 328 (Landana; across Congo to Angu and Ituri district).

Avakubi, ♀, October 24.

Gamangui, 4 ♂, February 1, 17, 19, 23; 7 ♀, February 4, 17, 18, 19, 22; ♂ juv., February 20.

Medje, ♂, March 26; 2 ♀, January 18, May 17.

Niangara, ♀, May 9.

ADULTS OF BOTH SEXES.—Iris dark brown; culmen dark brownish, rest of bill orange; naked skin above ear grayish yellow; feet bright orange.

DISTRIBUTION OF THE SPECIES.—Southern Nigeria, Cameroon, and Portuguese Congo, east to the Upper Uelle district, Uganda, Mt. Kenia, Kilimanjaro, the Uzungwe Mountains and the Manyema district. Southward it reaches the northern edge of Angola. *Fringilla achantensis* Temminck of forested Upper Guinea is believed by Professor Neumann² to be conspecific, and this name was published three years before *squamatus*.

Of the five races of *F. squamatus* recognized by Sclater, the typical form inhabits the whole Lower Guinea forest area east to the Upper Ituri, and south to the Lower Congo and Kwamouth. In the Mayombe district, to judge by its voice, it is common. Neither Dr. Schouteden nor Father Callewaert has found it in the Kasai district, and at Lukolela I failed to hear it. Nahan's three specimens came not from the Ituri but from Popoi on the Aruwimi; Dr. Christy obtained one at Zambo between Mawambi and Moera; and Dr. Schubotz brought home skins from Duma, Ubangi district, and Surunga on the Uelle.

¹1920, Ibis, p. 844.

²1922, Orn. Monatsber., p. 136.

We found this francolin to be very common in second-growth and old clearings in the Ituri Forest, as well as throughout the southern Uelle, wherever there were patches of forest. Its easily recognized call was even heard as far northeast as a piece of woods twenty-five miles beyond Faradje, on the road to Aba.

HABITS.—Notwithstanding that its range probably coincides almost exactly with the forest area of the Cameroon, Gaboon, and Congo, this brown francolin is not a true forest-dwelling bird. It is confined everywhere to spots in which the vegetation is relatively low, as in second growth about native villages, or the ill-kept cultivated lands of the natives: banana, rice, or manioc fields. Although an extremely difficult bird to see, unless made to fly by pure accident, its presence is quickly learned through its loud cackling voice. As Bates aptly says, it starts every morning, with the regularity of an alarm clock, from 4:30 to 5 o'clock, this being the half-hour before dawn. Its call may be written "kwee, tchă-churru!", or "kwee-kk, krrr . . ."; indeed this has given it a native name of "Tchachurru" much used in the trade-language of the Ituri region. It calls again in the evening, just as darkness begins to fall, and always from the tangled second-growth. When flushed it rises noisily and does not perch in trees, but generally it escapes on the ground, evading observation.

Its food consists, in part, of cultivated plants, such as sweet potatoes, for which it scratches, and rice; but other seeds are eaten, as well as fruit, including wild figs, and snails, insects, and millipedes. In the eight individuals examined, vegetable food predominated, but five had eaten from one to several small snails each; three, a few ants; one, a hemipter; one, a caterpillar; and one, two small millipedes.

Unlike *F. lathami schubotzi*, which is a true forest species, *F. squamatus* has a well-defined breeding season in January and February in the northern Ituri. On February 17 and 19, birds were taken with fully formed eggs in the oviduct, and a chick one-third grown was caught February 20. At other times of the year the reproductive organs were in a quiescent state; and it is to be noted that the breeding season thus falls in the only dry period of the year. Bates¹ found this to be the case in the Cameroon. Where the range of *Francolinus squamatus* extends south of the equator, we must expect a change in the dates of breeding, while in the intervening area it might be supposed that there would be two nesting-periods.

¹1908, *Ibis*, p. 563; 1909, *Ibis*, p. 10.

Our eggs measure 42.5×33.4 mm. and 46.7×34.3 . They are uniform buff, pitted all over, and exceedingly thick-shelled. Bates believes that the usual clutch is about six.

***Francolinus squamatus schuetti* Cabanis**

Francolinus (Scleroptera) schuetti CABANIS, 1880, Journ. f. Orn., p. 351; 1881, idem, Pl. II (type locality: northern Lunda country, between Angola and Kasai district).

Francolinus schuetti BOCAGE, 1881, 'Orn. Angola,' part 2, p. 560 (Lunda).

Francolinus schuetti schuetti C. GRANT, 1915, Ibis, p. 18 (Belgian Congo; "Congo basin").

Francolinus squamatus schuetti M.-PRAED, 1922, Ibis, p. 132 (Lunda). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 88 (southern Belgian Congo).

Differs from typical *squamatus* in having the back and wings more uniform brown, less varied with fine, irregular marks of buff; throat whiter, and feathers of upper breast much more distinctly margined laterally with light gray.

DISTRIBUTION.—Only the type specimen is known from the northern border of Angola, where this race was discovered, although Schütt reported that it was the commonest francolin in the northern Lunda country. To judge from Cabanis' plate it is quite distinct from *Francolinus s. squamatus* and more similar to the eastern forms which used to be united with *schuetti*. It remains to be proved that *zappeyi* is really distinct from *schuetti*. The latter race certainly may be expected to range eastward to the upper Lualaba or even to Lake Tanganyika, and it is surprising that it has not recently been taken in the southern Kasai.

***Francolinus squamatus zappeyi* Mearns**

Francolinus schuetti zappeyi MEARNS, 1911, Smithson. Miscell. Coll., LVI, No. 20, p. 4 (type locality: E. shore of Lake Victoria).

Francolinus schuetti O.-GRANT, 1910, Trans. Zool. Soc. London, XIX, p. 452 (Mubuku Valley, 6500 ft.).

