Article IV.—THE HYRAXES COLLECTED BY THE AMERICAN MUSEUM CONGO EXPEDITION[1]

By Robert T. Hatt

Plates XVIII to XXII; Text Figures 1 to 3

INTRODUCTION

The American Museum Congo Expedition, of which Mr. Herbert Lang was leader and Mr. James P. Chapin assistant, operated in the Belgian Congo from 1909–1915.[2] Among the excellent series of mammals obtained were ninety-eight hyraxes. Particularly well represented was the then little-known Emin's tree hyrax. A novelty was a new species, *Heterohyrax chapini*, described in a preliminary report.[3]

Study of the Hyracoidea of the collection was initiated in 1932, but the manuscript left uncompleted pending the appearance of Hahn's monograph[4] of this group. The collection on which the present report is based represents rather fully the hyrax fauna of the northeastern Congo, and thus furnishes a good basis for the appraisal of Hahn's conclusions concerning the taxonomy of the species present in this same area.

[1] Scientific results of the Congo Expedition, Mammalogy, No. 17.

[2] A general account of the expedition with a map of its collecting grounds may be found under the following reference:
Osborn, Henry Fairfield, 1919, 'The Congo Expedition of The American Museum of Natural History,' Bull. Amer. Museum of Natural History, XXXIX, pp. xv–xvii.

[3] Hatt, Robert T., 1933, 'An Annotated Catalogue of the Hyracoidea in the American Museum etc.,' American Museum Novitates, No. 594, 13 pages.

[4] Hahn, Herbert, 1935, 'Die Familie der Procaviidae,' Zeitschrift für Säugetierkunde, Bd. IX, pp. 207–358.

Hahn's monograph, a long-needed review of recent and fossil Hyracoidea, is based on the excellent collections in Berlin, Frankfort and Tervueren, together with notes compiled by the late Doctor Brauer on collections in other continental museums. It is unfortunate that the author had no opportunity to examine the British Museum Collection nor any of the material in America, specimens which are of immense importance in any study of this group of animals. Included in the work is a sound discussion of the skull and skeletal characters, used as criteria of relationship, together with a dissertation on the ecological and zoogeographical background of hyrax phylogeny.

Most of Hahn's conclusions appear sound, particularly as regards the main phyletic trends. As may be seen in the following treatment there are, however, numerous points on which I cannot agree with him concerning the taxonomy of Congo forms. Thus, it appears to me highly probable that *Dendrohyrax d. latrator* must be recognized; and I am convinced that there is no basis, other than Hahn's failure to recognize dichromatism, for considering the tree hyraxes of the northeastern Congo as anything but homogeneous. The fact that in the monograph my *Heterohyrax chapini* was listed under another species was due obviously to the fact that my previous report on the Order did not appear until it was too late for Doctor Hahn to give it consideration. The omission in Hahn's revision of all reference to types and type localities is an unfortunate neglect, particularly in that his predecessor, Brauer, so frequently made no mention of the number, sex or age of his types. Apparently overlooked in the review was *Dendrohyrax rubriventer* Brauer (= *D. d. emini* Thomas).

It is again my pleasure to tender my thanks to Doctor James P. Chapin for his invaluable advice; and to the authorities of the Field Museum, the United States National Museum, the Museum of Comparative Zoölogy and the British Museum for their courtesy in permitting the examination of collections in their charge.

The text figures in this Bulletin were drawn by Marcelle Roigneau Hatt and the photographs of animals in the flesh made by Mr. Lang.

SPECIES WITH THEIR LOCALITIES AND NUMBER OF SPECIMENS FROM EACH LOCALITY

Species	Localities	Specimens
1.—*Dendrohyrax dorsalis latrator*	Bolobo, 1.	1
2.—*Dendrohyrax dorsalis emini*	Akenge, 3; Avakubi, 1; Gamangui, 4; Medje, 6; Ngayu, 2; Niangara, 3; Niapu, 24.	69
3.—*Heterohyrax chapini*	Matadi, 2.	2
4.—*Procavia johnstoni lopesi*	Aba, 24; Faradje, 1; Vankerckhovenville, 1.	26

LIST OF LOCALITIES, WITH NAMES OF THE SPECIES AND SUBSPECIES AND NUMBER OF SPECIMENS TAKEN AT EACH LOCALITY

Localities	Species and Subspecies	Number of Specimens
Aba	*Procavia j. lopesi*	24
Akenge	*Dendrohyrax d. emini*	3
Avakubi	*Dendrohyrax d. emini*	1
Bolobo	*Dendrohyrax d. latrator*	1
Faradje	*Procavia j. lopesi*	1
Gamangui	*Dendrohyrax d. emini*	4
Matadi	*Heterohyrax chapini*	2
Medje	*Dendrohyrax d. emini*	6
Ngayu	*Dendrohyrax d. emini*	2
Niangara	*Dendrohyrax d. emini*	3
Niapu	*Dendrohyrax d. emini*	24
Vankerckhovenville	*Procavia j. lopesi*	1

VARIATION NOT INDICATIVE OF RELATIONSHIP

Individuality in Skulls

Skulls of the hyraxes show a range in variation in general skull type beyond that encountered in many mammals. Comparing specimens of equal apparent age,[1] as judged by suture closure, development of skull ridges and dental wear, there are found skulls that contrast to the extremes shown by the measurements given below for *Dendrohyrax d. emini*. Specimens of every intermediate size and shape occur in the

[1] For the convenience of the reader, Thomas's (1892, P. Z. S., p. 53) classification of the developmental stages of the hyraxes is repeated.

Stage I. Before the milk dentition is fully in place.
Stage II. Milk dentition all up and in use. M^1 not visible.
Stage III. M^1 up; M^2 below level of bone.
Stage IV. M^2 just appearing or partly up.
Stage V. M^2 nearly or quite up, M^3 below level of bone.
Stage VI. Tip of M^3 appearing.
Stage VII. M^3 partly or nearly up, but still unworn.
Stage VIII. M^3 up and in use.

series and one cannot admit the cases at one extreme or the other as dwarfism or gigantism.

Cranial Individuality in Adult Males of *Dendrohyrax d. emini*

	Old VIII		Early VIII	
American Museum Number	53836	53837	53823	53822
Greatest length	122.8	110.0	114.5	106.5
Condylobasal length	120.7	110.0	114.0	106.5
Zygomatic breadth	67.5	65.2	63.2	62.3
Anterior edge of orbit to gnathion	43.7	38.5	40.3	34.0
Frontal suture, length	34.2	32.9	36.7	35.0
Bregma to occiput	49.5	40.0	40.0	40.0
Palatal length	63.5	58.2	60.0	59.0
Basisphenoid plus basioccipital, length	41.2	34.3	35.9	32.1
Premolars plus molars, length	42.3	39.5	37.7	41.0

In the instance of the older skulls the two specimens contrasted differ chiefly in the measurements of length, the discrepancies between the two being greatest in the postorbital region, but also pronounced in the preorbital. The two younger skulls, on the other hand, show a striking difference in the length of muzzle but little difference other than this.

Similar broad divergence is observed in the Congo Expedition series of *Procavia j. lopesi* where the skulls of three female specimens all in Stage VIII and with nearly the same degree of tooth wear (see "height of crown") are of three types, one (No. 53776) long and slender, another (No. 53777) long and broad, a third (No. 53796) short and slender. The degree of difference is perhaps best shown by the following table of measurements.

Cranial Divergence of Stage VIII Females of *Procavia j. lopesi*

American Museum Number	53776	53777	53796
Greatest length	103.0	98.8	92.0
Condylobasal length	102.5	95.7	89.8
Zygomatic breadth	57.2	57.8	51.8
Width at postorbital processes	35.6	40.5	34.0
Length of nasal suture	27.0	24.4	24.5
Frontal suture, length	39.5	38.4	34.0
Bregma to occiput	33.2	32.7	31.7
Diastema, length	15.0	11.6	10.7
Premolars plus molars, length	42.3	41.8	39.3
Height of crown, M^3	4.5	4.1	4.1

Fontanel and Wormian Bones

Fontanel and wormian bones occur with relative frequency in the Congo Expedition series of *Procavia j. lopesi*. None were found in the skulls of *Dendrohyrax d. emini*, the early closure of the cranial sutures being unfavorable to their recognition, even should they be present in early life. In this respect these two species are representative of their generic groups, for fontanel and wormian bones are about four times as frequent in occurrence in *Procavia* as in *Dendrohyrax*.

