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ZOOLOGY OF EGYPT.

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ZOOLOGY OF EGYPT:

MAMMALIA.

BY THE LATE
JOHN ANDERSON, M.D., LL.D., F.R.S.

REVISED AND COMPLETED
BY
W. E. DE WINTON, F.Z.S.

LONDON:
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gypt - Mammals

G. M. Allen

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LIST OF MORE IMPORTANT WORKS BY DR. ANDERSON.

P R E F A C E.

THIS volume on the Mammalian Fauna of Egypt completes the two sections to which the lamented Author had determined to confine his personal labours in the comprehensive scheme for a complete description of the Vertebrate Zoology of Egypt, which he contemplated should in the course of time be accomplished. The scheme included the Survey of the Fishes of the Nile, which readily commended itself to the Earl of Cromer and the Egyptian Government, and was undertaken by them on Dr. Anderson's initiative, the Report on which, by Mr. Boulenger, will form part of the Series.

To render complete the Vertebrate Fauna, it was also under his consideration to issue a volume on the Birds, to supplement the valuable and beautiful work of Captain G. E. Shelley. As the present volume goes to press, there is every hope that this work will soon be commenced under the auspices of the Egyptian Government.

As stated by himself in the opening words of the General Introduction to the Zoology of Egypt, in the volume on the Reptiles, the purpose of the Author was to achieve under British auspices such results as would compare favourably with the brilliant work accomplished by the French at the dawn of the XIXth century, when they were, for a brief period, masters of the Valley of the Nile. It was his ambition to supplement, a century later, the zoological researches made under the personal supervision of that distinguished naturalist, Etienne Geoffroy St.-Hilaire. Moreover, in order to make the work more truly serviceable to zoologists, instructions were issued to all who should be engaged in procuring specimens, urging the

importance of accurate statements of the locality and the conditions in which each animal was found, and thus to guard against the unfortunate omissions of the French Naturalists in this respect, who were generally content to record the distribution solely as from 'Egypt,' which in those days was considered sufficient.

But, with this large idea before the Author, and whilst his mind was still vigorously engaged with all the details of his self-imposed task, a sudden and brief illness closed his earnest and useful career, on the 15th of August, 1900.

Fortunately for the branch of Science to which the Author had devoted his attention, the general scope of the present volume had been clearly indicated. Therefore it seemed a possible, even an imperative, duty to prepare for publication the results of the Author's researches during the past eight years; for the collection of Mammals had begun as early as that of the Reptiles, and the question of priority in the publication hung in the balance, until the former was eventually delayed by the political events which disturbed the country and which did not admit of any other than the lesser forms of Mammals being procured, and those were almost exclusively from Lower Egypt.

When the country was settling down on the conclusion of the brilliant campaign which ended in the capture of Khartum by Lord Kitchener, and the complete extinction of Mahdism, a little later, by Major-General Sir F. R. Wingate, an appeal was made to Egyptian officials who were supposed to have zoological tastes, asking for assistance to obtain *desiderata* in Mammalian specimens. A hearty response came from several officials of the new *régime*, notably from Colonel T. E. Hickman, then Governor of Dongola; but herein came disappointment, as one officer after another was called away for service in South Africa. This will account for some of the regrettable blanks in this work, even after every possible effort to obtain specimens from Egyptian territory in time to be dealt with in these pages.

On the other hand, a very fine collection of animals was the outcome of a personal visit of Dr. Anderson to Suakin; so successful—through the generous aid of the then Governor, Colonel, now Lieut.-General Sir Archibald, Hunter—that specimens

from the district of the Red Sea Littoral have frequent notice in the volume. Even here, however, it was not found practicable to hunt for larger game in the neighbouring hills, because the ubiquitous Osman Digna, with some of his followers, was located there in 1893-4 and was threatening an attack.

There being no doubt as to my duty in the circumstances in which I was placed, I thankfully had recourse to the advice and guidance of Dr. W. T. Blanford, whose tastes and sympathies were akin to those of my late husband; they had been drawn together in scientific pursuits, not exclusively zoological, during the years they had spent in India, and had formed a friendship that remained unbroken.

When Dr. Blanford saw the extent of the materials left in varying degrees of incompleteness, he encouraged the desire to produce a volume which might prove not unworthy to be placed alongside that treating of the Reptiles and Batrachians. To fill up the blanks, however, required zoological experience and fitness to gather in the still unfulfilled promises of further contributions from Egypt, and likewise the time at command to examine and determine these. It was also felt to be of the utmost importance to place the materials in the hands of some one in a measure familiar with the Author's method of working; and it was accordingly decided to approach Mr. W. E. de Winton on the subject. He had the great advantage of having assisted Dr. Anderson in a few of the sections during the previous winter; and after due consideration he complied with the joint request of Dr. Blanford and myself to undertake the revision and completion, as far as possible, of the present volume.

Certain portions—*e. g.*, Soricidæ and Leporidæ—have been entirely written, and others in part re-written, by Mr. de Winton from notes left by Dr. Anderson, and he alone is responsible for the passages enclosed in square brackets or followed by his initials.

The manner in which Mr. de Winton has executed his task will commend itself to zoologists generally; but it ought to be remembered that he laboured under the disadvantage of the absence of specimens which were confidently expected when the work was begun.

But, to return to a review of the condition in which the materials were found: the majority of the Plates for their illustration were well advanced, some of the Rodentia were even completed as early as 1893, whilst a considerable amount of Manuscript had been revised by the Author himself, who had seen it type-written in the early months of 1900.

The section devoted to the Cercopithecidæ had been thus written out; the Collotype Plates of skulls of baboons had been all selected by himself from the large collection of photographs taken for his use in the Natural History Museum at Berlin, in the autumn of 1899, when Professor Moebius had generously facilitated his researches by requesting, by telegraph, from the different Museums in Germany—Stuttgart, Darmstadt, Frankfort-on-the-Main, Munich, and Hamburg—the specimens which proved so valuable in the way of comparison; and Dr. Anderson has frequently referred to his indebtedness to the Directors of the different Institutions who gave so prompt and courteous a response to Prof. Moebius's application. Also it must not be omitted here to record the valuable assistance so cheerfully rendered to Dr. Anderson, in his researches in the Berlin Museum, by Mr. Paul Matschie, the Curator of the Mammal Collection.

In July 1900, the artist, Mr. P. J. Smit, had been sent to Berlin and Cologne to figure living specimens of baboons in the Zoological Gardens of those cities; only one, however, of the water-colour sketches of baboons—that of *Papio anubis*—was seen and approved by Dr. Anderson, the remainder being brought to London too late to have the advantage of his criticism: nor was it considered desirable to make any modifications in the text, consequent on any apparent want of accord between the descriptions and the drawings; hence these have been reproduced as Plates, by Messrs. Mintern, Brothers, very much as they were received.

No attempt has been made to supplement the few references to 'Mammals on the Monuments' scattered through the text. On this subject Dr. Anderson had gone so far as to have some notes and tracings made out for his use, by that expert in Egyptology, Mr. F. Llewellyn Griffith. It is well known, however, that one object the author had in view in his study of the living animals, especially the baboons,

was to throw light on the crude representations of the ancient Egyptians, determining the species where that was possible.

The facilities afforded for the study of the materials in our own British Natural History Museum, which have been so helpful throughout the progress of this work, must not remain unacknowledged. These began under the administration of the late Director, and personal friend, Sir William Flower, K.C.B., and they have been continued under the present Director and his Staff; and here more especially would I express my obligations to Mr. Oldfield Thomas, the Curator of the Mammalian Department, who has always been most willing to give access to the specimens contained in the National Collection.

To those who have contributed specimens from Egypt my very best thanks are offered; and it is to be hoped that any inadvertent omission in the text of the names of donors will be excused because of the difficulties which have attended its publication.

And to the sympathy of all I must appeal for indulgence towards the shortcomings and imperfections unavoidable under the trying circumstances in which this book has been produced.

I prefix to the volume a portrait of the Author, which will pleasingly recall to his personal friends a very familiar attitude.

I have also been advised to append a List of some of the more important works that issued from his pen. These reveal a long period of literary activity, concurrent with the painstaking performance of his duties to the Government of India, which he served from 1865, when he was appointed by the Secretary of State for India to organize an Imperial Museum at Calcutta, a labour which he undertook *con amore*; and the result remains as a lasting memorial to him.

On two occasions he accompanied Government Expeditions into the then little-known regions betwixt Burmah and China, and he proved himself to be an unusually

observant traveller, with an aptitude to delineate, both by pen and pencil, the facts and features of the countries traversed and their inhabitants, exactly as they came before him.

After his return, what most would regard as leisure from professorial and administrative duties was employed by him in arranging for publication the information obtained on his journeys.

The love of travel, and the after-pleasure of gathering in, systematizing, and giving forth to the public the knowledge thereby gained, continued unabated after his retirement from the service of the Indian Government, and, as his later publications show, were mainly devoted to zoological research.

But I shall have to be pardoned for dwelling perhaps too long on these recollections, which bring to me both pride and pain—the latter predominating—as I close the literary record in which I was privileged during many happy years to have a humble share.

My reward will be to find that scientific research, in any branch, has been encouraged and stimulated by his example.

GRACE S. ANDERSON.

71 Harrington Gardens, London,
November 1902.

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To face page 1.

This Map was originally prepared by Dr. Anderson for his work on the Reptiles of Egypt ;
it is here reproduced, with alterations to suit the present volume.

THE
MAMMALS OF EGYPT.

MAMMALIA.

PRIMATES.

CERCOPITHECIDÆ.

THE area of the African continent north of the 20° N. lat., and eastward of the 25° E. long., is devoid of any representative of the Simiidæ and Cercopithecidæ. The explanation of this is to be sought for in the almost total absence of either scrub or trees over that area, owing to the circumstance that it lies beyond the influence of the periodical rains and is practically rainless.

The region to the south of the great bend of the Nile between Old Dongola and Abu Hamed is more or less favoured by regularly recurring rains, meagre and uncertain it is true, for some degrees to the south of lat. 17°, but increasing in volume and certainty further southward.

Our knowledge of the Cercopithecidæ which inhabit the area known in ancient times as Ethiopia is still in a most unsatisfactory condition, but now that the country is thrown open to civilization its fauna will doubtless soon claim the attention of zoologists.

Two distinct genera of the family Cercopithecidæ are represented on the monuments of Egypt, viz. *Cercopithecus* and *Papio*; but when an attempt is made to identify the figures with the existing species representing these genera, the subject is found to be

attended by great difficulties, due largely to the very imperfect delineation of the characters of the animals depicted. In the present state of art, mammalian species can be so faithfully represented that it is at once possible to recognize and name the figures given of them; but no such claim can be advanced on behalf of the great mass of the representations of mammals which have been bequeathed to us by the ancient Egyptians. The identification of the genera is usually possible, but in those cases in which a genus is represented by a diversity of species, identification is little more than mere guesswork in the great majority of instances.

The chief sources of information respecting the Fauna of the country now under consideration are contained in that portion of the 'Description de l'Egypte' dealing with zoology, written by Etienne Geoffroy St.-Hilaire and Victor Audouin in the beginning of the 19th century, and in the 'Symbolæ Physicæ,' written by Dr. C. G. Ehrenberg some few years later.

So far as the Mammals are concerned, the first-mentioned work is limited to the species which occur in Egypt proper, the collectors having penetrated to the south only as far as the First Cataract, and thus no mention is made of the Cercopithecidæ.

On the other hand, the valuable treatise on the fauna observed by Drs. Hemprich and Ehrenberg during their travels in Egypt and the neighbouring countries in the beginning of the 19th century, and compiled with such masterly skill by the latter, the sole survivor¹, after his return to Europe in 1826, has proved a real storehouse of information which I feel specially bound to acknowledge.

Besides the material contained in these two works, a few observations relating to the Mammals of Egypt are to be found scattered through various books of travel; but when we proceed further south towards the confines of Abyssinia, Sennaar, and Kordofan, we have the records of several good naturalists, such as Dr. Edouard Rüppell and the Baron Theodor von Heuglin.

With regard to the Cercopithecidæ, Ehrenberg has stated his impression that a great many more kinds of monkeys had been ascribed to Ethiopia than had ever been noticed there, and that consequently the ancient Egyptians had been accredited with the worship of several kinds of monkeys. He pointed out, at the same time, that while the monuments of Egypt show that the Egyptians knew more than one kind of monkey, they just as clearly prove that these remarkable people never worshipped more than one species.

In the representations on the monuments we find both sections of the Cercopithecidæ portrayed, and not unfrequently in the same scene, and it is noticeable that the

¹ "Dr. S. F. Hemprich, the intimate associate of C. G. Ehrenberg as a fellow student at Berlin, and afterwards as the endeared companion in so many exciting journeys, died at Massowah, 30 June, 1825, of typhus fever, having just recovered from the bite of a viper." ('Encyclopédie des Gens du Monde,' vol. ix. p. 295. Article "Ehrenberg, C. G.," par Jomard. 1837. Paris.)

Egyptians distinguished two sorts by name—the *Cercopithecus*, , , and the Baboon, .

Both kinds are figured with their names, male and female, at El Bersheh, in the tomb of Nehera, XIIth Dynasty, and they are also similarly represented in an inscription in the Temple of Deir-el-Bahari, XVIIIth Dynasty, in which monkeys are enumerated among the treasures of Punt, brought to Thebes by the famous Expedition of Queen Hatsheput. They are also represented on the walls of the temple in a series of coloured bas-relief sculptures, reproduced by Dümichen in his work ‘The Fleet of an Egyptian Queen,’ and in Mariette’s ‘Deir-el-Bahari.’ The publications of the Egypt Exploration Fund also give a full account of this temple and its decorations. Among the painted scenes at Beni Hasan we likewise find very crude figures of different monkeys in the tomb of Baqt.

One of the earliest representations of the monkeys and baboons together is at Medum¹, IVth Dynasty, where a boy leads a yellow ape with red callosities; the way it carries its tail shows it to be a baboon, but as the colour from the head downwards to the left foot is not given it may be that the figure is imperfect. In front of the boy is a *Cercopithecus*, also yellow.

The appearance of baboons, both mantled and unmantled, along with other monkeys, is not uncommon in the delineations of tribute brought to the Pharaohs, and in the scene figured² from the tomb of Rekhmara at Thebes (XVIIIth Dynasty) there are several *Cercopithecæ*, one of them clinging to the neck of a giraffe³. The negroes that lead the monkeys and other animals, as well as the offerings of ebony, ivory, gold, and ostrich-feathers they carry, indicate that all come from the “South Country” or from Punt (Somaliland).

Illustrations of similar scenes occur in the magnificent volumes of the ‘Denkmäler,’ the work of Dr. Lepsius.

As has been already stated, no species of *Cercopithecus* or *Papio* has inhabited the region to the north of the 20th parallel of N. lat. in the Nile region during the extended period over which the present physical conditions have lasted. Owing to this fact all the Cercopithecidæ represented on the monuments to the north of this line were animals brought from regions lying further south. A recognition of this circumstance is of considerable importance in attempting to identify the figures, more especially when a genus is represented by a variety of forms. Therefore one of the first steps to be taken to ensure any approach to accuracy in determining what species of the Cercopithecidæ are represented on the monuments is to ascertain what species now exist in the region of the Upper Nile. Owing to a variety of causes, but chiefly

¹ Petrie, Medum, pl. xxiv.

² Wilkinson, ‘Ancient Egyptians,’ vol. i. pls. 11 A & 11 B.

³ Rosellini, Mon. Civ. pl. xxii.

to the unsettled state of that region for many years, our knowledge on this subject may possibly be very imperfect. Associated with this imperfect knowledge regarding the fauna of the Upper Nile, a like ignorance prevails as to the specific features of the animals which have been handed down to us as mummies. The first and, indeed, the only step which will yield us a correct knowledge of the monkeys known to the Ancient Egyptians is to institute a comparison between the osteological features of the mummies and those of the Cercopithecidæ still occurring in the neighbouring regions of the Bahr-el-Abiad and Bahr-el-Azrek (the two branches of the Nile meeting at Khartum) and of Abyssinia and Somaliland. Having identified a mummy satisfactorily with its existing representatives, the approximately accurate recognition of the figure on the monuments would follow. Egyptologists, unfortunately for the prosecution of a work of this kind, regard mummified animals as objects too precious to be unwound and to be submitted to a zoological examination. But in the course of time, as materials bearing on the recent fauna of the regions in question accumulate, and mummies lose somewhat of their treasured sacredness in the eyes of Egyptologists, a correct knowledge of the animals represented on the monuments will be within reach.

By permission of the Trustees of the British Museum I had the Röntgen rays passed through the mummies of some of the apes in the National Collection of Egyptian Antiquities, and consequently I am in a position to reproduce in this volume the revelations made known by these marvellous X rays, and thus to disclose details without disturbing the wrappings¹.

The mummies selected for the radiographs unfortunately proved to be those of immature animals. Radiograph N^o. 1 shows an undoubtedly young specimen, judging from the condition of the teeth and of some of the long bones; the appearance resembling a coil of wire or some such substance in the pelvic region is due to a number of the lower ribs having fallen down, owing to the partial decomposition of the contents of the mummy; the tail is clearly indicated.

A baboon of the same species, but a rather older animal, is seen in Radiograph N^o. 2. The head has not come out very clearly, as the mummy is encased in a layer of calcareous matter, which has partially obstructed the passage of the rays. The skulls, however, of both the animals radiographed closely resemble that of *Papio hamadryas*, Linn., which Ehrenberg held to be the sacred baboon of the Ancient Egyptians.

An attempt to radiograph a larger and presumably fully-adult baboon had to be abandoned, as there was only time to do the head; but, like the former two mummies, it was undoubtedly a specimen of the *Hamadryas* baboon.

¹ The radiographs were made at the British Museum, Bloomsbury, by Mr. J. H. Gardiner, F.C.S., in my presence, 24th June, 1899.

RADIOGRAPH
Nº. 1.

M U M M Y.

Papio hamadryas.

(Reduced $\frac{2}{5}$.)

RADIOGRAPH
Nº. 2.

M U M M Y.

Papio hamadryas.

(Reduced $\frac{2}{5}$.)

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RADIOGRAPH
Nº. 3.

•

YOUNG MONKEY.

Species undetermined.

(Reduced $\frac{1}{2}$.)

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Permission was given me to have the skull of a mummified baboon cleaned by an osteologist of the Natural History Department. Some of its teeth were wanting, and the under jaw was slightly imperfect. However, I had it photographed, and beside it (Plate III. at the close of my account of *P. hamadryas*) there is placed for comparison a photograph of the skull of a wild-killed *Papio hamadryas*, Linn., collected by Rüppell in Abyssinia in the third or fourth decade of the last century.

Radiograph N^o. 3 discloses the contents of a wrapped mummy which Professor Flinders Petrie kindly permitted me to subject to the Röntgen rays before its presentation by the Egypt Exploration Fund to the Natural History Department of the British Museum along with other mummified objects. The animal is so very immature as to render it impossible to determine the species. It was found at Denderah in the winter of 1897–8, and Professor Petrie has stated that it is of the Roman period.

ZOOLOGICAL LITERATURE.

PYTHAGORAS, who lived about 2500 years ago, wrote an account of the Red Sea. This precious fragment has been preserved to us by Ælian¹. In it the Greek philosopher and traveller gave a good detailed description of an animal he had met with in his travels along the Red Sea. He says it was a terrestrial animal, and that its name, κῆπος, meant 'garden,' as the animal was variously coloured. When full-grown, it was as large as an Erythrean dog. Its head, back, and spine as far as the tail were rufous, but that on these parts there were some golden-coloured hairs scattered here and there. Its face was white to its very cheek, thence, however, golden bands ran right down to its neck. The neck, chest, belly, and front of the feet were whitish, but the hinder parts of the feet and their soles were black. The two mammæ were greenish blue, and each was so large that it filled the hand. The shape of its muzzle might be compared to that of a *Cynocephalus*. Such is the original description of the famous κῆπος.

In Pythagoras's description, as detailed by Ælian, one can without doubt recognize the red monkey, *Cercopithecus pyrrhonotus*, Hemp. & Ehr. My visit to Suakin was signalized by an experience similar to that of the Greek philosopher, because one of the monkeys brought to me during my stay at that seaport was an example of the κῆπος, and the interest of the experience was heightened by the fact that I also became possessed of a young *Papio hamadryas*, the κυνοκέφαλος of many of the classical authors.

¹ Hist. Anim. lib. xvii. c. 8.

Pythagoras's first acquaintance with this long-tailed monkey, so striking by reason of its rich colouring, was doubtless also the first occasion on which he had heard the term *κῆπος* used. The similarity between it and the Greek word signifying "a garden" led him erroneously to imagine that the animal had been so named on account of the diversity and beauty of its colours; whilst it is supposed rather to be the Greek rendering of an ancient Egyptian word 'Kaf,' meaning a long-tailed monkey, a term which has a remarkable resemblance to the Sanscrit word 'Kapi'¹, also signifying a monkey; but which of these tongues is entitled to priority in point of age is a question it would be difficult to solve. The ancient Egyptians had, likewise, a special name for the baboons, some of which also have tails well-developed, although not so long as those of the ordinary monkeys of the Upper Nile province. The word 'Kaf,' however, seems to have been applied indiscriminately to monkeys, including the baboons. That this is true of the latter is substantiated by the figure of a baboon, *Papio hamadryas*, Linn. (*vide* Lepsius, Denkm. Abth. ii. Bl. 13, No. 86), in a tomb at the Pyramids of Gizeh, under which the hieroglyphic name 'Kaf' appears.

About the time of Pythagoras the Phœnicians had circumnavigated Africa at the instigation and under the patronage of the Pharaoh Nekho. The expedition started from a port on the Red Sea, and passing round the coast-line of the continent returned by the Mediterranean to the mouths of the Nile. Moreover, the trading-exploits of that remarkable people had extended not only to the west of Africa but also to the east of Arabia. The vessels that returned laden to the Mediterranean with the merchandise of foreign lands were manned by sailors doubtless with instincts much the same as those of the present day, so that we may rest assured they brought back with them to their respective ports examples of the animals from the countries they visited, more especially from the lands beyond the Red Sea, where, among apes, they would meet with the Yellow Baboon, and on the West Coast of Africa with the Drill and the Mandrill. The ships of Solomon, also, prior to this period, had sailed down the Red Sea and along the East-African coast to Tarshish—the modern Mombasa—bringing apes, among other strange animals.

Aristotle (B.C. 384), in his remarkable work on the Animal Kingdom², had probably acquired his knowledge of the monkeys from specimens taken to Alexandria by the Phœnician navigators. The great historian's attempted classification of the monkeys into three divisions, viz. *πίθηκος*, *κῆπος*, *κυνοκέφαλος*, is not clearly defined, and the understanding of it is beset with many difficulties at the present time. The members of the first group had no tails, or merely rudimentary ones; and probably Aristotle was familiar with others presenting this character besides the Barbary ape,

¹ Comp. Dict. of the Languages of India and High Asia, by W. W. Hunter, 1868, p. 140.

² Aristoteles Thierkunde, Aubert & Wimmer, 1868, i. pp. 71, 267 (lib. ii. c. 8).

Macacus innuus, Linn. (Syst. Nat. xii. 1866, p. 35), which he had in all likelihood taken as the type of this division.

The monkeys of the second group were provided with tails, and the species with which he would be best acquainted was probably *Cercopithecus æthiops*, which doubtless was carried to Alexandria from Ethiopia for sale.

The members of the third group had the form of those of the first, but they were larger and stronger, and in their faces resembled dogs. It is thus evident that the baboons, such as *P. hamadryas*, the black-faced olive-coloured *P. anubis*, and the yellow baboon, *P. cynocephalus*, fell under Aristotle's personal observation.

The Greek geographer Agatharchides¹ (140 B.C.) likewise wrote a book on the Red Sea, which, however, is only known through the portions preserved in the writings of Diodorus Siculus (66 B.C.) and from an epitome of it given by Photius² (825–891 A.D.). Agatharchides stated that the κῆπος along with the 'Sphinx' and 'Cynocephalus' were brought to Alexandria from the country of the Troglodytes and from Ethiopia. He repeated Pythagoras's explanation regarding the meaning of the name, but added that the animal had the face of a lion, while in all other parts it "was like a panther, except that it was as large as a deer!"

Strabo³ seems also to have misapplied the term κῆπος, at least in the sense in which it was used by Pythagoras, as he said the animal had the face of a satyr, but that in other respects it was intermediate between a bear and a dog—a description which recalls the general characters of the two baboons, *P. anubis*, F. Cuv., and *P. hamadryas*, Linn.

Pliny⁴ likewise mentions some animals from Ethiopia under the name of κῆπος, which were exhibited at Rome at the games of Pompeius Magnus. Their fore feet were like human hands, and their hinder extremities like human feet and legs.

Juvenal, towards the close of the 1st century A.D., when banished to Egypt by the tyrant Domitian, in his Satire xv, directed against the Egyptians, speaks of the golden image of a long-tailed ape glittering when the magic chords resound from mutilated Memnon.

Prospero Alpini⁵ devoted a chapter of his work on Egypt to the enumeration of the various kinds of apes he had seen in the country, prefacing it with the statement that although no kind of ape was a native of Egypt, yet countless numbers were brought thither from Arabia Felix and Ethiopia for the sake of trade. It is evident, however, from a consideration of his description of the different kinds he had seen, that some of them came from very far afield, even from India. Thus, his very black monkey like a lion in face and body was named 'Karander,' evidently the Tamil word for monkey. Attempts have been made by different authors to identify the monkeys described by

¹ Geogr. Græci Minores, Müller (Carl), i. 1855, p. 159.

² Ap. Phol. Bibl. ccl. c. 39.

⁴ Hist. Nat. lib. viii. c. xxviii. p. 278.

³ Geogr. Paris, 1819, v. xvii. p. 413.

⁵ Rerum Ægypt. 1735, chap. xi.

Alpini, but his descriptions are so vague, and his illustrations so crude, that the results are of no scientific interest. There is only one exception to this, viz. his unmistakable account of a red, long-tailed monkey, kept alive in his house in Cairo for two years, which there can be little, if any, hesitation in identifying with the *Cercopithecus pyrrhonotus*, Hemp. & Ehr. The only one of his figures which is recognizable is that of the Barbary ape. The animals represented in his three plates (17 to 19) have been identified as *Papio hamadryas*, and, indeed, have served as the types of *Simia hamadryas* in Linnæus's 10th edition of the 'Systema Naturæ,' but even that author comments on the vagueness of the representations.

