

HORNBILLS

Family BUCEROTIDÆ

Vol. I., p. 103; Vol. II., p. 48.

THE hornbills (*Bucerotidæ*) are a group of large birds found throughout Africa, except the Mediterranean region, and Southern Asia, extending to Papua, but not into Australia. The Asiatic forms are the most varied in type.

The very large bill, generally slightly curved, and provided with a casque or helmet, differs greatly in the various genera and with the age of the individual. Feet are heavy and clumsy, with the soles somewhat broadened, and the tail sometimes with the two centre tail feathers much elongated.

The members of the family in most cases nest in holes in trees, generally lofty, and the females are built up into the nesting-holes, either by the males or by their own efforts, and remain so during the whole process of incubation, only the beak emerging through a narrow slit left for the purpose, the nesting bird being fed by its mate.

The food is, in the main, fruit, though captive birds are not averse to meat, lizards, etc., and fledgeling birds, while one species is said to capture fish.

The bases of the flight feathers are bare, with the result that flight is very noisy, in one species resembling the noise of a traction engine in the distance, labouring up a heavy incline.

The colours are varied, but never brilliant; the sexes differ slightly, usually in details of the tail and the size and coloration of the bill and casque.

Habits are semi-social, the birds travelling in small parties, and often covering great distances in their search for food (from *Robinson*, Vol. I., p. 103).

Eleven species are known from the Malay Peninsula. With the exception of the two small black and white forms of *Anthracoceros*, all are, normally, birds of the heavy forest.

KEY TO THE MALAYAN HORNBILLS

I	{	Abdomen, white	2
	{	Abdomen, brown or black	5

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|---|---|---|--|---|
| 2 | { | Centre tail feathers enormously lengthened; front of casque a flat ivory-like plate | <i>Rhinoplax vigil</i> , p. 98 | |
| | | Tail normal; front of casque not flattened | | 3 |
| 3 | { | Wings entirely black; casque recurved | <i>Buceros r. rhinoceros</i> , p. 87 | |
| | | Wings with a median white bar and tipped with white; casque double-pointed in front | <i>Dichoceros b. bicornis</i> , p. 90 | |
| | | Wings black, tipped with white; casque pointed and knife-edged in front | | 4 |
| 4 | { | Outer tail feathers, white | <i>Anthracoceros convexus</i> , p. 91 | |
| | | Outer tail feathers, black, broadly tipped with white | <i>Anthracoceros malabaricus leucogaster</i> , p. 92 | |
| 5 | { | Tail entirely white | | 6 |
| | | Tail not entirely white | | 8 |
| 6 | { | Head with a long white crest; wings tipped with white | <i>Berenicornis comatus</i> , p. 97 | |
| | | Head with no long white crest; wings entirely black | | 7 |
| 7 | { | Mandibles corrugated at the bases | <i>Rhyticeros undulatus</i> , p. 97 | |
| | | Mandibles smooth at the bases | <i>Rhyticeros subruficollis</i> , p. 95 | |
| 8 | { | Tail, black, outer feathers tipped with white | <i>Anthracoceros malayanus</i> , p. 92 | |
| | | Tail with basal half black; terminal half white or rusty | <i>Cranorrhinus corrugatus</i> , p. 94 | |
| | | Tail with basal half grey; terminal half black | <i>Anorrhinus galeritus</i> , p. 97 | |

*Buceros rhinoceros rhinoceros***The Rhinoceros-Hornbill**

Vol. II., p. 51.

Buceros Rhinoceros Linn., *Syst. Nat.*, i., 1758, p. 104 (Malacca); Ogilvie-Grant, *Cat. Birds, Brit. Mus.*, xvii., 1892, p. 352.

Malay Name.—Burong ěnggang.

Description.—Size large. Plumage, black; the belly and tail, white, the latter with a broad black band. A conspicuous compressed helmet, or casque, on the top of the bill, curled upwards at the front end.

Adult.—Sexes alike in plumage. Abdomen, thighs, upper and under tail coverts and tail, white, the tail with a broad, black, subterminal band. Remainder of plumage, black with a slight blue-green gloss.