Francolinus schüttili REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-. Afr. Exp. Mecklenburg,' III, p. 258 (Kisenyi).

?*Francolinus schuetti schuetti* SCLATER AND M.-PRAED, 1920, Ibis, p. 847 (Meridi).

Francolinus squamatus zappeyi M.-PRAED, 1922, Ibis, p. 132 (Uganda to the Kivu district and round the lake to Kavirondo). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.' part 1, p. 88 (Kivu district). BOWEN, 1926, Sudan Notes and Records, IX, p. 113 (Meridi). CONOVER, 1928, Auk, p. 357 (Kigezi). FRIEDMANN, 1930, in Strong, 'Afr. Rep. Liberia Belg. Congo,' II, p. 751; 1930, Bull. 153, U. S. Nat. Mus., p. 121 (Kibati).

DISTRIBUTION.—From Mt. Elgon and the Kavirondo country across Uganda to Ruwenzori, Bukoba, and Lake Kivu. Sclater and

M.-Praed also reported a specimen from Meridi in the southern Bahr-el-Ghazal province, which they considered indistinguishable from the Uganda bird.

In Uganda van Someren¹ described this francolin as "met with in the rough lands near native cultivations. It is a noisy bird, especially towards evening, when it will perch on some ant-hill or other prominent position and call loudly. . . . They usually go in pairs. When flushed they usually make for the nearest tree. . . . They nest twice a year; the nest is placed under a tuft of grass or small bush; the eggs are sandy to buff in ground-color with pitted surface. They have very hard shells. We have taken the eggs in nearly every month of the year, but nests are most numerous from May to July and December and January."

Along the eastern Congo border *Francolinus s. zappeyi* would seem to frequent the lower border of the mountain-forest belt, for it has been taken on the eastern slope of Ruwenzori up to 6500 feet, at Kisenyi on Lake Kivu (about 5000 ft.), and at Kigezi, north of the eastern Kivu Volcanoes (about 6500 ft.). Natives trapped a male for me at 6500 feet near Lulenga, and I have heard its shrill, raucous cries near Burunga, in the woods at the base of Mt. Mikeno. Rockefeller and Murphy, on the other hand, collected two females at Kita-Kita, south of Kama, in the lowlands of the Manyema district.

[*Francolinus griseo-striatus* O.-Grant]

Francolinus griseo-striatus OGILVIE-GRANT, 1890, Ibis, p. 349, Pl. x (type locality: "Congo River," subsequently corrected to Kwanza R.).

This Angolan species has not yet been taken within our limits, though possibly it may occur in the vicinity of the Kwango River. While apparently related to the *squamatus* group, it is smaller (wings of males 150-168 mm.) and more richly colored, with rufous on the centers of feathers of back and scapulars, as well as on the bases of outer rectrices.

***Francolinus nobilis* Reichenow**

Francolinus nobilis REICHENOW, 1908, Orn. Monatsber., p. 81 (type locality: Mt. Sabinyo, 3800 m., Birunga volcanoes, Belgian Congo); 1908, Journ. f. Orn., p. 627, Pl. 1 (Mt. Sabinyo); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 258 (Saddle of Mt. Sabinyo, 3800 m.). SCHOUTEDEN, 1914, Rev. Zool. Afr., III, p. 262 (Kilo); 1918, idem, V, p. 229 (Kilo). M.-PRAED, 1922, Ibis, p. 135 (Kivu district). GYLDENSTOLPE, 1922, Bull. Brit. Orn. Club, XLIII, p. 31 (Kivu Volcanoes); 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I, No. 3, p. 317 (Mt. Sabinyo, 2600 m.; Mt. Mikeno, 3400 m.). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1,

¹1916, Ibis, p. 216.

p. 89 (Kivu district; Kilo). CHAPIN, 1927, *Ibis*, p. 359 (W. slope of Ruwenzori); 1928, *Natural History*, N. Y., XXVII (1927), p. 624 (W. Ruwenzori, 8960 feet).

Francolinus nobilis is related to *F. jacksoni* O.-Grant, which lives on the higher mountains of Kenya Colony; but the latter species has a great deal more gray and white in its markings, and no bare skin around the eye. *F. camerunensis* Alexander, though smaller, seems also closely allied.

DISTRIBUTION.—Hitherto known only from the Kivu Volcanoes and the vicinity of Kilo, west of Lake Albert. It is a bird of mountain forest, and was thus to be expected on Ruwenzori. There the British Museum reported a large species of francolin, which "frequented the thickest parts of the forest, and though its cry might constantly be heard, its skulking habits baffled all the efforts made to procure specimens. Mr. Carruthers actually succeeded in shooting one, but the bird being only winged instantly disappeared among the dense jungle."

On the Kivu Volcanoes, Count Gyldenstolpe likewise found the species exceedingly shy, and he saw but four individuals, of which two were obtained. Running with great agility amid the densest undergrowth, they were difficult to flush, and soon dropped to the ground again. Toward sunset and very early in the morning their characteristic "crows" were frequently heard.

It seems safe to infer that Thélie's specimens were not taken at the station of Kilo, which is at the eastern margin of the Ituri Forest, only 4800 feet above sea level, but rather in some adjacent highland, probably the Lendu Plateau, where there are considerable areas of mountain forest. This is supported by some of the other species collected by Thélie, especially *Aplopelia simplex jacksoni*, *Hyphanturgus melanogaster stephanophorus*, and *Cinnyris r. reichenowi*.

The first specimen of *Francolinus nobilis* from Ruwenzori was an adult female shot by Edmund Heller at 9000 feet on the Bugongo Ridge, west of Mt. Stanley, February 20, 1925. It is now in the Field Museum. The species is common on the western slopes of the range, for in 1926, by trapping, our black men secured thirteen specimens in the mountain-forest and bamboo zones, from 7000 to 9000 feet. They frequented the undergrowth in the forest, and not infrequently at dusk we would hear their harsh notes: "chuckarick" or "cock-rack," repeated six to eight times.