Hasselquist¹ mentions only two species of monkeys observed by him in Egypt: one, which he designates *Simia ægyptiaca*, the dog-head monkey, about the size of a young bear, which was brought to Egypt by vagrants and exhibited to the people at the time of the inundation of the Nile; and another, *Simia æthiops*, which the negroes carried to Lower Egypt in great numbers. Both of these species, he says, were from Ethiopia. The first was *Papio hamadryas*, which to the present day is exhibited in the towns and villages, while the second was *Cercopithecus æthiops* of this work.

Forskål², in his enumeration of Egyptian mammals observed by himself, mentions under *Simia caudata*—'Robáh,' with naked buttocks; and 'Nisnas,' said to come from Nubia. The native name applied to the first species proves it to be the Hamadryas baboon; as the term Nisnas, however, appears to have been applied in Lower Egypt to more than one species of monkey, the speculation that *C. pyrrhonotus* only was referred to by that name may or may not be correct.

E. Geoffroy St.-Hilaire's and Audouin's account of the mammals of Egypt³ dealt exclusively with the Nile Valley from the sea to Assuan; there is consequently no reference to monkeys.

Cailliaud⁴ clearly indicated the existence of *Cercopithecus æthiops* in the Nile Valley, and established the occurrence in Sennaar of a red species of the same genus, which he regarded as *C. patas*. He also recorded the presence in the "Ile de Méroé" (between the Atbara and the Blue Nile), and at Sennaar, of a baboon which he designated *Simia sphinx*, but of which he gave no description.

Ehrenberg, who was with Hemprich in New Dongola in 1822, while Cailliaud was at Sennaar, states in his chapter on *Papio hamadryas* in the 'Symbolæ Physicæ'—a work to which I am much indebted for the references to and quotations from the old authors in this present article—that the only monkeys seen by him and Hemprich in Dongola were *Cercopithecus sabæus*, Linn. (= *C. æthiops*), and *C. pyrrhonotus*, Hemp. & Ehr., and these were in confinement; the former in the quarters of the Turkish soldiery, and the latter in the possession of some merchants returning from Kordofan and

¹ Iter Palæst. 1757.

² Descr. Anim. 1775, p. iii.

³ Descr. de l'Égypte, Hist. Nat. ii. 1818.

⁴ Voy. à Méroé, &c. 1819-22, vol. iv. p. 268.

Dar-Fur. The *Simia sphinx* of Cailliaud, Ehrenberg considered should be regarded as the young of *Papio hamadryas*, Linn., until further and exact observations should prove Cailliaud to have been correct.

Rüppell was the first qualified zoologist to visit the so-called Island of Meroë and Kordofan. The first of these localities he visited in the beginning of 1824, and the second on his third journey to New Dongola in the years 1824–25. In the ‘Neue Wirbelthiere’ he records *P. hamadryas* not only from Abyssinia but also from Sennaar, Kordofan, and Dar-Fur¹, whereas in his Catalogue² he restricts this species, and correctly so, to Abyssinia. Under the name of *Cynocephalus babuin*, a baboon is stated³ to inhabit Abyssinia, Sennaar, and Dongola, but in his Catalogue the distribution of *C. babuin* is likewise restricted to the first of these localities. Besides these two baboons, which Rüppell states he had observed in the wild state, he mentions that two others occurred in the region of the Nile: one, a large unknown *Cynocephalus*, having whitish hair throughout, red callosities and buttocks, and red to the middle of the tail, was said to be found in the southern provinces of Abyssinia, and to extend as far west as Dar-Fur, living in wooded districts. The description was drawn up doubtless from native accounts, as Rüppell was careful to let it be known when he had seen or had not seen the objects he described. This account suggests *P. hamadryas* as probably the baboon that was meant. The other baboon was said to be as large as a young ass, with longish grey-black hair, somewhat long tail, and white callosities and rump. He concluded it to be a *Cynocephalus*, and suggested it might probably be the true *C. porcarius*, Boddaert, which he believed F. Cuvier had confounded with *C. sphingiolus*, Hermann, whereas it was in all likelihood the same baboon which he had discovered in Abyssinia and identified with *Papio anubis*, F. Cuv. The only specimens of baboons collected by Rüppell in his wanderings, and preserved in the Frankfort Museum, are registered under the names of *Cynocephalus hamadryas* and *C. anubis*, and both were obtained in Abyssinia.

Rüppell also recorded from the Nile Valley (Sennaar and Kordofan) the two species *Cercopithecus griseoviridis*=*C. æthiops*, Linn., and *C. ruber*, Gmel.=*C. pyrrhonotus*, Hemp. & Ehr. In the account of his residence in Dongola⁴ he speaks of the natives hunting monkeys with dogs, and mentions that on his journey to Kordofan he met with the tracks of monkeys.

The ‘Magot’ (*Macacus sylvanus*, Linn.) was one of the monkeys which Rüppell said he had himself seen alive. He stated that it occurred in the western Oases of Egypt⁵,

¹ In a biographical sketch of Rüppell’s life in the ‘Allgemeine deutsche Biographie,’ xxix. 1889, I cannot find that he ever visited either Sennaar or Dar-Fur, so that in referring species to these localities he did not speak from personal observation.

² Mus. Senck. iii. 1845, p. 151.

³ Neue Wirbelth. p. 7.

⁴ Reisen in Nubien, Kordofan, &c. 1829, p. 70.

⁵ *Op. cit.* p. 8.

and that it was known as 'Girt'; there is, however, no evidence that Rüppell ever visited any of these western oases. It may be as well, however, to record here that Hartmann¹ mentions, on the verbal authority of Barth, that this species is found in the Libyan desert, to the west of the Nile in Abîr, but adds that it cannot be regarded as forming part of the fauna of the Nile Valley. It may be that Barth was only repeating what he had learned from Rüppell's writings.

Sundevall², in his account of the results of Professor Hedenborg's expedition into the Upper Nile Valley, mentioned the presence at Sennaar of *Simia subviridis* (*S. griseoviridis*, F. Cuv., rec.), *S. pyrrhonotus*, Hemp. & Ehr., and *Cynocephalus anubis*, F. Cuv., but none of them were described.

Heuglin, whose observations in the valley of the Upper Nile extended as far south as 4° N. lat., entrusted his collections to Fitzinger for description. In the account³ given of them by that author the following apes were stated to occur in the Upper Nile region, viz.: *Colobus guereza*, Rüpp., *Cercopithecus griseoviridis*, Desm., *C. ruber*, Gmel., *C. pyrrhonotus*, Hemp. & Ehr., *C. poliophæus*, Heugl., *Theropithecus gelada*, Rüpp., *T. senex*, Puch. & Schimp., *T. obscurus*, Heugl., *Cynocephalus hamadryas*, Linn., *C. anubis*, F. Cuv., and *C. porcarius*, Bodd. There were thus, according to Fitzinger and Heuglin, eleven species of monkeys inhabiting that region.

Sir Samuel Baker records⁴ that one of his men shot a great male baboon, one of a large party he had observed sitting on the rocks in the Latuka Valley, about 60 miles to the east of Gondokoro, at an elevation of about 2236 feet above the sea. He mentions the animal as a 'Cynocephalus,' and says that it was about as large as a mastiff, with a long brown mane like a lion. Hartmann⁵ has suggested that this may possibly have been a *Theropithecus gelada*; but one cannot help thinking that if Baker had had a specimen of the latter striking baboon before him, with its curiously-shaped head and remarkable bare patches on its chest and neck, he would never have dismissed it in his pages with a few words and designated it "an immense specimen of the Cynocephalus," a statement which evidently meant that he regarded it as being merely a very large individual of the baboon with which he was familiar from having met with it in various parts of the Nile Valley.

The same traveller, who resided for five months at Sofi, above the junction of the Takazzi with the Atbara not far from Gedarif, has mentioned⁶ that the tamarind-trees from July to November, the period of his visit, were generally filled with dog-faced

¹ Zeitschr. Ges. f. Erdk. Berlin, iii. 1868, p. 33.

² Kgl. Vet.-Akad. Handl. Stockh. 1843, p. 198.

³ SB. k. Akad. Wissensch. Wien, liv. 1866, p. 537.

⁴ Albert Nyanza, i. 1866, p. 339.

⁵ *Op. cit.* p. 37.

⁶ Nile Tributaries of Abyssinia, 1867, p. 177.

baboons in the evening, at their drinking-hour. He, however, threw no light on the species, and simply described it as "the great dog-faced baboon (*Cynocephalus*)."

In view of the name by which the baboon, which I suppose to represent *P. anubis*, F. Cuv., is known in Abyssinia, viz. by the Amharic word 'Doguera,' it is a curious coincidence that in the most recent map of this part of the Nile Valley issued by the War Office¹ there is a village called Dogovura, situated near Obbo in the Latuka district. According to Professor T. Nöldeke, the Amharic language extends from the left bank of the Takazzi into regions far to the south.

Among the collections of natural history objects made by Petherick on the White Nile there was the flat prepared skin of a monkey which had been in use either as an apron or as a mat for sitting on. It was wrongly referred by Dr. J. E. Gray to *C. leucampyx*². It appeared to be a well-marked species, and was described by Schlegel³ under the name of *C. neglectus*. This species has been rediscovered within the last two years by Dr. Donaldson Smith⁴, who brought home specimens which he killed on the Omo River, thus proving it to be an inhabitant of the valley of the White Nile.

Mrs. Petherick⁵, in her note-book, mentions the presence of *Colobus guereza* on the beautifully wooded banks of the Ayi River, about 30° E. long. and 4° 50' N. lat.

Hartmann⁶, in his account of the mammals of North-east Africa, gave a list of the monkeys which had been recorded from Abyssinia and the upper region of the Nile, up to the time at which he wrote, but without critical discrimination.

F. L. James⁷ observed baboons sitting on the rocks a short way to the east of Hackota on the Gash River, and not far from Kassala. He spoke of them as the "*Cynocephalus* or dog-faced variety (*C. hamadryas*)."

In the Zoological Gardens at Frankfort-on-the-Main I have recently seen (1899) some black-faced, olive-coloured baboons, which at once recalled to me F. Cuvier's figure of *P. anubis*; and on making inquiries I learned that they had been obtained through the well-known dealer in living animals, Mr. J. Menges, of Limburg a. d. Lahn. Mr. Menges has been so good as to inform me that they had been brought by him from Basaland on the river Gash, east of Kassala, and that "this dark-faced, olive-coloured baboon is the only one met with on the rivers Gash, Setit⁸, Atbara, Basalam, Rahad, and Dinder." He has further stated that he believed it to be the same baboon

¹ Map of the Nile Valley from Berber to Victoria Nyanza, 1898.

² Cat. Monkeys &c. Brit. Mus. 1870, p. 22.

³ Mus. d'Hist. Nat. des Pays-Bas, vii. 1876, p. 70.

⁴ [Proc. Zool. Soc. 1900, p. 801.]

⁵ Petherick's Travels in Central Africa, i. 1869, p. 295.

⁶ Zeitschr. Ges. f. Erdk. Berl. iii. 1868, pp. 30-37.

⁷ Wild Tribes of the Sudan, 1883, p. 62.

⁸ Baker also observed a baboon at Setit, as many as 100 being in a group (Nile Tribut. Abyss. 1867, p. 307).

as the one described by Heuglin from some islands on the White Nile, which is in all likelihood the case. He has also mentioned that it abounded in the mountains of Kassala and on the Gebel el Lus, and that it was numerous on all the isolated mountains in Takah and to the south, east, and west of it, and especially in Basaland. As it is extremely improbable that two large species of baboons occur together on the Gash River near Kassala, I conclude that Sir Samuel Baker's dog-faced baboon, observed by him in the neighbourhood of Gedarif, and James's so-called *C. hamadryas* were closely allied to, if not identical with, the black-faced, olive-coloured baboon of Abyssinia, *P. doguera*, Puch. & Schimp., viz. *P. anubis*, F. Cuvier.

All the evidence on record points to the existence of only seven species of the Cercopithecidæ in the valley of the Nile between the latitudes of Dongola and Fazoql, viz. *Colobus guereza*, Rüpp.¹, *Cercopithecus æthiops*, Linn., *C. pyrrhonotus*, Hemp. & Ehr., *C. neglectus*, Schleg., *Papio hamadryas*, Linn., *P. anubis*, F. Cuv., and *Theropithecus gelada*, Rüppell.

¹ [The Guereza of Abyssinia should bear the specific name of *abyssinicus*, for there can be no doubt as to its being identical with the *Lemur abyssinicus* of Oken (Lehrb. Naturg. iii. Zool. 1816, p. 1182).—W. E. DE W.]

CERCOPITHECUS.

Cercopithecus, Erxleben, Syst. Reg. Anim. 1777, p. 22.

Form agile. Muzzle short; nostrils lateral; cheek-pouches present; ischial callosities moderate; tail long; last lower molar without posterior talon.

Confined to Africa.

CERCOPITHECUS ÆTHIOPS, Linn.

Simia æthiops, Linnæus, Hasselq. Iter Palæst. 1757, p. 190; Syst. Nat. 10, i. 1758, p. 28; Hermann, Observ. Zool. 1804, i. p. 6.

Simia sabæa, Linn. Syst. Nat. 12, i. 1766, p. 38 (partim).

? *Simia engytithia*, Hermann, Observ. Zool. 1804, i. p. 1.

“Le Grivet” (*Cercopithecus griseus*), F. Cuv. Hist. Nat. des Mammif. livr. 7, June 1819.

Cercopithecus griseoviridis, Desm. Encycl. Méthod., Mamm. 1820, p. 61; Rüpp. Neue Wirbelth., Säug. 1835, p. 8; Martin, Nat. Hist. 1841, p. 518; Rüpp. Mus. Senck. iii. 1845, p. 150; DesMurs, Voy. Abyss. pt. iv. 1847, p. 11; Brehm, Reise nach Habesch, 1863, p. 57; Fitz. SB. k. Akad. Wissensch. Wien, 1866, p. 539; Hartmann, Zeitsch. Ges. f. Erdk. Berlin, iii. 1868, p. 33; Blanford, Geol. & Zool. Abyss. 1870, p. 224; Heuglin, Reise N.O.-Afr. ii. 1877, p. 5; Slater, Proc. Zool. Soc. 1893, p. 247.

Simia subviridis, F. Cuv. Dict. Sci. Nat. 1821, xx. p. 27; Desmoul. Dict. Class. Hist. Nat. vii. 1825, p. 567; Sundev. K. Vet.-Ak. Handl. Stockholm, 1842 (1843), p. 198.

General colour greyish olive or dingy green, brighter or more yellow on the top of the head and along the back; the hairs annulated with black and broad yellow rings. A white frontal band continuous with the white whiskers, which consist of long hairs directed backwards and almost covering the ears. The outsides of the thighs less richly coloured than the back; the hands and feet dusky black, the under parts and inner sides of the limbs white. Tail dusky grey throughout its extent, ash-coloured or even white on its under surface, and sometimes yellowish towards the point. Face black, livid round the eyes; the skin of the chin dusky, but the hairs covering it white; ears and under surface of the hands and feet black. Some long stiff black superciliary hairs; hairs between the callosities and about the anus white; scrotum green.

Linnæus's description of *Simia sabæa* was based primarily upon Brisson's¹ definition of ‘Le Singe verd,’ and at once suggests the Grivet of F. Cuvier, whereas the second reference given was Edwards's² St. Jago Monkey, the Callitriche of F. Cuvier. The localities assigned to the species by Linnæus (viz., Africa, Egypt, and Cape Verd

¹ Reg. Anim. 1756, p. 204.

² Gleanings of Nat. Hist. 1758, v. p. 10, pl. 215.

Islands) cover in a general way the distribution of the foregoing two forms, which are closely allied to one another. They have similarly coloured scrotums, or nearly so, as F. Cuvier describes the scrotum of the Callitriche as green, and that of the Grivet as copper-green. The *C. griseoviridis*, Desmarest, is stated by its describer to have a green scrotum like *C. callitrichus*, F. Cuvier; whereas Martin, and recently Sclater, say that the blue scrotum of this species distinguishes it from its West-African representative, *C. callitrichus*. As a matter of fact, the only West-African monkey of this group with a blue scrotum is the Malbrouck (*C. cynosurus*). The colour of the scrotum after death becomes modified in some of these monkeys, and consequently in Martin's description of the Grivet, drawn up from a skin, the scrotum is described as turquoise coloured, whereas that of the Callithrix is said to be green. It is also generally stated that the hairs around the scrotum of the Callithrix are yellowish, while those in a similar position in the Grivet are white. This is due to the fact that the hair of the under parts of the Callithrix exhibit a yellowish tint, whereas in the corresponding parts of the Grivet this tint is absent; but the difference is only one of degree. The two forms are unquestionably very closely allied; and, indeed, it seems a just view of their relationship to regard them as merely geographical races of a single species. Further, one of the features supposed to be distinctive of the Callithrix was the yellow tip to its tail, whereas in the Grivet the tail was defined as grey throughout. This trivial distinction cannot stand, because Is. Geoffroy St.-Hilaire¹ has pointed out that monkeys in Abyssinia, conforming in other respects to *C. sabæus*, have the end of their tails marked with yellow. The species described by Blyth² under the name *C. chrysurus*, but the origin of which was unknown, seems to have been closely allied to the western Callithrix, and, as sometimes happens in it, *C. chrysurus* had not a white frontal band; its tail is yellow and its whiskers dingy white. Hartmann has regarded it as a synonym of *C. sabæus*, but it appears to me to be intermediate between the Callithrix and Grivet. I have also directed attention³ to a similar coloration in an adult male Grivet collected by Blanford at Adigrat, Tigré.

Is. Geoffroy St.-Hilaire thought that the term applied to it, 'Singe de Saba,' taken in conjunction with Linnæus's mention of Egypt as one of the localities in which it occurred, helped to strengthen the evidence existing in the description that the Grivet of F. Cuvier was the *Simia sabæa*, Linn. The difficulty, however, is to understand what locality was meant by 'Saba.' The most noted place of this name was Saba in Arabia Felix; but although the Hamadryas baboon exists in some parts of Southern Arabia, there is as yet no evidence on record that a species of *Cercopithecus* is indigenous there as well. A port also called Saba was situated on the Ethiopian coast of the Red Sea, in

¹ Cat. Méthod., Mamm. 1851, p. 22.

² Journ. As. Soc. Beng. xiii. 1844, p. 477.

³ Cat. Mamm. Ind. Mus. i. 1881, p. 57.

the land of the Troglodytæ, to the south of Ptolemaicus Theron; and there was, likewise, the town Saba, somewhere in the immediate vicinity of the present Massowah. The Grivet might well be associated with the last-mentioned locality, as it was situated in the very region over which this monkey is widely distributed. The appropriateness of Linnæus's name thus becomes apparent.

[There can be no question as to the species indicated by Linnæus in his account of Hasselquist's journey to Egypt and Palestine, published after the death of that traveller. In the 10th edition of the 'Systema Naturæ' the same name (*S. æthiops*) is applied to this animal, which is unquestionably the green monkey of the Upper Nile Valley and Abyssinia. In the 12th edition of the 'Systema' Linnæus unfortunately only mentions this name in connection with a variety of another species from West Africa.

Simia sabæa, Linn., ed. 12, should therefore lapse into a synonym of *Cercopithecus æthiops*, for Egypt is referred to primarily as the habitat, and there is no mention of yellow in the whiskers or tail, the colour of the latter being described as "cinerea" and "cana" = hoary.

For some unknown reason *Simia æthiops* has been applied by most modern writers to a species of Mangabey (*Cercocebus*). There is nothing in the original description applicable to any member of that genus, while every word agrees perfectly with the monkey under notice, which, as Hasselquist mentions, is so frequently seen in captivity in Egypt. It has been said, in excuse for this view, that Linnæus described the *eyelids* as white. This is an error, for not only did the white band mentioned not affect the *eyelids*, but it was placed *above the eyebrows*. The description runs: "linea candida tenuis, proxime super supercilia, transvaliter per frontem extensa." The Mangabey referred to has no claim, therefore, to the name *æthiops*, and should be called *Cercocebus lunulatus*, Temm. (Esquis. Guin. 1853, p. 37).—W. E. DE W.]

The following are some of the facts bearing upon our knowledge of this species since the days of Linnæus:—

Browne¹, in his account of the wild animals met with in Dar-Fur, mentioned a monkey under the name of *Simia æthiops*, the term applied by Hasselquist to this species, and also under the native designation of 'Abu-lang,' an Arabic word applied in the Nile Valley, and in the region of Nubia generally, both to this species and to *C. pyrrhonotus*.

Cailliaud, writing in 1827, gave a short account of the different objects of natural history collected by himself on his travels in the Libyan Desert and in the Nile Valley²,

¹ Travels in Africa, 1799, p. 263.

² Voyage à Méroé, au Fleuve Blanc, au delà de Fazoql dans le midi du Royaume de Sennâr, à Syouah et dans cinq autres Oasis, 1819–22 (1826), vol. iv. p. 268.

and, in doing so, mentioned that a species of monkey very closely allied to the Callitriche or green monkey, *Simia sabao* (*sic*), was very common at Sennaar and Fazoql; but in the sentence following he says, "Cependant, d'après les individus que j'ai rapportés des environs de l'île de Moqrat, M. F. Cuvier la regarde comme une nouvelle espèce, et il lui a donné le nom de grivet," and he refers to F. Cuvier's figure in the Hist. Nat. des Mammifères. This, if correct, makes known a hitherto unrecognized fact, viz., that the monkeys of the genus *Cercopithecus* found along the bend of the Nile at Abu Hamed are typical representatives of the Grivet, or *Cercopithecus griseus*, F. Cuv. In view of the wide distribution of many so-called western species of Mammalia across Central Africa to the east, the question arises, Are the monkeys of Sennaar and Fazoql specifically identical with the Grivet from the island of Moqrat, or is it possible that they may prove to be referable to *C. callitrichus*? No materials exist for the settlement of this question; but if Cailliaud's statement is to be accepted, and if his specimens from the island of Moqrat really constituted the types of F. Cuvier's Grivet (*C. griseus*), there can be no misunderstanding regarding either their character or their affinities. There is this to be said about the individuals on which Cailliaud states *C. griseus*, F. Cuv., was based, that they were not obtained by Cailliaud on his journey to Meroë, as that expedition was not entered upon until November 1819. It must, therefore, be concluded that he had taken them with him to France in February 1819, the date on which he returned to Paris after having spent three years in various parts of Egypt, but more particularly in the Eastern Desert. In the account he has given of these travels¹ no mention is made of his having visited the island of Moqrat; but it should be borne in mind that that work did not profess to give a complete account of his travels from 1815 to 1818, as the second volume, the preparation of which had been intrusted to a member of the Academy, was seemingly never published, although the subscribers to the first volume had been impatiently awaiting its appearance. It seems probable, in view of Cailliaud's distinct statement about F. Cuvier having regarded the specimens from the island of Moqrat as a new species, that, had the second volume been completed by the Academician, some mention by Cailliaud of his visit to the island would have been included in it and a reference likewise to the monkeys he obtained. Cailliaud arrived in Paris in February 1819, with his monkeys from the neighbourhood of the island of Moqrat; and in June of the same year F. Cuvier's description of the Grivet appeared, but unaccompanied by any mention whence the animal was obtained, and indeed he only hazarded the suggestion that it was probably an African form. The specimen figured, he states, was a male which had been presented to the King's Menagerie by M.M. . . .; but there is no reference to M. Cailliaud, so that the claim advanced by the latter, that the specimen figured by

¹ Voy. à l'Oasis de Thèbes dans les Années 1815 à 1818. This work, the French edition of which I have not seen, was translated into English in Phillip's New Voy. & Travels, (3) vii. 1822.

Cuvier was obtained by him in the environs of the isle of Moqrat, meets with no support from Cuvier's account.

On the right bank of the Blue Nile, above its junction with the Rahad and below that with the Dender, the country is covered with clumps of trees and spiny bushes, and in this locality Cailliaud¹ observed many monkeys in the trees; also below Sennaar, towards Dender, he saw a troop of eleven monkeys, which he designates *Callitriche*. They appeared to be very plentiful and were caught by the natives by exposing vessels full of an intoxicating drink (bulbul), which being drunk by the monkeys rendered them easy of capture.

Ehrenberg relates that he saw *Simia sabæa* more than once with the Turkish soldiers and that he received one as a present. He was assured by the natives that the monkeys were to be found two days' journey from Ambukol²; but he seems to have discredited this, as he says he had convinced himself that there were no monkeys in Nubia and Dongola, and probably never had been any, but adds notwithstanding that they were found two days' journey in a southern direction from Ambukol, near Sennaar. As the distance between these places is very much greater than that represented by the time mentioned, the natives doubtless meant two days north from Ambukol, which would bring the spot indicated by them close to where Cailliaud had obtained *C. griseus*, F. Cuvier.

Rüppell³ does not mention the presence of *C. sabæus* on the Abu Hamed bend of the Nile; but he records its existence in Kordofan and Sennaar, probably in those parts of the former province which skirt the Nile, and not in the interior towards El Obeid. He observed it to be common in all the lower parts of Abyssinia up to 1219 metres above the sea.

The presence of monkeys at Abu Hamed in the second and third decades of the 19th century is further substantiated by Linant de Bellefonds⁴, who says the woods about Abu Hamed were full of monkeys, which on the approach of man betook themselves to the dhum-palms. To capture them the Arabs set fire to the trees and thus obliged the monkeys to leap to the ground.

Hoskins⁵, who visited Abu Hamed in 1833, described the valley of the Nile at that place as being neither very pleasing nor fertile, and the eastern bank of the river he characterized as almost entirely swallowed up by the desert. The island of Moqrat in

¹ Voy. à Méroé, &c. vol. ii. p. 221.

² Abhandl. k. Ak. Wissensch. Berl. 1833, p. 347.

³ Neue Wirbelth. 1835-40, p. 8.

⁴ L'Etbaye, &c. p. 34. This volume bears no date, but it was published many years after the journeys he described were made, seemingly not until 1858. In the work itself no years are mentioned, but in 1827 he explored the province of Atbara and had ascended the Nile in the boat belonging to the Association for promoting the Discovery of the Interior Parts of Africa.