Immature.—A young, but full-grown, bird has the black band on the tail

broader than in adults and in the juvenile dress the dark parts of the plumage appear to have been brown rather than glossy black. But the chief difference between adult and immature birds is in the shape of the casque, which in the latter consists merely of a swelling, roughly conical in shape, on the top of the bill, near the forehead. At first it is not well defined and merges into the upper mandible. Between this incipient casque of juveniles and the huge helmet of adults with its recurved anterior horn all gradations occur.

The newly hatched *nestling* is quite naked.

Soft Parts.—*Male*: iris, dark red; bill, ivory-white, tinged with yellow sub-basally, more so on the upper mandible, and with a black area at the base, the black on the upper mandible running forward along the edge to the "tooth"; occasionally the edges of both mandibles, very narrowly, are black. On the upper mandible the black basal patch is preceded by a red patch. Casque, reddish, passing into yellow in front. Base of casque, black, which colour is continued as a thin line between the bill and the casque, and then across the casque to its tip. *Females* have no black on the edges of the mandibles or on the casque. In dried skins the red and the yellow have usually faded out. Feet, yellowish, or brownish olive.

Dimensions.—*Male*: total length, about 45 to 50 in.; wing, 18.4 to 19.75 in.; tail, 14 to 15.5 in.; bill from gape, 10 to 11 in.; length of casque (in a straight line), 6.5 to 8.5 in.; tarsus, about 2.75 in. There is much variation in the size of bill and casque; the measurements given above are of full-grown birds, but individuals are often rather smaller. *Female*: smaller, total length, about 36 in.; wing, 16.75 to 17 in.; tail, 12.75 in.; bill from gape, 8.3 to 8.7 in.; casque, 5.25 to 5.5 in.

Range in the Malay Peninsula.—Specimens have been examined from Taiping and numerous localities throughout the Federated Malay States south to Malacca and Johore. There is one record from Singapore Island. The northern limit of the species has not been defined in detail, but it seems not to have been recorded from any part of Siam.

Extralimital Range.—Sumatra and Billiton. Borneo is inhabited by a subspecies which differs only in its slightly smaller size. The Javan form (*silvestris*) is rather more distinct.

Nidification.—There is no record from the Malay Peninsula. The following notes, published by the late Charles Hose, were made in the Baram district of Sarawak and refer to the Bornean race (*Buceros rhinoceros borneoensis*): "The nest is always built in the hollow of a large tree—the hollow, be it noted, being always due to disease of the tree or to the ravages of termites, not to the personal labours of the birds. The bottom of this cavity is often plugged by a termite-nest and accumulation of decayed wood, and on the upper surface of this is made the nest, a very rough and ready structure, composed simply of the feathers of the female. The hollow of the tree communicates with the exterior air by means of a long aperture, which, just before the period of incubation, is closed up almost entirely by the male, simply leaving a long open slit, up and down which the beak of the enclosed

female can move. The substance used in thus closing the aperture closely resembles some vegetable resin, and is probably composed of a gastric secretion combined with the woody fragments of fruit. It should be noted that this slit is always in close proximity to the nest, so that the female can easily protrude her beak for food without moving from her sitting position. During incubation the male bird supplies the female with food in the form of pellets of fruit, seeds, insects, portions of reptiles, etc., the pellets being enclosed each in a skin of rubber-like consistency. While feeding the female, the male clings to the bark of the tree, or sits on a branch if conveniently near, and jerks these pellets into the gaping beak of the hen, two to four pellets forming a meal. During mastication (for it is a mistake to suppose that the Hornbills always bolt their food entire) some fragments of the pellet fall to the ground; any seeds which these fragments may contain take root, germinate, and sprout, and the natives can approximately judge of the date of incubation by the age of the seedlings. When these are four-leaved the eggs have been hatched out for two or three weeks. At this stage, though not always so early, the mother-bird leaves the nest, breaking down the gluey substance with her beak to effect an exit; having left the nest, the aperture through which she left is carefully closed up again, leaving the slit as before, and now both male and female devote their energies to feeding the young birds, who in course of time follow the example of their mother and leave their place of imprisonment. It is more than probable that this gluing-up first of the mother-bird and her eggs and afterwards of the nestlings alone is solely a means of protection against predaceous carnivora (*Paradoxurus*, *Hemigale*, *Arctogale*, *Arctictis*, etc.); the fact that I have shot a specimen of *Hemigale hardwickei* in close proximity to a Hornbill's nest lends support to this view. One, two, or three eggs are laid. The egg of *B. rhinoceros* is white closely mottled with brown, giving a pepper-and-salt appearance." An egg in the Sarawak Museum measures 2.55 by 1.75 in. (*E. Banks*).