On the Kivu Volcanoes, on Mikenö and Karisimbi, I heard them again, at levels from 7700 to 12,000 feet; but my natives were poor trappers, and I was never able to shoot a specimen. I have not been able to examine one from the Kivu district, but none in our series from

Ruwenzori agrees with Professor Reichenow's plate. All the males from Ruwenzori seem to have much more rufous beneath than the one from Mount Sabinyo described by Count Gyldenstolpe. The coloration of Ruwenzori specimens is as follows.

DESCRIPTION.—Head and neck gray, centers of feathers darkest, throat grayish buff with dusky spots or streaks in center of feathers. Feathers of back gray on margin, but deep rufous in middle; scapulars and lesser wing-coverts still more rufous or maroon, larger wing-coverts and innermost secondaries almost entirely deep rufous. Rump and upper tail-coverts dark brownish-gray. Breast and flanks rufous, their feathers margined laterally with gray and grayish buff. Abdomen gray, feather-tips buffy; under tail-coverts blackish brown with lighter margins. Under wing-coverts dark gray or brown; remiges and rectrices dark gray-brown.

Males and many females are alike in color; but some females are decidedly duller, with much more gray or grayish buff on breast, though some rufous always remains on center of breast and flank feathers.

Wing: males 206–211 mm., females 184–201; tail: males 87–93, females 78–85; culmen (to base): males 29–30, females 25–26.5; metatarsus: males 62–66, females 53–57.

Adult males have the iris rich brown; bill and naked skin about eye scarlet, bare spot above ear dull orange; feet scarlet with claws dusky brown. There are commonly two pairs of spurs in the male, but the upper spurs are small. Females lack spurs, and have usually less red on bill, face, and feet.

[*Fracolinus hildebrandti johnstoni* Shelley]

Fracolinus johnstoni SHELLEY, 1894, *Ibis*, p. 24 (type locality: Zomba, Nyasaland).

Reported by Neave¹ from the Loangwa Valley, though he did not find it anywhere in the Upper Katanga. The species, as a whole, ranges through eastern Africa from northern Kenya Colony to southern Nyasaland. Females are very different in color from males, much browner, and are usually provided with spurs like their mates. The male of *johnstoni* is streaked below, rather than spotted, with blackish on a white ground.

¹1907, *Mem. Proc. Manchester Lit. Phil. Soc.*, LI, No. 10, p. 3; 1910, *Ibis*, pp. 83, 84.

KEY TO THE SPECIES OF *Pternistis* OCCURRING IN OR NEAR THE CONGO

- 1.—Feet red or orange-red in life, light brown in dried skins. *P. afer*.
Feet blackish or dark brown, slightly tinged at most with reddish; dusky brown in dried skins. 2.
- 2.—Feathers of upper back and wings, as well as breast and flanks, margined laterally with rufous; underparts also streaked with black and white; lower edge of malar region white. *P. rufopictus*.
General color brown, with blackish streaks on many parts of body, but rufous margins, if present, confined to breast; malar region without white patch. *P. swainsonii*.

[*Pternistis swainsonii* (Smith)]

Perdix swainsonii A. SMITH, 1836, 'Rep. Exped. Centr. Afr.,' p. 54 (type locality: rivers north of Kurrichane, i.e., western Transvaal).

Though not known from the Katanga, this species occurs in the valleys of the Loangwa and Kafue, ranging thence to the Transvaal and Ovampoland. It is not closely allied to *P. afer cranchii*, being much browner, with dark-colored feet; and it lacks the fine white speckling or vermiculation of the underparts. Specimens from the Kafue River¹ were found by Bowen to be paler and more narrowly streaked below than birds from farther south. Neave² reported both *P. swainsonii* and "*melanogaster*" [= *P. afer humboldtii*] as occurring in the Loanga Valley.

***Pternistis afer cranchii* (Leach)**

Perdix cranchii LEACH, 1818, in Tuckey's 'Narrative Exp. R. Zaire,' Appendix, p. 408 (type locality: Lower Congo River³).

Francolinus branchii HARTLAUB, 1850, 'Beitrag. Orn. Westafr.,' p. 38 (Congo).

Pternistes cranchii HARTLAUB, 1857, 'Syst. Orn. Westafr.,' p. 203 (Congo).

Francolinus cranchii HEUGLIN, 1872, 'Orn. Nordost-Afr.,' p. 902 (Congo).

Pternistis cranchii HARTLAUB, 1884, Journ. f. Orn., p. 210 (Congo).

?*Francolinus capensis* JOHNSTON, 1884, 'The River Congo,' p. 367 (middle Congo R.).

Pternistes lucani DUBOIS, 1886, Bull. Mus. Roy. Hist. Nat. Belgique, IV, p. 149 (region of L. Tanganyika).

Francolinus cranchi SCHALOW, 1886, Journ. f. Orn., pp. 415, 416, 419, 421, 431, 432 (E. Marungu; Masembe; Kauwire; Lulenge R.; Likulwe R.); 1887, idem, p. 229 (from L. Tanganyika to the Katanga). D'AUBUSSON, 1911, Bull. Soc. Nation. Acclim. France, LVIII, p. 53 (Congo R.).

?*Francolinus rubricollis* SCHALOW, 1886, Journ. f. Orn., p. 417 (Kau R.).

Pternistes cranchi MATSCHIE, 1887, Journ. f. Orn., p. 147 (Masembe; Lufuku; Kauwire; Lofunzo Valley; "Lualaba"; Lulenge R.; Likulwe). O.-GRANT, 1893, 'Cat. Birds Brit. Mus.,' XXII, p. 178 (Congo); 1908, Ibis, p. 316 (N.W. of L. Tanganyika, 2800 ft.); HARTERT, 1900, Nov. Zool., VII, p. 30 (Ngombe). REICHENOW,

¹They may be *P. s. chobiensis* Roberts, 1932, Ann. Transvaal Mus., XV, p. 23 (Kabulabula, Chobe R.).