⁵ Travels in Ethiopia, 1835, p. 34.

his day was remarkable for its numerous fine dhum-palms, but he does not mention the presence of monkeys. However, while at Berber he received from the Governor the present of a little grey monkey, and he observed what appears to have been this species on the small beautifully wooded islands which occur on the Nile to the south of the Atbara.

Is. Geoffroy St.-Hilaire has recorded specimens from the banks of the White Nile, whence they were obtained by d'Arnand and Salatin in 1843.

Kotschy¹, in his sketch of the banks of the White Nile, mentions the occurrence of numerous troops of *Cercopithecus griseoviridis* on the west bank not far to the south of Khartum.

Fitzinger², in his account of the Mammals collected by Heuglin in North-east Africa, confirms the statement regarding the occurrence of this species between Ambukol and Abu Hamed and on the large island of Moqrat, on the authority of the natives in Heuglin's employment.

Hartmann³, in 1868, also confirmed the existence of this species along the bend of the Nile to the north of Bayuda in the districts of Dar Robatat (Moqrat Island) and Dar Monasir (Ambukol), along the Atbara and the Blue Nile south to 14° N. lat., and also in Kordofan; but as he extended its distribution to Senegambia, it would seem that he did not clearly distinguish it from *C. callitrichus*, an opinion in favour of which a good deal may be said.

Schweinfurth⁴ observed it above Kowa (Koweh), about 200 kiloms. south from Khartum.

[In the 'Proceedings of the Zoological Society of London' for 1900, p. 952, giving an account of a recent visit to the White Nile, Capt. Stanley S. Flower says:—"The Grivet Monkey was noted on the 14th and 15th of March at Abu Zeit, and on the 19th of March near Renk; each time in small parties of five or six individuals, sometimes walking on the ground, sometimes in trees. We saw no other species of monkey along the White Nile." No specimens of these monkeys were obtained.—W. E. DE W.]

This species is distributed over the Nile Valley southwards from the bend of the river beyond Dongola and Abu Hamed. To the west of the Nile it is said to occur as far as Dar-Fur, and to the east it ranges to the shores of the Red Sea and of the Indian Ocean. Its wide distribution over Abyssinia has been alluded to by many travellers, and it has been recorded from elevations as high as 7500 feet near Dildi⁵.

It is generally found in troops among the high trees of the wooded parts of the

¹ Mittheil. k. k. geogr. Ges. Wien, 1858, Abhandl. p. 80.

² SB. Ak. Wissensch. Wien, Band liv. i. 1866, p. 539.

³ Zeitschr. Ges. Erdk. Berlin, iii. 1868, p. 33.

⁴ Heart of Africa, i. 1873, p. 61.

⁵ Geol. & Zool. of Abyss. (Blanford), 1870, p. 224.

Upper Nile Valley. Mansfield Parkyns¹ observed it in Tigré in a spot highly characteristic of its proclivities, viz., a deep well-wooded ravine with a brook running through it. On the banks of the Nile and on the margin of the desert it is found only where there is vegetation, and generally trees. [In some recent letters to Dr. Anderson he is told that since the war with the Dervishes the apes have been scared from the banks of the Nile, which have been denuded of trees.—G. S. A.] Its food consists largely of the fruits and leaves of three genera of trees, viz., *Zyzyphus*, *Ficus*², and *Tamarindus*, and the gum of the latter, but it robs the *Sorghum* fields and the gardens of the natives and is occasionally very destructive.

It is known in Arabic as ابلاج (‘Abu-Lang’), which is the name generally applied to it in the Nile Valley, but it is occasionally also known under the same name in Abyssinia. According to Hartmann³, the term ‘Nisnas-cughajir’ is also given to it. Salt, Rüppell, Harris, Parkyns, Heuglin, Brehm, and Hartmann state that it is known in Amharic as ‘Tota’; on the authority of Lefèvre it is called ‘Amado’ and ‘Hhamedo’ in the Tigré modification of Geez. Salt says that it is called in Tigré ‘Alesto,’ and Parkyns and Heuglin ‘Woág.’ It is noticeable, however, that Hemprich and Ehrenberg apply ‘Tota’ and ‘Halestijo’ or ‘Alectijo,’ evidently the ‘Alesto’ of Salt, to the baboon, *Papio hamadryas*.

Berlin Museum.

Cercopithecus griseoviridis, Desm., ♂, Weisser Nil, 62, Lepsius. ♀ juv., Weisser Nil, 63, Lepsius.
♀, Blauer Nil, 9095, Lepsius.

General colour of the first of these specimens is cold greyish, due to the black and white speckled character of the head, trunk, and outsides of the limbs. Whiskers, chin, throat, chest, under surface of belly, and lower portion of sides of body pure white. There is a not very well-marked greyish-yellow frontal band, margined below with long black superciliary hairs. The face is dusky and covered rather thickly with short adpressed dark brownish hairs on the nose and external to it from the interorbital space downwards, the hairs along the upper lip being more or less whitish, also those on the chin. Although the general hue of the top of the head and of the back is cold greyish, these parts in certain lights manifest a slightly greenish tint. On the extremities, the grey passes into greyish brown on the upper surface of the feet. The tail on its upper surface is greyish brown, darkest at the base, whilst the tip is greyish with a faint yellowish tint. Owing to this specimen being stuffed in a seated position, to measure it was useless.

The second specimen, from the White Nile (no. 63), is much the same as the previous

¹ Life in Abyssinia, i. 1853, p. 228.

² Hartmann, *op. cit.* p. 33.

³ *Op. cit.* p. 33.

one, but the tints of the upper surface are less vivid, the white supraorbital band less distinct, and the upper surface of the hands and feet darker.

The third specimen (9095), from the Blue Nile, differs much from the foregoing in having the upper surface of its head rich golden yellow, the hairs being broadly banded with yellow subapically, with a well-defined black tip. This colour to a somewhat less degree occurs on the back and sides, but less so on the rump and still less on the outside of the humerus. The outsides of the thighs and of the fore limbs are pale slaty greyish brown, but with little speckling. The hands and feet are of the same colour, but slightly darker. The white orbital band is well defined, and the whiskers are long and white. The tail above is greyish brown, finely speckled, but greyish white towards its tip.

Besides the foregoing specimens, there are four skins in the Berlin Museum from Abyssinia.

1. ♂. 9100. Tigré, Schimper.

This specimen has the general characters of the White Nile male, but the tip of the head is distinctly yellowish, and the whole of the upper surface has likewise a yellow tinge, but paler than the head. The forehead is blackish, only a few of the hairs with narrow subapical pale yellowish bands, each hair terminating in a black tip. The pale frontal band is much the same as in the White Nile male, and not so white as in the female from the Blue Nile, no. 9095. The hairs at the extremity of the tail, for 60 to 70 mm. of its length, are yellowish white.

2. ♀. 9099. Tigré, Schimper.

This specimen has the general colour much as in the last mentioned, but the forehead is not so blackish grey, and the yellowish tinge on the head and back is pale. The tip of the tail is greyish white with a yellowish tinge.

3. ♂ juv. 9096. Tigré, Schimper.

This specimen is slightly more yellowish than the previous one. Its frontal band is better defined, and the last portion of its tail (70–80 mm.) is pure yellowish white.

4. ♀ adult. Salomona, Abyssinia, near the coast.

The general colour of the upper surface of this animal is more decidedly yellowish above than in the last three monkeys, and in this respect it is more like the specimen from the Blue Nile. The sides of the neck, the throat, and part of the chest have a decided yellowish tinge, and the hairs internal to the ischial callosities are brilliant rusty red, not due to any adventitious substance. The tip of the tail has been almost denuded of hair.

In specimens referable to the West-African form with yellow whiskers, the rufous area internal to the ischial callosities is sometimes present.

Skull of a mummied specimen in the British Museum at Bloomsbury.

♀, No. 22,001.

	mm.
Premaxillaries to parieto-occipital suture	95
Inner border of foramen magnum to tip of premaxillaries	68
„ „ „ posterior border of palate (mesial line)	30
Length of palate	38
Breadth of palate between middle of last molars	19
„ „ „ 1st premolars	17
Length from centre of orbital ridge, upper margin, to tip of premaxillaries	45
„ „ „ „ parieto-occipital suture	70
Breadth across centre of orbital region (with dried skin)	55
Greatest zygomatic breadth to ditto, on one side	58
Breadth of muzzle outside 1st pm.	28
„ „ „ canine	16
Length of lower jaw	66
Height of lower jaw at angle	26
Length of 1st upper molar, measured outside	6
„ 2nd „ „ „	6·5
„ 3rd „ „ „	?
„ 1st lower molar	6
„ 2nd „	5
„ 3rd „	?

This monkey is no doubt constantly represented both in figures on the tombs and in mummified remains, but owing to loss of colour and general deterioration the absolute identity of the species is uncertain.

CERCOPITHECUS PYRRHONOTUS, Hemp. & Ehrenb.

Cercopithecus pyrrhonotus, Hemp. & Ehr. Berlin. Gesells. naturf. Fr. Verhandl. Band i. 1829; Hemp. & Ehr. Symbolæ Physiæ, 1829; Is. Geoff. St.-H. Dict. Univ. Hist. Nat. 1843, iii. p. 307; Reichenb. Affen, 1863, p. 123, fig. 311; Selater, P. Z. S. 1871, p. 623, 1893, p. 250.

"Nisnas," F. Cuv. Hist. Nat. Mamm., Nov. 1830.

Cercopithecus ruber, Rüpp. Neue Wirb., Säug. 1835, p. 8 (*nec* Gmel.).

*Berlin Museum.**Description of the Type of the Species.*

The upper surface of the head and neck, outsides of the shoulders, the trunk and outsides of the thighs, and the upper surface of the tail, rich orange-reddish, very brilliant and deep in colour on the top of the head; hairs on the belly white at base, with their apices orange-yellow. A few of the hairs on the front of the shoulders are black-tipped, but no black hairs occur on the chest. Many of the white hairs on the malar region and on the upper part of the cheeks are black-tipped. A well-marked black supercilium and a narrow black area passing backwards on the forehead above the external angle of the supraorbital ridge. The skin of the face and chin nearly black. A black vertical infraorbital line of hairs, but the *hairs on the nose dusky white*, as also are the straggling hairs on the upper lip.

The fore limbs from the elbow downwards, and the hind legs from above the knees downwards, and the back of the thighs, the inner sides of the limbs, and the sides of the face, neck, and throat, and the under surface of the tail, more or less whitish, nearly pure white on the limbs.

The hairs on the chin are quite dusky. A long tuft of whitish hairs inside the ears. Skin of under surfaces of hands and feet black.

Dimensions.

	mm.
Snout to vent	572
Vent to tip of tail	502
Height at shoulder	495

As compared with the type, an adult male from Togoland, referable to *C. patas*, presents the following differences:—

The face, including the chin, is pale coloured, the hairs on the *nose are black*, and those on the upper lip and chin are white and more numerous. The hairs behind the malar region and on the upper part of the cheeks have the black tips more numerous, and the superciliary black band is continued backwards to the ear. The hairs on the front of the shoulder and on the outside of the humerus, instead of being orange-

red, as on the rest of the body, are grey, owing to the hairs being white with black tips. The outside of the fore limb further down is not the pure white of the Eastern form, but is more or less tinged with pale yellowish brown, which is darkest on the dorsum of the foot, where this colour occurs in patches.

In the Togoland specimen the top of the head is especially deep coloured, but not so much so as on the base of the tail; but the upper surface of the head is never so brilliant as in the Eastern form.

In some young specimens from Western Africa the rufous of the outsides of the thighs and fore limbs is prolonged downwards in a narrow line to the upper sides of the feet, while in others this tint only occurs here and there on the parts of the limbs which are white in the Eastern form. In some of the young of the Western form the grey on the shoulder and the outside of the humerus is hardly present, its place being taken by rufous.

Senckenberger Museum, Frankfort.

One of Rüppell's specimens (I.E. 1.6) from Nubia has, as will be seen from the following description, all the characters of the type.

This specimen is a pale sandy yellow, but slightly rufous down the middle of the back. The belly is nearly white, and also the inner and outer sides of the limbs, with the exception of the hands and feet. A few of the yellowish-white hairs on the shoulders are seen to have a trace of black tips, but do not appear to have had any other annuli. The upper surface of the head is rusty red, the whiskers are whiter than the rest of the body, and immediately above the external angle of the eye there is a blackish area, which is prolonged backwards as a fine dusky line over the occiput, and is continuous internally with the black and white eyebrows. The skin of the cheeks, along the upper lip, along the side of the nose, and over the inner angle of the eye is ochre-yellow; a narrow area over the eye, the corners of the upper eyelids, and a triangular area below the eye and continuous with the dark area around the eye, of a similar colour. The nose has seemingly been dusky, but it is covered with *yellowish-white hairs*, which occur along the upper lip and on the chin. Upper half of the inside of the ears with a brush of long, whitish, erect hairs.

Dimensions.

	mm.
Snout to vent, about	490
Tail	490
Height at shoulder	335

The pale colour of this specimen is probably largely, but not entirely, due to its having become bleached by long exposure to light for a period of over 70 years.

Also in this Museum there is a seemingly adult female of a red monkey, said to

have been sent from Kordofan to the Zoological Society of Frankfort in 1861, in whose gardens it had lived; but it is extremely doubtful that it ever came from that locality. The nose is deep black, so that if the locality were correct it would establish the eastern extension of the Western form to near the banks of the Nile. Another young stuffed female in the same Collection, professing to have been obtained in Nubia in 1892, has the nose covered with white and black hairs, but below the nose white is the prevailing colour, whilst a female from Senegambia has the nose deep black.

Paris Museum.

Here I saw a fine skin of a male Patas from Kaloum, in the French Sudan, where it had been obtained by Dr. Macclaud. The whole upper surface, including the outside of the thighs and upper surface of the tail, was deep rusty orange-red. The front of the shoulder was nearly black, but mixed with greyish. Hairs on cheeks white, but with black hairs intermixed. Frontal band, line along bridge of nose, and nose black. Face whitish. Radial portion of fore limbs and tibial portion of hind limbs, with hands and feet, white. The brilliancy of the colouring of this animal was very striking.

According to Hartmann¹, *C. pyrrhonotus* lives in small troops in the thick forest and among the dense bush which covers extensive areas in the region of its distribution. At Sennaar, this bush is made up of *Acacia mellifera*, *A. fistula*, *A. ferruginea*, *A. campylacantha*, *Tamarindus indicus*, *Combretum hartmannianum*, *Zizyphus spinachristi*, *Ficus populifolia*, and *Grewia populifolia*, so that these monkeys have a plentiful supply of the fruits to which they are partial.

Ehrenberg, in his exhaustive account of *C. pyrrhonotus*, states that it was known in Egypt as the 'Nisnas'², نسناس, a term first mentioned by Forskål. In the provinces of the Upper Nile and in Lower Egypt it is called أَبْلَنْجُ الْاَحْمَرِ = 'Abu-Lang el achmar'; and in Kordofan, according to Rüppell, its native name is 'Nango.' Hartmann gives, on the authority of Barth's 'Central African Vocabulary,' a number of names that are applied to it.

The monkey first mentioned by Heuglin³ in his "Fauna of the Red Sea and the Somali Coast," under the name of *C. poliophæus*, has been regarded by some authors as identical with *C. pyrrhonotus*, but too little is known at present to admit of a satisfactory conclusion being arrived at. It has been described by Fitzinger from a four-year-old male from Fazoql, and from one about a year old, said to have been obtained on the Bahr-el-Abiad. These specimens, to his mind, left no doubt as to the validity of *C. poliophæus*.

¹ Zeitschr. Ges. Erdk. Berlin, iii. 1868, p. 34.

² Rüppell in his 'Neue Wirbelth.' pp. 7-8, mentions *Cynocephalus babuin* (misspelt *babouin*) as occurring in the desert near Ambukol, and adds that it was known in Egypt as the 'Nisnas.'

³ Petermann's Mittheil. 1861, p. 13.

[The monkey described by Ehrenberg as *C. pyrrhonotus* had a white nose, the remainder of the face being black. From the above given notes on the more important specimens in the Continental Museums, it will be seen that some examples attributed to the Nile region have black noses. Up to the present time, scarcely a single wild-killed specimen of this monkey from the Nile Valley has reached the European Museums, so nothing is known as to the distribution of the different forms. But there is little doubt that an entirely black-nosed form exists in the upper valley of the White Nile, and this would represent *C. poliophæus*, Heuglin; but to what extent the Nile Valley form differs from the West-African *C. patas* has yet to be determined. This monkey extends into East Africa as far as the Mau Escarpment.—W. E. DE W.]

Before the Red Monkey of the Nile Valley had been prominently brought to the front by Ehrenberg, the *κῆπος* of the Greeks had been identified, by Buffon, Linnæus, and others, with some East-African monkeys, while, on the other hand, Schreber had been the first to suggest that the red Senegal monkey corresponded to it. How correct his supposition was is substantiated by the extremely close affinity of the eastern and western red monkeys.

Belon¹, in speaking of the different kinds of monkeys that were trained in his day by the natives to perform in public, said there was one “desquels est celuy que Plin, pour la grand' beauté de ses cheveux et de son poil, a nommé Callitriches. Il est totalement iaun comme fil d'or, et est du genre des Cercopithecus, qu'Aristote nomme Cebus, car il a la queue longue comme ont les Guenons.” This was in all probability *C. pyrrhonotus*.

A little more than a century later (1698) Narvarche de la Brué² discovered in the forests of Senegal a red monkey, known as ‘Patas’ to the natives. This *Cercopithecus* was fully described by Buffon³ under the name of “Patas à bandeau noir, et Patas à bandeau blanc.” The name properly applicable to the Senegal monkey is *C. patas* (Schreber).

A careful consideration of the ten kinds of monkeys mentioned by Prospero Alpini⁴ in his work on Egypt sanctions the conclusion that they were not all of African origin. For example, the fact that one of them bore the name ‘Karander’ suggests that it was a Southern Indian monkey, as the Tamil name for a monkey is ‘Kurangu.’ He had kept in confinement in Cairo for two years a monkey which he designated *Simius callitrix*, and described it as having been about the size of a large cat, and like one in form. Its body was somewhat long, the head was small and round, and

¹ Les Observ. de plus singul. et Choses mém. 1554, p. 120/2.

² Hist. Gén. des Voy. ii. 1698, p. 321.

³ Hist. Nat. xiv. 1766, pp. 212-223.

⁴ Rerum Ægypt. lib. iv. 1735, p. 244, pl. xx. fig. 4.

therein the human face was plainly visible. It had a lion's mouth and the teeth of a cat. It was slender about the flanks, and wholly of a reddish-yellow colour; the face was black and bearded all round, and since the beard was white its face resembled that of a venerable old man; the tail was long and reddish. This monkey was called by Brisson¹ "Le Singe roux d'Egypte," and consequently is identical with *C. pyrrhonotus*, Hemp. & Ehrenb.

Forskål², while passing through Egypt to Arabia, about the year 1760, observed that a monkey known as 'Nisnas' (نسناس) was found in Nubia, and since his day it has been ascertained that this term is applied along with others to the species under discussion.

Cailliaud³, in his account of the different objects of natural history collected on his journey, said:—"Je me procurai, au Sennâr, le patas à bandeau blanc de Buffon, *Simia rubra* de Linné. La couleur de cette guenon est très-rousse; l'espèce n'en est pas commune dans le pays."

Ehrenberg relates that whilst he was in the province of Dongola with Hemprich, in 1822, the same year in which Cailliaud was at Sennaar, he met some merchants returning from Dar-Fur with a young male red monkey, which he says was as like as possible to the 'Cepus' of the ancients! He bought it and took it alive with him to Berlin in 1826, where it lived for one year, after having been in confinement for five years! He regarded it as distinct from the Senegal monkey, and described it in 1829⁴ for the first time. A full account of it appeared in the 'Symbolæ Physicæ'⁵. This seems to have been the only specimen obtained by Hemprich and Ehrenberg, and I can find no verification of Schlegel's statement⁶ that Ehrenberg "l'a tué dans ces mêmes contrées [Kordofan and Dar-Fur] et, en outre, dans le Sennaar," because he did not visit any of the districts of the Nile to the south of Korti and Ambukol. Ehrenberg, however, relates that he believed he had seen a female of *C. pyrrhonotus* at Alexandria, and mentions that it had a more graceful and slighter shape than the male, and that in its appearance it approached somewhat closely to *C. patas*. He did not purchase it, because it had no tail and had evidently degenerated by captivity. All its colours were paler than those of the male, its teeth were less strong, and the skin of its face was less black, being of a dusky shade.

¹ Reg. Anim. 1756, p. 210.

² Descr. An. 1775, p. iii.;

³ Voy. à Méroé, iv. 1827, p. 267.

⁴ Verh. Ges. naturf. Fr. Berl. i. 1829, p. 406.

⁵ The article on *C. pyrrhonotus* in the 'Symbolæ Physicæ' bears the date Aug. 1832, although Pars I. 'Zoologia,' is dated 1829 on the titlepage of the volume. The former date must be wrong if Valenciennes's article, livr. 64, t. vii., on this species in the Hist. Nat. des Mammif. was correctly dated Nov. 1830, because he refers in a footnote to Ehrenberg's plate 10 in the 'Symbolæ Physicæ' depicting this species.

⁶ Mus. d'Hist. Nat. des Pays-Bas, vii. 1876 p. 85.

The *Cercopithec*i are frequently found depicted on the early monuments of Egypt, both painted and engraved, but this does not necessarily prove that they were ever objects of worship. A monkey of this genus is often represented tied under the chair of some member of the family of the Pharaohs or of his officials, with whom it was probably a household pet. It has been suggested by Ehrenberg that the monkey figured in tombs with a belt round its body was one of the objects provided for the amusement of the dead.

There is a Relief on which this species is portrayed, still in a state of perfect preservation, in the splendid collection of Egyptian monuments in the Royal Museum at Berlin, which Passalacqua brought from Sakkarah in the province of Memphis, along with other most precious and numerous relics. It formed a portion of the inner wall of the Tomb of Rij and is of the XIXth Dynasty ¹. Other figures are represented besides those of the deceased and his wife, who are seated. Under the chair of the latter, to which it is tied, the monkey stands erect. There are yet traces of colouring in the figure; the face, hands, and feet, as well as the cord, have indications of red; the rest of the body is differently coloured, being somewhat greyish green or blue. The size of this figure is 20·4 cm. in height ². Among other representations there is a beautiful wooden group ³ of Amen-em-opet and his wife, where a monkey is seated eating fruit beneath the lady's chair.

¹ Kat. Kgl. Mus. Berlin, 1899, No. 7278, p. 148, fig. p. 149.

² [The author's note having been submitted to Dr. H. Schäfer, he kindly supplied the accurate measurements of the animal, adding the interesting observations on its colouring.—G. S. A.]

³ *Op. cit.* no. 6910, p. 142.

PAPIO.

Papio, Erxleben, Syst. Reg. Anim. 1777, p. 15.

Form massive; muzzle much produced, with the nostrils terminal; cheek-pouches present; ischial callosities large; tail moderate or short. Last lower molar with a posterior talon.

Existing forms confined to Africa and Arabia.

PAPIO HAMADRYAS, Linn. (Plates I. & II.)

"Le Tartarin," Belon, Les Observ. singul. &c. 1551, p. 101.

Cynocephalus, Magot or Tartarin, Gesner, Icon. Anim. 1560, p. 92, fig. 93.

Cercopithecus (*Cynocephalus* 2), Jonstonus, Hist. Nat. Quadr. 1657, tab. lix.

Simia supra aures comata, Alpini, Rerum Ægypt. 1735, p. 242, pl. 5. tab. xvii.-xix.

Cercopithecus cynocephalus, Brisson, Reg. An. 1756, p. 213 (1) ♀?, p. 214 ♂.

Simia ægyptiaca, Linn. Hasselq. Iter Palæst. 1757, p. 189.

Simia hamadryas, Linn. Syst. Nat. ed. 10, i. 1758, p. 27, ed. 12, i. 1766, p. 36; Zimmermann, Geogr. Gesch. ii. 1780, p. 182; Schreb. Säug. i. 1775, p. 82, pl. 10; Shaw, Gen. Zool. i. 1800, p. 28; F. Cuv. Dict. Sc. Nat. xii. 1818, p. 378; Desmoul. Dict. Class. v. 1824, p. 259; Fischer, Synops. Mamm. 1829, p. 35.

Cercopithecus hamadryas, Erxleb. Syst. Reg. Anim. 1777, p. 22.

Papio hamadryas, Geoff. Ann. Mus. xix. 1812, p. 103; Kuhl, Besti, 1820, p. 20; Schlegel, Mus. Pays-Bas, vii. 1876, p. 129; Matschie, SB. Ges. naturf. Fr. Berlin, 1893, p. 25.

Cynocephalus hamadryas, Desm. Encycl. Méth., Mamm. 1820, p. 69, pl. 10. fig. 3; Hemp. & Ehrenb. Symb. Phys. 1828, pl. xi.; Rüpp. Neue Wirb. 1835-40, p. 7; id. Mus. Senck. iii. 1845, p. 151; Brehm, Reise n. Habesch, 1863, p. 58; Fitz. SB. Ak. Wissensch. Wien, liv. 1866, p. 541; Blanf. Geol. & Zool. Abyss. 1870, p. 222; Heuglin, Reise N.O.-Afr. ii. 1877, p. 7; Giglioli, Ann. Mus. Genov. 1888, p. 12; Anders. Cat. Mamm. Ind. Mus. pt. i. 1881, p. 80.

Cynocephalus wagleri, Agassiz, Isis, 1828, p. 861, juv., pl. 11.

Hamadryas ægyptiaca, Gray, Cat. Monkeys Brit. Mus. 1870, p. 34.

The head (with the exception of the forehead and vertex), the neck, shoulders, and back as far as the loins are covered with long shaggy hair; but on the hips, thighs, and legs the fur is short and has the appearance of having been clipped. The hair of the occiput and neck is upwards of a foot in length, and forms a long mane, which falls back over the shoulders, and at a distance looks something like a full short cloak. The whiskers are broad and directed backwards so as almost to conceal the ears; their colour, as well as that of the head, mane, and fore part of the body, is a mixture of grey and cinereous, each hair being marked with numerous alternate rings of these two colours; the short hair of the hips, thighs, and extremities is of a uniform cinereous-brown colour, rather lighter on the posterior surface of the thighs.