The hypothesis advanced by Schultz (1923, Journal of Mammalogy, IV, p. 65) that these bones are neomorphs in the mammalia that appear at places in which the normal roofing-over process is inadequate to meet demands of protection, receives some slight support from these findings, for in the hyraxes these accessory ossicles occur with greatest frequency in the group with the most retarded solidification of the skull roof, and most rarely, if one may judge from examination of a series that contained few skulls with open parietal sutures, in the group in which early closure is the rule.

The incidence of occurrence in the three genera, as determined from a survey of all skulls of hyraxes in the American Museum, is as follows:

Genus	Total Number of Skulls	Number of Skulls with Wormian or Fontanel Bones	Incidence
Procavia	53	8	15.1%
Heterohyrax	34	3	8.8%
Dendrohydrax	78	3	3.7%
All forms	165	14	7.8%

The two species of Congo hyraxes represented by series show slightly different percentages than do the larger groups considered. Thus *Procavia j. lopesi* has five cases of accessory roofing bones in 22 skulls, an incidence of 30 per cent, whereas no case (unless a single Stage I skull in which the interparietal bears a median suture should be considered an exception) occurs in 37 skulls of *Dendrohyrax d. emini*.

The sexual distribution of extra bones in the mid-line was approximately equal, there being 6 males and 7 females showing the variant.

Asymmetry

Asymmetry is not a character of the Hyracoidea and no case of well-marked asymmetry in the skulls of Congo hyraxes has been encountered

that was not clearly the direct result of some individual pathological condition. However, one skull of *Dendrohyrax. d. nigricans* in the collections of the American Museum is exceptional in a distinct warping of the skull. Here the right side is longer than the left, the difference being most obvious in the occipital region. Correlated with this asymmetry is a difference in the upper tooth rows, that of the right side being nearly straight, that of the left clearly bowed.

Dental Anomalies in the Hyraxes

Parallel to the cases so frequently encountered among the rodents, where too the proper occlusion of the persistently growing incisors is dependent on even wear of the tips, are hyraxes in which the upper incisors, unopposed by wear below, grow in great arcs. No specimen in the Congo collection shows this anomaly, but the American Museum possesses one skull of this type picked up by Dr. Chapin on Mt. Kenya at an altitude of 14,000 feet. The specimen is that of a *Procavia j. mackinderi.*

Another similar anomaly occurs in a specimen of an old male *Dendrohyrax d. emini* in which one of the upper incisors had been lost long before death and the two lower incisors, which would normally oppose this tooth had grown forward about twice as far as the corresponding teeth on the opposite side. This same individual had suffered a broken zygomatic arch on the same side as the tooth loss, at what was probably the same time. Most of the chewing teeth had been broken and destroyed during life and it appears that this ancient hyrax may have died through the accidents to which his dental equipment had been subjected.

The first permanent teeth to wear completely away are the first molar above, the first molar below. These teeth are fully functional and well worn before the deciduous fourth premolar is shed and before the second molar is up in position. The condition in which the first molar is worn down to the roots is encountered in all of the genera of hyraxes, and is not uncommon, but specimens in which the second molar is also worn out are rare. I have encountered no skull in which the crown of the third molar has disappeared.

Sexual Characters in the Skulls

The sexual dimorphism of the upper incisors was established by Thomas (1892, P. Z. S., p. 54). As he pointed out, in some species the dimorphism is not well marked. It is, however, firmly established in

both *Procavia j. lopesi* and *Dendrohyrax d. emini* where the sex of any adult may be easily recognized by these teeth.

The size of the skull in the Congo species seems to be uncorrelated with sex as was also recognized by Thomas for the hyraxes as a whole.

Sex differences in the skulls of the *Procavia j. lopesi* and *Dendrohyrax d. emini* are not the same. In the latter, one observed difference is that the skulls of the males are more massive and rugged, the ridges overlying the roots of the incisors larger in the males, reflecting the larger size of the teeth.

Sex differences in the skulls of the rock hyraxes of Aba (*Procavia j. lopesi*) are centered about the muzzle and the incisors, reflecting a better fighting equipment in the males. Thus the heavy bony ring at the gum line of the incisors is in the males enlarged and rough, and the muzzle is slightly more massive. Most striking is the difference in the maxillary root of the zygomatic arch, the outer surface of which in all adult males is deeply concave, while in the females and young (Stage V) males it slopes gently from the gum line to the maxilla-malar suture. For purposes of sex diagnosis this is second in usefulness only to the shape of the incisors. The mandibular symphysis further reflects the increased strength of the male buccal region in the development of sharply delineated ridges which carry forward the line of the lower mandibular borders and pass upward to meet high on the symphysis.

In the males of this species there is the further difference that the frontal bone is on the average flatter and broader than in the females.

The Ages at Which the Upper Canine Is Lost

The deciduous canine is lost at different ages in different genera, as Hahn has shown. My own figures, given below, bear out his conclusion that in *Procavia* the tooth is lost before Stage V; that in *Heterohyrax* it may be retained in Stage V; and in *Dendrohyrax dorsalis* is always present to at least Stage IV and commonly to Stage VII.

In *Procavia j. lopesi* the five specimens in Stage III all retain the upper tooth which Lataste (1886, Ann. Genova Mus., (2) IV), concluded was a canine, whereas all specimens in stages older than this have lost this tooth. The Matadi hyrax (*H. chapini*) does not have this tooth in the specimen in Stage VIII, but does in the other which is in Stage V. The canine is retained in all specimens of *D. d. emini*, seven in number, of Stages I to V and is lost in the six specimens of Stages VI and VII. There are twenty-four specimens in Stage VIII, in twenty-

two of which no canine is present. In the two others, however, a canine is retained on one side.

SOME CHARACTERS UTILIZED FOR CLASSIFICATION OF HYRACOIDEA AND THEIR VARIATION IN THE CONGO SPECIES

Cranial Characters

Because Hahn's monograph treats exhaustively of the value of most commonly used skeletal characters it would be superfluous for me to discuss them in general, but the series which I have studied have furnished some information not covered by Hahn or at least neglected by him. Some of this is here recorded.

Closure of the Orbits

No specimen of either *Procavia j. lopesi* or *Heterohyrax chapini* in the Congo Expedition collection has closed orbits. Every skull of *Dendrohyrax d. emini* examined has closed orbits, even in Stage I. In this respect all specimens are in harmony with their generic standard. In many other species of hyrax such constancy does not obtain.

Length of Diastema

Diastema length, as I have noted above and as may be clearly seen from an examination of the table of cranial measurements, is subject to too great variation in equal aged individuals of the same sex, from the same locality, to be a reliable criterion as to race. Generic differences are well marked, it is true, and occasionally specific differences. The length of the diastema increases with age, both actually and relatively, in most, if not in all species.

The Course of the Temporal Ridges

The course of the temporal ridges in my experience, although Brauer[1] believed otherwise, has proved totally inconstant in every species of hyrax examined in series. Among equal-aged specimens of one sex of one species (e. g., *D. d. emini*) are found ridges that are parallel along the greater part of their superior border; others strongly bowed and most nearly approximate at the middle of the parietal; others which converge sharply from the anterior end of the parietal to its posterior border. For this reason I do not consider the pattern as indicative of genetic relationship.

[1] 1934, Zeitschr. für Säugetierkunde, Bd. IX, pp. 198–206.

Separation of Malar and Lacrymal Bones

The malar and lacrymal bones of *Procavia j. lopesi* usually come in contact before Stage VIII. In only one of ten Stage VIII skulls is there any separation, and this is but slight. Two Stage VII skulls have a gap of about 1 mm. between the bones, while two in Stage VI already have the bones in union. Three Stage V skulls show a gap between the two, while two in Stage IV show it closed. In three Stage III skulls there is contact of malar and lacrymal, while in a fourth these bones are separate. Thus for the rock hyrax of the Upper Uele it seems the rule that there is union of these bones in adults, but that the time of first contact is exceedingly irregular and may occur very early in life.

Union of malar and lacrymal bones in the Congo tree hyrax is rare, having been observed in only one of 24 Stage VIII skulls and in none of the nine skulls of earlier stages. It is further evident from an examination of the table of cranial measurements of Stage VIII specimens that the distance between these bones is on the whole fairly constant in the species.

These observations bear out Brauer's (1934) conclusion that the malar-lacrymal relationship serves as a good generic character.