²1907, Mem. Proc. Manchester Lit. Phil. Soc., LI, No. 10, pp. 3-5.

³Not specifically mentioned by Leach, but Cranch's whole collection came from there.

1901, 'Vögel Afrikas,' I, p. 457 (Marungu; Masembe; Lufuku R.; Lofunzo valley; "Lualaba"; Lulenge R.; Likulwe R.; Katanga). DUBOIS, 1905, *Annales Mus. Congo, Zoologie*, I, f. 1, p. 27 (Tanganyika). LÖNNBERG, 1907, *Arkiv. f. Zool.*, III, No. 21, p. 4 (Mukimbungu). NEAVE, 1907, *Mem. Proc. Manchester Lit. Phil. Soc.*, LI, No. 10, p. 4 (road to Ndola, Alala Plateau; bank of Kafue); 1910, *Ibis*, p. 84 (Bunkeya R.). SASSI, 1912, *Annalen K. K. Naturhist. Hofmus. Wien*, XXVI, p. 348 (in part. Baraka; forest border W. of Tanganyika). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 229 (in part. Kalambélémbé); 1930, *idem*, XVIII, p. 280 (Kafubu R. near Elisabethville).

Francolinus lucani D'AUBUSSON, 1911, *Bull. Soc. Nation. Acclim. France*, LVIII, pp. 53, 54 (on the Congo).

Pternistes sp. MOURITZ, 1914, *Ibis*, p. 36 (S. E. Katanga).

Pternistes cranchi cranchi SCHOUTEDEN, 1923, *Rev. Zool. Afr.*, XI, pp. 316, 388 (Luebo; Kabambaie; Kwamouth); 1924, *idem*, XII, p. 262 (Kisantu; Kidada); 1925, *idem*, XIII, p. 5 (Kunungu); 1926, *idem*, XIII, p. 187 (Moanda). CHAPIN, 1927, *Bull. Amer. Mus. Nat. Hist.*, LIII, p. 476 (Lower Congo). CONOVER, 1929, *Auk*, p. 346 (Boma; Matadi; Luluabourg; Haut Luapula District; Tanganyika; Katanga).

Pternistis cranchii cranchii W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 90 (Landana and Congo Valley to L. Tanganyika and L. Nyasa). BOWEN, 1930, *Proc. Acad. Nat. Sci. Phila.*, LXXXII, p. 86 (Boma; Matadi; Bukama). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 333 (Lower Congo).

Pternistes cranchi DE RIEMAECKER, 1927, *Rev. Zool. Afr.*, XIV, p. 266 (Elisabethville; Lubumbashi Valley).

Pternistis afer cranchii BOWEN, 1930, *Proc. Acad. Nat. Sci. Phila.*, LXXXII, p. 159 (Boma to Bukama).

Boma, ♂, ♀ im., January 3.

Matadi, ♀, December 27.

ADULTS OF BOTH SEXES.—Iris dark brown; bill, orbits, throat, and feet scarlet.

The female from Matadi, though in adult plumage, lacks all trace of chestnut streaking below, while the immature female from Boma already shows broad rufous inner borders on some of the feathers of the lower breast. Here too, it still retains some of its earlier plumage, pale brownish-gray, each feather with a very distinct subterminal bar of dark brown.

The two groups of bare-throated francolins formerly separated as *P. afer* (Müller) and *P. cranchii* (Leach) have been found to intergrade through the race *benquellensis* living on the highlands of Angola. I follow Bowen in uniting them in a single species, though I do not include *P. swainsonii*. Some thirteen races are recognizable.

DISTRIBUTION OF *Pternistis afer*.—From the west coast between the Congo mouth and the Cunene River, across the continent to the shores of Lake Victoria, the Zambesi Valley, Gazaland, and the east and south-east coast from Witu, Kenya Colony, to Swellendam, Cape Province. Three races are known with certainty from Congo territory, three others approach our borders on the south and southeast.

P. a. cranchii ranges from the Loango coast and Lower Congo eastward along the southern edge of the Congo forest to Lake Tanganyika and the Katanga. Its chest, lower breast, and flanks are thickly vermiculated with blackish and whitish, without well-marked black shaft streaks; and on the middle of the underparts the feathers are usually margined on both sides with chestnut. Specimens from the savannas of the Manyema district and Marungu agree rather closely with *cranchii*.

The valley of the Ruzizi, however, north of Lake Tanganyika, is occupied by a very distinct race, *P. a. harterti* Reichenow, with marginal stripes of blackish or deep maroon on the middle of the underparts. The feather-centers there are rather whitish. To the northward, about Lakes Kivu and Victoria, a race again appears which is very like *P. a. cranchii*, but with narrow black shaft-streaks on the chest, and the malar region and sides of the neck more variegated with whitish. At first regarded as belonging to the typical race, then later referred to *intercedens*, these birds have recently been described as *P. a. nyanzæ* Conover. The other subspecies known from close to the Congo borders are mentioned below.

HABITS.—In the savannas just south of the great forest, this bare-throated francolin fills much the same place as does *Francolinus icterorhynchus* on its northeastern edge. Coming down the Congo River, one finds the first long-grass country above Bolobo, and immediately the raucous voice of *cranchii* makes itself heard, usually at sundown. These reiterated calls resemble those of *Francolinus icterorhynchus* very closely.

In the Lower Congo, I found *Pternistis a. cranchii* in pairs or singly, in the tall grass on hillsides and in valleys; it was, of course, flushed with difficulty and never seen to alight on trees, calling from the grass. At this season, December-January, though a rainy season in theory, but little rain actually fell. None of the three specimens secured showed any enlargement of the reproductive organs, and the fact that one of them still showed traces of juvenal plumage would indicate that the breeding season was past. From Luluabourg in the Kasai, Father Callewaert has sent a specimen still largely in juvenal dress, dated September 16; so it may be assumed that the eggs there are laid towards June or July.