Habits.—In the south of the Malay Peninsula this is the commonest of the larger hornbills. It is mainly a bird of the thick, virgin forests of the lowlands, but is found on the slopes of the mountains up to about 4000 ft., being comparatively rare at the higher levels. Robinson records that it is exceedingly common on the Larut Hills in Perak, and Bukit Kutu in Selangor, but less so in Negri Sembilan and Pahang. Mr H. N. Ridley records having seen a pair in the Botanic Gardens in Singapore, and considers that the birds were resting in the course of a long flight. There is, otherwise, no evidence for supposing that this species performs the long journeys, sometimes over salt water, undertaken by some other species of hornbills. Mr E. Banks notes that the harsh croak is more wheezy in the female than in the male. In the Malay States I have always found it a very shy bird, usually to be seen feeding on fruits at the top of high trees in deep jungle. It is most often met with in small parties and, as in the case of other hornbills, the flight is very noisy. The sound made by the wings has been likened to the noise made by a starting railway train.

*Dichoceros bicornis bicornis***The Great or Homrai Hornbill**

Vol. II., p. 51.

Buceros bicornis Linn., *Syst. Nat.* (10th ed.), 1758, p. 104 (Sumatra).

Dichoceros bicornis, Oates, in Hume's *Nests and Eggs Ind. Birds* (2nd ed.), iii., 1890, p. 68; Ogilvie-Grant, *Cat. Birds, Brit. Mus.*, xvii., 1892, p. 355; Blanford, *Faun. Brit. Ind., Birds*, iii., 1895, p. 142; Oates, *Cat. Birds' Eggs, Brit. Mus.*, iii., 1903, p. 43; Robinson and Kloss, *Journ. Nat. Hist. Soc. Siam*, v., 1922, p. 131.

Dichoceros bicornis bicornis, Stuart Baker, *Faun. Brit. Ind., Birds* (2nd ed.), iv., 1927, p. 284; Stuart Baker, *Nid. Birds Ind. Emp.*, iii., 1934, p. 428.

Malay Name.—Ēnggang papan.

Description.—Size, large. Colour, black with white neck and bar across the wings. Tail, white with black bar. Casque, box-like, rounded behind, concave on top and sides, the side ridges of the top plate produced into two points in front.

Adult.—Sexes alike. Head all round, black; neck, white, stained with buff and sharply defined against the adjacent black parts. Tips of greater wing coverts, primary coverts and wing quills, bases of wing quills, the abdomen, thighs, upper and under tail coverts, white. Tail, white with a broad, black, subterminal band. Remainder of plumage, black with a faint greenish gloss.

In *young birds* the casque is much less developed.

Soft Parts.—*Female*: "iris, inner ring silver-white, outer ring mottled with brown; orbital skin, pale brownish yellow. Bill, upper mandible gamboge, washed with red at the tip, back end of casque blood-red; lower mandible ivory-white; tip tinged yellow, base black. Feet olive, tarsi and soles washed yellowish. *Male*: similar to the female, but the base and front of the casque and a line on the culmen reaching half-way to the tip black" (S.E. Siam, *C. B. Kloss*).

In skins of both sexes from Peninsular Siam the iris is marked as "red" and the feet "greenish" or "greenish black." Several authors have considered that the red iris is indicative of the male only, but this seems not always to be the case.

The greasy yellow substance found on the bill of this hornbill in life, and also sometimes found staining the neck and white parts of the plumage, has often been commented upon. Davison was certain that it was a product of the oil gland at the base of the tail, and described how the birds rubbed their bills against the gland and then transferred the secretion to the plumage. The colour fades after death.