The Breadth of the Lacrymal Process

Brauer has used the breadth of the lacrymal process in characterizing species, but the great individuality shown in the size of this process among series of hyraxes from a single locality suggests that this is insignificant and useless as a criterion. In Stage VIII *Procavia j. lopesi* this process varied from 2.2 to 3.3 mm. in width, while in *Dendrohyrax d. emini* the range is from 2.5 to 5.5 mm. This variation embraces the width of practically any specimen of hyrax in the Museum's collection, and the character is not believed to be of use in so far as the species here represented are concerned.

Position of Lacrymal Foramen

The position of the lacrymal foramen was found by Brauer to be of significance in some cases. In the Congo collection there is high variability in this structure that is uncorrelated with either age or sex, and though this variation is far greater in *Dendrohyrax d. emini* than in *Procavia j. lopesi* it is believed that the feature cannot at present be considered stable in either species and hence reliable for taxonomic

purposes. The position of the lacrymal foramen (on one side, there being little bilateral asymmetry) as found for these two species is as follows:

	Peripheral	Complete below Process	Complete behind Process
Dendrohyrax d. emini	9	16	11
Procavia j. lopesi	20	1	0

A survey of all the hyrax skulls in the American Museum indicates that all types of lacrymal foramina occur in all of the genera, but that central foramina are more common in the tree hyraxes and marginal foramina more frequent in *Heterohyrax* and *Procavia.*

The Ventral Surface of the Auditory Bullae

The ventral surface of the auditory bullae of hyraxes is fairly constant in shape within any age group of a species of hyraxes, and as different species show different forms of bullae the character has been used (by Brauer et al.) to distinguish the species. The character, however, is limited in its usefulness for the best descriptive terms are ambiguous and these bullae can at best be described as more or less inflated than those of another species to which they are compared.

Dendrohyrax dorsalis latrator (Thomas)

Procavia emini latrator Thomas, 1910, Ann. Mag. Nat. Hist., (8) V, p. 285. Type locality: Batempa, Upper Sankuru River, southern central Congo.

Dendrohyrax dorsalis emini Hahn, 1934 (part), Zeitschr. für Säugetierkunde, Bd. IX, p. 259.

A race distinguished from *D. d. emini* by the white or whitish coloration of the basal half of the body hairs.

Represented by a single, incomplete native skin, unsexed and juvenile, obtained at Bolobo in December, 1914. The American Museum has one other native skin of an adult, collected at Lukolela by a more recent expedition.

These two incomplete specimens, one probably of a Stage I individual, the other possibly of one in Stage VIII, bear out Thomas's original description of the race, as far as the skin areas are represented.

It would seem from the localities represented by the type and these two specimens that the range of *Dendrohyrax dorsalis latrator* extends along the southwestern border of the Congo Forest.

Dr. James P. Chapin informs me that the voice of *D. d. latrator,* as he

has heard it about Lukolela, is entirely different from that of *D. d. emini* as he knew it to the east. The two, he states, could never be confused by their calls.

Dendrohyrax dorsalis emini Thomas

Plates XVIII to XXI; Text Figure 1

Dendrohyrax emini Thomas, 1887, Ann. Mag. Nat. Hist., (5) XX, p. 440. Type locality: Tingasi, Monbuttu (2° 30′ N., 27° 50′ S.), Belgian Congo.

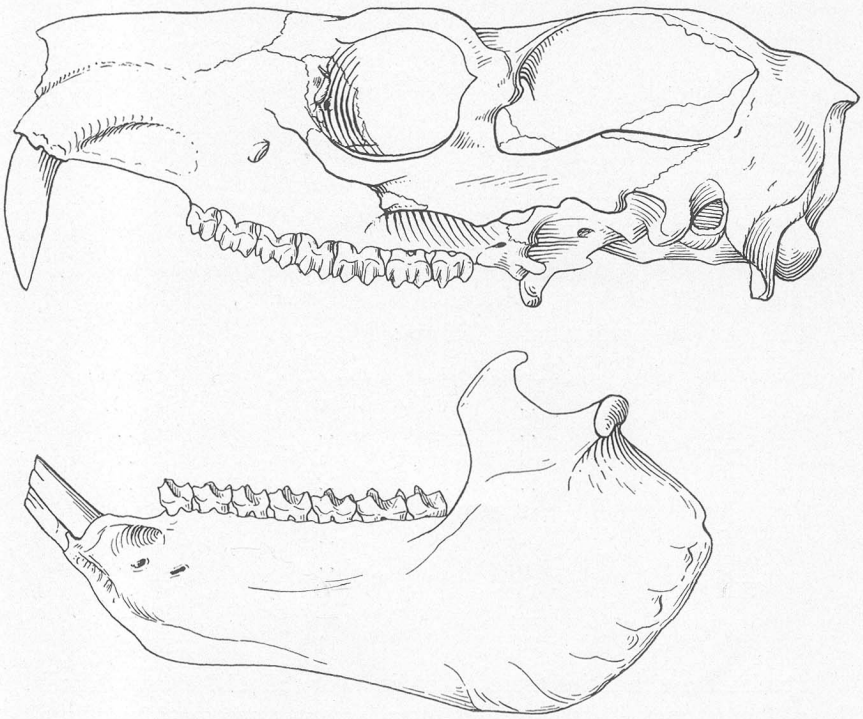

Fig. 1. *Dendrohyrax d. emini.* Male, Stage VIII. Niapu, Belgian Congo. A. M. N. H. No. 53830. Natural size.

Dendrohydrax beniensis Brauer, 1917, Sitz. Ber. Gesell, naturf. Freunde, p. 295. Type locality: Beni Zambo, between Kalumenda and Beni, Belgian Congo.

Dendrohyrax congoensis Brauer, 1917, *loc. cit.* Type locality: Beni (Kartoushi) [slightly north of Beni, close to the Semliki River], Belgian Congo.

Dendrohyrax rubriventer Brauer, 1917, *loc. cit.* Type locality: Kalumenda, Beni, Belgian Congo.

Dendrohyrax brevimaculatus Brauer, 1917, *loc. cit.* Type locality: Lesse, eastern Belgian Congo.

Dendrohyrax dorsalis nigricans HAHN, 1934 (part), Zeitschr. für Säugetierkunde, Bd. IX, p. 257.

Dendrohyrax dorsalis emini HAHN, 1934 (part), *op cit.*, p. 259.

Dendrohyrax d. emini is a large tree hyrax typical of the genus in cranial characters and the mammary formula. It belongs to the *dorsalis* group of forms in which the muzzle is largely naked in the adult animal, but differs from the typical subspecies in the pelage which in *emini* is usually more lightly colored and harsher. In many skull characters it resembles *D. d. dorsalis* but differs from that race in the fact that the interparietal-parietal sutures are closed and the interparietal-supraoccipital suture open, the reverse of which obtains in the Gulf of Guinea specimens.

Represented by 33 skins, 2 skeletons, 37 skulls and 5 fetuses in alcohol, collected as follows:

Akenge, 3 (♂ ♂), Oct. 2–18, 1913.
Avakubi, 1 (♀), Oct. 22, 1909.
Gamangui, 5 (♂ ♂), Feb. 10–18, 1910.
Medje, 6 (5 ♀ ♀, 1 fetus), Jan. 21–Oct. 1, 1910.
Ngayu, 2 (♂, 1 fetus), Dec. 19, 1909.
Niangara, 3 (♂ ♂), Nov. 20, 1910–April 28, 1913.
Niapu, 24 (14 ♂ ♂, 5 ♀ ♀, 2 juv. sex?, 3 fetuses), Nov. 10, 1913–Jan. 3, 1914.

The ages are represented as follows:

STAGE	MALES	FEMALES	SEX?
I	..	2	2
II	..	..	..
III	1	1	..
IV	..	..	..
V	2	..	..
VI	1	..	..
VII	4	..	..
VIII	16	8	..
	24	11	2

Specimens with skins were taken in every month except March, June, August and September, but there is poor representation of such specimens in all the season from March to September. This is, however, of little importance for none of the specimens were taken as much as four degrees from the equator, and the two short dry periods in January and July probably produce no change in the pelage of the hyraxes.

The monthly catch of specimens was as follows: January, 2; February, 3; March, 2; April, 2; July, 1; October, 5; November, 5; December, 13.

The mammary formula of *Dendrohyrax d. emini*, as determined from an examination of skins of 8 females from the Congo series, is 0–1 = 2, which formula is typical of *Dendrohyrax*.