PAPIO HAMADRYAS. ♂.

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The muzzle is moderately elongated and broad in the adult, naked and of a dusky flesh-colour, with a lighter ring surrounding the eyes. The septum dividing the nostrils is moderately long, and on the inner side of each nostril the ala curves inwardly in a scroll-like fashion. Over the upper end of the septum there is a slight median furrow. The extreme apex of the nose projects slightly anterior to the upper lip. The alæ of the nostrils are directed slightly obliquely backwards, so as to be posterior to the median septum at their lower end. From the apex the fleshy part of the nose rises somewhat upwards and backwards and then downwards and backwards until the end of the nasal bone is reached, when the surface between the maxillary ridges slopes upwards. The fleshy portion of the nose is thus not on the same line as the rest of the face, but is convex from behind forwards. At its base opposite the ends of the nasals it is marked by fine transverse folds or creases. The maxillary pit is well developed, but the depression on the lower jaw does not show much, although present on the bone. The superciliary ridge is very prominent, pent-like, and forwardly projecting. Behind it the skull is slightly depressed.

The face is reddish tan-coloured, but on the cheeks and the rest of the body, with the exception of the chest, abdomen, and nates, the skin is pale flesh-coloured. On the chest and abdomen the colour is markedly bluish. The callosities are large and of a livid flesh-colour. The buttocks are prominent, rounded, quite nude, pale, covered with white skin, suffused with pink, often brilliant red. The lower belly dusky white, the genitalia reddish flesh-coloured. The sides of the face are covered sparsely with short white hairs, and the sides of the muzzle anteriorly with a few wiry, dark, scattered bristles. Front of whiskers whitish. Hands and feet blackish or rusty brown. Conjunctiva of the eye brown. Ear triangular, rounded at the tip. The posterior border of the conch on the last third of its external surface covered rather thickly with long whitish hairs.

The tail is about half the length of the body, and is carried drooping, as in the other baboons; in the full-grown male, on its terminal portion, longer and rougher hairs mix with the others, tending somewhat to form a pencil, but in captivity these hairs frequently rub off.

The female, when full-grown, almost equals the male in point of size, but differs considerably in the length and colour of the hair. This sex wants the mane which ornaments the neck of the male, and is covered over the whole body with short hair of equal length, which, on the back, is of a uniform deep olive-brown colour, slightly mixed with green. The throat and breast are but sparingly covered with hair of a slightly paler tint, and the skin in these parts, as well as on the face, hands, and callosities, is of a deep tan-colour.

The young of both sexes resemble the female, and the large whiskers and manes of the males only begin to make their appearance when the animals arrive at their full

growth and mature age—that is, when they have completed their second dentition. At this period they undergo as great a change in their mental propensities as in their physical appearance. While young they are gentle, docile, and playful, but as soon as they have acquired their full development they become sulky, malicious, and morose.

[Several fine representatives of the Hamadryas baboon, ♂ and ♀, exist in the Zoological Gardens at Cologne; and in July 1900, Dr. Anderson sent his artist, Mr. P. J. Smit, to figure them, and the results appear in Plates I. and II.¹ The coloured sketches, however, were not received from the artist in time to be approved of by Dr. Anderson. At the same time, sketches were made of *Papio thoth*, *P. babouin*, and *P. langheldi* (all considered by the author of the present treatise to be forms of one and the same animal, *P. cynocephalus*), then living in the same Gardens. It may be mentioned here that Mr. Smit also visited the Zoological Gardens at Berlin, and drew from life *Papio doguera*=*anubis*.

In the autumn of 1899, on our return from a lengthened tour on the Continent of Europe, examining the different species at Museums and Zoological Gardens, we made a short stay in Paris and visited, according to our wont, the Jardin d'Acclimatation. There, in the "Salle des Hamadryas," we were struck with the grotesque appearance of two venerable males, seated side by side, the one the exact fellow of the other.—G. S. A.]

In its native haunts the ordinary food of this baboon is berries, bulbous roots, and grains. Pearce, in his 'Life and Adventures in Abyssinia,' says he had seen an assembly of large monkeys (baboons) drive the reapers from their fields of grain in spite of their slings and stones, till several people went from the village to their assistance, and even then the baboons only retired slowly, seeing that the men had no guns.

It is also asserted that they search with avidity for the nests of birds and suck the eggs, and that they are more or less indiscriminate feeders, eating reptiles, insects, and scorpions.

Blanford (Geol. & Zool. Abyss. 1870, p. 222) has the following interesting notes on the habits of this species:—"The great Dog-faced Baboon, the Sacred Ape (Thoth) of the ancient Egyptians, is by far the commonest Monkey throughout the portion of Abyssinia traversed by me. It was met with everywhere from the plains around Annesley Bay to the top of the Dalanta plateau, although most abundant perhaps in the tropical and subtropical portions of the country. I saw a small herd close to Theodore's old camp at Baba, on the Dalanta plateau, at above 9000 feet of elevation. In the passes leading to the tableland from the coast immense numbers were constantly

¹ [It would be well to remember that the author described the Baboons from Museum specimens, whilst the Plates were taken from living animals; this being borne in mind, should explain any discrepancies.]

PAPIO HAMADRYAS. ♀

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seen, and the animals evidently keep much to the sides of rocky ravines. The herds vary in number; some cannot include much less than 250 to 300 Monkeys of all ages. This species feeds on small fruits, berries, and seeds, and often on buds of trees and on young shoots. On the highlands I frequently saw troops of them in the fields, searching for the 'quentee,' the small tubers of *Cyperus esculentus*. This species is rarely seen in trees; it appears to avoid woods."

Papio hamadryas has never been observed, as far as I have been able to ascertain, between the western side of the Suakin range and the Nile. It is present on the mountains in the neighbourhood of Suakin, as I obtained a young male from the hills near to Tokar. I am indebted to Mr. Menges, who knows that region well, for the information that this species follows the Habab Mountains as far as Tokar.

[Heuglin (Reise N.O.-Afr. ii. p. 7) says that this baboon is known by the Arabs of the Red Sea coast as 'Rohāb,' and in Egypt it is called 'Qird.' Among the local tribes it is variously called 'Žindšero' and 'Djogura.' I cannot find any published reference to the Amharic name 'Necho' mentioned below as being on a specimen in the Stuttgart Museum.—W. E. DE W.]

Stuttgart Museum.

A male juv., No. 1034, from Djidda Thal, collected by Heuglin in 1863, "called 'Necho' in Amharic," is uniform brown throughout and has a tufted tail. It is quite young, with some of its milk-teeth still in place. There can be no question about its specific identity with *P. hamadryas*. There is a young female of this species in the same Museum, No. 1288, skeleton 1359; obtained by Dr. Klunzinger at Suakin in 1869.

The first of the skulls measured (p. 32) is distinguished from the second by the character of a shorter preorbital expansion of the muzzle, and in this and in its general characters it resembles the mummy skull (Plate III. fig. 1), whereas the second skull, in its elongated muzzle, resembles the skull of Rüppell's specimen (Plate III. fig. 2) in the Senckenberger Museum at Frankfort. In the skull from Somaliland the distance between the middle of the lower border of the orbit to the inside of the anterior end of the nasal is 53 mm., and in the other specimen, from Bogosland (Heuglin), 61 mm. The anterior breadth of the muzzle in the former, opposite the anterior end of the nasals, is 38 mm., and in the latter 32. The stuffed skin of the latter specimen is in the Stuttgart Museum, and is a typical *P. hamadryas*. Professor Lampert informs me that the stuffed skin of the first individual is in St. Petersburg. He saw the specimen, and he states that he is perfectly certain as to its being *P. hamadryas*. It was mounted in Stuttgart, and Herr Katz, who stuffed it, also assures me that there can be no doubt that it is correctly identified.

Measurements of skulls.

	Somaliland. No. 2961, ♂. mm.	Bogosland (Heuglin), ♂. mm.
Extreme length of skull from premaxillary to external occipital protuberance	288	211
Lower border of foramen magnum to tip of premaxillaries . .	154	149
Length from front of upper margin of orbital ridge to tip of premaxillaries	120	128
Length from front of upper margin of orbital ridge to external occipital protuberance	115	114
Minimum frontal diameter	57	57
Greatest zygomatic breadth.	126	123
Breadth across centre of orbital region	92	90
Vertical height of orbit at middle	26	22
Transverse breadth of orbit	32	29
Breadth of base of muzzle immediately before and under orbits .	51	50
Greatest breadth of muzzle external to first premolar	51	49
Lower border of foramen magnum to posterior border of palate .	49	50
Length of palate	100	100
Breadth of palate between middle of last molar	26	26
„ „ first premolars	31	30
Extreme length of lower jaw	150	151
Greatest vertical depth of lower jaw	68	?
„ antero-posterior extent of symphysis	48	49
„ transverse breadth of symphysis (alveolar border to posterior root of 1st pm.)	34	35
Length of 1st upper molar	11	10.5
„ 2nd „	13	13
„ 3rd „	13	13.5
„ 1st lower molar	10	10
„ 2nd „	12.7	13
„ 3rd „	16.5	18

The species of ape held sacred by the ancient Egyptians appears without doubt to have been the Hamadryas baboon, and the mature male with his complete mantle of hair is alone represented as worshipped. It is very prominent in Egyptian art as the attendant or representative of Thoth, the god of letters and scribe of the gods.

It is worthy of notice that the name of that deity differs very little from the word 'Tota' or 'Tata,' applied in some parts of Abyssinia, according to Hemprich and Ehrenberg¹, to the baboon *Papio hamadryas*. Also these travellers quote Ludolf as having indicated,

¹ Symb. Phys. dec. i.

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SKULLS OF PAPIO HAMADRYAS.
1. Mummy. 2. Recent.

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in his 'Histora Æthiopiæ' (1681), two Abyssinian species of monkeys, the larger called 'Tota,' the lesser 'Hobe.'

The Greek god Hermes¹ was identified with the Egyptian Thot or Theut as early as the time of Plato: hence the great seat of the worship of Thoth was at Hermopolis, and beside the temple was a large cemetery of the sacred apes; and their embalmed remains extracted from the catacombs have been attributed both by Champollion and by Ehrenberg to the species *hamadryas*.

The Hamadryas baboons are also associated with Sun-worship: then they are almost invariably shown standing with their fore paws raised to greet the rising sun; thus they are sculptured at Abû Simbel in a row on the cornice of the entrance to the magnificent Rock-Temple² of Rameses II. and dedicated to Ra.

Striking examples of the full-mantled baboons are to be observed in the Salle des Dieux of the Louvre, Paris, on the sculptured base upon which the obelisk, now in the Place de la Concorde, originally stood at Luxor. Most probably the obelisk was separated from its base with the intention of preserving the valuable sculptures on the latter. The northern and southern faces of that pedestal (1 metre 62 cm. in height) are each ornamented with four splendid figures in high relief of *Cynocephali* (1 metre 30 cm. in height³) represented in the attitude of adoring the rising sun. Between each figure is sculptured the cartouche of Rameses II. of the XIXth Dynasty. They are undoubted representatives of the male Hamadryas baboon of Abyssinia. The material of the base is rose-granite, and was the gift of Mehemet Ali.

Another very interesting illustration is to be found in the temple of Medinet Habu, in the court of Rameses III. of the XXth Dynasty, in which there occurs a long frieze, in the centre of which a boat is represented, having in it nine human figures, the middle one seated and the four on either side facing the central figure; at either end of the boat is a cartouche of Rameses, followed by a kneeling human figure, behind which are four well-mantled baboons holding up their forearms.

The 'Book of the Dead' is replete with representations of these sacred baboons, either as adoring the Sun God⁴, or as representative of Thoth⁵ watching the scales of justice, in which the good and bad actions of the dead are being weighed.

Both mantled and unmantled baboons appear not infrequently on the monuments in the delineations of Tribute brought to the Pharaohs.

¹ Class. Dict. (Smith), p. 313.

² French Exped., Antiq. iv. pls. 50 & 51.

³ [I am indebted to M. Pierret, Conservateur du Musée Egyptien, Paris, for obliging me with the exact measurements given above.—G. S. A.]

⁴ Naville, Todtenbuch, vol. i. pl. xxi.

⁵ Ibid. pl. xlii.

PAPIO ANUBIS, Fischer. (Plate IV.)

"Cynocéphale Anubis," F. Cuv. Hist. Nat. Mamm. livr. 50, Juin 1825.

Simia anubis, Fischer, Synops. Mamm. 1830, p. 33.

Cynocephalus anubis, F. Cuv. Hist. Nat. Mamm. 2nd ed. 1833, p. 125, pl. 43 (*fide* Trouessart);

id. *ibid.* Index, circa 1843; Ogilby, Libr. Ent. Knowl., Menageries, 1838, p. 427.

Cynocephalus babouin, Rüpp. Neue Wirb., Säug. 1835, p. 7 (*nec babuin*, Desmar. *nec* F. Cuv.).

Cynocephalus olivaceus, Is. Geoff. Cat. Primates, 1851, p. 34.

Cynocephalus doguera, Puch. et Schimp. Rev. et Mag. Zool. 1856, p. 96; id. *ibid.* 1857, p. 250.

Papio neumanni, Matschie, SB. Gesellsch. naturf. Fr. Berlin, 1897, p. 161.

Papio heuglini, Matschie, SB. Gesellsch. naturf. Fr. Berlin, 1898, p. 81.

Head rather flattened above, but little arched; forehead receding. Body compact, stout; tail not tufted, about two-thirds the length of the body. Ears not sharply pointed, more or less quadrangular, hinder margin straight; face long and black, paler (almost livid greyish) below the eyes, at some distance behind the angle of the mouth, and below and in front of the ears. Upper eyelids whitish, lower eyelids much less so; skin of ears black anteriorly, except in front of the tragus, and posteriorly, with the exception of the lower third which is whitish. Bare area around the callosities, and the callosities themselves, livid greyish purple. Under surface of the hands and feet black; throat and rest of the skin whitish. General colour rather rich yellow and dark brownish black, the two colours being more or less grouped irregularly over the trunk in small irregular areas, producing an appearance as if the animal were blotched or washed with yellow and blackish. The two colours are considerably less vivid in adults than in the young. The yellow is brighter on the hinder parts of the body and on the outsides of the hind limbs than elsewhere. On the limited area of the vertex and on the limbs the general aspect is speckled yellow and brownish black, not blotched with those colours. The under side of the trunk is more or less speckled yellow and blackish brown, the hair being moderately profuse in the male, whereas in the female the chest and belly are rather sparsely clad. The yellow colour is less pronounced on the front of the limbs, especially of the fore limbs which are finely speckled yellow and blackish, uniformly so in many specimens (young and adolescents?) to the ends of the digits, whilst in others (adult males?) the upper surface of the hands and feet lose the speckling and become nearly uniformly blackish. The tail is speckled pale yellow and blackish brown, and is consequently somewhat of a greyish-olive colour. The shoulders in the adult male are clad with long hair, nearly uniform in length, without the long straggling hairs characteristic of *P. cynocephalus*, Linn.; whereas on the sacral region the hair is much shorter, but in no way comparable to the cropped-like hair of *P. hamadryas*. In the adult male the hair on the vertex varies from 61 to 76 mm. in length, on the shoulders from 120 to 137 mm., on the pectoral region from 80 to 95 mm., on the sacral region from 40 to 58 mm., on the outsides of the thighs

PAPIO ANUBIS. ABYSSINIA.

P. DOGUERA, Pucheran.

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from 33 to 58 mm., and on the lower part of the limbs from 19 to 25 mm.¹. Entire face, from between the eyes forwards, more or less covered with fine hairs, those on the mesial line between the eyes very minute (requiring the aid of a lens to detect them), depressed downwards in the direction of the muzzle, the majority being nearly pure white; similar hairs occur on the sides of the face below the eyes, directed backwards and outwards to behind the eyes, where they merge with the hairs on the side of the head. Besides these microscopic hairs, which merely produce a softening tone or bloom on the face, other longer hairs are sparsely scattered over the face, and are generally of a blackish or brown colour. Whiskers not prominent, directed upwards and backwards, greyish or pale brown, showing more or less annulation as they become longer and denser in front of and below the ears which they partially hide. The pelage consists of two kinds of hairs, those constituting the general mass stiffish and coarser than the rest, which are fine, wavy, and sparsely distributed. The bases of the hairs (*i. e.* the non-annulated portion) are dark vinous-brown, paling, however, in many parts into greyish as they approach the skin. Hairs generally more or less annulated, the greatest amount of annulation occurring on the pectoral region; each hair has its tip black to a varying extent, succeeded by a yellow band also varying, but generally rather broad; the latter is followed by a black band of considerable breadth and intensity, shading off gradually into the vinous-brown portion of the base of the hair; in many hairs, however, there is a pale area beyond this black band, while in many others it is succeeded by another yellow band, generally feebly defined; but the prominent feature is the broad yellow subapical band. On the pectoral region as many as 6 to 9 bands may be developed. The long black tips to the hairs and the subapical yellow band are chiefly instrumental in producing the characteristic colouring of this baboon, as is the case also in its allies. The other bands, except on the pectoral region, are hidden in the pelage; but the hair on the chest is not so dense as on the head and back, and the annulations are consequently more apparent.

F. Cuvier published in 1825² an account of two baboons. They were about one foot and a half in length from the end of the muzzle to the hinder end of the body, and two feet in height at the vertex. In these baboons the muzzle was more elongated

¹ In an adult female the hair on the foregoing parts has the following measurements:—vertex 60–75 mm.; shoulders 73–98; pectoral region 59–75; sacral region 42–50; outside of thighs 33–48; lower portion of limbs 19–23. In a young male the hair on these parts is as follows:—vertex 71–85 mm.; shoulders 74–100; pectoral area 40–73; sacral region 39–61; outside of thighs 36–69; lower portion of limbs 14–20.

² Hist. Nat. Mamm. livr. 50, Juin 1825. [In this description no Latin name was given. Cuvier, in fact, was doubtful whether the specimen he figured was not the representative of an older stage of development of his Babouin [*P. cynocephalus*]. The scientific name must therefore be credited to Fischer, who published it in proper form a few years after. This alteration of authors will not affect the particular species attributed to *P. anubis*, F. Cuv., in the pages of this book.—W. E. DE W.]

than that of 'Le Babouin,' and the upper surface of the head was more flattened. The general colour of the pelage was green, much darker than that of his Babouin, and approaching that of the young of his Drill, except that the cheeks had pale yellow hairs, and the inner surface of the limbs was greyish white. All the anterior part of the face was black. The cheeks and the area around the eyes were of a flesh-colour. The ears and the feet were black; the bare area of the buttocks was violet-coloured.

This species of baboon F. Cuvier designated "*le Cynocéphale Anubis*." He gave no indication whence it came; but as he selected the name of an Egyptian deity as appropriate to it, we are entitled to conclude that he supposed it to inhabit some country bordering upon Egypt.

In the valley of the Nile, more especially on the so-called island of Meroë, and in many other localities, a baboon occurs which corresponds generally with the foregoing description, but more especially with the figure F. Cuvier gave of the species. This is direct evidence favouring the supposition that this baboon of the Upper Nile really is the Anubis of that author; and it should not be lost sight of that at the time F. Cuvier wrote, and for a number of years previously, many Frenchmen and Europeans of other nationalities were in the employment of Mehemet Ali, and had taken part in his expeditions into Upper Nubia and the Sudan, where this black-faced baboon occurs, so that it is quite probable that one of these Frenchmen may have sent or taken to Paris living examples of the species, or it may have been only skins.

In 1819, Cailliaud, on his return to the French capital, took with him living examples of the monkeys found by him in Upper Nubia, and there can be no doubt that the baboon he saw at Sennaar and elsewhere, and wrongly recorded under the name of *C. sphinx*, was this species.

Ogilby¹, writing thirteen years after Cuvier, described *Cynocephalus anubis*, F. Cuv., as a Nubian species of a much more sombre green than *C. babuin*, with a longer muzzle and a flatter skull. He described the anterior part of the face as black, the cheeks and a circle round the eyes as flesh-coloured; the cartilage of the nose was prolonged rather beyond the extremity of the upper lip; the ears and feet were black, and the callosities violet-coloured. He could not ascertain where the specimens he described—a full-grown male and a female in the Surrey Zoological Gardens—had been procured, but he thought it probable that they had come from Egypt; and he based this supposition on the circumstance that Dr. Rüppell had brought specimens of this species from Abyssinia; which he himself had seen, and he added there could consequently be no doubt as to the habitat of the *C. anubis*. Unfortunately, five years later², he changed his opinion about the habitat of *C. anubis*, as he confounded the baboon he described under the name of *C. thoth* with Rüppell's Abyssinian

¹ Libr. Ent. Knowl., Menageries, 1838, p. 427.

² Proc. Zool. Soc. 1843, p. 12.

baboons, or rather, it may be said, that having forgotten the essential characters of the latter, he considered them to be the same as the former, an error which has led to endless confusion. He therefore abandoned the idea that *C. anubis* was an Abyssinian and Nubian baboon, and assigned it to Western Africa, ascribing *C. thoth* to these two foregoing areas, where, however, it is not found, unless it be in the very southern extremity of Abyssinia. Zoologists who followed him, misled also by Rüppell's first erroneous identification of his Abyssinian baboons with *C. babuin*, which he stated occurred in Dongola, Sennaar, and Abyssinia, and further recognizing in the *C. thoth*, Ogilby, the 'Le Babouin,' F. Cuvier, commonly enumerated this latter species among the animals of the Nile Valley and Abyssinia¹, whereas in reality the species inhabiting these countries was *C. anubis*, the *Papio anubis* of this work.

Baboons presenting the somewhat vaguely-defined character of *C. anubis* indicated by F. Cuvier are also found in Western Africa, and many individuals have now and again been mentioned in scientific literature under that name, the term usually applied to them in museums. Although F. Cuvier's description, in the present state of our knowledge, may fail in definiteness, yet, on the other hand, it is supplemented by the figure, which on the whole agrees well with the baboon of the Nile Valley, if due allowance be made for individual differences and the changes which occur with growth. Is. Geoffroy St.-Hilaire, in dealing with the baboons of Western Africa, closely allied to the Nile species in all their leading features, experienced so much difficulty in attempting to identify them with F. Cuvier's figure and description, that he indicated them under a new name, applying to this West-African form the term *olivaceus*; but, from what he stated in a footnote², it was quite evident that he was not convinced of their really being specifically distinct. Unfortunately after all these years the material at present available is not sufficient for the settlement of this question. After a careful inspection of all the specimens of baboons in any way referable to *P. anubis*, existing in the Museums of Berlin, Frankfort-on-the-Main, London, Paris, Stuttgart, and a much more cursory examination of those in the Museum of Leyden, the conclusion is pressed home that the species of baboon presenting the general characters assigned to the Anubis by F. Cuvier is spread across Africa to the south of the region distinguished by the practical absence of periodical rains, from about 38° or 39° East longitude to the Atlantic.

In the east, the area of periodical rains practically ceases at 19° N. lat., but to the west it contracts and expands in its course, depending on the physical characters of the region embraced within the 19th parallel.

The southern range of baboons conforming to *P. anubis* is practically unknown, but they appear to spread from Abyssinia and the Nile Valley as far as the region of

¹ Cf. Schlegel, Mém. d'Hist. Nat. des Pays-Bas, vii. 1876, p. 128.

² Cat. Méth. des Mammif. 1851, p. 34.

the great Lake Victoria Nyanza. They also extend through the river-system of the Bhar-el-Ghazal to Dar Fertit, where Schweinfurth obtained specimens. From the Victoria Nyanza district this species possibly follows the greater part of the river-system of the Congo, while from Dar Fertit it extends to the Niger. Its form seems to be modified in given areas of this vast region, but the differences manifested in the scanty material at present available will probably be somewhat bridged over when zoologists are placed in full possession of the different phases assumed by the individuals in diverse geographical areas and at various periods of their existence.

The skull of this baboon has a heavy and deep muzzle, sloping forwards and slightly downwards to the end of the nasals, beyond which it curves downwards and forwards. (See Plate V. for side view of type of *P. heuglini*.) The orbito-maxillary ridge is well-defined, but the surface between these ridges varies somewhat, depending on the character of the nasals, as in some specimens these bones form a slightly rounded longitudinal mesial eminence with a slight concavity external to them on either side, or a flattened surface. In other skulls the nasals may not be raised, but may be somewhat concave at their middle antero-posteriorly, with a marked lateral longitudinal depression on either side of them. These characters are present in both males and females. The skull from Shilluk has raised nasals with a concavity on either side, while in the baboon from Abyssinia, collected by Rüppell, these bones are less raised, and the lateral areas external to them are nearly flat. In the male from the Gash River the nasals are slightly concave at the middle. The nasals vary in breadth anteriorly and posteriorly. When they are broad before their suture with the frontal, they give rise to a broad interorbital septum, as in the baboon from the Shilluk Islands (Plate V. fig. 1); and when less so, to a narrow septum such as occurs in the skull from the Gash River (Plate VI. fig. 1); whereas in the skull from Abyssinia the breadth of the septum is intermediate between that of the two foregoing skulls.

The following are the measurements of this septum in four male skulls authenticated by their skins:—

		Length of skull.	Breadth of septum.
		mm.	mm.
Nile baboon.	Stuttgart Museum	218	14
Nile baboon.	Darmstadt Museum	213	10
Abyssinian baboon.	Frankfort Museum . .	228	11
Abyssinian baboon.	Munich Museum . .	209	12

It seems evident that no importance can be attached to these variations in the breadth of this septum in these four skulls; but at the same time it is an interesting fact that in the skull of a large male baboon obtained by Schweinfurth from Dar Fertit, on the watershed of the Nile and the Congo, this septum is broad. This

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SKULL OF PAPIO ANUBIS. SHILLUK ISLAND.
P. HEUGLINI, Matschie (Type).

skull in its general features is practically a replica of the Abyssinian skulls, but the fact that a broad interorbital septum is a feature of the skulls of the baboons of this group in West Africa serves in a way to link them to those of the Upper White Nile and of Dar Fertit ¹.