FOOD.—Examination of the crops of our three specimens showed that in each case their principal food had been small bulbs, about one-fourth of an inch in diameter, which I found to be those of a fine grass, growing commonly between the tussocks of coarse grass. These bulbs usually lay an inch or so below the surface of the ground; in freshly

cultivated land they were turned up in quantities, but elsewhere would have to be scratched for. In addition to this vegetable food, one bird had eaten numbers of ants and a small snail; another, many termites, not winged individuals.

***Pternistis afer nyanzæ* Conover**

Pternistis cranchi nyanzæ CONOVER, 1929, Auk, p. 345 (type locality: Fort Ternan, western Kenya Colony. Also from L. Mutanda; Kisolo; Rutshuru Valley; Nyanza on L. Tanganyika).

Pternistis cranchi OGILVIE-GRANT, 1910, Trans. Zool. Soc., XIX, p. 452, Pl. XIX, fig. 8, egg (Mokia, 3400 ft.). REICHENOW, 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 257 (L. Mohasi; N. E. Ruanda; Kisenyi; Kasindi). SASSI, 1912, Ann. Nat. Hist. Hofmus. Vienna, XXVI, p. 348 (in part: Urundi; Kisenyi; Kasindi). LÖNNBERG, 1917, Arkiv. f. Zool., X, No. 24, p. 12 (Rutshuru?). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 229 (in part: Lesse; Lisasa; Kabaré, Kalégéla; Old Mission Saint-Gustave).

Pternistis cranchi cranchi GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl., (3) I, No. 3, p. 318 (Mt. Muhavura, 2500 m.; Mt. Sabinyo, 2300 m.; Tamohanga; Ngoma).

Pternistis cranchii intercedens SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 91 (slopes of Ruwenzori). BANNERMAN, 1930, 'Birds Trop. W. Afr.,' I, p. 334 (plains near Ruwenzori).

Pternistis cranchi intercedens VAN SOMEREN, 1925, Journ. E. Africa and Uganda Nat. Hist. Soc., No. 23, p. 97 (Ruwenzori).

Pternistis afer nyanzæ BOWEN, 1930, Proc. Acad. Nat. Sci. Phila., LXXXII, p. 161 (lower Rutshuru Valley).

DISTRIBUTION.—Countries near east, south, and western shores of Lake Victoria, from the Nyando Valley, Ikoma District, and Mwanza to the northeast shore of Lake Tanganyika, Lake Kivu, Rutshuru Plain, upper Semliki Valley, and Mubendi in Uganda.

A very common bird in grassy plains along the eastern Congo border from Lake Kivu to the forest belt that crosses the Semliki Valley. It does not ascend the slopes of Ruwenzori, but in the Kivu District it is found up to 8,000 feet, provided the vegetation is open and grassy. Raven obtained four specimens at Nyanza on the northeast shore of Lake Tanganyika. Six miles farther north on the same shore, I collected one male which shows a slight approach to *harterti*.

In habits and voice *nyanzæ* resembles *cranchii*. Their harsh calls are so like those of *Fringilla icterorhynchus* that without seeing the makers, one would scarcely realize that he was listening to francolins of different genera on the opposite sides of the Semliki forest. The voice of *Pternistis leucoscepus* in East Africa is likewise almost identical.

Near Ruwenzori Woosnam found a nest of *P. a. nyanzæ* in a slight hollow lined with a little grass and feathers, under the shelter of a large

tuft of grass. It contained six eggs, uniform pale lilac-buff, rather finely pitted and mottled all over with white; dimensions 38.6–39.4 mm. \times 33. Jackson gives the seasons for laying, in Uganda, as November and July.

***Pternistis afer harterti* Reichenow**

Pternistes harterti REICHENOW, 1909, Orn. Monatsber., p. 41 (type locality: Usumbura, north end of Lake Tanganyika); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,' III, p. 258 (Usumbura).

Pternistes cranchi harterti SASSI, 1912, Annalen K. K. Naturhist. Hofmus. Wien, XXVI, p. 348 (Uvira). SCHOUTEDEN, 1918, Rev. Zool. Afr., V, p. 229 (Uvira). CONOVER, 1929, Auk, pp. 344, 346 (Ruzizi Valley; Uvira).

Pternistis cranchii harterti W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 91 (country N. of L. Tanganyika).

Pternistis afer harterti BOWEN, 1930, Proc. Acad. Nat. Sci. Phila., LXXXII, p. 161 (Ruzizi Valley).

DISTRIBUTION.—Known only from the Ruzizi Valley, Usumbura, and Uvira at the north end of Tanganyika. When first examining one of Grauer's specimens, I was greatly impressed by its remarkable distinctness from either *cranchii* or *nyanzæ*, although it dwells right between their ranges.

More recently, I have had the opportunity to study this very localized race in life, and have found that it extends up the Ruzizi Valley to Kamaniola, or possibly farther. I have seen birds of this species at the south end of Lake Kivu, but cannot say to which race they belonged; on the northern shore near Ngoma they are *nyanzæ*.

At Luvungi, *harterti* is common, and in July it was found in small parties amid the grass and bushes of the savanna in the river-bottom. Among them were young birds still largely clothed in juvenal plumage. Their raucous calls are like those of the other races; in addition I heard a plaintive whistle, slightly prolonged, a "scatter-call" which is probably not peculiar to this one race.

There is some variation in the dark margins of the breast-plumage, they may be nearly black or else largely maroon in adult males. In one adult female, they are entirely black, in another, partly maroon. A male from Uvira is like those of Luvungi; but *harterti* does intergrade with the adjacent races, as is shown by a male from north of Nyanza, on the opposite shore of Tanganyika.