Dimensions.—*Male*: total length, about 46 in.; wing, 18.5 to 19.25 in.; tail, 14.25 to 15.25 in.; tarsus, 2.3 to 2.6 in.; bill from gape, 8.3 to 9.6 in.; length of casque (straight), 5.8 to 6.6 in. *Female*: total length, about 42 in.; wing, 17.3 to 18.6 in.; tail, 12.75 to 14.5 in.; tarsus, 2.3 in.; bill from gape,

8 to 8.8 in.; casque, 5.5 to 6.7 in. (specimens from Peninsular Siam). The difference in size between the sexes is not very well marked, but females seem to average rather smaller than males.

Range in the Malay Peninsula.—Peninsular Siam and the islands off the west coast (Junk Zeylon, Lontar, Telibun); Terutau and Langkawi; Perak, Trengganu, the Dindings and Pulau Pangkor Besar. Recorded from Penang and Malacca by Cantor, but the records from both places need confirmation. Rare or absent in the south of the Peninsula, but southern limit not yet defined.

Extralimital Range.—South-West India; the Himalayas from Kumaun eastwards to Assam; East Bengal, throughout Burma, all Siam, French Indo-China from Tonkin to Cochin-China; Sumatra.

Nidification.—No record from the Malay Peninsula. In other areas the nesting habits are recorded as being, in the main, similar to those of other hornbills, the eggs being laid in natural hollows in trees, the entrance hole then being walled up except for a hole through which the female can receive food. The eggs are white and of a regular oval shape. The shell is rough and often uneven. Average measurements about 2.55 by 1.8 in. The clutch usually consists of two eggs.

Habits.—In the northern (Siamese) part of the Peninsula this is the commonest of the larger species of hornbills, but it becomes much rarer further south and is very scarce, if existent, in the extreme south. It is common in the Langkawi group of islands and on the coastal islands off the west coast of Peninsular Siam. In these localities Robinson reports it as nearly always flying very high, or feeding in tall trees, and, in consequence, difficult to procure except with a rifle. It is also numerous on the Dindings, low islands off the mouth of the Perak river only separated from the mainland by a narrow channel.

Like its relatives this is a very noisy bird and produces a great variety of harsh, discordant notes, of which the most usual one is best described as a bark. Davison found nothing but fruit in the stomachs of birds collected in Tenasserim, but Mr Stuart Baker considers that it is almost omnivorous and adds reptiles, rats, insects and grain to the diet.

On the few occasions on which I have met with the species it has been in small flocks of less than ten individuals, but it is said to congregate into much larger flocks at roosting time.

Anthracoceros convexus

The Southern Pied Hornbill

Vol. I., p. 104.

Casque, large; the sides rounded, the top keeled and the front projecting and pointed. In females, lower and less pointed in front. Head, neck, breast and centre pair of tail feathers, black with a faint green gloss. Wing quills broadly tipped with white; remaining tail feathers and abdomen, white. Bill and casque, ivory-white patched with black.

Total length, about 30 in. ; wing, about 12 in.

Common in the lowlands from Patani southwards, but most abundant on the eastern side of the Peninsula. It is essentially a bird of the coasts and large river-courses in cultivated country and secondary growth rather than of the old forest. It feeds on fruit and is usually seen in flocks.