The fossa before the malar and on the side of the maxilla is greatly developed, and also the external mandibular pit below the first and second premolars and first molar. The depth and length of the palate vary, and its length depends much on the age of the animal, as when the last molar has travelled forwards to be in front of the base of the zygomatic process of the malar, the palate is consequently much longer than in skulls less mature. The lateral temporal ridges in the adult define an elongated backwardly-pointed V-shaped area, the front of which is marked by the frontal depression, and at this period of growth the ridges unite at the hinder extremity of the frontal. Young males, as regards the general features of the skull, resemble the adult female. In the case of the female the temporal ridges are always widely apart anteriorly and posteriorly, and rarely unite, even on the occipital. The maxillary and mandibular pits are well marked in the females.

Matschie was under the impression that the baboon from the Shilluk Islands (*P. heuglini*), the skull of which he stated strongly resembled in its structure the skull of *P. doguera*, differed from the latter in the shape of its last lower molar. In the Shilluk baboons he held that the terminal cusp does not lie in the line of the inner cusps, but between the inner and outer cusps of the tooth; but from the figures here given (Plates V., VI., VII.) there does not appear to be any difference in the position or essential characters of this cusp in the skulls of baboons from Abyssinia, the Gash River, and Shilluk.

A leading feature of the skull of *P. anubis* as compared with the skull of *P. cynocephalus* is the great prominence and upward and forward projection of its superciliary ridges, so that the frontal surface is more depressed and more concave.

¹ In photographing skulls of baboons it is of the utmost importance that they be placed perfectly vertically, or at least that a uniform method of representing them be adopted. When a skull is vertically placed, the suture formed by the frontal and the malar at the external angle of the orbit should be projected backwards by the tilting of the muzzle, so as almost to cover the anterior end of the parietal bone in the temporal fossa, and thus reduce what is visible of the broad outlines of the fossa to a small oval space lying between the zygomatic and orbital branches of the malar. When the tip of the muzzle is depressed backwards the proportions of these parts appear quite altered, and an erroneous impression is given of the character of a skull in a series, if the others have been photographed out of the vertical.

¹ The Kavirondo female skull has considerably larger teeth than the female Abyssinian skull, and has a much more pronounced maxillary pit. *The basi-occipital suture is completely obliterated.*

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SKULL OF PAPIO ANUBIS. GASH RIVER.

Paris Museum.

Type of *Cynocephalus doguera*, Schimper, Cat. No. 317 A; Pucheran & Schimper, Rev. et Mag. Zool. sér. 2, viii. 1856, p. 96; Pucheran, ibid. ix. 1857, p. 250.

In the Paris Museum there is a fine example of *P. doguera*, adult male, bearing the following label:—" *Cynocephalus doguera* (Puch.). Type, M. Schimper, Abyssinie."

On the under surface of the stand the following occurs:—" *Cynocephalus doguera* (Pucheran) Abyssinie," also "d'Abyssinie acquis au Musée de Strasbourg, en 1893¹ (1853?). Cat. No. 439." *Skull in specimen.*

There is a second specimen, a female, bearing the following label:—" *Cynocephalus doguera* (Puch.). Type M. Schimper, Abyssinie"; on the under surface of the stand, in ink, "(J. T.) M. Schimper No. rouge 438." This specimen was also obtained from the Strasbourg Museum.

These specimens have the following measurements:—Snout to vent, ♂ 950 mm., ♀ 670; vent to tip of tail (without terminal hairs), ♂ 560, ♀ 470; height at shoulder, ♂ 570, ♀ 460.

In the male the hairs on the shoulder are about 140 mm. long, on the hind-quarters 40 to 50, in front of the chest 10 to 100, above the elbow 80 to 90, on the back of the thighs 50 to 60, above the wrist 30 to 40, above the ankles from 50 to 60, at the tip of tail 70 to 80. This specimen has not the bright colour of that in Munich Museum, but it does not differ, so far as I can make out, from the specimen in the Stuttgart Museum from the Shilluk Islands.

The lower half of the fore limbs tends to become black, with an intermixture of yellow, but on the hands the colour is almost wholly black. The upper surfaces of the hind feet are less black and the lower half of the tibial portion is concolorous with the upper part. The portion of the fore limb externally between the elbow and the dark area below it, and the outside of the thighs, have a greyish tinge. In this baboon the greatest degree of yellow is on the head; the greatest amount of black is developed on the front of the shoulders and chest and on the inner side of the fore limbs; the hairs immediately behind the mouth are greyish, but further back they are brownish.

The female is decidedly more yellowish than the male, more especially on the limbs.

¹ [Dr. Anderson came to regard this date as a clerical error, this conclusion being the result of his correspondence on the subject with Professor L. Döderlein, Conservator and Director of the Strasbourg Museum since 1882, and with the late Professor A. Milne-Edwards, who made careful research into the matter. The latter replied that "in 1853 (not 1893) the Museum of Paris had acquired from the Museum of Strasbourg, through the intermediary of Schimper (a cousin of the Governor of Tigré of the same name), then Conservator of the Natural History Cabinet of Strasbourg, two examples of *Cynocephalus doguera*: a male fully adult, which was immediately placed in the Galleries, and a female of which the skin had remained put away in the 'Magasins.' Pucheran, when he described the 'Doguera,' had neglected to search the drawers of these 'Magasins'; and so it happened that, much later, this skin was prepared and placed beside the male in the Gallery. The male specimen is certainly the type described by Pucheran."—G. S. A.]

The fore feet are not so black as in the male, and the hind feet, instead of being black, are brownish. The hairs on the lower part of the hind limbs are relatively much longer than in the male. The hairs behind the maxillary pit are yellowish grey.

Hair measurements (breadth of annulations in mm.).

	Apical black tip.	Yellow band.		Base of hair.
Type of <i>P. doguera</i> , P. & S., Paris Mus., male	25	15	a dark band below the yellow.	107
<i>P. doguera</i> , P. & S., Munich Mus.	{ 24	12		98
	{ 30	10		130
„ „ Stuttgart Mus. Type of <i>P. heuglini</i> , Matschie	25	15		80
„ „ Frankfort Mus., female	17	13		70
<i>Papio</i> (? <i>neumanni</i>), Brit. Mus. (Lord Delamere), male ..	21	11		113
„ „ Lake Elmetaita (Jackson), Brit. Mus., male	16	11		125
<i>P. doguera</i> , Kavirondo (O. Neumann), Berlin Mus.	{ 13	11	A black band passing into the brown of the base.	{ 92
	{ 22	14		{ 69
<i>P. neumanni</i> , Matschie, Berlin Mus.	{ 15	9		{ 98
	{ 16	12		{ 91
<i>P. sphinx</i> (= <i>C. choras</i> , Ogilb.), Frankfort Mus., { 9 5 8 6 8 6 10 6 9 7 7 64				
Senegambia, Zool. Gdns.	{ 8 5 6 5 7 7 9 5			101
„ female, Brit. Mus., 51.7.9.11	{ 13 7 12 8 9 7 11			79
	{ 17 4 11 5 12 6			81
„ male, Brit. Mus., 44.11.8.9, Warwick; { 14 6 5 6 4 5 4 5 4 57				
no further history	{ 8 5 5 6 6 9 7 6 10 9 5 28			

Stuttgart Museum.

Papio heuglini, Matschie. Adult male. Type. No. 717. Stuffed specimen and skull.

	mm.
Snout to vent	875
Length of tail, along curve	470
Height at shoulder	610

A large powerful baboon, mottled yellowish and brownish black, the two colours giving rise to a yellowish-olivaceous hue, the dark colour of the base of the hairs having a somewhat purplish tinge. The dark mottling is due in part to the exposure of the dark colour of the base of the hairs, but chiefly to the aggregation of black tips of the hairs in masses. The black apical portion averages about 20 to 25 mm. in length and the yellow band about 20 mm. On the vertex the hair is about 96 mm. long, on the shoulders 100 to 120, on the loins 50 to 60, and on the thighs 40 to 50. Although the hair is longest on the shoulders and the back anterior to the loins, there

is no well-defined mantle as in *P. hamadryas*, the hair on the hind-quarters never having the shorn character of that species. The hair on the inner side of the thighs is greyish, but on the under surface of the body in the adult male it is banded in the same way as the upper surface; on the thighs the basal dark colour becomes very pale and the black mottling is due to the terminal black tips. The face in the stuffed type is black and is practically nude on its upper surface, although a very few small hairs may be detected here and there, but on the sides of the muzzle they are somewhat more plentiful. On the front of the muzzle below the nostrils, along the lips, and on the chin there are bristly black hairs. On the area of the ascending ramus of the lower jaw, below the zygoma, the short backwardly-directed hairs are nearly white. The hands and feet are black, and the black extends up the limbs for a short way. The two terminal phalanges of the fingers are nude, with the exception of a few straggling long hairs on the upper surface, but the upper surfaces of the toes are thickly clad with long hairs. The tail is concolorous with the body, but the hairs on the sides of its base are longish, 50 to 60 mm.; the remainder are short, except those at the tip, which measure about 70 mm. long, so that it is slightly tufted. The nates are nearly black in the stuffed specimen; the hair below them is rather long and dense. The muzzle of the male in the stuffed specimen is rather long, and the ridge from the orbit to the premaxillaries is well marked. The ears are moderately pointed, nude or semi-nude externally and internally, but on the latter surface the inner margin of the conch is clad, but not densely, with moderately long annulated hairs. An immature female, No. 718, from the same locality as the male has all its essential features, but the hair on the inner side of the hind legs is greyish, and the hair on the upper surface of the hind feet instead of being black is annulated with greyish.

The leading features of the skull of the male are its broad interorbital septum, the breadth of the muzzle at the base below the orbits and anteriorly at its termination, the prominent character of the maxillary ridge, and the extent to which the nasal bones rise as a central rounded ridge with a slight concavity on each side of them. The palate is broad, and the palatal bones in their mesial extent from the spine forwards equal nearly one-third of the length of the entire palate. The interval between the palatal foramen and the hinder curved border of the palate equals one-fifth of the length of the entire palate measured from the anterior osseous border of the posterior nares.

In this skull the premaxillaries form only a very short suture with the nasal, but in the female the suture is considerably broader.

The skull of the female is unfortunately much injured in its calvarium. Its third upper and lower molars are not yet visible, so that the specimen is that of a very young animal. But the bone covering the last molar of the right side of the lower jaw has been broken off, thus partially exposing the tooth, which is seen to have a well-defined third inner cusp, as in the adult female of *P. doguera*, but it

seems to be longer. The two upper molars that are present are very large, the first measuring 12·5 mm. and the second 15·6; in the lower jaw the same great size prevails, thus the first molar is 12 mm. and the second 14·5. In the adult female *P. doguera* from Abyssinia, collected by Rüppell, the following are the measurements of these teeth: the first molar is 11 mm. and the second 12·5 in both upper and lower jaws. The much larger size of the teeth of the female *P. heuglini* as compared with the corresponding teeth of the female *P. doguera* supports the supposition of these two forms being possibly racially distinct.

The *Cynocephalus anubis*, No. 719, male juv., Sennaar, Heuglin, 1855, is unquestionably a young example of the species found in the Shilluk Islands. The skull is that of a young animal with its milk-dentition. Even at this age the colour of the fur is exactly like that of the adult, but rather richer yellow. The specimen from snout to vent measures 440 mm., tail 400, height at shoulder 320.

Munich Museum.

Adult male of *Papio doguera*, Pucheran and Schimper.

"Schimper, Abyssinia," appears on the under side of the stand, in Matschie's handwriting. In pencil "No. 48" is written, and the same number occurs on the skull.

This specimen, as it now appears, has shorter legs than the male in Stuttgart from the Shilluk Islands, but reliance cannot be placed on this character in a stuffed specimen. The colour is rather rich yellow and black, due to the yellow subterminal band and the black tips to the hairs; these colours falling together, the yellow by itself and the black by itself, gives rise to small irregularly distributed patches of yellow and black. This arrangement is the same as in the Shilluk baboon, but the yellow of the Abyssinian baboons is brighter; indeed, the yellow hue generally over the body of the Abyssinian baboons of this species is more vivid than in specimens from the Valley of the Nile.

The fur is dark blackish brown below and on the shoulder, where the longest hair attains to 170 mm. in length; the dark basal portion is 130 mm., being succeeded by a yellow band about 10 mm. in length or somewhat more, and terminating in a black tip about 30 mm. long. On the rump and outsides of the thighs the hair averages from 30 to 40 mm. long, and on the vertex between 50 and 60 mm. On the front of the shoulder it is from 70 to 90 mm., and on the front of the fore leg 30 to 40 mm. On the front of the hind leg it is 50 to 60 mm. long. The hairs on the tail generally are about 23 mm. long, on the base, however, they vary from 50 to 60 mm. in length; also equally long hairs occur near the tip, tending to form a pencil.

The side of the muzzle is very sparsely covered with straggling pale hairs, but behind the malar region it is well clad with shortish yellow-grey hairs, those behind

SKULL OF PAPIO ANUBIS. ABYSSINIA.
P. DOGUERA, Pucheran (Munich Museum)

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passing into brownish, but all the rest of the side of the head is covered with more or less yellowish and black annulated hairs. All the hairs of the chest and belly and inner sides of the limbs are annulated yellow and black, the black tips being well developed on the abdominal hairs. The bases of the hairs immediately behind the ears are greyish, instead of being dark blackish brown. The face and the nates are blackish, and the hairs below the latter are rather long and dense. The upper surfaces of the hands, and to a less degree of the hind feet, from a short way above the wrist and ankle, are blackish.

[This is not the type of the species, which I have since seen in Paris, see above, p. 41.]

This adult male measures:—Snout to vent 790 mm.; vent to tip of tail 480; height at shoulder 510.

Muséum des Pays-Bas.

Papio doguera.

The specimens referred by Schlegel to this species are distinguished by the characters indicated by himself and resemble essentially the type of *P. doguera*, the form to which they are unquestionably referable.

Clot Bey's specimen, which is young, is rather brilliantly yellow.

Senckenberger Museum, Frankfort.

In this Museum there are an adult male and female of *P. doguera*, Pucheran and Schimper, collected in Abyssinia by Dr. Rüppell in 1834.

The collector's label on the under surface of the stand gives *Cynocephalus anubis*.

The general colour of the female is a richer yellow than that of the more immature female in the Stuttgart Museum, and in this respect it resembles the male. This female is 695 mm. from snout to vent; the tail is 452 mm., and the height at the shoulder 510 mm. The hair on the shoulder is distinctly longer than that on the hind-quarters. The hands and feet are more or less concolorous with the rest of the limbs, but the black tips to the hairs are so pronounced as to confer, especially on the hands, a blackish appearance, but to no great degree.

For comparative measurements of the skulls of these two specimens, see p. 40, nos. 1 & 8.

The skull of the type of *P. heuglini* measures in extreme length 218 mm. and the Munich example of *P. doguera* 209 mm., whereas Rüppell's Abyssinian male has a skull 228 mm. long. In the former, the length from the anterior border of the foramen magnum to the tip of the premaxillaries is 162 mm., and in the latter 147 mm. In *P. heuglini* and *P. doguera* the zygomatic breadth of the skulls is practically the same, the former being only 2 mm. broader than the latter. The facial portion of the skull between the eyes and the end of the nasals is seemingly variable. In the type of

P. heuglini the muzzle immediately before and under the orbits is broader than in a specimen of *P. doguera* preserved in the Munich Museum, but only by a few millimetres. However, in the male skull from Abyssinia in the Frankfort Museum, collected by Rüppell (which, from its general characters, may unquestionably be referred to *P. doguera*, a fact that is substantiated by its skin), the base of this part of the muzzle is considerably broader than in the Munich skull of *P. doguera* and broader than in the type of *P. heuglini*, so that this portion of the skull in *P. doguera* is evidently subject to considerable variation. In the type of *P. heuglini* the length of the flattened portion of the face before the orbits (*i. e.* from the inferior border of the orbits to the end of the nasals) measures 66 mm., and in *P. doguera* 62 mm., whereas in Rüppell's specimen referable to the latter species it is 69 mm. in length.

In the Munich skull the posterior palatine foramina are separated from the posterior border of the palate by a much narrower interval than in *P. heuglini*, in which a wide interval exists between these points. But in the skull of the baboon in the Frankfort Museum from Abyssinia collected by Rüppell, the breadth of this interspace nearly equals that of *P. heuglini*. In the Munich skull the interval is only 16 mm., in *P. heuglini* 20 mm., and in the Frankfort skull 19.6 mm. It is thus evident that no importance can be attached to this character. In the three foregoing specimens the upper line of the premolars and molars is, in all, 54 mm. in length; and the lower line, consisting of the 2nd premolar and molars, is as follows:—*P. doguera* (Munich) 49 mm., *P. heuglini* 51 mm., and in the Frankfort skull 51 mm. In *P. doguera* the third lower molar is 16 mm. long, in *P. heuglini* 17 mm., and in the Frankfort specimen of *P. doguera* 16 mm.

In *P. doguera* the third inner cusp of the third lower molar is well-developed, as also in *P. heuglini* and in Rüppell's specimen, so that this tooth, which usually yields some recognizable character when a species is well marked, is alike in all these skulls. They show, however, that even in them this cusp is variable, as on the left side of *P. heuglini* it is broken up into two sections, while on the left side of Rüppell's *P. doguera* it is distinctly smaller than on the right side.

Berlin Museum.

Papio neumanni, Matschie. Type ♂, Donyo Ngai, Natron Sea, Central Africa. O. Neumann.

This specimen has externally the features of *P. doguera*, but it is much more brilliant yellowish brown, almost golden, especially on the hinder quarters and on the hind limbs. The basal part of the fur is reddish brown, the subapical band rather rich yellow, and the apex black. The sides of the face are sparsely covered with short greyish or greyish-yellow hairs, which, as they become longer externally to and below the eyes, have a distinct yellow sheen; on the sides of the head and below and anterior to the ears the hairs throughout are more or less yellowish grey, without any of the

SKULL OF *PAPIO ANUBIS* subsp. *NEUMANNI*.

P. NEUMANNI, Matschie (Type).

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dark reddish-brown tint of the hairs of the trunk, and the annulation is so obscure as to be hardly traceable. Behind the ears they are distinctly paler than elsewhere, being pale yellowish white. The hair on the shoulder varies from 100 to 120 mm. in length, on the vertex from 40 to 50, and over the hind-quarters 60 to 70 mm. On the front of the shoulders the hair is 60 to 70 mm., on the middle of the radial portion of the arm not more than 20 mm., while on the middle of the tibial portion of the leg the average length is about 40 mm.; but some hairs are as long as 60 mm., and on the outside of the thighs somewhat longer. The hairs at the apex of the tail measure 45 mm. On the humeral portion of the fore limbs the pale annuli are almost greyish yellow compared with the brilliant yellow of the hinder quarters, and on the outside of the radial portion of the arm the yellow annuli are nearly absent, this part

Measurements of the skull of the type of *P. neumanni*, Matsch. (Plate VIII.)

	mm.
Extreme length of skull (tip of premaxillaries to external occipital protuberance)	185
Anterior border of foramen magnum to tip of premaxillaries	127
Tip of premaxillaries to mesial point of superciliary ridge	120
Mesial point in superciliary ridge to external occipital protuberance	104
Minimum frontal diameter	54
Maximum interzygomatic breadth	111
„ intermalar breadth across middle of orbit	81
Vertical height of orbit	27
Breadth of orbit	28
Distance from middle of lower border of orbit to end of nasals	53
Breadth of muzzle immediately before and below orbit	42
„ „ external to first premolar	43
„ „ opposite to end of nasals	38
Anterior border of foramen magnum to posterior border of palate	43
Length of palate	86
Breadth of palate between middle of last molars	25
„ „ „ 1st premolars	28
Extreme length of lower jaw	136
Vertical depth through coronoid process	68
Alveolar border of lower jaw to posterior (digastric) border of symphysis	44
Breadth of lower jaw at posterior root of 1st premolar	32
Length of 1st upper molar	11
„ 2nd „ „	12.6
„ 3rd „ „	13
„ 1st lower „	11
„ 2nd „ „	12.5
„ 3rd „ „	16

of the limb being rich dark brown, but a short way above the wrist the yellow annuli again appear mixed with the dark brown. The hind limb generally in its lower portion is almost uniform yellow, owing to the absence of the black tips, but the dorsum of the hind foot is dark reddish brown speckled with yellow. The first half of the tail is concolorous with the back, but the remainder is rich yellowish, concolorous with the lower parts of the hind limbs. The under parts are annulated like the upper, whilst the inner surfaces of the limbs conform to the general colouring of the under surface.

This male skin measures:—

	mm.
Snout to vent, along curve of neck	600
Vent to tip of tail	380

There is a skull from Muanza, on the southern shore of Victoria Nyanza, which belongs to the *P. anubis* group, but which Mr. Matschie at first thought was the adult male of the species from Unguru, named by him *C. langheldi* from the skin of a female which is preserved in the Hamburg Museum along with its skull. The latter specimen was afterwards referred correctly to the East Coast baboon, *P. cynocephalus* of this work, while for the Muanza baboon he proposed to retain the term *P. langheldi*; but as that name was undoubtedly bestowed on the animal from Unguru, it must relapse into a synonym of *P. cynocephalus*.

The measurements of this Muanza skull (Berlin Mus. 8386) I have given on p. 40, no. 9. Unfortunately the basioccipital and greater part of the basisphenoid have been destroyed. While all the teeth are through, the condition of the premaxillary and some of the other sutures indicates that only a slight capacity for growth still existed.

Besides this skull, I examined three other adult male skulls from Muanza, exactly similar, but unfortunately not one of them is accompanied by a skin. They vary remarkably in orbital breadth and in the breadth of the muzzle. Thus in 8386 the transorbital breadth is 91 mm., and in 8387, 80 mm. At the base of the muzzle of 8386 the breadth is 51 mm., and in 8387, 39 mm. The breadth across the muzzle opposite to the end of the nasals in the former is 43 and in the latter 40 mm.

A skull from Samui collected by Wërther is that of an immature male; the third molars are not through the jaw, and the canines only partially so. Its forehead, moreover, has the broad character of youth. The extreme length of this skull is 120 mm. It is distinguished from the foregoing adult skull by its larger teeth. Thus the second lower molar of skull 8386 measures 12.5 mm., whereas the corresponding tooth of this skull is 14.2 mm. The upper incisors are wanting in 8386, but the incisors are present in the lower jaws of the two skulls. In the former a mesial incisor is 7 mm. broad and in the latter 9 mm. The upper incisors of this young skull are as large as the incisors of the baboon from Dar Fertit collected by Schweinfurth.

In the skin of the Samui baboon the hair is annulated above and below with yellow and black, but the yellow is not brilliant. The yellow and black are equally distributed. The sides of the face are sparsely covered with yellowish-grey hairs. A narrow line of deep black hairs runs down the interorbital space. The hairs behind the ears are rather long and not annulated, but greyish brown with a yellowish tinge towards the tips. Similar hairs occur behind the ears of *P. neumanni*, and the skull referable to that skin also proves the animal to have been not adult. A few black hairs occur along the lips and on the chin; the hairs on the throat and upper neck are greyish with yellowish tips. The fore limbs are moderately finely annulated yellowish and black in about equal proportions, but on the hind limbs the yellowish prevails and the black annuli are obscure except in the proximal portion of the limbs and on the upper surface of the feet, which are concolorous with the hands. The base of the tail is concolorous with the back, but it becomes more yellowish further down towards the tip, which has longish hairs but no tuft.

The bases of the hairs are greyish brown, with a yellow annulus about 12 mm. broad situated at 80 mm. above the base; the black tip of the hair is 15 to 20 mm. in length. On the shoulder the hairs are 100 to 110 mm. in length; on the rump they are little more than half that length. On the fore limbs they are not more than 30 to 40 mm. long, while on the tibial portion of the hind limbs they are as much as 50 to 60 mm.

I consider the differences exhibited in these skulls attributable to age, and I have no hesitation in identifying the Samui skull with the other skulls from Muanza, so that the skin of this animal may be taken as illustrating the appearance of these baboons in life. When the foregoing skin is placed alongside the stuffed specimen of the type of *P. heuglini*, the two baboons are seen to be inseparable externally.

In the base of the more mature of these two skulls are found all the characters of that of the skull of *P. doguera*, and in the younger skull all the features of the skull of the type of *P. heuglini*. The maxillary pit in both, but especially in the adult, is very pronouncedly marked, much more so than in any other baboon skull which has come under my observation, as below the canine ridge of the maxilla the wall of the maxilla is not vertical, but is directed downwards and inwards.

These skulls seemingly represent a local race of *P. anubis*.

There is also a large skull of a baboon from Dar Fertit, collected by Schweinfurth, which, from the size of its teeth and the character of its last lower molar (which is not yet above the level of the alveolar portion of the jaw), seems to be closely allied to the large West-African baboon properly referable to *P. olivaceus*, Is. Geoff.

British Museum.

Papio anubis, ♂, Lake Elmetaita, Brit. E. Africa, 1899. Stuffed. Presented by F. J. Jackson, C.B.
Skull No. 99.6.10.2.

	mm.	
Snout to vent	720	
Vent to tip of tail	470	(hair at end of tail 75 mm.).
Height at shoulder	565	

The general surface is washed blackish brown and yellowish, conferring on it a somewhat finely mottled appearance when viewed at a distance. The hairs behind the chin and in front of the whiskers are greyish yellow, showing little or no annulation, but the whiskers themselves, as in all the foregoing specimens, are annulated like the body. Behind the ears, the base of the hairs is greyish brown, while on other parts of the body this portion of the hair is blackish brown. The ears are decidedly pointed; along the inside of the greater part of the upper half of the posterior border there is a line of long straight hairs directed backwards, having dark tips with a greyish sheen at their bases. This line of hairs is present in all these baboons. The hands and the area some way above the wrists are black, but the feet are speckled black and yellow. The tail is concolorous with the body, but with a rusty tint at the tip.

The hairs on the occiput are 105 mm. long, on the shoulder 130 mm., and on the lumbar region about 70 mm. The under parts are annulated like the back. The face has the usual short hairs, with bristly hairs on the lips, and long bristles on the side of the snout. The hairs around the bare buttocks are rusty yellow.

Judging from the length of the facial portion of the skull, the muzzle has been considerably shortened in the stuffed animal.