[*Pternistis afer intercedens* Reichenow]

Pternistes cranchi intercedens REICHENOW, 1909, Orn. Monatsber., p. 88 (type locality: L. Rukwa, western Tanganyika Territory). CONOVER, 1929, Auk, pp. 344, 346 (Kigoma).

We have not examined topotypical specimens of *intercedens*, which was described as having heavy black shaft-streaks on the chest, while the breast-feathers have large areas of white almost without gray vermiculation. It is the intermediate form between *cranchii* and *P. a. böhmi* Reichenow¹ of the region about Tabora. Somewhat farther east in Tanganyika Territory lives *P. a. itigi* Bowen,² very boldly streaked on underparts with black, white, and chestnut.

The range of *intercedens* seems to extend from the base of the Livingstone Mountains north at least to Lake Rukwa. While Conover refers a young bird from Kigoma to *intercedens*, there is little likelihood of its reaching Congo territory, even in southern Marungu.

[*Pternistis afer punctulatus* (Gray)]

Perdix punctulata J. E. GRAY, 1834, 'Illustrations of Indian Zoology,' II, Pl. XLIII, fig. 2 (no type locality; Bowen proposes Villa General Machado, Angola).

A race closely allied to *cranchii*, but more whitish on cheeks and underparts, yet well striped with chestnut below.³ It ranges from central Angola northwestward to Ndala Tando, and possibly reaches Congo territory near the Kwango River.

Of greater interest, although farther removed from the Congo, is *Pternistis a. benguellensis* Bocage,⁴ which dwells on the plateau of Benguela. Boulton has obtained several specimens, which show it to be distinct from *P. a. afer*, and intermediate in many ways between that form and *P. a. cranchii*.

[*Pternistis afer afer* (Müller)]

Tetrao afer P. L. S. MÜLLER, 1776, 'Syst. Nat. Suppl.,' p. 129 (Africa; restricted type locality: Benguela).

?*Francolinus afer* JOHNSTON, 1884, 'The River Congo,' p. 367 (Congo R. up to Bolobo).

Pternistis afer afer W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 90 (Congo R. to Cunene R.).

The typical race is stated by Sclater and by Reichenow to range from the Cunene River north to the Congo, but I know of no reliable occurrence within our limits. Sir Harry Johnston's statement that it was found in "most parts" along the Congo up to Bolobo would suggest a confusion with *Pternistis a. cranchii*.

¹1885, Journ. f. Orn., p. 465 (Igonda, Tang. Terr.).

²1930, Proc. Acad. Nat. Sci. Phila., LXXXII, p. 86 (Gwaos, near Itigi, Tang. Terr.).

³For the use of Gray's name, see Bowen, 1930, Proc. Acad. Nat. Sci. Phila., LXXXII, p. 158.

⁴1893, Journ. Sci. Lisboa, (2) III, pp. 154, 165 (Galanga, Angola).

[*Pternistis afer humboldtii* (Peters)]

Francolinus humboldtii PETERS, 1854, Bericht Preuss. Akad. Wiss. Berlin, p. 134 (type locality: Tete, Zambesi R.).

Ranges from the lower Zambesi and Loangwa valleys through southern Nyasaland to Tanganyika Territory, especially the southeastern part. It was found by Neave¹ to be rather common in the Loangwa Valley, but not in the Upper Katanga. This form differs from *afer* and *cranchii* in having a large black area on the middle of the underparts, a character shared by *P. a. leucoparæus* Fischer and Reichenow, of East Africa.

[*Pternistis rufopictus* Reichenow]

Pternistes rufopictus REICHENOW, 1887, Journ. f. Orn., p. 52 (type locality: Wembere Plains, Tanganyika Territory). VAN SOMEREN, 1925, Journ. E. Africa and Uganda Nat. Hist. Soc., No. 23, p. 99 (Ruanda).

Somewhat similar to *P. a. itigi* in color of underparts, but feathers of upper back, scapulars, and wing-coverts conspicuously margined with rufous. Its range appears to overlap that of two forms of *afer* for it lives in the dry country south of Lake Victoria, and is said to extend to southern Uganda. While Jackson does not mention it, van Someren reports it from "western Uganda, Bunyoro to Ruanda." If this be so, it is to be looked for in Belgian Ruanda and Urundi.

ORDER TURNICIFORMES

FAMILY TURNICIDÆ. HEMIPODES OR BUTTON-QUAILS

KEY TO THE CONGO SPECIES OF *Turnix*

Forehead and sides of head largely cinnamon or light rufous; sides of neck and chest with black and white bars, which may extend across fore-neck in males. . *T. nana*.

Forehead and sides of head varied with whitish and small black markings, but little rufous save where crown-stripes extend forward to base of culmen; black markings at sides of neck and chest are heart-shaped, round, or lunulate. . . *T. sylvatica*.

Turnix sylvatica lepurana (Smith)

Ortygis lepurana A. SMITH, 1836, 'Rep. Exped. Centr. Afr.' App., p. 55 (type locality: north of Kurrichane, western Transvaal).

Turnix lepurana SHARPE AND BOUVIER, 1878, Bull. Soc. Zool. France, III, p. 79 (Condé). HARTLAUB, 1881, Abhandl. Naturwiss. Verein Bremen, VII, pp. 85, 118 (Mahagi). SCHALOW, 1886, Journ. f. Orn., p. 412 (Manda in Marungu); 1887, idem, p. 226 (Manda). MATSCHIE, 1887, Journ. f. Orn., p. 145 (Manda). O.-GRANT, 1893, 'Cat. Birds Brit. Mus.,' XXII, p. 539 (Landana). REICHENOW, 1900, 'Vögel Afrikas,' I, p. 301 (Marungu; Mahagi); 1911, 'Wiss. Ergeb. D. Zentr.-Afr. Exp. Mecklenburg,'

¹1907, Mem. Proc. Manchester Lit. Phil. Soc., LI, No. 10, p. 4 ("P. melanogaster"); 1910, Ibis, p. 84.