In Lower Perak Mr A. T. Edgar has found the eggs in a hole in a "nyireh" tree (*Carapa*), about eighteen feet from the ground, in swampy jungle near the coast. As is usual with hornbills, the entrance hole was plastered up with a substance resembling dry mud or clay. This hole contained newly hatched young on 9th March and an egg on 17th January of the next year. Another nesting-hole at the base of a coconut-palm was occupied for three years at least. On 12th January it contained three almost round, white eggs (1.85, 1.93, 1.99 by 1.4, 1.42, 1.4 in.). Mr Edgar writes: "The entrance had been a long cleft about six inches wide before being plastered up, and the tree was hollow for some distance up the trunk. The eggs were laid on wood refuse at the bottom of the hole. In 1936 the hen entered the nest on 3rd January and stayed inside till 30th March, eighty-seven days. The masonry consisted of a mixture of soil, droppings containing seed from fruit which the bird had eaten, and scraps of contour feathers. On each occasion on which this nest was used the sitting bird had moulted her wing and tail quills while in the nest. The male fed her on berries, mainly those of *lakum*, a wild vine, and *halban* (*Vitex pubescens*). Outside the nest, as incubation proceeded, the pile of droppings and rejected fruits grew daily; the hen apparently keeps the nest clean by collecting the droppings and putting them outside. A certain amount of crushed sea-shells was mixed with the pile, this having probably been used by the bird for digestive purposes."

Anthracoceros malabaricus leucogaster

The Northern Pied Hornbill

Vol. I., p. 105.

Like the last-mentioned species (*A. convexus*), but the outer four pairs of tail feathers not white, but black tipped with white.

Total length, about 29 in. ; wing, about 11.5 in.

This species is found only in the north of the Peninsula (south to the valley of the Plus river in Perak).

Common in Peninsular Siam and in the Langkawi and Terutau Islands in situations much like those affected by *A. convexus*. There is no local record of the nest and eggs.

Anthracoceros malayanus

The Malayan Black Hornbill

Vol. II., p. 56.

Buceros malayanus Raffles, *Trans. Linn. Soc.*, xiii., 1822, p. 292 (Sumatra).

Anthracoceros malayanus, Ogilvie-Grant, *Cat. Birds, Brit. Mus.*, xvii., 1892, p. 368.

Malay Name.—Burong kělëngking.

Description.—One of the smaller hornbills. Plumage black, a white, or grey, stripe over the eye; outer tail feathers tipped white. Bill, white or black. Casque, high and compressed, the front edge nearly straight in females, but much projecting forwards in males: seen from the side the outline is convex.

Adult male.—General plumage, glossy black with a blue-green sheen; outer four pairs of tail feathers broadly tipped with white. A broad grey, or white, stripe extends from the nostril, over the eye, to behind the ear; a shorter, thinner, grey stripe runs back from the gape, but sometimes these head-markings are obsolete. Bill and casque, white.

Adult female.—Like the male, but the bill and casque blackish.

Juvenile.—Bill and casque white in both sexes. White tail tip, usually, but not always, mottled with black. Casque indicated merely by a knob at the base of the culmen.

Immature.—Like the adult in plumage, but with the casque not fully developed.

Note.—D. G. Elliot in his monograph of hornbills, published in 1882, correctly stated that white and black bills are sexual differences (distinctions noticed by Wallace), and also described and figured in a beautiful plate adults of both sexes, with and without the white superciliary. Ten years later Ogilvie-Grant in the *Cat. Birds, Brit. Mus.*, incorrectly stated that the black bill was indicative of the sub-adult, and white and grey superciliaries of male and female respectively. In his preliminary note on this species in the second volume of the present work, Robinson, obviously without personal inquiry, followed the latest, but unfortunately inaccurate, conclusions.

The presence of a superciliary stripe, either white or grey, or its absence, seems purely an individual character. Of a large number of specimens examined, the majority of adult males have the stripe grey; the majority of immature males have it white; in adult females, white and grey stripes are about equal in number; in juveniles the stripe is grey, or white, irrespective of sex.

Soft Parts.—“*Male*: iris, red; orbital skin, black; lower eyelid, yellow; bill and casque, ivory-white; feet, blackish. *Female*: iris, orange-brown; orbital skin, light claret; bill, casque and feet, blackish” (Sumatra, *Jacobson*). The casque and bill of the male are narrowly black at the base.

Juvenile: iris, pale brown; orbital skin, yellow; bill, pale green; gular skin, blackish; feet, dull plumbeous, soles yellowish, claws black (*Kloss*).