The Pelage

Dichromatism

Dichromatism in hyraxes was first noted by Aharoni[1] who observed that in the Syrian species some of the individuals were light colored, others dark. Shortly after this, in June, 1932,[2] MM. Heim de Balzac and Bégouen in the description of *Heterohyrax antineae* of the Hoggar Plateau, Central Sahara, noted two well-marked color phases, but mislead by an atypical combination of cranial characters they did not recognize that one of the color phases of their supposedly new species was nothing more than the earlier known Hoggar species *Procavia bounhioli* Kollman, a slip which Schwarz[3] soon discovered.

Dichromatism, as I have found, is also strongly marked in *Dendrohyrax d. emini*, a circumstance which mislead Brauer into describing too many forms and Hahn into recognizing too many. The common phase of the species is the type with a broad yellow wash (Plate XX, center), the rarer, a dark pelage (Plate XX, right). Between these are specimens superficially intermediate, but in reality these others are worn stages of the light and dark types. Color and color pattern in these two sorts of animals are not precisely constant, since lighter animals have, for example, dirty white, light yellow or orange bellies, and some less conspicuous features show a wide range in variation. That these color varieties are early established is shown by two Stage I specimens of approximately equal age, both females, one taken October 22 at Avakubi, the other January 21 at nearby Medje. The pelages of these two, well shown in Plate XIX, differ throughout, the bases as well as the tips of the hair shafts being darker in the dark individual than in the light. The diffusion of the pigment extends to belly, hands and feet.

The type specimen of *D. d. emini*, to judge by the color plate published of it (1888, P. Z. S., Plate II), is an animal in the more common yellow pelage. The types of *D. beniensis* and *D. congoensis* to judge by the original description are individuals of *emini* in the darker phase.

Well worn specimens of the light *emini* (Plate XXI, center) are intermediate in appearance, the lighter tips to the hairs being gone, the

[1] 1930, Zeitschr. für Säugetierkunde, V, p. 330.
[2] 1932, Bull. Mus. Hist. Nat. Paris, (2) IV, p. 479.
[3] 1933, Ann. Mag. Nat. Hist, (10) XII, p. 625.

dark bases show out and present a color much like that of true "darks." Worn "darks" are in turn slightly darker in general tone than their genetic twins in fresh pelage, for in individuals of the dark type there is a narrow subterminal band of brown which gives a grizzled appearance to the coat.

One individual in the collection (Plate XX, left), No. 53819, a Stage VIII ♂ taken November 20, 1910 at Niangara, is unique in the presence of three well-marked rusty-orange bands crossing the body transversely, one over the shoulders, one at the level of the anterior end of the dorsal spot (between these there is a light wash of the same color) and a third across the back at about the level of the crests of the ilia. These bands extend well down over the flanks but do not pass on over the belly. Basically the individual is a normal light phase, and it might be presumed that these bars were due to some period of faulty packing or storage of the skin, but because the orange color is exactly matched by the hair tip color, occurring as a uniform wash over other specimens, I am inclined to believe the unique pattern to be epidermal in origin.

Mr. Lang made some notes on the skin and eye colors of a living or freshly-killed male brought in to him alive at Ngayu, December 19, 1909. These notes, directly transcribed are:

> Snout and skin that is visible beneath the scanty hair up to and around the eyes, dark gray, nearly black. The tip of the lower jaw shows the same color. The skin visible on ears, dark gray, inside pinkish. Pupil round, iris dark brown. Pads on feet dark gray, pinkish in middle. The large elliptical place about the dorsal gland is pinkish white.

Emin's hyrax, diverse as are the colors and color patterns encountered, does not have any difference in the pelages of the sexes, as far as my eye can determine. Color, length and quality of the hair are seemingly equal in male and female.

A careful and detailed examination of this series has failed to reveal the slightest difference between specimens from any of the localities represented. It is concluded that within the areas the species is homogeneous.

Age changes in pelage involve at least two phenomena. The first of these is the replacement of the soft woolly juvenile pelage by a coarse coat typical of all adults of the species. A second change, progressive through life I believe, is the falling away of the hair in the region of the snout.

Mammals living so close to the equator as do the hyraxes in this series are not subjected to great seasonal fluctuations in climate. In

this area there are periods focussing in January and July in which the rainfall is slightly lighter than in the balance of the year, but the difference is small and the "seasons" short, with the result that pelage changes are not known to occur in response to the little seasonal change. The skins of this series were critically examined with reference to any such possible change, but none was found.

Many specimens in the collection have a reddish-yellow tinge, particularly marked on the lighter underparts, that is due either to a soiling in the original environment or to changes occasioned by grease incompletely removed from the study skin. A vigorous application of benzine serves to remove much of this color, but some of it, which I assume to be natural to the hair, remains. One striking example of a hyrax with a coloration that suggests staining, yet proves non-removable, is the yellow-banded individual (No. 53819) pictured in Plate XX.

Attainment of Full Growth

There is a range in total length of specimens with skulls in Stage VIII from 525 mm. to 625, with the individuals scattered fairly uniformly between these extremes. The four with skulls in Stage VII also lie within these limits, the lower limit coinciding with that of Stage VIII, the higher limit lying at 535 mm. Two specimens in Stage VI are 525 and 545 mm. long, and the one individual in Stage V, is 550 mm. long. It would thus appear that full growth in this species is attained at about Stage V, though the greater upper range limited to Stage VIII suggests a continuation of growth after Stage VIII is first attained. The one specimen in Stage IV and the one in Stage III are 465 and 460 mm. long, respectively, which is distinctly smaller than any of those in Stages V to VIII.

Behavior

Field notes made by Mr. Lang at Ngayu on December 19, 1909, Medje, January 22, 1910, and Gamangui, February 18, 1910, shed some light on the habits of the species. These notes combined for brevity and slightly altered in wording where necessary, are as follows:

General Behavior.—A male brought in alive by the pygmies, moved very slowly on the ground when undisturbed, but would rush rapidly for a yard or two towards a stick thrust at it, or a person that would approach. At such times it would turn its eyes so far backwards that only the yellowish white membranes in front or in back could be seen, and would also erect the hair along its back and that on its head. This little beast understands how to command the respect of all.

VOICE.—The animal, when disturbed, as described above, would make a short, abrupt, pig-like grunting noise. It continually ground its teeth (seemingly the molariform series) producing a loud noise by these movements. When taken by the neck it would make a soft whistling noise, rapidly repeated.

The tree hyraxes in the forest cry or rather howl for ten minutes or even half an hour with practically no interruption, repeating one long-drawn howl[1] after another. Sometimes, however, one howls as rapidly and as strongly as though it would defy all competition. One would rather attribute the call to a cat-like animal on account of its peculiar sound. The animals start about 9:00 P. M. and cry particularly about 10:00 P. M., though they may be heard even as late as 2:00 A. M.

These night calls of the tree hyrax may be heard a half an hour's journey through the forest. No more than a single animal was heard calling in the same place. Apparently only males howl, as for a long time only males were brought in, and in the total collection the males are more abundant.

The calls were heard in many places, the first time in Batama, September 15, 1909.

FOOD AND FEEDING.—The pygmies and other natives at Ngayu claim that the tree hyrax descends the trees at night and feeds on the ground. The stomachs of three hyraxes taken at Gamangui contained chewed up leaves, all of the same species of trees. One of these stomachs also contained three bees in a ball of hair, all practically intact.

NATIVE CAPTURE.—The tree hyrax, although common all over the forest, is difficult to procure, as it does not start howling until after night-fall, and then the natives are afraid to wander about in the forest on account of leopards.

These hyraxes keep to the same place with great persistence, as they are nearly always heard in the same direction. The natives even claim that one keeps to the same tree for a certain time, which seems probable, as one was heard howling every night for about six days in at least the same clump of trees.

The natives secure the hyraxes by locating the tree upon which the animal is howling. In the morning they climb the tree and search for it, cut down the tree in order to secure the animal, or watch the animal closely until they find some opportunity to capture it. One specimen was taken from a dead hollow tree.

Heterohyrax chapini (Hatt)

Plate XXII; Text Figure 2

Procavia chapini HATT, 1933, Amer. Mus. Novitates, No. 594, p. 1. Type locality: "Loadi Hill, 5 klm. SW. of Matadi, Bas Congo."

Heterohyrax syriacus bocagei HAHN, 1934 (part), Zeitschr. für Säugetierkunde, Bd. IX, p. 283.

A pale drab, coarse-haired bush hyrax with a well-marked light yellow dorsal spot. The mammary formula is 0–2 = 4. The cranial characters are those of the heterohyraxes except that the skull is larger, the muzzle longer, the dorsal profile flatter and the basisphenoid more elevated than in *H. syriacus* and its subspecies.