III, p. 249 (N. shore of L. Edward). DUBOIS, 1905, *Annales Mus. Congo, Zoologie*, I, fasc. 1, p. 27 (Lower Congo). SCHOUTEDEN, 1918, *Rev. Zool. Afr.*, V, p. 222 (Kabaré). EMIN, 1919, in Stuhlmann, 'Tageb. Emin Pascha,' II, p. 79 (Mahagi). BERLIOZ, 1925, *Bull. Mus. Nat. Hist. Paris*, XXXI, p. 352 (Luluabourg).

Turnix leburana SCHWEINFURTH AND RATZEL, 1888, 'Emin-Pascha,' German Ed., p. 156 (Mahagi).

Turnix sylvatica alleni MEARNS, 1911, *Smithson. Miscell. Coll.*, LVI, No. 20, p. 5 (type locality: N. Guaso Nyiro River, N. of Mt. Kenia). SCHOUTEDEN, 1923, *Rev. Zool. Afr.*, XI, p. 315 (Luluabourg; Macaco).

Niangara, 3 ♂, March 30, April 6, May 6; 2 ♀, April 6, 13.

Faradje, 2 ♂, January 24, February 5.

ADULTS OF BOTH SEXES.—Iris rather dull yellow; bill light blue with blackish culmen and tip; feet flesh-color.

There is considerable variation in color even in this small series of adults. In one male, black spots extend all across the upper chest; the others all show a certain variability in the color of the back, but this is most marked in the two females. One of the latter has conspicuous lunate marks and bars of black, in the other they are obsolete, and the whole tone of its back is much lighter and more rufous. Some of the males are much duller than the females, especially on the breast, but one of them differs little if at all in these respects from the opposite sex.

DISTRIBUTION OF THE SPECIES.—Southern Europe, the Aden Protectorate, and practically the whole of Africa south of the Sahara excepting the rain-forests. Also the Oriental Region, where *T. s. dussumieri* and *bartelsorum* extend from the Himalayas and Formosa to Hainan and Java.

The typical race occupies the Mediterranean region, and is replaced in tropical Africa by *T. s. lepurana*, which ranges from the Gold Coast, Egyptian Sudan, and Aden throughout the grasslands south to the Cape Province. It reaches the borders of the West African forests, even in the Portuguese Congo; and Father Callewaert has sent us ten specimens from Luluabourg in the Kasai District. I have seen it at Boma. In East Africa it often lives at an altitude of 5000 feet.

Turnix s. alleni Mearns was claimed to be of deeper coloration, and was accepted by Sclater as extending from Kenya Colony to the borders of the western forests. I have compared the type (male) with some of our Congo specimens, and found them to agree fairly well; but Mr. H. B. Conover, who has compared our Congo series with specimens from Natal, cannot find any constant difference. Dr. Mearns seems to have based his opinion on two rather yellowish specimens from just south of Kilimanjaro, which he regarded as typical of *lepurana*. We now have a

female from the Northern Guaso Nyiro, type locality of *alleni*; and it is a rather light-colored individual.

This button-quail is probably a much more common bird than usually supposed. It often escapes notice by running off like a rat beneath the vegetation. In the Upper Uelle it is fairly numerous where there are large open fields; and at Kasenyi on the southwest shore of Lake Albert I have found it to be very common. I also observed it at Irumu, at Kasindi, and on the Rutshuru Plain. It seems likely that it will be collected in the Upper Katanga, where Neave and Mouritz both failed to come across it.

In the Uelle, to be sure, we secured it only between January 24 and May 6, a dry period of the year; and every one of our specimens had the sexual organs enlarged. According to Lynes,¹ it would appear to be only a summer visitor in Darfur, an interesting fact in view of its apparent disappearance from the Uelle at that season.

Our first specimen (Faradje, February 5, 1912) was a male which had been caught on the nest at night, and one of its eggs, which was brought with it, was of relatively large size, whitish, thickly spotted with grays and browns of several shades; dimensions 24.4×18.9 mm. The nest, which I visited myself, was built of dry grass, laid on the ground just beside the base of a tiny bush, in a field where *Eleusine* millet had been grown during the wet season, but where only a rich crop of weeds was standing now.

It was in just such open, dry fields that we found the species near Niangara, associated with *Coturnix delegorguei*, and flushing in much the same manner, singly or in pairs. Their flight is very quail-like, though possibly not quite so strong—certainly more silent, and when they had dropped into the thick grass adjoining the cultivated fields it was well-nigh impossible to make them take wing again. They seldom flew more than fifty yards. No note was ever heard from them, and no noise at night that could be attributed to them, though I listened purposely.

This hemipode breeds in the dry season just south of the equator, for Böhm found a nest with three eggs at Manda (Marungu) in July; Emin found chicks at Tabora, Tanganyika Territory, late in the same month; and Schillings collected two small chicks at Ndjiri, west of Kilimanjaro, on June 18. In southern Somaliland, Erlanger² found them breeding in May, and stated that the regular number of eggs is four.

It is well known that among the hemipodes the smaller dull-colored male does most of the work of incubation, and later rears the young with

¹1925, *Ibis*, p. 582.

²1905, *Journ. f. Orn.*, p. 92.

little or no help from the female. It has even been suspected that the hen may change mates before her eggs are hatched.

Fortunately, the breeding of *Turnix s. lepurana* has been carefully observed in captivity by Hauth and by Behrens, whose results are presented in English by A. G. Butler, 1905, *Avicultural Magazine*, (2) III, pp. 217-222. The female is noisier than her mate, and during mating-time delivers two long-drawn penetrating notes, frequently repeated ten or twelve times. The first syllable is higher in pitch and of longer duration; the second an octave lower and shorter. The bill meanwhile is closed, and with each effort the sides of the neck are remarkably distended.