Dimensions.—*Male*: total length, about 30 in.; wing, 11·6 to 12·4 in.; tail, 11·6 to 12·5 in.; tarsus, about 2 in.; bill and casque vary much according to age, but in fully grown birds, bill from gape, about 4·9 to 5·6 in.; length of casque (straight), 4·5 to 6·1 in. *Female*: slightly smaller in body, markedly so in the casque. Wing, 10·6 to 11·8 in.; tail, 10·3 to 11·6 in.; tarsus, 1·8 in.; bill from gape, 4 to 4·5 in.; casque, 2·5 to 3 in.

Range in the Malay Peninsula.—From Patani to Johore. Not on any of the islands.

Extralimital Range.—Sumatra, Banka, Billiton and Borneo. There is a very doubtful record from French Indo-China, but otherwise the bird is known only as purely a Malaysian species.

Nidification.—Although very young juveniles have been obtained in the Malay Peninsula there are no published details of the nesting habits from our area. An authenticated egg from Sarawak is white and measures 1.8 by 1.3 in.¹

Habits.—Not so common in the Peninsula as the pied hornbill and rather local in distribution. It is less numerous in the north than in the south. In Pahang and Johore it is fairly common, occurring in jungle, especially along the courses of the larger rivers, in small, noisy flocks: it is also frequently seen in more open country and even near villages, but it is essentially not a bird of the cultivated areas as is *Anthracoceros convexus*. We have seen specimens from Johore, Malacca and all the Federated Malay States, and Mr C. J. Aagaard obtained it in Patani, which seems to be about the northernmost limit of its range.

Cranorrhinus corrugatus

The Wrinkled Hornbill

Vol. II., p. 52.

Buceros corrugatus Temminck, *Pl. Col.*, 531, 1832 (Borneo).

Cranorrhinus corrugatus, Ogilvie-Grant, *Cat. Birds, Brit. Mus.*, xvii., 1892, p. 379.

Malay Name.—Uncertain. Ēnggang (generic for large hornbills).

Description.—Size large. Female black, except for terminal two-thirds of tail, which are white. Male with foreneck and face also white. Casque keel-like, in males curiously and unevenly buckled in front as if by a collision. Base of lower mandible with transverse ridges in males. Throat naked.

Male.—Head and neck, white, except the top of the head, which is glossy black, forming a well-defined, isolated cap. Terminal two-thirds of tail, white. Remainder of plumage, glossy black with a blue-green sheen.

Female.—Differs in having the entire head and neck black. The casque simple and keel-like. Under mandible without transverse ridges at the base.

Note.—Most specimens of this bird have the terminal part of the tail chestnut, not white, and the bird has sometimes been described and even figured in this condition, but common though this state is, I have seen skins in which the *new* tail feathers are white, and it seems that the more usual chestnut-colour is due to stain of some kind.

Soft Parts.—*Male*: iris, red; edge of lids, black; naked orbital skin, pale blue; naked throat, white, fleshy or pink, mottled with black; bill, yellow, white at tip, red at base; casque, red; feet, dark grey. *Female*: bill, yellow; throat and orbital skin, blue.

Dimensions.—*Male*: total length, 32 to 33 in.; wing, 15 to 16 in.;

¹ A valuable paper on the nesting habits of Malaysian hornbills has recently appeared in three parts in *De Tropische Natuur*, 26, 1937. The writers are Messrs M. and H. Bartels. The paper is written in Dutch.

tail, 10.25 to 10.5 in.; tarsus, 1.8 in.; bill from gape, 5.8 to 6.5 in.; casque (in a straight line), 3.3 to 3.5 in. *Female*: total length, 30 in.; wing, 13.8 in.; tail, 9.4 to 10 in.; tarsus, 1.9 in.; bill from gape, 4.5 to 4.8 in.; casque, 2.5 to 2.7 in.

Range in the Malay Peninsula.—Pahang, Selangor, Negri Sembilan and Malacca. Not on any of the islands.

Extralimital Range.—Sumatra and Borneo. A subspecies has been described from the Batu Islands off the west coast of Sumatra.

Nidification.—Unknown from the Peninsula.