Represented by two females, one adult, one juvenile and two embryos from the adult. These were collected by James P. Chapin near

[1] Dr. Chapin (field notes) describes their cries as "agonized reiterated screeching."

Collector's Measurements of *Dendrohyrax d. emini*

Locality	Sex	Number	Total	Tail	Foot	Ear	Skull Stage
Akenge	♂	53803	605	25	79	..	VIII
"	♂	53804	545	35	85	31	VI
"	♂	53805	550	30	82	35	V
Gamangui	♂	53808	600	20	84	..	VIII
"	♂	53809	620	22	82	..	VIII
"	♂	53810	535	21	80	..	VIII
"	♂	53811	580	..	82	..	VIII
Ngayu	♂	53818	550	20	80	..	VIII
Niangara	♂	53819	525	20	78	30	VII
"	♂	53821	520	22	80	29	...
Niapu	♂	53822	538	18	75	35	VIII
"	♂	53823	540	20	87	32	VIII
"	♂	53825	555	20	86	31	VII
"	♂	53829	525	15	77	35	VIII
"	♂	53830	562	18	..	32	VIII
"	♂	53831	605	25	88	36	VIII
"	♂	53832	545	28	84	31	VIII
"	♂	53833	535	25	80	32	VII
"	♂	53834	525	25	85	31	VI
"	♂	53835	525	25	81	31	VIII
"	♂	53836	595	25	88	34	VIII
"	♂	53837	575	25	83	35	VIII
"	♂	53842	550	20	77	29	VII
"	♂	53844	595	20	82	33	VIII
Average	♂ ♂		**558.3**	**20.8**	**78.5**	**32.3**	**VII–VIII**
Minimum	♂ ♂		520	15	75	29	
Maximum	♂ ♂		620	30	88	36	
Medje	♀	53814	575	18	82	..	VIII
"	♀	53815	585	25	85	32	VIII
"	♀	53817	635	25	80	33	VIII
Niapu	♀	53824	580	20	82	32	VIII
"	♀	53826	565	20	85	30	VIII
"	♀	53828	590	18	82	32	VIII
"	♀	53838	585	25	85	35	VIII
"	♀	53840	585	15	85	34	VIII
Average	♀ ♀		**585**	**20.7**	**83.2**	**32.5**	**VIII**
Minimum	♀ ♀		565	15	80	30	
Maximum	♀ ♀		635	25	85	36	
Average	♂ ♂ ♀ ♀		**565**	**21.5**	**79.7**	**32.4**	**VII–VIII**
Minimum	♂ ♂ ♀ ♀		520	15	75	29	
Maximum	♂ ♂ ♀ ♀		635	30	88	36	

Matadi, December 27, 1914. The adult and juvenile are preserved as skins with skeletons, the embryos are preserved in formalin.

A novelty of the collection was Chapin's bush hyrax, secured as near to the mouth of the Congo as any hyrax is apt to occur. The reduced number of mammae (if the type specimen is indicative) set this species apart from others of the genus, and its nearest neighbor, *Heterohyrax bocagei*, is quite different in its longer, thicker pelage, smaller size, broader teeth, proportionately broader skull, elevated supraorbital ridges, shorter muzzle and flatter basicranium. (See Plate XXII.)

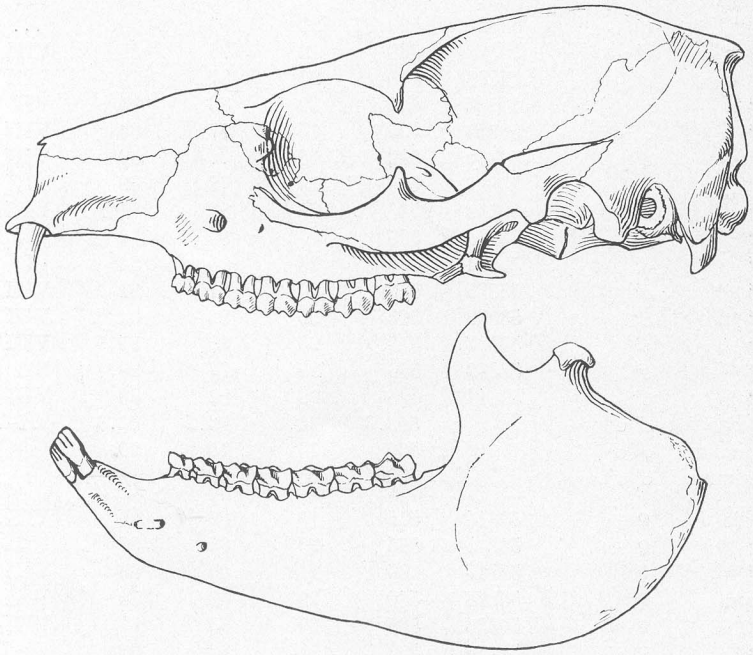

Fig. 2. *Heterohyrax chapini*. Female, Stage VIII. Type. Natural size.

Collector's Measurements of *Heterohyrax chapini*

Locality	Sex	Number	Total	Tail	Foot	Ear	Skull Stage
Matadi	♀	53800	522	12	68	35	VIII
"	♀	53801	430	10	60	30	V
Average	♀ ♀		**476**	**11**	**64**	**32.5**	

Procavia johnstoni lopesi Thomas

Plate XVIII; Text Figure 3

Procavia lopesi THOMAS, 1907, Ann. Mag. Nat. Hist., (7) XIX, p. 520. Type locality: Kodja Hill, Gaima Range, Monbuttu, Congo.

Procavia ituriensis BRAUER, 1917, Sitz. Ber. Gesell. naturf. Freunde, p. 303. Type locality: Ituri, Belgian Congo.

Procavia johnstoni lopesi HAHN, 1934, Zeitschr. für Säugetierkunde, Bd. IX, p. 293.

A large-toothed, coarse-haired rock hyrax apparently closely related to *P. j. matschiei*. The general color is Raw Umber to buffy brown. The crown is black and this shade occurs down to a sharply drawn line below the eye. The dorsal spot is broad and a deep Colonial Buff in color.

Represented by 23 skins, 6 skeletons, 17 skulls and 2 fetuses in alcohol, collected as follows:

Aba, 23 (8 ♂♂, 13 ♀♀, 2 fetuses), July 16, 1911—January 2, 1912.

Faradje, 1 (♂), April 1, 1911.

Vankerckhovenville, 1 (♂), August 7, 1910.

The ages represented may be summarized in the following table:

STAGE	MALES	FEMALES
I	..	..
II	..	..
III	3	2
IV	1	..
V	2	1
VI	..	2
VII	..	2
VIII	4	6

It is thus apparent that the series of fully adult specimens is not large.

The seasonal distribution of specimens is only fairly satisfactory, the animals with skins being secured as follows: January, 3; April, 1; July, 3; August, 1; December, 15.

DISTRIBUTION

Procavia j. lopesi was first made known by the description of Thomas who had two specimens collected by Boyd-Alexander on Kodja Hill, described by this noted explorer as "directly in back of the Gaima Range," which in turn lies on the left bank of the Kibali, below Vankerckhovenville. The Congo Expedition specimen labeled Vankerckhovenville was shot by Dr. Chapin on a hill behind Mt. Gaima which is, in all probability, the Kodja Hill of Boyd-Alexander, though the collector is

not perfectly certain on this point. The other specimens in the Congo collection are from hills in the vicinity of Faradje and Aba.

The Pelage

Procavia j. lopesi appears to be one of the least variable of hyraxes as regards its pelage. From early youth (Stage III) to old age the color pattern, the color and the character of the pelage remains almost unchanged.