The nest is built of dry grass with an arched roof and lateral entrance, both sexes work at its construction. During the first days of incubation the female assists the male, later he assumes entire care; and when the young hatch, after thirteen days, he feeds the young covey and leads them about. In natal down they are reddish brown above, with several longitudinal stripes of fawn-yellowish; under surface grayish white.

F. E. O. Mörs,¹ who hatched eggs of this button-quail in an incubator, reared three young, and found that a female paired and laid eggs when not quite four months old. This time incubation required fifteen days, and sets of five and seven eggs were laid. The males took entire charge of the brood after hatching.

Food.—As with *Coturnix delegorguei*, the food includes both seeds and insects. Of the six stomachs examined, one contained only seeds, and one only insects, but the four remaining had both, and one contained small stones in addition. Among the insects only one termite was identified, and *Eleusine* millet had been eaten but once.

The oesophagus does not serve as a crop for the retention of food, as in the quail and other true gallinaceous birds. This is a point of resemblance to the rails; and it seems certain that the male of *Sarothrura elegans* uses its distended oesophagus as an accessory vocal organ, in the same way as the female of *Turnix*.

***Turnix nana* (Sundevall)**

Hemipodius nanus SUNDEVALL, 1851, Öfv. K.S. Vet.-Akad. Förh. Stockholm, VII (1850), p. 110 (type locality: "in Caffraria inferiore," i.e., Natal).

Turnix nana O.-GRANT, 1910, Trans. Zoöl. Soc. London, XIX, p. 451 (Mokia). REICHENOW, 1923, Mitteil. Zool. Staatsinstitut u. Zool. Mus. Hamburg, XL, p. 63 (Lupungu). GYLDENSTOLPE, 1924, K. Svenska Vet. Akad. Handl. Stockh., (3) I,

¹1915, Journ. S. Afr. Orn. Union, X, pp. 19-22.

No. 3, p. 313 (Makora). W. L. SCLATER, 1924, 'Syst. Avium Ethiop.,' part 1, p. 76 (vicinity of Ruwenzori).

Niangara, ♂, ♀, April 6.

ADULT MALE.—Iris light gray, bordered on inner and outer edges by dark brown; bill dusky brownish, with base of mandible and corners of mouth light dirty grayish; feet light pinkish-buff.

FEMALE.—Very similar, but no dark brown in iris.

As is usual in the hemipodes, the female is larger and more brightly colored than the male. The two birds measure as follows: ♂, wing, 78 mm.; tail, 30; exposed culmen, 9.5; tarsus, 20, middle toe with claw, 16. ♀, wing, 87; tail, 25; exposed culmen, 11; tarsus, 20.5; middle toe with claw, 16.5.

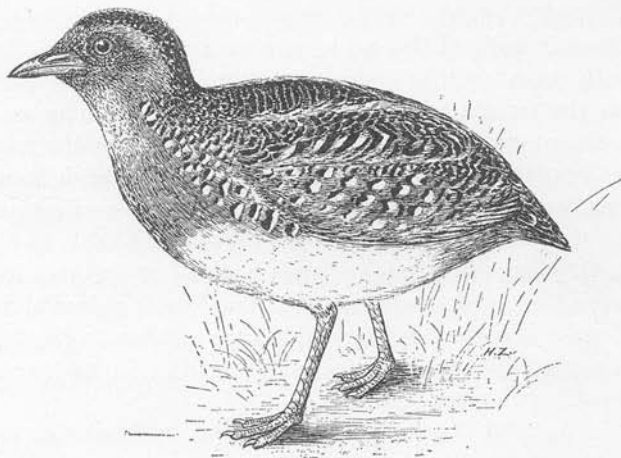


Fig. 208. *Turnix nana*, female. $\times \frac{2}{3}$.

The upper breast of the female is clear light rusty brown, with short white and dusky bars only along its sides. These bars in the male are larger and far more numerous, extending all across the chest.

Our specimens have been compared with one in the Philadelphia Academy from Port Natal. Though without indication of sex on its label, it resembles our female, yet is not quite so brightly colored, and has more conspicuous bars at the side of the upper breast. Its wing measurement is 80 mm. Father Callewaert has sent us three males and a female from Luluabourg, with wings: ♂ 70–77 mm.; ♀ 87.

DISTRIBUTION.—Formerly known from eastern Cape Province and Natal north to Angola, but more recently taken by Frobenius at Lupungu in the Lomami district (Hamburg Museum), by the Ruwenzori Expedition of the British Museum at Mokia, near Ruwenzori, in May

and June, then by van Someren at Mpumu (near Kyetema) in Uganda, May 4, and now at Niangara, to the north of the forest region. Kelsall (1914, *Ibis*, p. 226) even reports it from Sierra Leone. Its range therefore seems to resemble that of *T. sylvatica lepurana*, though it is less abundant. Our examples from the Congo do not agree with the description of *T. n. luciana* Stoneham¹ of western Kenya Colony, which is said to be very rufous on the throat.

The two individuals secured during our Congo Expedition were in the same dry fields with *T. s. lepurana* and *Coturnix delegorguei*. In both cases, their stomachs contained seeds and the remains of small insects. During 1926 and 1927, I found *Turnix nana* far more common in the eastern Congo than had been expected and secured specimens on the Lendu Plateau between Dele and Irumu, at the south end of Ruwenzori between Kasindi and Katwe, southwest of Lake Edward at Luofu (5400 feet), and on the Lualaba at Kabalongwe, fifteen miles north of Bukama. It is often possible to distinguish *nana* from *lepurana* on the wing by its blackish rump, and thus I have additional sight-records of *nana* from Kasenyi on Lake Albert, the lower Lubilia Valley (north of Lake Edward), and the Rutshuru plain.

¹1931, *Bateleur*, III, p. 79 (Trans-Nzoia, Kenya Colony).

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