Habits.—This hornbill seems to be rare wherever it occurs, but, judging from the number of imported birds I have seen in captivity in Singapore, I suspect that it is commoner in Sumatra than in the Malay States or Borneo. Little is known of its habits, and, like Robinson, I have never seen the bird in the field. Robinson suggests that it is largely confined to the coast and that, like *Rhyticeros subruficollis*, Blyth's wreathed hornbill, it performs considerable journeys over salt water. In life the white feathers of the neck are sometimes stained deep yellow, possibly by the secretion of the oil (uropygial) gland at the base of the tail.

The following note by Dr Maingay, a surgeon stationed in Malacca, published in *Proc. Asiat. Soc. Bengal*, 1868, p. 196, is of great interest:

"I met with this fine hornbill, for the first time since I have been in Malacca, only last December, when, singular to relate, it suddenly appeared in large flocks along the coast, and from the direction of the flight, I imagine the birds must have crossed from Sumatra. They remained about a month, during which period several living examples passed through my hands. The Malays declared the birds had not been seen in Malacca for twenty years, and, so far as my own four years' experience goes, I can corroborate their statements. They have since all disappeared as mysteriously as they came, and I have not met with any for the last three months. I am quite at a loss to account for so singular and unusual a migration, and the only plausible conjectures are: either that it was produced by a very unusually strong monsoon, or from a failure in the supply of fruits. So bold and fearless were the birds on their first arrival, that a few actually roosted, out of gunshot, however, on a very lofty and bushy *Pterocarpus* tree, within the precincts of the town."

Rhyticeros subruficollis

Blyth's Wreathed Hornbill

Vol. II., p. 53.

Buceros subruficollis Blyth, *Journ. Asiat. Soc. Bengal*, xii., 1843, p. 177 (Tenasserim).

Rhytidoceros subruficollis, Oates, in Hume's *Nests and Eggs Ind. Birds* (2nd ed.), iii., 1890, p. 81; Ogilvie-Grant, *Cat. Birds, Brit. Mus.*, xvii., 1892, p. 385; Blandford, *Faun. Brit. Ind., Birds*, iii., 1895, p. 148; Oates, *Cat. Birds' Eggs, Brit. Mus.*, iii., 1903, p. 45; Robinson and Kloss, *Journ. Nat. Hist. Soc. Siam*, v., 1922, p. 133.

Rhyticeros subruficollis, Stuart Baker, *Faun. Brit. Ind., Birds* (2nd ed.), iv., 1927, p. 292; Stuart Baker, *Nid. Birds Ind. Emp.*, iii., 1934, p. 434.

Malay Name.—Burong jawa (*Selangor*). Énggang (generic for large hornbills).

Description.—Size medium. Female, black with white tail. Male with white head and chestnut crest in addition. Casque, low, flattened and shield-like; heavily ridged and with the appearance of overlapping plates. Very like the Malaysian wreathed hornbill (*Rhyticeros undulatus*) but smaller (wings in males, 15.8 to 17 in., in females, 14 to 14.5 in., against 18.5 to 20.5 in. and 16 to 17.5 in. in *R. undulatus*), without the corrugations at the base of the mandibles, which are smooth, and also lacking the dark band across the naked throat.

Adult male.—A narrow chestnut band, starting on the forehead at the base of the bill, broadens on the nape into a large patch which merges into the black of the hind neck. Remainder of head and neck, white. Tail, white. Remainder of plumage, glossy black with a greenish sheen.

Adult female.—Tail, white; remainder of plumage, glossy black with a greenish sheen.

Soft Parts.—Iris, red; throat, yellow in males, blue in females; bill, ivory-white, tinged with brown at the base of the mandibles and on the casque; concavities of corrugations, brown; feet, blackish. According to Davison the immature male has the throat blue as in females.

Dimensions.—*Male*: total length, 34 to 35.25 in.; tail, 10.75 to 12 in.; wing, 15.8 to 17 in.; tarsus, 2.2 to 2.3 in.; bill from gape, 7.0 in. *Female*: total length, 30 in.; tail, 9 in.; wing, 14.5 in.; tarsus, 2.1 in.; bill from gape, 5.62 in. (Tenasserim birds, *after Davison*).

Range in the Malay Peninsula.—The Pakchan estuary. The Selangor coast.