The Elmetaita skull has the basioccipital suture intact. The upper canines, although they measure 38 mm. long, have not yet been fully grasped by the alveolar border. All the other teeth are perfectly through and the incisors are considerably worn, more especially the upper ones. The posterior border of the last upper molar cuts the base of the anterior root of the zygomatic arch, and is slightly posterior to the hinder border of the maxillo-palatine foramen; there is a triangular expansion, 11 mm. long, behind it. The tympanic is not so overarched by the periotic as in the Fio Hill skull. The superciliary ridges are thrown upwards, but not to the same extent as in the specimen next described, a feature evidently due to its more youthful character, and the frontal ridges, owing to the same cause, are much more widely apart, and no ridge has yet been formed in the parietals. There is also greater breadth across the maxillary-malar suture than in the Fio Hill skull, owing to the greater expansion of the portion of the maxilla opposed to the malar. There is no sulcus from the orbit, the area anterior to which slopes downwards and forwards, and

Measurements of skulls.

	Lake Elmetaita. No. 99.6.10.2.	Fio Hill. No. 99.7.8.1.
	mm.	mm.
Extreme length of skull (tip of premaxillaries to external occipital protuberance)	190	200
Anterior border of foramen magnum to tip of premaxillaries . . .	133	145
Tip of premaxillaries to mesial point of superciliary ridge . . .	125	128
Mesial point in superciliary ridge to external occipital protuberance	109	110
Minimum frontal diameter	55	55
Maximum interzygomatic breadth	117	118
„ intermalar breadth across middle of orbit	87	84
Vertical height of orbit	27	24
Breadth of orbit	28	28
Distance from middle of lower border of orbit to end of nasals . .	55	59
Breadth of muzzle immediately before and below orbit	51	47
„ „ external to first premolar	50	49
„ „ opposite to end of nasals	40	39
Anterior border of foramen magnum to posterior border of palate	46	50
Length of palate	91	94
Breadth of palate between middle of last molars	30	29
„ „ „ „ 1st premolars	33	29.5
Extreme length of lower jaw	136	140
Vertical depth through coronoid process	65	64
Alveolar border of lower jaw to posterior (digastric) border of symphysis	47	49
Breadth of lower jaw at posterior root of 1st premolar	33	33
Length of 1st upper molar	10.2	9.5
„ 2nd „ „	13	13
„ 3rd „ „	13	12
„ 1st lower „	10.2	9.6
„ 2nd „ „	12.5	11.6
„ 3rd „ „	15	13

is flat or only slightly concave from side to side, but on the middle of the upper surface of the muzzle there is a short depression on each side of the nasals. The ridges of the maxillæ from the maxillary-malar suture are more rounded and swollen, but parallel to each other even beyond the nasals, and the sides of the maxillæ below them have practically the same character that distinguishes them in the other skull.

The lateral postsymphysial pit is only indicated by a shallow concavity, scarcely

forming a pit. The last lower molar possesses a well-developed terminal cusp in line with the two outer cusps, and it is connected with the second inner cusp by a short folded ridge. The mesial length of the last lower molar of the Fio Hill skull is 13 mm., while that of the Elmetaita skull is 15 mm.

The most marked difference between these two skulls lies in the form of the muzzle and in the greater length of the muzzle of the skull 99.7.8.1.

Papio anubis, ♂, Fio Hill, East of Lake Rudolf. Reg. No. 99.7.8.1. Stuffed. Presented by Lord Delamere.

Approximate measurements:—

	mm.
Snout to vent	760
Vent to tip of tail	490 (hair at end of tail 90 mm.).
Height at shoulder	560

This specimen, with uniformly annulated hair above and below, is somewhat different in its coloration from the specimen from Elmetaita, and, moreover, it has a considerably longer muzzle. The hair on the occiput is 120 mm. long, on the shoulder 132 mm., and on the lumbar region 70 mm. The difference in coloration is so slight, however, that it is impossible to define it accurately in words, except that the hairs below the bare buttocks have a distinct greyish tint at their bases, and the thighs also posteriorly are not so rufous as in Mr. Jackson's specimen, which will probably prove to be referable to *P. neumanni*, a form not to be regarded as more than a local race of *P. anubis*. The hands, and also the feet, have much less black on them than have those of the Elmetaita individual. The hairs behind the ears are greyish at the base, and the basal portion of the fur generally is not quite so dark. The hairs margining the whiskers are much the same as in Mr. Jackson's specimen.

The skull, besides having the facial portion longer, has the lateral ridges much more distinctly marked, and between them and the much arched nasals there is a wide concavity from the orbit to the premaxillaries. In the Elmetaita baboon no concavity occurs before the orbital margin, which slopes gradually downwards to the middle of the nasal, on each side of which there is a decided concavity, but of no great extent. There is thus in this latter skull nothing corresponding to the strong nasal ridge and longitudinal concavities of Lord Delamere's specimen. Besides this, in the Fio Hill skull there is a much greater interval between the end of the nasals and the tip of the premaxillaries than exists in the Elmetaita skull, in which those bones are much arched anterior to the nasals, and in the former the muzzle anteriorly is broader than that of the latter. The superciliary ridge is more developed and more upwardly directed than in the Elmetaita skull, but this is probably due to its somewhat greater age.

The teeth of this male taken as a whole are smaller than in the Elmetaita baboon.

The last lower molar of the Fio Hill specimen has only a feebly developed last talon, whereas the talon on the same tooth in the Elmetaita baboon is strongly developed and the whole tooth 2 mm. longer.

The skull is fully adult, but the position of the basioccipital suture is still marked. The canines are much worn, especially the upper ones, which have been much cut away on their interno-posterior surfaces by the action of the first lower premolars. The cusps of the molars are also considerably worn away and also the incisors. The last upper molar has its posterior border on a line with the palato-maxillary suture, and in a line with the middle of the anterior root of the zygoma. There is a short (13 mm.) triangular edentulous area behind it.

[In the above observations on the Anubis-group of baboons it is clearly shown that the large black-faced dark green baboons with purple-brown callosities are all considered to belong to one widely distributed species, having slightly modified local forms which are in themselves variable, and thus none too well-defined. As far as the material contained in the Museums of Europe shows, the baboons of Abyssinia and the Nile Valley (*P. doguera* and *P. heuglini*) may be considered to belong to the typical form of *Papio anubis*; those of the neighbourhood of Victoria Nyanza and Lake Rudolf to a slightly modified form, *P. anubis* subsp. *neumanni*; while a large form with strongly developed teeth, ranging from Nigeria to Dar Fertit, may be known as *P. anubis* subsp. *olivaceus*.—W. E. DE W.]

PAPIO CYNOCEPHALUS, Linn. (Plates IX., X., XI.)

- Cercopithecus*, Jonst. Quadr. 1657, tab. lix. ult. fig. sinist.
Cercopithecus cynocephalus, &c., Brisson, Reg. An. 1756, p. 213.
Simia cynocephalus, Linn. Syst. Nat. ed. 12, 1766, i. p. 38.
Simia cynocephalus, F. Cuv. Mém. du Mus. iv. 1818, p. 419, pl. xix.; Diet. Sc. Nat. xii. 1818, p. 377; Desmoulins, Diet. Class. Hist. Nat. v. 1824, p. 259.
Cercopithecus cynocephalus, Erxl. (part.) Syst. Reg. An. 1777, p. 30.
Papio sphinx, E. Geoff. St.-Hil. & G. Cuv. (part.) Mag. Encyclop. iii. 1795, p. 462.
Papio cynocephalus, Schlegel, Mus. Pays-Bas, vii. 1876, p. 127 (part.); Pousargues, Bull. Mus. d'Hist. Nat. iii. 1897, p. 199; Matschie, Säugeth. Deutsch-Ost-Afr. 1895, p. 11.
Simia ægyptiaca, Oken (*nec* Hasselq. & Linn.), Lehrb. Naturg. iii. 1816, p. 1220.
 "Le Babouin," F. Cuv. Hist. Nat. des Mammif. livr. iv., March 1819.
Cynocephalus babuin, Desm. Mamm. 1820, p. 68 (syn. in part.); F. Cuv. Hist. Nat. Mamm. 2nd ed. 1826 (1833?), p. 122, pl. 42 (*fide* Trouessart, Cat. Mamm. nouv. éd. 1897, p. 30); Ogilby, Libr. Ent. Knowl., Menageries, 1838, p. 425; Is. Geoff. St.-Hil. Arch. du Mus. ii. 1841, p. 579, pl. xxxiv.; Pucheran, Dict. d'Hist. Nat. (d'Orbigny) iv. 1846, p. 535; id. Cat. Méth., Mammif. 1851, p. 34; Peters, Reise nach Mossamb. i. 1852, p. 4; Fischer, Mittheil. Geogr. Ges. Hamb. (1878) 1880, p. 54; Noack, Jahrb. Hamb. Anst. 1887, ii. p. 287; id. *ibid.* 1891, ix. p. 143.
Cynocephalus antiquorum, Agassiz, Isis, 1828, p. 863.
Cynocephalus sphinx, Ogilby, Libr. Ent. Knowl., Menageries, 1838, p. 425.
Cynocephalus (*Cynocephalus*) *babuin*, Wagner, Schreber, Säugeth. Suppl. i. 1840, p. 156; id. *ibid.* Suppl. v. 1855, p. 63, *nec anubis*.
Papio babuin, Trouessart, Cat. Mamm. 1897, p. 30.
Cynocephalus thoth, Ogilby, Proc. Zool. Soc. 1843, p. 11.
Cynocephalus doguera, Anderson (*nec* Pucheran), Cat. Mamm. Ind. Mus. 1881, p. 81.
Papio thoth, subsp. *ibeanus*, Thomas, Ann. & Mag. Nat. Hist. (6) xi. 1893, p. 47.
Cynocephalus langheldi, Matschie (part.), SB. Ges. nat. Fr. Berlin, 1892, p. 233.
Papio langheldi, Matschie, Säugeth. Deutsch-Ost-Afr. 1895, p. 11, fig. 5; SB. Ges. nat. Fr. Berlin, 1897, p. 158.

Head not flattened and not receding behind the superciliary ridge. Limbs moderate; tail not tufted, shorter than the body and head. Face moderately long, of a livid flesh-colour, less livid on the cheeks and around the eyes; covered with short adpressed white hairs, thickest and rather longer on the sides of the snout. Tip of nose projecting slightly beyond the upper lip, the intervening area being more or less concave. Ears not hidden by the fur, pointed, the outer margin concave in its upper half, and somewhat rounded in the lower portion. The ears and the under surface of hands and feet violet-brown; bare area around callosities livid purplish. Skin generally whitish, bluish on the belly in parts. Hair on the vertex 60 to 93 mm. long, tending to form a straggling crest. Hairs on shoulder long, constituting a mantle, with many very

PAPIO CYNOCEPHALUS. Aged male.

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long hairs, averaging from 200 to 400 mm. in length; long straggling hairs on the sides of the body. Hairs on lumbar and sacral regions comparatively short, contrasted with those on the shoulders; the hairs on the fore limbs much shorter than those on the outside of the hind limbs.

General colour yellow, olive-yellow, or olive-brownish, much more vivid on the hinder quarters, but more especially on the outsides of the hind limbs and, in some specimens, on the vertex. Front of shoulder generally more or less speckled with blackish, also the hairs on the front of the fore limb and on the lower part of the hind limb; and, occasionally, the black tips are so marked on the upper surfaces of the hands and feet that those parts are blackish; these black-tipped hairs, most marked on the foregoing parts, sometimes occur on the top of the head. Hairs on cheeks (whiskers) yellowish grey or pale yellowish white, similar or nearly so on the throat; chest with annulated hairs more or less well marked. Belly pale yellowish white or silvery white. Inner sides of limbs yellowish, the hairs without annulations. Colour of tail uniform with the tints of the body, sometimes rather brilliant yellow at the base. The hairs are annulated dark brown or blackish and yellowish; the apical portion black, except on the pectoral region, where it is pale yellow or nearly white, succeeded in the former case by alternate bands of yellow and brownish or blackish, and in the latter instance by dark and yellowish bands. Bands of colour most numerous on the shoulder, occasionally fourteen, but variable, sometimes feebly indicated beyond the second to the fifth band, owing to their merging into one another. Generally three bands on the hairs of the forehead; hairs on pectoral region with two to twelve bands; those on sacral region and outside of thighs with three or four bands. The bands are most clearly indicated in individuals from Lamu and its neighbourhood, but in others they are very obscure and are only discernible by allowing the light to play on individual hairs.

Approximate measurements of adult ♂¹.

	mm.
Snout to vent	710
Vent to tip of tail	580
Height at shoulder	560

The skull of this species is characterized by a shorter muzzle than the skull of *P. anubis*, so that it has altogether a shorter and at the same time broader character without a frontal depression behind the superciliary ridge. The series of skulls

¹ [The animal represented on Plate IX., figured from life, had been for about 15 years in the Cologne Gardens. A life of captivity, with increasing age and lack of exercise, has a tendency to give the animal a heavier build, with a shortening and thickening of the limbs. It has been observed also with regard to the skulls of menagerie specimens that they show marked differences when compared with those of freshly-killed wild animals.]

examined proves that the individuals are subject to considerable variation as to the size to which they attain. The terminal cusp of the last lower molar is more or less in a line with the outer cusps, but, at the same time, median in position. It is occasionally broken up into a crenulated surface and is, in such cases, not well marked.

Sir H. H. Johnston¹ had scarcely left the coast on his journey to Kilima-njaro when he encountered this species, which he found especially abundant in the inhabited region known as Chaga, at the foot of the mountain. The troops numbered from 14 to 20, of all ages and of both sexes. Böhm² describes a baboon met with on his journey to Tanganyika as frequenting the cultivated lands, on which it made extensive raids during the harvest-season, feeding liberally on the maize- and millet-fields, from which it was with difficulty driven off by the natives specially set to watch the crops. The baboons were so little molested by the natives that they showed scant fear of man, and were known to rob women of the food that they had gathered or were carrying to market, and were known to pursue young people with threatening attitudes, grunting and showing their teeth. When one of their number was shot, the others did not leave the spot where the companion had fallen; and Johnston records that when he had killed one of a troop which had been rifling a maize-plantation, the other baboons surrounded their dead companion, snarling defiantly, but were driven off on the arrival of some men. Böhm also states that the wounded were protected by the old males, who, when danger threatened, exposed themselves in the front, and if the troop happened to be among the trees, challenged the enemy by stepping forward from time to time on the more prominent branches. The same traveller describes the voice of the old male as deeper and stronger than that of the young, and compared it to an abrupt barking sound. When in terror a troop will scream and screech piercingly; but in retreating they do so slowly, leaping from time to time on to low trees, now and then standing up against the trunks to look at their pursuers. Fischer says that this species is a dexterous climber of high trees, and that it leaps down from them when it makes away from any danger. The same author describes this species as one of the plagues of the natives living on the coast, where it frequents the mangrove-thickets, and can be seen in numbers in the morning and evening, an old male leading each troop. They also wander through the high grass to the corn-fields, but they do not confine themselves to grain and grass, as they are known to seize straying fowls and small animals. In Kipini, Fischer had frequent opportunities to observe how they lay in wait in holes and thorn-bushes for dwarf species of antelope, on which they would spring; but these little creatures were wary as a rule, and made off as soon as they observed the baboons appearing. They also seize even large antelopes, such as the Bushbuck (*Tragelaphus roualeyni*, Cumming);

¹ Proc. Zool. Soc. 1885, p. 215.

² 'Sansibar zum Tanganyika,' Herman Schalow, Leipsig, 1888.

but should these antelopes discern a baboon they stamp and butt simultaneously, and then uttering their peculiar warning cry, betake themselves to flight.

It may be worth recording here that a flesh-eating propensity is not confined to these baboons, in which the canines are so greatly developed, but is found also in the Gibbons among the Simiidae, in which in some cases it assumes a near approach to cannibalism. I can vouch for the fact that a male *Hylobates leuciscus*, Schreber, robbed a female *Semnopithecus pileatus*, Blyth, of her babe, killed it and partially ate it. The incident occurred in the Calcutta Zoological Gardens, on the 6th May, 1877.

From March to May the young may be seen riding on the backs of their mothers.

They are said not to attain adult condition until they are at least 12 years of age, but nothing is known regarding the average duration of their lives.

Native name.—In the lake districts of Africa this species is known as ‘Niani’ according to Pousargues, a name which is also applied to it in the country at the further end of Nyassa, and the plural of which is ‘Niondra.’ According to Böhm, it is called in the language of the Wanyamuesi ‘Mkuku.’

The northern limit of the distribution of this species, as at present reliably known, is Southern Gallaland¹; but Rüppell has stated that he had learned that “a great *Cynocephalus*” with whitish hair and red callosities and buttocks occurred in the southern provinces of Abyssinia, and that it extended its range to the west of the Nile as far as Dar-Fur. No example, however, of *Papio cynocephalus* from any part of the Nile Valley exists in any museum, and it is probable that the baboon of which Rüppell had heard was *P. hamadryas*. Its clearly ascertained distribution, speaking in general terms, begins about the Equator in longitude 43° E., and extends westwards to the region of the great lakes, to longitude 30° E. It ranges as far south as the Zambesi and possibly to the 20th degree of S. latitude.

The baboons hitherto recorded in literature southward of the Berber-Dongola tract of the Nile Valley, under the name of *Cynocephalus babuin*, were not this species, but the black-faced baboon, *Papio anubis*.

In the 12th edition of the ‘Systema Naturæ,’ Linnæus characterized *Simia cynocephalus* as “*S. caudata imberbis flavescens, ore producto, cauda recta, natibus calvis*,” adding a reference to Brisson’s² “*Cercopithecus cynocephalus ex viridescentibus et flavicantibus pilis*.” Linnæus quotes, as an illustration of the animal, Jonstonus’s³ figure, which unquestionably represents a baboon; and as its colour is said to be “*simillima S. Inuo, sed caudata*,” there is every reason to believe that the yellow baboon is the species indicated. The term “*cauda recta*” is not applicable to a

¹ Fischer, Mittheil. Geogr. Ges. Hamb. 1878–79, p. 54.

² Reg. An. 1756, p. 213.

³ Hist. Nat. Quad. 1657, pl. lix. lower left-hand figure.

Baboon and is more descriptive of the way in which a Macaque carries its tail; but as the figure to which Linnæus has referred cannot be taken for any animal but a baboon, its evidence rectifies the discrepancy in the description.

Oken¹, in 1816, described a large yellowish baboon with red callosities, under the name of *Simia ægyptiaca*; stating, as Hasselquist had done in the case of the *Hamadryas* to which he had given the same name, that it had been shown about the streets of Cairo.

F. Cuvier, in his monograph, gave expression to his views regarding the *Cynocephali*. Leaving the Mandrill and Drill out of consideration, he indicated *Simia sphinx* from the middle regions of Africa; the Babouin (which he states had never been figured), from the countries situated beyond the Atlas; also *Simia porcarius* and *S. hamadryas*; and he gave a figure of the Babouin, under the name of *Simia cynocephalus*, Linn.

Ogilby, in 1838², described, under the name of *Cynocephalus sphinx*, a semi-adult baboon which had lived for three years in the Surrey Zoological Gardens. His description of it is as follows:—"The sphinx is of a dark greenish colour above, mixed with long black hairs thinly scattered, and nearly naked on the under parts, the skin of the belly being of a light bluish white colour, and the hair of the thighs having a tinge of yellowish red; the face is pale violet brown, as are likewise the ears, palms of the hands, and soles of the feet, and there is a tan-coloured circle about the eyes. The animal is of a slender make, and longer in the limbs than the common cynocephal, in form, indeed, approaching towards the semnopithecus; its nose does not extend beyond, or even as far as the lips, and the inside of the nostrils is white." Besides this baboon, he had seen another "in Wombwell's travelling menagerie," which agreed with it in every respect, but was older and larger. "The hair of this specimen, particularly on the head, was longer than in the common species; it was rather thin, but stood erect, which was likewise the case in the individual just described, and gave the animal rather a shaggy appearance." He identified this species with the *Cynocephalus babuin* of the French naturalists; but as he regarded this specific appellation as barbarous, he replaced it by *sphinx*. It is not necessary to discuss here the grounds on which he appropriated the name for the baboon he was describing, but his statement, that "the propriety of the application of this term (*sphinx*) to an animal common in the countries bordering upon Upper Egypt is obvious in other respects," deserves notice, because of the suggested habitat of the species, vague though it be. He, however, a few lines further on, stated that while there could be no doubt regarding Nubia as being the habitat of *C. anubis*, that of the Sphinx or Babouin was not well authenticated.

¹ Lehrb. Naturg. iii. 1816, p. 1220.

² The Library of Entertaining Knowledge. The Menageries: the Nat. Hist. of Monkeys, Opossums, and Lemurs, 1838, p. 425.

PAPIO CYNOCEPHALUS. Adolescent.

P. IBEANUS, Thomas & P. LANGHELDI, Matschie.

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The fact that F. Cuvier had regarded the 'Babouin' as the baboon which had been worshipped by the ancient Egyptians,—an opinion which he did not adopt on the authority of Brisson, as stated by Ogilby,—led the last-mentioned author to conclude that Cuvier had regarded the baboon as a native of Nubia and the adjacent countries. Ogilby, however, notwithstanding his statement that the animal was common in the countries bordering upon Upper Egypt, proceeded to argue that as Rüppell, Hemprich, and Ehrenberg had not observed it, and as it could scarcely have escaped their observation, he was rather inclined to consider it indigenous to Western Africa. He therefore thought it probable that the sacred baboon of the ancient Egyptians was the *C. anubis*, F. Cuv., two examples of which had been obtained by Rüppell in Abyssinia, while others had been observed by Cailliaud at Meroë and Sennaar. A few years later Ogilby¹ pointed out that the two Abyssinian baboons had been wrongly referred by Rüppell to *C. babuin*, under which name they had appeared in the 'Neue Wirbelthiere' (p. 7); and although he stated that he was too well acquainted with the latter species to have made such a mistake himself, he had afterwards to confess that he had committed a similar error, and had confounded Rüppell's baboons with *C. anubis*, F. Cuv. Ogilby had visited the Frankfort Museum in 1837 and had seen the two specimens; but it is quite evident that he had not carried away an accurate impression of their essential characters, or if he had done so they had faded from his memory; for he believed that in describing the animal he called *C. thoth* he was also describing Rüppell's two Abyssinian baboons, which was quite erroneous, as the baboon he so designated was identical with his *C. sphinx* and inseparable specifically from *Papio cynocephalus*, Linn. Moreover, I consider that he was perfectly correct in his former determination of the Abyssinian baboons, viz., that they were identical with *P. anubis*.

Rüppell in drawing up his catalogue² referred his two specimens to *C. anubis*, F. Cuv., and on the under surface of the stands on which they are mounted they bear this name up to the present day. The baboon which Ogilby thought was specifically identical with the two Abyssinian baboons in the Frankfort Museum was living in the Gardens of the Zoological Society of London when he wrote. Although he was perfectly ignorant whence this animal was obtained, he speaks of it, in the most unhesitating terms, as "the Abyssinian species," an unwarrantable assumption as to its native country, founded on a fallacy. He believed it to be the same as Rüppell's specimens, and as they had unquestionably come from Abyssinia, he assumed that his *Cynocephalus thoth* had also emanated from the same region, when all he knew of it was that it had been purchased from off a ship which had come from Bombay. He imagined that the baboon had been taken to that seaport by some vessel trading to the Red Sea, whereas

¹ Proc. Zool. Soc. 1843, p. 10.

² Mus. Senck. iii. 1845, p. 151.

the probability is that it was carried from the Zanzibar coast by some ship trading direct with Bombay. Ogilby's allocation of this baboon to Abyssinia has been productive of great confusion. After its death the specimen passed into the Museum of the Zoological Society, London, and subsequently, in 1855, it was made over to the British Museum, where it is still preserved. At present it has no great resemblance to the figure given of it in Fraser's 'Zoologia Typica,' either in its coloration or in its general appearance. It is much paler, and its form is more slender and its limbs longer, characters which Ogilby held were distinctive of *C. babuin* and in marked contrast to the massive thick-set form of his *C. thoth*. Whatever may have been the original characters of this baboon, which Ogilby now in his turn held was the species worshipped by the ancient Egyptians, to the exclusion of *P. hamadryas*, Linn., the claims of which to this distinction had been ably advocated by Ehrenberg¹, the specimen now professing to be the type of *C. thoth* is unquestionably identical with the 'Babouin,' for which F. Cuvier was the first to claim the honour of its having been sacred to the deity *Thoth*. Ogilby allowed that his *C. thoth* had the same bright silvery-grey whiskers and under parts of the body as in his so-called *C. sphinx*, but that the upper colours were more obscure, the bright yellowish green being replaced by sordid dunnish brown. These are the colour-differences which are met with in the examples of *P. cynocephalus* at different ages, and are modified in different localities. The fact that Ogilby's type was characterized by him as differing entirely from *C. babuin* (*P. cynocephalus*) by its massive thick-set form is not of much importance, and does not affect the question of the specific identity of the two, because it is perfectly explained by the complete deterioration of the skeleton by a life of confinement. Ogilby describes the type as an old male of great size, but the greatly diseased skull has the basioccipital suture intact, and from the relations of the last upper molar to the surrounding parts it is quite evident that the animal was not completely mature. Unsuitable food and absence of exercise are two conditions quite sufficient to account for the spongy swollen condition of the bones of the skull, also for the widely separated temporal ridges and the obliteration of all the salient features distinctive of the skull of an animal living a life of freedom in its own wilds. The foregoing conditions also amply account for the thick-set character of the animal in life, a feature, however, which has not been preserved in it as a museum specimen.

Is. Geoffroy St.-Hilaire, writing in 1843², held that it was entirely wrong to admit the identity of the *Cercopithecus cynocephalus ex viridescens* of Brisson with the Babouin, on the ground that the name *Cercopithecus cynocephalus* was not for that writer a specific, but a generic denomination. *Cercopithecus cynocephalus* constituted

¹ Abhandl. k. Akad. Berlin, 1833, Phys. Kl. p. 337.

² Arch. du Mus. ii. 1841, p. 579, pl. 34. This volume, from internal evidence, appeared after the C. R. vol. xv. for 1842, and according to Is. Geoffr. St.-Hilaire, Cat. Méthod. 1851, p. 21, not until 1843.

PAPIO CYNOCEPHALUS. Adolescent.
'LE BABOUIN' F. Cuvier, P. BABUIN, Desmarest.