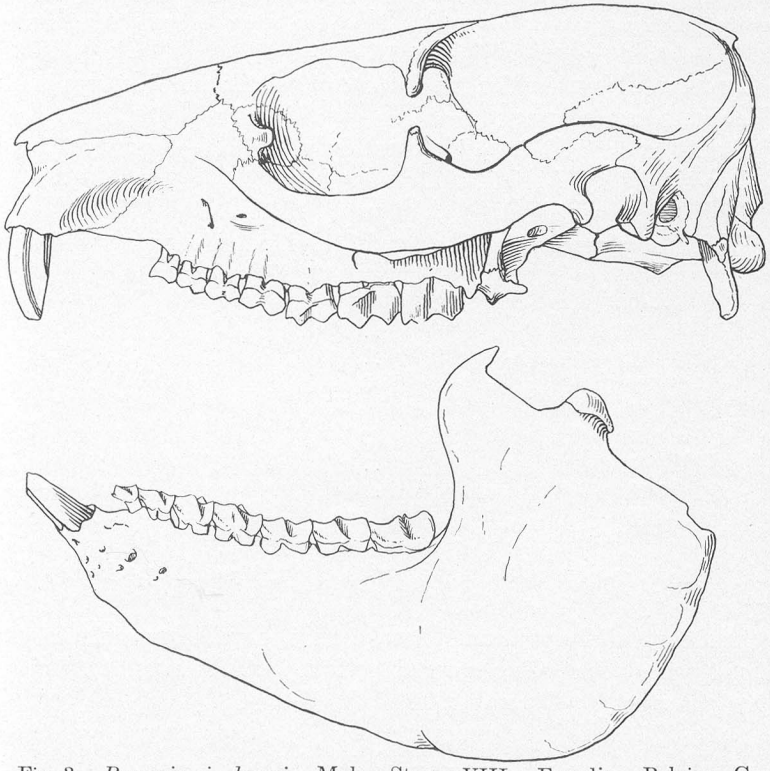

Fig. 3. *Procavia j. lopesi.* Male, Stage VIII. Faradje, Belgian Congo. A. M. N. H. No. 53799. Natural size.

There is a very slight diminution of the orange tint of the throat and belly between Stages III and VIII, and specimens of older individuals show a somewhat greater restriction of black pigment in the region of the ears, but beyond this, age leaves little mark upon them.

From hair characters I am unable to distinguish the sexes. If there is

an annual cycle of pelage change it is not indicated in this series which contains specimens scattered fairly well over the year. The series cannot be expected to show geographical variation as the three localities represented are close together—about one hundred miles apart in the extremes.

Attainment of Full Growth

The smallest specimen in Stage VIII measures 480 mm., the longest 585. Of the two specimens in Stage VII, the smaller measures only three mm. less than the smallest in Stage VIII, the larger well within the limits of variation of the above. The single skull in Stage VI is from a specimen longer than either of those in Stage VII, while three in Stage V are from specimens practically within the limits set by the two in Stage VII. The one skull in Stage IV is from a specimen 15 mm. longer than the smallest animal with a Stage VII skull. Two skulls in Stage III are from animals 378 and 382 mm. long. Thus, animals fully adult as measured by the attainment of function of the complete dentition range in size between limits that are within five mm. of embracing the range represented by all specimens down to the stage in which the second upper molar is only partly up. Animals in Stage III (M^1 functional, M^2 below the level of the bone) are distinctly smaller. It would appear from this that full growth in this species is attained at about the time of the eruption of the second upper molar, which contrasts with the situation suggested by the Congo Expedition collection of tree hyraxes (*Dendrohyrax d. emini*) where full growth seems not to be attained before the period of full function of the second upper molar (Stage V). The period of time between the eruption and the functioning of M^2 may not be great, however, and actual differences in growth pattern between these two species may be very slight, or even nonexistent, for the series with which I have worked is too small to furnish statistical proof.

Behavior

Notes made by Mr. Lang at Aba, December 18, 1911 are:

The colonies on these rocky hills are rather small, three or four being the usual number of animals. They are, however, found on every rock, the cracks and boulders of which offer sufficient shelter to them. The largest number found in one colony was fourteen, but in this case the rock is exceptionally large and the hyraxes from the whole rock assemble at one side to bask in the sun. On this rock is a place where the water has collected. The hyraxes evidently wade into the water (about 5 inches deep) to chew off the sprouts of a flowering water plant.

The hyraxes leave their burrows or ledges towards three in the afternoon and probably feed throughout the night. At eight in the morning and slightly later they bask on their ledges, but are always watchful. After ten o'clock they are not seen out.

These animals are very shy and make a low barking (somewhat guttural) sound at the approach of danger. They run swiftly along and upward on the strongly inclined rocks where it would be impossible for any man to get a foothold.

These hyraxes evidently give birth to their young the end of December or the beginning of January.[1]

The hyraxes nibble off the fine grass growing between the rocks. This grass when chewed or rubbed has an aromatic smell. Their stomachs contain, chiefly, this grass finely chewed up. There are many other plants fed upon, also the ordinary grass, especially that sprouting freshly after being burned out in the beginning of the dry season. The natives assured me that the hyraxes are often found far from their rocks, feeding on young sprouting grass.

Collector's Measurements of *Procavia j. lopesi*

Locality	Sex	Number	Total	Tail	Foot	Ear	Skull Stage
Aba	♂	53779	515	20	71	33	VIII
"	♂	52780	490	21	71	29	V
"	♂	53784	556	20	75	27	VIII
"	♂	53786	475	20	65	27	V
"	♂	53791	580	24	73	35	VIII
"	♂	53797	545	22	70	35	VIII
Faradje	♂	53799	575	11	76	33	VIII
Average	♂ ♂		**534**	**19.7**	**71.5**	**31.3**	**VII–VIII**
Minimum	♂ ♂		475	11	65	27	
Maximum	♂ ♂		580	24	76	35	
Aba	♀	53776	570	22	71	38	VIII
"	♀	53777	566	20	71	36	VIII
"	♀	53781	520	22	67	32	VII
"	♀	53783	526	21	71	31	VI
"	♀	53787	545	22	68	32	VIII
"	♀	53788	525	21	67	32	V
"	♀	53793	585	24	76	32	VIII
"	♀	53795	477	20	66	33	VII
"	♀	53796	480	18	71	37	VIII
Average	♀ ♀		**532.6**	**21.1**	**69.7**	**33.6**	**VII–VIII**
Minimum	♀		477	18	66	31	
Maximum	♀		585	24	76	38	
Average	♂ ♂ ♀ ♀		**533**	**20.5**	**70.5**	**32.6**	**VII–VIII**
Minimum	♂ ♀		475	11	65	27	
Maximum	♂ ♀		585	24	76	38	

[1] A conclusion scarcely justified by observations made over only 7 months of the year, and on few adult females.

The natives (Logo) try to catch the animals with a noose, or a number hide late in the afternoon at the rocks where the hyraxes have been observed before in sufficient numbers. After the hyraxes are out the natives suddenly start howling and as the animals run back to take refuge in their holes many of them are stoned This is possible only near places where young short grass is abundant. The natives are very fond of eating these hyraxes.