Extralimital Range.—Extends north along the Siamese part of the Peninsula and Tenasserim to North Siam, Pegu, Toungoo and Arakan. Davison regarded it as only a straggler along the coast of South Tenasserim, but found it common between Moulmein and Tavoy. Not recorded from East Siam or French Indo-China. Occurs in Sumatra and Borneo.

Nidification.—No record from the Malay Peninsula. In Tenasserim the nesting habits, as recorded, seem much like those of other hornbills, the eggs being laid in holes in high trees. The entrance to the hole is then plastered up. Two or three white eggs are laid: they measure about 2.25 by 1.6 in.

Habits.—Very little is known about the habits of this hornbill in the Malay Peninsula. It has been met with in the mangroves on the coast of Selangor and, according to Robinson, at sea along the coasts of the Straits of Malacca. Robinson suggested that the species was migratory, but Davison, in Tenasserim, has noted that this hornbill seems to go long distances to feed, that it associates in large flocks and that these are sometimes at such a height that the birds are only just distinguishable. The food is said to consist largely of fruit, but it will also eat snails, etc., on the ground. The voice is described as a short hoarse bark uttered when flying, or at rest, and the noise

made by the wings in flying carries for a great distance. Mr E. Seimund remembers shooting one from a flock of about thirty on the coast of Selangor, and told me that on the evening in question the small flocks "came over like fighting pigeons."

Rhyticeros undulatus

The Malaysian Wreathed Hornbill

Vol. II., p. 52, pl. 2, fig. 2.

The casque consists of a series of low-ridged plates. The base of both mandibles is corrugated. *Male*: top of the head, chestnut; sides of the head, the neck and the tail, white. Remainder of plumage, black. *Female*: black with a white tail.

Total length, about 40 in.; wing, 16 to 20.5 in.

A forest bird commoner in the north of the Peninsula than in the south. There is no record of the nest from the Peninsula. In Tenasserim the eggs are laid in holes in tall trees.

Anorrhinus galeritus

The Bushy-crested Hornbill

Vol. II., p. 55, pl. 2, fig. 1.

Casque much compressed, and coming to a knife-edge in front; ridge almost parallel with the bill. Head, neck and upper parts, black with a green gloss; under parts, blackish brown. Tail, brownish grey with an olive tinge and the terminal third black. Young birds are much browner and less blackened; wing coverts and secondaries edged with buff; abdomen, etc., pale buffy brown.

Total length, about 33 in.; wing, about 13.75 in.

There is no record of this species from the extreme south of the Peninsula, but elsewhere it is not uncommon in heavy lowland forest, although more common in submontane districts. The breeding habits are unknown.

Berenicornis comatus

The Long-crested Hornbill

Vol. II., p. 53, pl. 2, fig. 4.

Casque, small, narrow, much compressed and sharply keeled. Head with a long bushy crest.

Male: head, neck, breast, upper abdomen, tips of the wing quills, and the tail, white. Remainder of plumage, black. *Female*: neck and entire under parts, black; otherwise as in the male.

Total length, about 40 in.; wing, about 15 in.

This is one of the less common Malayan hornbills. At times it turns up in the lowland forest, but far more frequently it is met with in small flocks on the mountains. There is no local record of the nest.

*Rhinoplax vigil***The Helmeted Hornbill**

Vol. II., p. 49, pl. 2, fig. 5.

Casque very large and high, the front abruptly truncated and forming a flattened, hard, ivory-like plate. Central tail feathers greatly lengthened. Throat, neck and a narrow strip down the back, naked and red. Most of the casque and bill, red. Top of the head, blackish; ear coverts, chestnut; upper parts, dark brown, almost black on the wing coverts and much paler, greyish brown on the rump, wings tipped with white; tail, white with a sub-terminal black band.

Total length, from 50 to 65 in.; wing, about 20 in.; tail, 25 to 36 in. Females rather smaller.

This hornbill is absolutely restricted in range to the old heavy forest of tall trees. In such localities it is not rare, but always shy, difficult to approach and far more often heard than seen. The nidification has not been observed in the Peninsula.