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Brisson's fifth race of monkeys, and in the Reg. Anim. p. 213 the essential characters of the group are defined. But Brisson described three species, "Le Cercopithèque cynocéphale," "Le Makaque," and "Le Magot" or "Tartarin," each bearing its respective number. It would appear that the first species was so called for two reasons: first, because he selected it as the type of his fifth race; and secondly, because he did not know its native name, or any other name by which it was called. On the other hand, to the two species that followed it he applied the respective names by which they were known. Under each species there is a short account of its leading characters, the *Cercopithecus cynocephalus* being defined as already stated. There can be no doubt that by this Brisson intended to indicate a species, and by this particular one a baboon of a greenish-yellow colour, and, in all likelihood, a baboon corresponding to that known later as the 'Babouin.' Throughout the whole of Brisson's book the subject is treated in a similar way, and no one can hesitate to accept his definitions as an attempt on his part to indicate species. It is therefore not in keeping with fact to say that the use of the phrase *Cercopithecus cynocephalus* was purely generic, as it was also used in a specific sense when other than generic attributes were appended to it.

Is. Geoffr. St.-Hilaire's figure of this baboon under the name of *Cynocephalus babuin* was taken from a specimen still preserved in the Paris Museum, but the locality whence it came is unknown.

Thanks to the courtesy of the late Professor Milne-Edwards, I have been enabled to examine this specimen. I went to the study of it fresh from a careful examination of the specimens existing in the British and Berlin Museums, and the conclusion I have arrived at is that it cannot be regarded in any other light than as identical with the East-African baboon described by Ogilby.

The opening up of Eastern Africa by Great Britain and Germany, and the intelligent interest which has been manifested in the Natural History of the region by exploring expeditions, and by some of the European officials intrusted with the administration of the protected States, have greatly contributed to the enlargement of our knowledge respecting its Zoology, and have brought to light the fact that it is the abode of *Papio cynocephalus*, Linn.

The value of the collections on which the following observations are based is due to the fact that they contained eleven skulls of baboons supported by their skins, and only five skulls unsupported by their skins. Another favourable feature distinguishing them is that the locality where each specimen was obtained has been accurately recorded. On examining the names of the different places, they are found to be comprised within the area lying between the Tana and the Zambesi, the most inland being Langenberg and the localities at the southern end of Lake Nyassa, which may be stated to lie at 560 and 630 kilom. respectively to the west of the coast-line. It is possible, however, that this species spreads southwards across the Zambesi, and that

TABLE I.—Annulations on the hair of Baboons referable

Locality.	Name.	Source.	Reg. No.	Region of hair.	Dark.	Light.	Dark.
Lamu	<i>Papio thoth ibeanus</i> , Thos. Type, male.	Brit. Mus.	92.10.18.1	Shoulder.	24	18	14
"	" " " "	"	"	"	16	12	14
"	" " " "	"	"	Pectoral region.	..	5	6
"	" " " "	"	"	Forehead.	19	11	10
Mombasa . . . . .	.....	"	95.5.4.1	Shoulder.	25	13	10
"	 female.	"	95.5.4.2	"	18	9	6
"	 "	"	"	"	17	11	8
Mpapwe (Werther) ..	.....	Berl. Mus.	....	"	15	10	5
Perondo, Uhehe ....	.....	"	....	"	37	12	..
" " ....	.....	"	....	"	24	11	15
Fort Johnston, Nyassa	.....	Brit. Mus.	97.10.1.9	"	23	6	8
Zomba, Nyassa .....	.....	"	97.10.1.10	"	18	24	10
" " ....	.....	"	"	Pectoral region.	..	9	6
" " ....	.....	"	"	"	..	10	6
	<i>Papio thoth</i> , Ogilby. Type, male.	"	55.12.24.18	Shoulder.	15	14	8
	" " " "	"	"	"	23	10	11
	" " " "	"	"	"	16	12	8
	" " " "	"	"	Pectoral region.	..	13	4
	" " " "	"	"	"	..	12	4
	" " " "	"	"	Outside of thighs.	9	8	9
	<i>Papio babuin</i> , Desm. male.	"	50.7.9.7	Shoulder.	15	20	9
	" " " "	"	"	Pectoral region.	..	7	4
	" " " "	"	"	Outside of thighs.	5	11	5
	" " juv.	Berl. Mus.	150	Shoulder.	16	..	..
	" " " "	"	151	Body-hairs.	20	17	9
	" " " "	"	151	"	18	12	11

to *Papio cynocephalus*, Linn. (measured in millimetres).

Light.	Dark.	Light.	Dark.	Light.	Dark.	Light.	Dark.	Light.	Dark.	Light.	Dark.	Light.	Dark.	Base.	Total length.	Remarks.	Texture of hair.
faint indications of others.														159	215	Dark greyish brown.	Moderate.
7	8	6	8	5	7	7	7	6	7	5	7	5	7	21	155	" "	"
5	6	5	6	5	6	7	4	9	4	..	..	..	..	19	87	" "	"
..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	61	" "	"
8	8	10	6	..	..	..	..	..	..	..	..	..	..	160	240	Greyish brown, verging on white at base.	"
10	9	..	..	..	..	..	..	..	..	..	..	..	..	75	125	" " "	"
..	..	..	..	..	..	..	..	..	..	..	..	..	..	80	116	" " "	"
faint indications of more.														64	94	Paler than brown band above it, which is much paler than the apical dark band.	Fine.
" "														243	292	Brown; yellow band not well-defined.	"
11	" "													112	173	" " "	"
8	10	12	9	..	..	..	..	..	..	..	..	..	..	137	213	Verging on grey at base.	"
..	..	..	..	..	..	..	..	..	..	..	..	..	..	201	253	Verging on grey at base. Pale bands white or nearly so.	"
12	8	..	..	..	..	..	..	..	..	..	..	..	..	64	99	Verging on grey at base.	"
11	8	13	5	..	..	..	..	..	..	..	..	..	..	56	109	" "	"
10	8	9	8	10	12	7	..	..	..	..	..	..	..	155	256	Yellowish-brown base (vinous brown in the mass).	Moderate.
7	8	6	8	..	..	..	..	..	..	..	..	..	..	152	225	Yellowish-brown base.	"
10	8	7	..	..	..	..	..	..	..	..	..	..	..	222	283	" "	"
9	5	6	5	6	3	5	3	..	..	..	..	..	..	32	91	" "	"
8	5	7	5	8	6	4	6	..	..	..	..	..	..	33	98	" "	"
7	..	..	..	..	..	..	..	..	..	..	..	..	..	70	103	" "	"
faint indications of many more.														188	232	Yellowish white. Pale bands yellowish white.	"
8	4	..	..	..	..	..	..	..	..	..	..	..	..	39	62	Yellowish white. Pale bands rather rich yellow. Tip not pure white.	"
..	..	..	..	..	..	..	..	..	..	..	..	..	..	77	98	Yellowish white. Pale bands yellowish white.	"
..	..	..	..	..	..	..	..	..	..	..	..	..	..	141	157	Yellowish white, passing into grey at base.	Fine.
..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	76	Yellowish, passing into paler at base.	"
..	..	..	..	..	..	..	..	..	..	..	..	..	..	24	65	" " "	"

in Mashonaland it finds its way into the region long ago supposed by some authorities to contain the "land of Ophir," and the claim of which to this distinction has again been advocated by Mr. W. E. de Winton and more recently by Dr. Karl Peters. This was the land whence Solomon's ships brought him apes; and if so, doubtless the yellow baboon may also have been carried to the Gulf of Akabah in ships of the same king from Tarshish, if, as has been supposed, Mombasa occupies the site, or nearly so, of that ancient seaport.

The following is a list of the skins and skulls, or skulls by themselves, of this baboon from well-authenticated localities, which have been examined by me:—

Specimens preserved in the British Museum.

- 1 ♂, Lamu. Type of *P. thoth ibeanus*, Thos., ex Coll. F. J. Jackson. Reg. No. 92.10.18.1. Skin and skull.
- 1 ♂, Mombasa, nearly adult. Received in the Zoological Gardens 15/11/94, died 20/11/94. Reg. No. 95.5.4.1. Skin and skull.
- 1 ♀, Mombasa, nearly adult. Received in the Zoological Gardens 15/11/94, died 19/12/94. Reg. No. 95.5.4.2. Skin and skull.
- 1 ♂, shot at Fort Johnston, Nyassa (H. C. Macdonald), Sir Harry H. Johnston. Skin and skull. The latter doubtful. Reg. No. 97.10.1.9.
- 1 ♂, Zomba, 6 Nov. 1896 (Blantyre district, west of Lake Shirwa), Nyassa (A. Whyte), Sir H. H. Johnston. Reg. No. 97.10.1.10. Skin and skull.
- 1 ♂, type of *Cynocephalus thoth*, Ogilby (without locality). Stuffed. Reg. No. 55.12.24.18. Skull 1100 a, Ost. Cat.
- 1 ♂, *Cynocephalus babuin*, Zool. Gardens, Lond. Reg. No. 50.7.9.7. Stuffed and skull.

Specimens preserved in Berlin Museum.

- 1 ♂, Osi-Tana. Coll. Denhardt. Skull.
- 1 ♀, Marpiensen, one half-hour from Tanga. Coll. Dr. Heinsen. Skull.
- 1 ♂, left bank of Kikafa, near Madschame, Kilima-njaro. Coll. Dr. Leut. Reg. No. 7587. Skull.
- 1 ♂, Moschi, Kilima-njaro. Coll. v. der Marwitz. Skull.
- 1 ♂, Mpapwe. Coll. Elpous. Reg. No. 26869. Skull.
- 1 ♂, Mpapwe. Coll. Böhmer. Skin and skull.
- 1 ♂, Mpapwe. Coll. Werther. Skin and skull.
- 1 ♂, Ukami. Coll. Leider. One of the types of *C. langheldi*, Matschie. Reg. No. 6495. Skull only.
- 1 ♂, Perondo, Uhehe. Coll. Dr. Stierling. Skin and skull.
- 1 ♂, Langenberg, North Nyassa. Coll. Dr. F. Fulleborn. Skin and skull. Masimani. Coll. M. Schillings. Three flat skins.

Specimen preserved in the Hamburg Museum.

- 1 ♀, Unguru, German E. Africa. Dr. Stuhlmann. One of the types of *C. langheldi*, Matschie. Stuffed specimen with skull.

Specimens belonging to the Paris Museum.

- 1 ♂, *Cynocephalus babuin* (Desm.). Ménagerie Afrique (on under surface of stand). No. 318.
 “Donné par M. le Prince de Joinville, on l’a dit, de Guinée, mais case le plus grand doute . . .
 ayant été acheté.” This is the specimen figured by Is. Geoffr. St.-Hilaire, Arch. du Mus. ii.
 1841, pl. 34 (6).
- 1 ♀, *Cynocephalus babuin*. Ménagerie Afrique.
 On under surface of stand, “Cynocéphale mort à la Ménagerie.” “*Simia* (*Cynomolgos*)
 (*Cynocephalus*). No. 315. *Cynocéphale babuin*, Frédéric Cuvier.”

From the foregoing Table (pp. 62 & 63), in which the annulations of the hair in eleven individuals referable to this species have been recorded in millimetres, it will be seen that the yellow rings cannot be said to be in excess of the black annuli. Neither is the greenish or olive hue of the baboons brought about by the yellow subapical bands being larger than the black tips, for, so far from this being the case, they are, as a rule, narrower; only in three instances in the foregoing table are they broader. The real explanation of the general tints assumed by this baboon is to be sought for in the degree of intensity of the colouring of the yellow and dark terminal bands. When more than three or four of these bands are developed, they are not visible in the ordinary hairs, as they are hidden by the mass of the pelage, and only the rings of the longest hairs may be visible; but as these long hairs are relatively few compared with the mass of the hair comprising the mantle, they become merged in the general effect. The annuli in the hairs of this species are never defined in the clear way so characteristic of the Hamadryas and of the West-African Orange-coloured Baboon (*P. choras*, Ogilby). In the young of *P. cynocephalus*, as in other species, the annulation of the hair is practically non-existent, and the degree to which the annulations are developed in different individuals from the same locality, quite apart from the differences produced by age, has yet to be ascertained; moreover, there are not sufficient specimens available at present to determine whether any particular locality is characterized by a special numerical type of annulation in the different kinds of hairs. Baboons live in immense troops, in which inbreeding must of necessity occur to a great extent, and it is well known that in any one of these troops an immense diversity of colouring prevails.

The pelage of baboons from the interior of the country, especially about Mpapwe, is of a somewhat finer texture than that of baboons from Lamu and Mombasa, and is sufficiently so as to attract attention when individual hairs are examined. The exact character of the climatic conditions of the two areas would require to be accurately ascertained before any suggestions were hazarded by way of explanation.

Among the baboons dealt with in this article, two are of special interest. The first was obtained at Lamu, on the sea-coast of British East Africa, and the second at Unguru, about 120 kilom. to the west of Pangani. The former was described by

Thomas¹ as *Papio thoth* subsp. *ibeanus*, and the second was named by Matschie² *Cynocephalus langheldi*; but as Thomas's description was the first to appear in print, it has priority. However, before considering the characters of these two baboons, the types of which have been examined by me, it is desirable first to consider in detail the external characters of the baboon named by Ogilby *Cynocephalus thoth*, because Thomas considered his baboon to be only a local form of that species.

Papio thoth (Ogilby), British Museum. Type. Reg. No. 55.12.24.18, male. Original of Mr. Ogilby's description, Proc. Zool. Soc. 1843, p. 11. Skull, 1100 *a*, Ost. Cat. B.M.

The body of this baboon has not the thick-set form of *P. anubis*, but, on the other hand, is somewhat slender, and the limbs are decidedly longer than those of that animal, and so it attains a greater height. The head is not flattened behind the superciliary ridge as in *P. anubis*; the muzzle is moderately long. The upper border of the ear is somewhat angular. Nothing can be learned regarding the colour of the face beyond that it may have been of a livid flesh-colour; its sides, before the eyes, are covered somewhat densely with short white hairs, which is a characteristic feature of *P. cynocephalus*; strong short white bristly hairs clothe the margin of the upper lip, and are directed downwards and backwards, while others on the lower lip are directed forwards and upwards. A few scattered, long, black bristly hairs occur on the sides of the muzzle and on the chin. The bare area around the callosities is large. The tail is about four-fifths the length of the head and body; the hair on it is generally short, with the exception of the apical hairs, which, however, do not form a tuft. Long grey hairs project over the nails of the hind feet. The hair on the vertex is longer than that on the rest of the head. The hairs on the shoulders are longer than on the rest of the body and form a mantle, the longest being about 290 mm., whereas those on the lumbar region are not more than 80 mm. long. Long straggling hairs, longer than the others, occur on the mantle, and hairs of the same character, but shorter, are present on the side of the trunk as far back as the last rib, on the humeral region, and on the back of the thighs.

General colour olive brownish yellow, but very slightly more yellowish on the hinder part of the body and on the outside of the thighs. The hairs on the sides of the head behind the nearly bare face and on the throat are pale yellowish white or yellowish grey. The inner sides of the limbs are yellowish without distinct annulations, but on the under surface of the trunk, and especially over the chest, the hairs are annulated in much the same way as on the back. The hairs generally terminate in a pronounced blackish or dark-brown tip, below which there are a varying number of yellow and dark rings. In the shorter hairs, measuring about 80 mm. long, as

¹ Ann. & Mag. Nat. Hist. (6) xi. Jan. 1893, p. 47.

² SB. Ges. nat. Fr. Berlin, 1892, p. 233 (publ. March 1893).

SKULL OF *PAPIO CYNOCEPHALUS*.

P. THOTH subsp. *IBEANUS* Thomas (Type).

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many as eight bands can be counted, with the base of the hair yellowish brown. Almost the same number can be detected in hairs measuring about 136 mm. long. In the long hairs on the sides of the shoulders, measuring 283 mm. long, only three yellow bands can be detected, the great mass of the hair along its basal portion being yellowish. It is the black and yellow bands and the black tip that produce the yellowish-olive colour of this baboon. On the top of the head and on the front of the limbs the black tips are more marked than on the rest of the body, but these parts, with this trifling exception, are concolorous with the rest of the body. When the hair is turned aside the basal portion looks greyish brown, but when an individual hair is examined the base is seen to be yellowish brown.

The type of *P. thoth* subsp. *ibeanus*, Thomas, so exactly resembles the foregoing individual in all its external characters, that, after I had examined it, I felt at once disposed to localize the type of *P. thoth*, Ogilby, and to assign it to Lamu, or at least to some part of the African coast near that locality. Indeed so alike is this Lamu baboon to *P. thoth*, that it is quite unnecessary to describe it. The degree of annulation on the pectoral region in baboons referable to this species is subject to a good deal of variation in different localities, but in these two it is identical, the rings on the hairs being equally well developed in both and the numbers the same. The dense line of white hairs on the cheeks and the long grey hairs over the toes are present in both.

The type specimen of *P. langheldi*, Matschie, was first mentioned by Noack¹. It was obtained on the eastern slopes of the Unguru Mountain, about 161 kilom. to the west of the coast-line opposite to Zanzibar, and 500 kilom. to the south-west of Lamu; but Matschie in describing this individual had also before him a portion of a skin of another from Tanga, on the coast opposite to the island of Pemba. The Berlin Museum also possessed a skull from Ukami, which lies about 100 kilom. to the south of Unguru. Two skulls, male and female, from the district of Usukuma, at the south-east end of Victoria Nyanza, 600 kilom. to the north-west of Unguru, were also regarded by Matschie as belonging to the same species; and the circumstance that he believed that he had been able to gather a clearer impression of the characters of his *langheldi* by a study of these two skulls from Usukuma led him to name the species after their collector, Mr. Langheld.

The type of *P. langheldi* has longish hairs on the vertex and long hairs on the shoulders, some of them, according to Matschie, being as much as 440 mm. long. The hairs on the lumbar and sacral regions are short. The general colour is more or less dirty olive-grey, or even greyish yellow, with an admixture of black-tipped hairs on the front of the shoulder over the lower portion of the fore limb, but more especially

¹ Jahrb. Hamb. Anst. ix. 1891, i. p. 143.

on the dorsum of the hand. The long hairs are rather lighter in colour, their bases being brownish, but passing into yellow-grey; the apex of each being black with a yellow band below it, succeeded by a dark brown band. The throat is greyish white and the cheeks yellowish grey. There is in this young female an absence of the same vivid yellow generally present in the males on the outsides of the hind limbs. The tail is brownish grey, and the under parts are more or less silvery grey. The animal, although young, measured 750 mm. from snout to vent, and the tail 270 mm. Matschie, when he described it, considered it to be nearly related to *P. babuin* and to *P. cynocephalus*, each of which he regarded as distinct, but that it differed from both in colour. He stated, however, that Dr. Stuhlmann had called his attention to the fact that the baboon of East Africa differs in its colouring according to its age and sex. He gave the following as a diagnosis of the characters of this female:—"Cynocephalus, sordide olivaceo-canus, dorsi capillis elongatis, cauda brunneo-cana, artubus externe flavo-brunneo lavatis."

Five years afterwards¹ he identified this young female from Unguru and the skull from Ukami with *P. thoth*, Ogilby; and as he had received further materials from the interior of German East Africa, he was led to regard the two skulls, male and female, from Usukuma as belonging to a distinct species, for which he suggested that the term *langheldi* should be reserved to the exclusion of the real type from Unguru².

With the invaluable assistance of Mr. Matschie, I was enabled to go over the whole of the material contained in the Berlin Museum, with this result, that I am disposed to agree with him that the female skull from the neighbourhood of the Victoria Nyanza belongs to a baboon of the *Papio anubis* type, allied to, if not identical with, his *P. neumanni*, and distinct from the Unguru baboon, which is unquestionably *P. cynocephalus*. We may therefore accept the Unguru baboon as undoubtedly the type of *P. langheldi*. About 90 kilom. to the west of Unguru, the district where *P. langheldi* was obtained, is Mpapwe, whence three skins of this baboon exist in the same collection. About 220 kilometres to the south of the latter locality is Perondo, also represented in the same collection by another skin and skull; and still further south, at the northern end of Lake Nyassa, is the German station of Langenberg, from which another skin was presented to the same institution.

The skin collected at Perondo, 350 kilom. inland from the coast-line, presents the following characters:—

The animal was an adult male with a well-developed mantle on the shoulders, the hair on the lumbar and sacral regions being very much shorter. The hairs on the upper surface of the neck, and on part of the shoulders and humerus, are also long, and the sides of the body, and outsides and hinder margins of the hind limbs, are

¹ Arch. f. Naturgesch. Jahrg. 1897, i. p. 82.

² SB. Ges. naturf. Fr. Berlin, 1897, p. 159.

likewise covered more or less with long hairs of a straggling character. The only really short hairs are on the radial portion of the fore limb, on the hind feet, and on the tail. The pelage is greyish yellow, but more yellowish on the vertex and on the hind-quarters, and rather rich yellow on the sides of the body, on the base of the tail, and on the outside of the limbs. The first phalanges of the fingers are covered with greyish-white hairs, while the others are nearly nude. All the phalanges of the toes are clad with long greyish-white hairs. The grey of the shoulders is more or less tinged with blackish, and the yellow of the outsides of the limbs is also tinted with the same colour, likewise the hairs on the vertex and on the upper surface of the neck. The black is due to the terminal band being especially well defined on the vertex, also on the neck, limbs, and tail. Below the ears the hairs are decidedly yellowish, with a few black-tipped hairs among them. The face is more or less covered with short white hairs, which are most numerous between the eyes and the mouth, so as to produce the appearance of a white band on the side of the face. The chin and throat are greyish white, passing into yellowish on the belly. The inner sides of the limbs are pale yellowish white. The grey appearance of the dorsal surface is due to the long hairs, in which annulation has all but disappeared. Some of the long hairs on the shoulder measure 230–270 mm. in length, and 130 mm. over the rump, where they are more sparse. The fur on the neck is dense and measures about 110 mm., and the long hairs on the sides about 150 mm.; on the outsides of the thighs the hairs are from 100 to 120 mm. long, but the hairs on the radial portion of the fore limbs are not more than 20 mm. long, whereas on the tibial portion of the hind limbs the hair is 80 to 100 mm. in length. The long hairs have a black tip varying in extent, followed by a yellowish-grey band and by a narrow blackish band, the greater part of the remainder of the hair being greyish yellow; but when the fur is pulled aside about 50 to 60 mm. of the base is seen to be very pale brownish. In very many of the hairs the annulation, especially in the long hairs of the sides, practically disappears. The hairs at the end of the tail are uniformly coloured pale greyish yellow, with a faint brownish tint, and are about 100 mm. in length. They tend to form a terminal tuft, but in no way comparable to the brush on the tails of *P. hamadryas* and *P. porcarius*. The preserved skin measures 810 mm. from snout to vent, and the tail 600 mm.

The type of *P. langheldi* is unquestionably the female of the baboon the skin of which has just been described, and is in no way separable specifically from *P. thoth*, and from its so-called subsp. *ibeanus*, from which, however, the Perondo skull (Plate XIII.) differs in its smaller size, but in no other respect.

In a male from Mpapwe the black on the carpal area, produced by the black tips to the hairs, is less than in the baboon from Perondo; but another male, also from Mpapwe, differs from these two in having much more black on the front of the fore limbs—indeed so much so, that the upper surfaces of the hands and feet are nearly black,

only a little yellow showing itself. The tail of this animal also differs from that of the others in being blackish brown, and having the long terminal hairs almost orange-yellow. The annulation of the hair is well marked, the subapical pale band being almost white, the skin has a greyish-brown appearance. Two of the flat skins from Masimani are more greyish than any of the foregoing, and one is more grey than the other. The full-grown specimen (10876) is much more yellowish than any of the baboons already enumerated, and a good deal of black occurs on the front of the fore limbs, which, however, are imperfect. The tail is mixed black and yellow, and it seems to have had a pale yellow tip.

An adult male baboon in the British Museum from Fort Johnston, at the southern end of Lake Nyassa, is much more yellowish on its upper surface than the types of *P. thoth*, and *P. thoth* subsp. *ibeanus*. The sides of its body are rather rich yellow, also the fore limbs, but more especially the outsides of the hind limbs. On these parts, and perhaps more so on the hind limbs, the annulation of the hair is not nearly so well marked as in subsp. *ibeanus*. The distribution of the hair on the face is the same as in the last-mentioned baboon, but it is more yellow. The chin, throat, and chest are greyish white with a yellowish tinge, but on the abdomen the yellow is much more vivid. On the chest the annulation so marked in *P. thoth* is almost entirely lost, but the black tips to the hairs on the front of the fore limbs and on the hands is much the same as in the foregoing type, but the yellow is more vivid. The tail, except at the base and tip, is dark olive-brown, speckled with yellowish; its base is concolorous with the yellow rump, and its tip, which is slightly tufted, is pale yellow with a rufous tinge¹.

Two baboons from Mombasa, also in the British Museum, are inseparable from the Fort Johnston individual. On the other hand, the adult male from Zomba, a little further to the south, about 64 kilom., has much the same colour on its dorsal surface as subsp. *ibeanus*, and its chest is annulated almost as distinctly. The outsides of the limbs are not nearly so yellow as in the Fort Johnston baboon, and in its colour generally it resembles the typical specimen of *P. thoth*. The tail is pale yellowish, but obscurely speckled with black, and its tip is whitish, the terminal hairs being so well developed as almost to constitute a tuft.

I cannot separate these two Mombasa specimens from baboons in the British and Berlin Museums, which lead directly into the specimen in Paris which Is. Geoffroy had before him in 1841 when writing his article on *C. babuin* (misspelt *babouin*) for the 'Archives du Musée.'

A young male example of this yellow baboon in the British Museum differs from the Mombasa baboons in being much more yellow throughout, especially on the upper surface of the head, on the front of the fore legs, outside of the thighs,

¹ This colour may be due to the same colouring-matter which has stained the long hairs on the soles of the feet orange-red.

SKULL OF PAPIO CYNOCEPHALUS. PERONDO.
P. LANGHELDI, Matschie.