Form and Locality	A. M. N. H. Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Skull height	Length nasal suture	Greatest breadth nasals	Height premaxillae	Length nasal-PMX suture
Dendrohyrax dorsalis emini										
Akenge	53803	♂	112.5	112.3	63.3	30.0	32.5	23.1	16.6	20.6
Gamangui	53808	♂	112.0	112.0	63.6	31.9	31.0	25.9	17.2	20.0
"	53809	♂	119.8	119.8	67.3	32.0	27.3	23.5	19.0	?
"	53810	♂	113.7	110.3	65.0	31.5	?	?	18.8	19.2
"	53811	♂	111.8	109.3	66.1	35.0	30.0	23.0	16.7	20.0
Ngayu	53818	♂	119.7	114.2	68.0	31.8	27.7	23.7	18.0	20.0
Niapu	53822	♂	106.5	106.5	62.3	31.0	29.0	20.5	16.7	19.5
"	53823	♂	114.5	114.0	63.2	29.2	30.5	23.0	17.1	21.2
"	53829	♂	114.8	114.5	63.4	32.0	27.0	21.8	17.6	?
"	53830	♂	110.4	109.5	58.8	32.4	24.8	20.0	16.7	23.4
"	53831	♂	115.0	113.8	64.6	32.8	31.1	23.2	17.1	19.0
"	53832	♂	107.3	105.7	61.3	28.7	25.5	21.3	18.0	18.7
"	53835	♂	110.0	109.1	62.8	29.0	23.6	24.7	17.7	19.7
"	53836	♂	112.8	110.7	67.5	31.0	?	?	17.3	23.8
"	53837	♂	110.0	110.0	65.2	30.2	32.1	25.6	19.0	18.5
"	53844	♂	113.2	111.2	61.7	30.5	31.5	21.3	17.1	21.0
	Average	♂♂	**112.7**	**111.4**	**64.0**	**31.2**	**28.8**	**22.9**	**17.5**	**20.3**
Medje	52120	♀	109.5	109.5	54.5	31.5	24.6	19.7	16.7	19.5
"	53814	♀	106.0	105.6	59.1	30.7	27.7	22.3	15.9	18.4
"	53815	♀	108.5	108.2	56.6	30.7	30.5	19.1	15.7	21.8
Niapu	53824	♀	105.3	104.5	53.8	31.0	25.6	16.3	16.0	18.5
"	53826	♀	104.9	104.9	58.6	30.0	24.6	20.5	15.2	19.0
"	53828	♀	109.5	109.4	58.1	32.3	25.0	20.3	13.7	17.5
"	53838	♀	107.2	106.6	58.1	28.8	29.7	19.5	15.0	19.1
"	53840	♀	114.0	113.7	59.8	29.2	30.8	22.8	16.0	21.7
	Average	♀♀	**108.1**	**107.8**	**57.3**	**30.5**	**27.3**	**20.0**	**15.5**	**19.4**
	Average	♂♀	**111.2**	**110.2**	**61.8**	**30.9**	**28.3**	**21.8**	**16.8**	**20.0**
Heterohyrax chapini										
Matadi	53800	♀	95.0	94.6	50.3	31.8	22.0	21.0	10.6	17.7
Procavia j. lopesi										
Aba	53779	♂	97.5	96.5	55.4	31.8	27.5	21.6	13.5	18.2
"	53791	♂	96.8	95.9	57.3	33.2	24.3	21.0	14.0	17.3
"	53797	♂	96.7	93.7	56.7	34.6	25.0	21.2	13.8	17.6
Faradje	53799	♂	98.7	98.5	62.3	34.0	26.7	24.5	13.1	18.4
	Average	♂♂	**97.4**	**96.1**	**57.9**	**33.4**	**25.9**	**22.1**	**13.6**	**17.9**
Aba	53776	♀	103.0	102.5	57.2	32.0	27.0	20.8	12.7	19.0
"	53777	♀	98.8	95.7	57.8	34.2	24.4	22.1	11.8	17.3
"	53784	♀	96.0	96.0	56.4	32.4	24.2	21.0	13.5	16.7
"	53787	♀	94.5	93.5	56.3	31.2	25.6	22.0	11.4	15.0
"	53793	♀	96.0	94.5	57.0	32.8	24.3	21.1	12.7	16.8
"	53796	♀	92.0	89.8	51.8	30.8	24.5	19.2	10.6	16.2
	Average	♀♀	**96.7**	**95.3**	**56.1**	**32.2**	**25.0**	**21.0**	**12.1**	**16.8**
	Average	♂♀	**97.0**	**95.7**	**56.8**	**32.7**	**25.3**	**21.5**	**12.7**	**17.2**

Diastema	Length frontal suture	Postorbital breadth	Least distance lacrymal and malar	Closest approximation temporal fossae	Temporal fossae to occiput	Breadth palate inside M-1	Length of mandible	Premolar. Molar length	Width PM-2	Width M-1	Height M-3	Length PM-1
15.3	36.4	29.5	5.8	15.4	10.2	21.0	98.5	40.3	4.4	6.1	3.3	4.5
19.0	33.7	29.3	2.3	18.4	9.0	20.0	94.5	39.0	4.1	6.3	4.2	4.3
21.3	32.5	29.0	4.3	11.5	6.4	20.7	105.9	39.6	4.5	6.5	2.7	?
16.5	?	29.7	3.2	16.8	10.0	20.5	96.0	38.6	4.2	5.9	0.5	4.3
17.6	34.9	29.8	5.9	15.3	9.8	21.3	92.4	39.3	4.4	6.5	2.2	4.7
18.4	38.8	30.5	3.8	23.9	11.8	19.7	96.5	41.0	5.2	6.5	2.6	4.6
15.6	35.0	28.1	3.7	14.7	9.6	18.7	91.0	41.0	5.0	6.6	3.3	4.5
19.7	36.7	28.9	3.3	12.5	8.9	19.0	96.9	37.7	4.5	6.0	3.4	3.8
?	39.5	27.9	1.3	18.5	11.5	19.5	97.5	?	4.9	6.5	2.2	?
16.8	31.5	28.7	3.2	21.5	11.8	17.5	92.1	38.3	4.4	6.1	2.5	4.3
16.1	39.0	29.2	5.1	14.6	12.6	21.6	97.3	38.9	4.7	6.2	3.0	5.3
16.4	34.0	27.2	4.6	14.4	9.3	20.0	91.8	38.8	4.7	6.3	3.1	4.5
16.8	36.7	30.0	1.3	15.1	8.5	20.0	93.3	37.7	4.3	6.3	2.7	4.3
18.6	34.2	30.0	5.0	18.6	13.2	21.6	104.0	42.3	5.0	6.9	0.5	4.7
18.0	32.9	29.0	4.0	16.3	10.0	20.3	99.2	39.5	4.5	6.4	1.9	?
18.4	33.7	28.6	4.0	17.1	10.0	21.0	95.4	39.1	4.7	6.0	3.6	4.8
17.6	**35.3**	**29.1**	**3.8**	**16.5**	**10.2**	**20.1**	**96.4**	**39.4**	**4.6**	**6.3**	**2.6**	**4.5**
17.5	38.5	28.1	4.7	18.1	10.5	19.0	91.6	38.0	4.5	6.0	3.6	4.0
15.8	32.0	29.2	2.3	14.2	10.7	20.1	92.5	38.6	4.5	6.3	1.5	4.4
18.4	33.2	26.6	1.8	10.5	8.3	20.1	86.3	37.8	4.4	6.0	2.7	4.3
17.9	32.4	27.6	4.6	15.6	9.7	17.9	89.2	37.5	4.1	6.1	3.7	4.2
15.2	33.7	29.2	4.2	14.5	10.0	20.0	91.1	40.0	4.6	6.2	4.2	5.3
16.0	36.5	28.9	5.6	12.2	10.0	20.3	92.0	41.0	4.6	6.6	3.2	4.7
16.5	36.8	28.5	0	17.3	7.0	19.2	92.5	40.9	4.6	6.4	2.9	5.0
19.6	36.2	28.4	4.5	20.3	10.5	21.3	98.1	40.0	5.0	6.2	2.1	4.9
17.1	**34.9**	**28.3**	**3.9**	**15.3**	**9.6**	**19.7**	**91.6**	**39.2**	**4.5**	**6.2**	**3.0**	**4.6**
17.4	**35.1**	**28.8**	**3.8**	**16.1**	**9.9**	**20.0**	**94.8**	**39.3**	**4.5**	**6.3**	**2.7**	**4.5**
16.2	36.5	25.7	4.7	12.2	8.5	16.9	84.7	32.0	3.9	5.3	2.5	3.3
13.5	37.6	23.1	0	6.8	3.7	16.4	85.0	41.8	4.8	8.2	6.7	3.3
12.5	37.2	23.2	0	7.1	1.6	16.7	86.5	40.5	4.9	8.0	5.3	3.0
12.0	36.5	26.3	0	13.0	0.5	16.3	87.7	39.7	4.3	7.5	2.8	
13.4	36.2	24.8	0.5	3.7	3.1	15.7	89.5	41.5	4.5	7.5	5.7	3.1
12.8	**36.8**	**24.3**	**0.12**	**7.6**	**2.2**	**16.2**	**87.2**	**40.9**	**4.6**	**7.8**	**5.1**	**3.1**
15.0	39.5	24.7	0		6.0	16.4	90.0	42.3	5.0	8.5	4.5	3.6
11.6	38.4	26.8	0	5.5	2.5	16.0	85.2	41.8	5.1	8.2	4.1	4.2
10.5	36.8	24.0	0	4.2	4.2	15.0	84.7	39.0	4.3	8.0	0	3.5
9.0	34.9	24.3	0	3.1	4.0	16.1	82.0	42.7	4.8	8.3	6.5	3.5
12.8	39.0	25.1	0	5.7	1.8		86.2	40.7	5.0	7.9	5.9	3.5
10.7	34.0	24.7	0	3.0	1.5	16.0	80.5	39.3	4.5	8.0	4.1	3.0
11.6	**37.1**	**24.9**	**0**	**4.3**	**3.3**	**15.9**	**84.7**	**40.9**	**4.8**	**8.1**	**4.2**	**3.5**
12.1	**37.0**	**24.7**	**0.04**	**6.0**	**2.9**	**16.0**	**85.8**	**40.9**	**4.7**	**8.0**	**4.6**	**3.4**

PLATE XVIII

Fig. 1. *Dendrohyrax d. emini.*

Fig. 2. *Procavia j. lopesi.* Female, Aba, Belgian Congo. Contrast this species with that above for distribution of hair on the face, and apparent length of hair on the back.

Specimens in the flesh. Herbert Lang, photographer.

1

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PLATE XIX

Light and dark phases in juvenile *Dendrohyrax d. emini*. The light (A. M. N. H. No. 53806) is a female taken at Avakubi, October 22. The dark (A. M. N. H. No. 53812), also a female, was taken at Medje, January 21.

PLATE XX

Color phases in adult *Dendrohyrax d. emini*. The center specimen (A. M. N. H. No. 53836, ad. ♂, Niapu, December 17) is an example of the common blond phase. To its right is a specimen (A. M. N. H. No. 53821, ad. ♂, Niangara, April 28) in the dark phase, and on the left another (A. M. N. H. No. 53819, ad. ♂, Niangara, Nov. 20) basically blond, but exhibiting darker transverse bands of orange color.

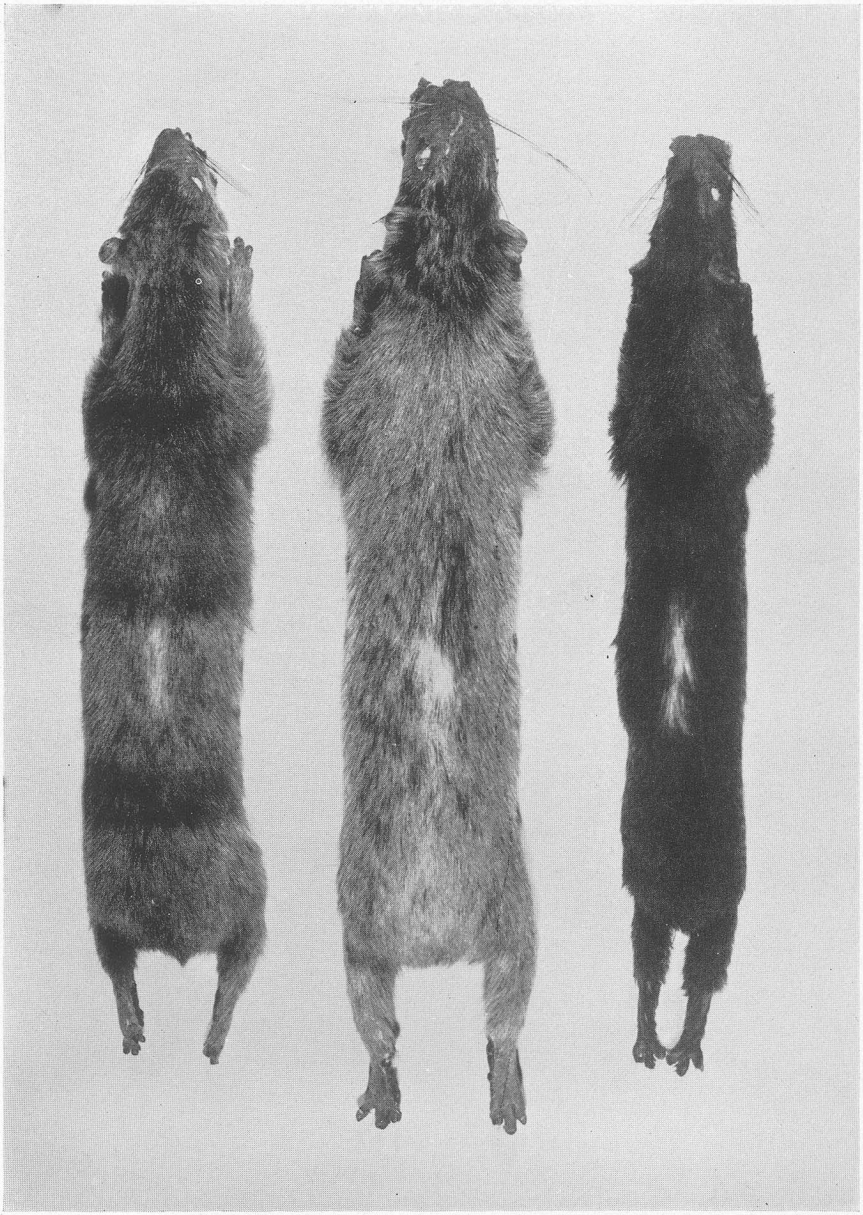

PLATE XXI

Color patterns due to wear in the pelage of *Dendrohyrax d. emini.* The left (A. M. N. H. No. 53836, ad. ♂, Niapu, December 17) is a light phase with unworn pelage. In the center is a specimen (A. M. N. H. No. 53815, ad. ♀, Medje July 27) with greatly worn pelage, in which over a broad area the dark bases of the hair show through. The specimen on the right (A. M. N. H. No. 53828, ad. ♀, Niapu, December 1) is an example of the dark phase in which the pelage is worn about equally to that in the center.

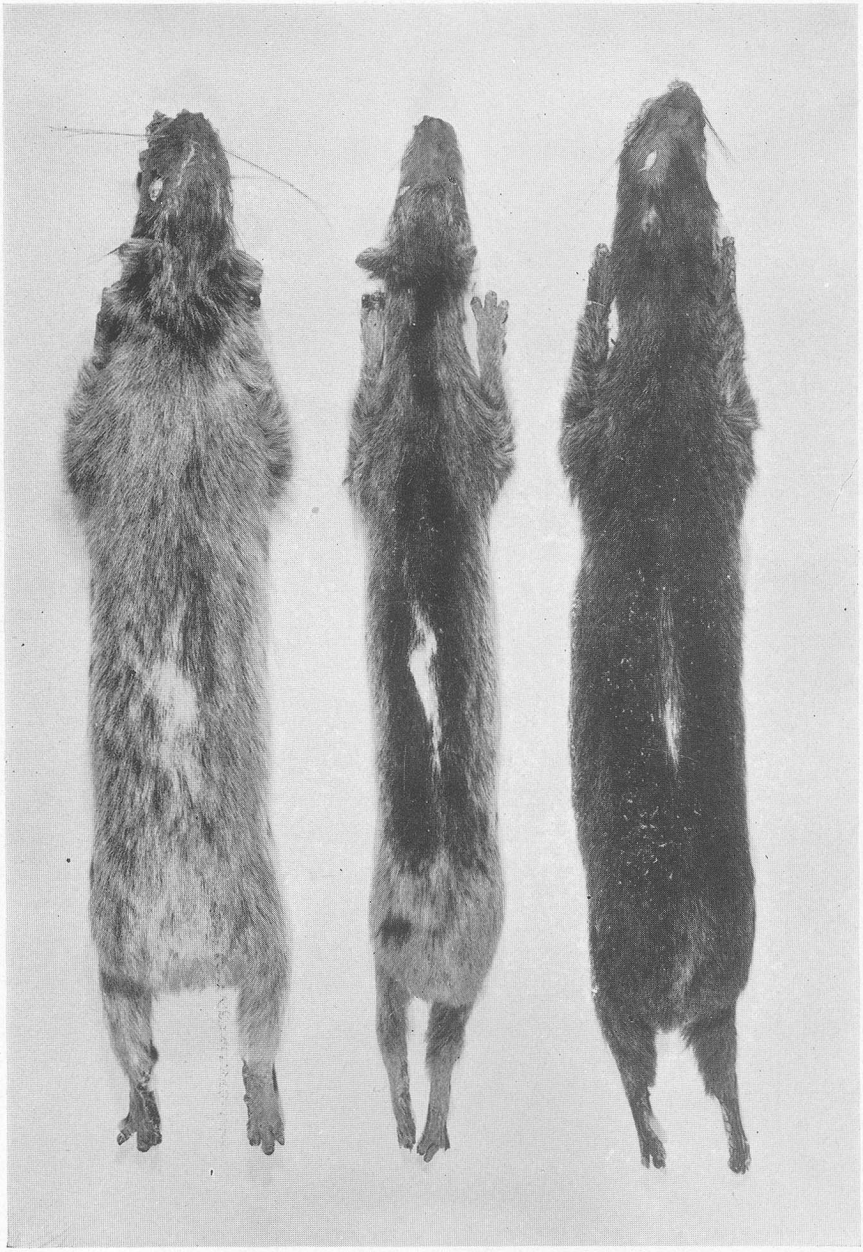

PLATE XXII

Skulls of *Heterohyrax s. bocagei* (above: A. M. N. H. No. 80601, ad. ♀, Lubango, Angola) and *Heterohyrax chapini* (below: type). Contrast the length of muzzle, the height of the supraorbital ridge, the basal eminence.