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lumbar region, and tail. On the lower half of the radial portion of the fore limb and on the dorsum of the hand the black tips of the hairs show here and there; whereas on the front of the hind limb and on the dorsum of the foot the black tips are hardly, if at all, developed, but, as in *P. thoth* and those already described, the tips of the toes are covered with long grey hairs. The hair on the shoulders is long, but the annuli are feebly indicated, with the exception of the subapical bands. The long hairs on the shoulders measure over 200 mm. in length, while those on the lumbar region are not more than 85 mm. long. On the outsides of the hind legs some of the longer hairs are 110 mm. in length. Four or five of the coloured rings of the hairs can be more or less detected, but fewer are present in the shorter hairs. The sides of the muzzle, before the eyes, are clad with short whitish hairs, as in the foregoing baboons, and the lips are also haired the same as in them. The skull of this specimen proves it to have been not full-grown, and consequently the form of the animal is more slender than that of adults.

The baboon in the Paris Museum so frequently described by French authors under the name of *Cynocephalus babuin*, has unfortunately had the face painted black and has been stuffed in a sitting position.

This specimen is of a rich, almost golden yellow, but with an intermixture of black, as the hairs usually terminate in black tips. Longer hairs are intermixed, and as they are generally of a paler colour than the shorter hairs, they are very distinct. The hairs on the head, more especially on the vertex, are long, as in *P. thoth*, and their black tips are particularly well developed. The usual, somewhat dense, line of short hairs is present on the side of the face. The whiskers are whitish with a few black tips, the hairs on the under surface of the throat, behind the chin, and on the inner sides of the limbs are pale yellowish white. The limbs are coloured like the body, and this colour on the hands is prolonged to the middle of the metacarpals, the hairs on the rest of the hand and fingers being greyish yellow or yellowish white like the inner sides of the limbs. Much the same colour prevails on the feet, with long greyish-yellow hairs over the toes.

As already stated, Mr. Matschie¹ regarded what he designated *C. cynocephalus*, Linn., and *C. babuin*, Is. Geoffr. St.-Hil., as two distinct species, which differed from one another in the following manner:—the former was greenish yellow, in certain lights yellow-brown, tinged only on the head with a little black; whereas the latter was intensely green, with a strong sprinkle of black on the head and on the back of the neck, with a few intermixed yellow-green hairs. These distinctions, however, are too ill-defined to be of value when the considerable series of the baboons herein mentioned are dealt with. The skull-characters, moreover, referred to by Matschie seem to be more indicative of diversity of age than of anything else.

¹ SB. Ges. nat. Fr. Berl. 1892, p. 231.

The materials which I have examined and herein described leave in my mind no dubiety regarding the specific identity of all the animals enumerated. They, however, suggest that as this baboon is traced southwards there is a tendency to a greater development of yellow pigment over its surface generally, and on the outsides of the hind limbs in particular, than is to be found in baboons occurring in the northern area of its distribution, and that the texture of the hairs becomes modified in some localities. But in order thoroughly to understand the variations to which this baboon is subject between its birth and its adult condition, it would be necessary to bring together a very large series of individuals not merely from one troop but from different troops, and equally extensive collections from different localities over the area of its distribution would have to be made to admit of the geographical and individual variations being thoroughly understood. Few would have the courage to enter on a wholesale massacre of baboons for such a purpose. I once inconsiderately shot a Macaque without killing it outright, and the way in which the poor unfortunate held its hand to its wound and looked at me is a picture still vivid in my memory after a quarter of a century.

The changes which take place in the maxillary region of the skull with advancing age are so great that measurements based on the space intervening between the front of the incisors and a line joining the posterior border of the last molar and compared with a measurement, *e. g.*, such as that between this line and some point of the foramen magnum, are misleading, unless the individuals under comparison have been accurately ascertained to be of exactly the same age or fully adult. In a skull with its milk-dentition, the posterior border of the second premolar may be, and generally is, on a line with the anterior border of the posterior palatine foramen, whereas in the adult skull the corresponding border of the third molar is on a line with the posterior border of that foramen. In the young skull the distance between the incisors and a line connecting the second premolars is about equal to or slightly in excess of the interspace between such a line and the anterior border of the foramen magnum, whereas in the adult skull the distance between the incisor and a line connecting the last molar is greatly in excess of the interval between the latter line and the foramen magnum. When the first molar appears its posterior border lies some distance behind the hinder border of the palate, whereas in adult life the tooth has moved so far forwards that its anterior border is opposite to the middle of the palate. Even after all the teeth are fully through the jaws they still continue to travel forwards. Thus the last molar will be found to have its posterior border lying in a line with the anterior root of the zygomatic arch, whereas in an animal with its teeth much worn the posterior border of the last molar is a long way anterior to that suture. With this forward movement of the jaws is associated the creation of a postdental maxillary tract behind the last molar, of varying extent, dependent on the age of the individual.

After maturity has been reached and has lasted for a few years, other changes ensue which still further modify the skull.

The following characters are found associated together in a fully adult skull:—(a) the posterior border of the last molar lies well before the anterior malar root of the zygomatic arch; (b) a long triangular postdental tract is developed behind the last molar; (c) the basioccipital suture has begun to disappear, *i. e.* union of the two bones has taken place more or less; (d) the temporal ridges unite on the sagittal suture or anterior to it.

The skulls in the accompanying Tables which manifest the above characters are those from Osi-Tana, Moschi, Ukami, Zomba, Lamu, Fort Johnston, and Langenberg.

In skulls not fully adult the following are the characters:—(a) the posterior border of the last molar lies behind the anterior root of the zygomatic arch; (b) a very short triangular upwardly sloping tract is developed behind the last molar; (c) the basioccipital suture has not united; (d) the temporal ridges in some are apart even on the occipital.

In still younger skulls the following are the characters:—(a) the posterior border of the last molar is much behind the anterior root of the zygomatic arch; (b) no postdental area is present behind the last molar; (c) the basioccipital suture is quite intact; (d) the temporal ridges are far apart.

The skulls of 9 males and 1 female, represented by skins, are dealt with in Table II., in which they have been arranged according to their size, which, however, does not imply that two animals of the same size are of the same age. The largest male skull is from Zomba, to the south of Lake Nyassa, and it measures 204 mm. long. It is fully adult, as are also the skull from Lamu and the one from Fort Johnston; but between these and the Langenberg skull, which is also adult, some skulls not fully adult are interpolated, so that the Langenberg skull, being adult, is that of a distinctly smaller individual. Fortunately, its skin is preserved in the Berlin Museum, and I have been enabled to compare it with two skins from Mpapwe, a district only 110 kilom. to the west of Unguru, whence the type of *P. langheldi* was obtained, and with a skin from Perondo, about halfway between Mpapwe and Langenberg. I have, however, failed to find any characters by which to separate it from them.

The skull from Ukami, one of the specimens upon which Matschie founded his *P. langheldi*, although unsubstantiated by a skin, may, on account of its general characters and the locality whence it came, be accepted as specifically identical with the Lamu baboon, the skull of which Mr. Oldfield Thomas has kindly allowed me to figure (Plate XII.). It may therefore be included along with the four adults from Lamu, Langenberg, Fort Johnston, and Zomba. This skull from Ukami (Table III.

TABLE II.—Measurements of Skulls of *Papio cynocephalus*.*Skulls accompanied by their skins.*

	1. mm.	2. mm.	3. mm.	4. mm.	5. mm.	6. mm.	7. mm.	8. mm.	9. mm.	10. mm.
Extreme length of skull (tip of premaxillaries to external occipital protuberance).	204	202	198	196	196	192	192	191	188	159
Anterior border of foramen magnum to tip of premaxillaries	140	151	143	149	149	140	137	141	134	109
Tip of premaxillaries to glabella	132	135	137	125	133	123	128	128	132	95
Glabella to external occipital protuberance.	110	108	102	105	102	114	106	100	105	100
Minimum frontal diameter	55	56	58	58	56	58	55	56	61	54
Maximum interzygomatic breadth	118	114	116	..	109	109	99	..	101	94
„ intermalar breadth across middle of orbit	87	91	91	89	86	88	80	87	86	75
Vertical height of orbit	27	26	24	24	26	26	26	25	25	23
Breadth of orbit	30	29	28	30	29	31	31	30	30	26
Distance from middle of lower border of orbit to end of nasals	59	58	64	60	57	58	57	58	56	39
Breadth of muzzle immediately before and below orbit	45	47	43	45	46	42	41	40	45	40
Breadth of muzzle external to 1st premolar.	50	53	49	50	49	48	45	47	49	41
„ „ opposite to end of nasals.	31	42	37	37	38	40	34	35	40	29
Anterior border of foramen magnum to posterior border of palate	49	55	53	52	48	50	46	47	49	39
Length of palate	97	97	93	96	100	91	95	95	89	70
Breadth of palate between middle of last molars	29	27	30	30	26	26	24	26	23	26
Breadth of palate between middle of 1st premolars	33	34	33	33	30	33	28	30	31	27
Extreme length of lower jaw	146	152	152	144	152	142	139	147	136	115
Vertical depth through coronoid process ..	65	74	65	75	61	56	55	61	63	58
Alveolar border of lower jaw to posterior (digastric) border of symphysis	52	51	47	42	49	45	49	43	46	33
Breadth of lower jaw at posterior root of 1st premolar	37	38	35	36	35	35	34	35	37	30
Length of 1st upper molar	10	11	9.8	10	11	11	10	11	10	10
„ 2nd „ „	12	12.5	11	12	13.5	12	11.8	13	11.5	12.5
„ 3rd „ „	12	13.5	12	12	13.2	12	12	13.5	13	—
„ 1st lower „ „	10	10	10	10.6	11	10	9.6	11	10.5	10.2
„ 2nd „ „	11.6	12.5	11.6	12.5	13	12	11.5	13	12	12
„ 3rd „ „	13	16	14	15	16.5	14.6	14.3	17	14	15
„ 4th „ „ (right side)	..	..	11.5	—	—	—	—	—	—	—

1. ♂. Zomba, 6th Nov. 1896, Blantyre District west of Lake Shirwa, Nyassa (A. Whyte), Sir H. H. Johnston. Brit. Mus. No. 97.10.1.11. Adult.
2. ♂. Lamu. Type of *P. thoth* subsp. *ibeanus*, Thos., ex coll. F. J. Jackson. Brit. Mus. No. 92.10.18.1. Adult. (Plate XII.)
3. ♂. Fort Johnston, Nyassa (from H. C. Macdonald), Sir H. H. Johnston. Skull doubtful. Brit. Mus. No. 97.10.1.9. Adult.
4. ♂. Mpapwe. Coll. Elpous. Berl. Mus. No. 26869. Not fully adult.
5. ♂. Mpapwe. Coll. Werther. Berl. Mus. Not fully adult.
6. ♂. Perondo, Uhehe. Coll. Dr. Stierling. Berl. Mus. Not fully adult. (Plate XIII.)
7. ♂. Langenberg, North Nyassa. Coll. Dr. F. Fulleborn. Berl. Mus. Adult.
8. ♂. Mpapwe. Coll. Böhmer. Berl. Mus. Not fully adult.
9. ♂. Mombasa. Zool. Gardens, Lond., 15/11/94 to 20/11/94. Brit. Mus. No. 95.5.4.2. Not fully adult.
10. ♀. Mombasa. Zool. Gardens, Lond., 15/11/94 to 19/12/94. Brit. Mus. No. 95.5.4.2. Not fully adult.

TABLE III.—*Skulls unaccompanied by skins* (all in Berlin Museum).

	1. mm.	2. mm.	3. mm.	4. mm.	5. mm.
Alveolar border of premaxillaries to external occipital protuberance	212	210	201	199	152
Anterior border of foramen magnum to tip of premaxillaries	158	158	140	150	104
Tip of premaxillaries to mesial point of superciliary ridge	138	144	133	130	97
Mesial point of superciliary ridge to external occipital protuberance	107	113	114	109	99
Minimum frontal diameter	58	58	58	58	56
Maximum interzygomatic breadth	114	118	113	110	91
„ intermalar breadth across middle of orbit	90	92	87	89	72
Vertical height of orbit	24	25	25	27	24
Breadth of orbit	32	31	30	30	28
Distance from middle of lower border of orbit to end of nasals ..	57	67	59	53	40
Breadth of muzzle immediately before and below orbit	44	51	46	44	36
„ „ external to 1st premolar	52	53	49	50	38
„ „ opposite to end of nasals	37	41	39	38	31
Anterior border of foramen magnum to posterior border of palate .	55	50	44	56	36
Length of palate	103	108	98	95	68
Breadth of palate between middle of last molars	27	31	29	26	21
„ „ „ 1st premolars	33	35	32	31	25
Extreme length of lower jaw	156	159	149	148	109
Vertical depth through coronoid process	70	66	69	71	56
Alveolar border of lower jaw to posterior (digastric) border of symphysis	51	49	43	43	28
Breadth of lower jaw at posterior root of 1st premolar	36	38	36	36	29
Length of 1st upper molar	11.5	11.3	..	11	9.5
„ 2nd „ „	13	13	12	12.3	12
„ 3rd „ „	13.3	12.5	12.3	13	11
„ 1st lower „	11	11	10	11	9.8
„ 2nd „ „	12.6	13	12	12.3	11.3
„ 3rd „ „	16	15.6	16	L.15, R.16	14

1. Adult ♂. Moschi, Kilima-njaro. Coll. v. der Marwitz.
2. Adult ♂. Osi Tana. Coll. Denhardt.
3. Adult ♂. Ukami. Coll. Leider. One of the types of *P. langheldi*, Matschie. Reg. No. 6495.
4. ♂. Left bank of Kikafa, near Madschame, Kilima-njaro. Dr. Leut. Reg. No. 7587.
5. ♀. Marpiensen, one half-hour from Tanga. Coll. Dr. Heinsen.

TABLE IV.—Illustrating the Variations in the Dentition of *P. cynocephalus*, Linn.

First upper molar. mm.	Second upper molar. mm.	Third upper molar. mm.	First lower molar. mm.	Second lower molar. mm.	Third lower molar. mm.
Moschi 11.5	Mpapwe 13.5	Lamu 13.5	Osi-Tana 11	Osi-Tana 13	Mpapwe 17
Osi-Tana 11.3	Mpapwe 13	Mpapwe 13.5	Kikafu 11	Mpapwe 13	Mpapwe 16.5
Kikafu 11	Osi-Tana 13	Moschi 13.3	Moschi 11	Mpapwe 13	Kikafu { 16 to 15
Lamu 11	Moschi 13	Mpapwe 13.2	Mpapwe 11	Moschi 12.6	Lamu 16
Mpapwe 11	Lamu 12.5	Kikafu 13	Mpapwe 11	Lamu 12.5	Moschi 16
Mpapwe 11	Kikafu 12.3	Mombasa 13	Mpapwe 10.6	Mpapwe 12.5	Ukami 16
Ukami ?	Ukami 12	Osi-Tana 12.5	Mombasa 10.5	Kikafu 12.3	Osi-Tana 15.6
Perondo 11	Mpapwe 12	Ukami 12.3	Lamu 10	Mombasa 12	Mpapwe 15
Mombasa 10	Perondo 12	Mpapwe 12	Ukami 10	Ukami 12	Perondo 14.6
Mpapwe 10	Zomba 12	Perondo 12	Perondo 10	Perondo 12	Langenberg 14.3
Langenberg 10	Langenberg 11.8	Fort Johnston 12	Fort Johnston 10	Fort Johnston 11.6	Mombasa 14
Zomba 10	Mombasa 11.5	Langenberg 12	Zomba 10	Langenberg 11.5	Fort Johnston 14
Fort Johnston 9.2	Fort Johnston 11	Zomba 12	Langenberg 9.6	Zomba 11.3	Zomba 13
Variation 2.3	 2.5	 1.5	 1.4	 1.7	 4
Variation north of Perondo 1.5	 1.5	 1.5	 1	 1	 2.4
Variation south of Langenberg 0.8	 1		 0.4	 1.3	 2.5

no. 3) is only 3 mm. longer than the skull from Fort Johnston, the latter being nearly 6 mm. longer than the Langenberg skull, so that there is a series of adult skulls, varying from 192 to 204 mm., substantiated by their skins.

When the dentition of these five males is examined, it will be seen, by consulting the accompanying Table (IV.), that the Lamu individual has all its teeth as large as or larger than the others, and that the Ukami skull takes precedence of the remaining three. The first and last lower molars of these two skulls are of the same size, but the other teeth of the Lamu skull are somewhat larger than those of the Ukami individual. The Langenberg skull, which is from a locality about 440 kilom. to the south-west of Ukami, has all its teeth smaller than the Ukami baboon, but to a trifling extent, viz. fractions of a millimetre, with the exception of the last lower molar, which is 1·7 mm. shorter antero-posteriorly than the corresponding tooth of the Ukami skull. The baboon from Fort Johnston, the next geographical position to the south, has some of its teeth smaller and others larger than those of the last skull, but only to the degree of fractions of a millimetre. The Zomba skull, which comes from a locality not far removed from Fort Johnston, when contrasted with the skulls from the foregoing localities to the north, gives the following results :—

Differences between teeth of Zomba skull and—	Upper molars.			Lower molars.		
	1.	2.	3.	1.	2.	3.
Fort Johnston skull	+·8	+1	=	=	—·3	—1
Langenberg skull	=	+·2	=	+·4	—·2	—1·3
Ukami skull	?	=	—·3	=	—·7	—3
Lamu skull	—1	—·5	—1·5	=	—1·2	—3

If the last lower molar is alone considered, it would appear from this statement that this tooth diminishes in size between Lamu and Zomba, and there is thus an ascending series from south to north: Zomba 13 mm., Fort Johnston 14 mm., and Lamu 16 mm. But if the skulls unauthenticated by their skins are admitted to the series, and there does not appear to be any reason why they should not, because they so conform in their essential features to the Lamu skull that they may be accepted as identical with it, then the series becomes more instructive. These skulls prove that although the five skulls just considered are adult, they do not represent the full size to which the species may attain (see Table II.). They establish that the species is characterized by considerable variations as to the size of the teeth, and when the teeth of these large individuals are tabulated along with the others (see Table IV.) the variation of the third lower molar is seen to be considerable. The baboon from Mpapwe has this tooth as much as 17 mm. long, whereas in the Zomba baboon it is only 13 mm.; but another individual from Mpapwe has its last lower molar only 2 mm. longer than the Zomba

specimen, so that in two individuals from one and the same locality this tooth varies as much as 2 mm. The variation is not restricted to any particular locality, as the baboons of Mombasa and Fort Johnston have this tooth of exactly the same size and only 0·6 of a millimetre shorter than the same tooth of the Perondo skull, which is only 0·4 mm. shorter than the corresponding tooth in one of the Mpapwe skulls, in which this tooth varies from 15 to 17 mm.

In the skull from Kikafu the posterior cusp of the last lower molar is almost suppressed, or at least so much so that only two cusps are visible externally.

Conclusion.—Whilst the specific identity of the individuals herein described seems to be established, the fact remains that those to the south of Perondo manifest a tendency to diverge somewhat in certain features from the baboons further to the north. These divergences, however, do not appear to me to be so emphasized as to entitle them to be regarded as a basis for the formation of geographical races, as in other characters they are found, so to speak, to intergrade with those of their northern representatives, leaving no clear line of demarcation between them. What these slight divergences are have already been indicated.

The series further establishes the fact that this species, like other species of baboons, is characterized by a remarkable diversity in the size of the individuals. In some of the other species it would appear that in certain areas of their distribution smaller individuals are met with than in other places, and these it may be desirable to indicate, when they are distinctive of an area, as local races; but in *P. cynocephalus* no analogous facts are met with. The Table bearing on dentition brings out, however, that the teeth, as a rule, gradually diminish in size in individuals from north to south, but this is associated with a certain amount of overlapping, so that it is impossible to seize hold of any assemblage of characters by which it would be possible satisfactorily to arrange these baboons into local groups. This remark is equally applicable to the external characters of the animals. Much more extensive materials are absolutely necessary to admit of these interesting details in variation being worked out satisfactorily.

PAPIO PRUINOSUS, Thomas.

Papio pruinus, Thomas, Proc. Zool. Soc. 1896, p. 789, pl. 38.

This remarkable male baboon from Monkey Bay, Livingstone Peninsula, at the southern end of Lake Nyassa, has been described under the name of *P. pruinus*. In the original description it is stated that it is distinguished at a glance from every other species by its hoary-grey colour, white belly, and unannulated fur.

The interest attached to this form, in so far as the zoology of the region to the south of Egypt is concerned, is the circumstance, already mentioned, that Rüppell has stated that he had heard of the existence, in the wooded district of Dar-Fur and in the southern provinces of Abyssinia, of a large unknown "*Cynocephalus*," having whitish hair throughout, and red callosities and buttocks, and also red on the middle of the tail. As *P. pruinus* is based on a skin, nothing is known of the colour of these parts in the living animal.

This specimen has been described as follows:—"General colour hoary grey throughout; on the upper surface there are two sorts of hairs, the shorter about 3 or 4 inches in length and the longer about 7 inches; both have black tips about $\frac{3}{4}$ to 1 inch long, while their remainder is dirty white. In a general view the black tips of the shorter hairs show clearly against their white bases, but those of the longer hairs do not show at all, so that these latter look wholly white. The general hoary colour obtained by this mixture of black and white extends all over the upper surface, including the head, along the outer sides of the limbs to the metapodials and to the end of the tail, which is, however, rather blacker proximally and whiter terminally than the rest of the body. Tip of tail untufted. Below, on the cheeks, chin, and belly, and on the inner sides of the limbs, the black tips disappear; the fur is then entirely dirty white. The fingers and toes are also nearly unmixed white." It may be added that on the pectoral region hairs are met with having white apical tips succeeded by a blackish ring followed by white, which is the colour of the remainder of the hair.

The most marked feature of the skull of *P. pruinus*, as compared with those of baboons referable to *P. cynocephalus*, is the shorter and less deep muzzle and the full and more rounded globular character of the calvarium, associated with an arching of the frontal region never met with in these baboons. Although the profile has a more downward and forward slope than in the type of *P. cynocephalus* subsp. *ibeanus*, the difference between them in this respect is not much. As was to have been expected, a shorter palate accompanies the reduced muzzle.

The skull of this somewhat enigmatical baboon is what may be called adult, but yet with a capacity for further growth. This is evinced by the position of the last upper molar, by the little development of the triangular space behind it, and by the canines being not yet fully exposed. The teeth are small, but not so small as in some

skulls of *P. cynocephalus*. The posterior cusp of the last lower molar is well developed and nearly mesial in position. The symphysis of the lower jaw is much more vertical than in *P. cynocephalus*. The pit on the side of the mandible and the lateral compression on the side of the maxilla are much less marked than in that species. There are many peculiar features connected with this unique baboon, but the figure of the skull here given (Plate XIV.) may tend ultimately to throw some light on its real nature, and so possibly to reduce it to the rank of an albinoid sport.

The measurements of its skull are as follows:—

	mm.
Extreme length of skull (tip of premaxillaries to external occipital protuberance)	180
Anterior border of foramen magnum to tip of premaxillaries	131
Tip of premaxillaries to glabella	119
Glabella to external occipital protuberance	109
Minimum frontal diameter	56
Maximum interzygomatic breadth	102
„ intermalar breadth across middle of orbit	79
Vertical height of orbit	26
Breadth of orbit	29
Distance from middle of lower border of orbit to end of nasals	47
Breadth of muzzle immediately before and below orbit	44
„ „ external to 1st premolar	47
„ „ opposite to end of nasals	36
Anterior border of foramen magnum to posterior border of palate	47
Length of palate (mesial line)	86
Breadth of palate between middle of last molars	27
„ „ „ 1st premolars	29
Extreme length of lower jaw	134
Vertical depth through coronoid process	64
Alveolar border of lower jaw to posterior (digastric) border of symphysis	42
Breadth of lower jaw at posterior root of 1st premolar	33
Length of 1st upper molar	10
„ 2nd „ „	12
„ 3rd „ „	12
„ 1st lower „	10
„ 2nd „ „	12.6
„ 3rd „ „	15.5

Beyond the length of the tail and that of the hind foot, there are no measurements extant of the dimensions of this baboon in life. The tail was 570 mm. long, and the hind foot 210 mm. Mr. Thomas found the skin of the head and body to be 750 mm. in length. The specimen was a male.

SKULL OF PAPIO PRUINOSUS (Type).

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There is a large stuffed baboon in the Hamburg Museum which I have had the satisfaction of examining, thanks to the courtesy of Professor Kraepelin, who sent it to the Berlin Museum for my inspection. I hesitate to identify it with the baboons just described, as it is a much more yellow-coloured animal, with a somewhat differently shaped skull, the facial portion of which is flatter and shorter and more straightly projected forwards than in any of the skulls herein described. It is unfortunate that no reliance can be placed on this as being a normal feature of the skull, the animal having spent about a quarter of a century in confinement. Another feature of this baboon is the great length of the tail, which is longer than the body and head, whereas in *P. cynocephalus* the tail is considerably shorter than that measurement.

	mm.
Snout to vent	745
Vent to tip of tail	790
Height at shoulder	650

It has the long hair of *P. cynocephalus*. The following are its general features:—

The face was evidently paler than that of *P. cynocephalus*. The hairs are long on the back of the neck and more especially on the shoulder, where some of them are as much as 330 mm. These long hairs, like the others, have a black tip about 16 mm. long, a yellow band below it about 10 mm., followed by a black band of the same breadth, succeeded by a yellow band also 10 mm., and then by another 7 mm., the yellowish-brown basal portion of the hair being 284 mm. in extent. On the rump the hairs measure 100–151, and on the vertex 50–60. On the front of the shoulder the hair is 150 mm. long, on the middle of the humerus 100–180, and on the middle of the radius 45–60. On the outside of the thighs it is 50–100 mm. long, and on the middle of the tibial region 50–90. On the sides of the body it is 170–260 mm. long. On the sides of the base of the tail it is 40–60, but beyond this the hair is short and adpressed, but the hairs at the tip are about 60 mm. long.

The general colour throughout is yellow, with a yellowish-olive tint, palest on the limbs, more especially on their posterior surfaces. The upper surfaces of the feet are yellow with a slight admixture, more especially on the hind feet, of black-tipped hairs. The tail at its base is concolorous with the back; behind this it becomes brownish and speckled with the yellow annuli, but towards the tip these disappear, and it is dark greyish brown.

The sides of the face before the malar bones and the area extending from below the eyes to the mouth are clad with short white hairs, the upper surface of the mesial portion of the face, to halfway between the eyes and the nose, being covered with very fine blackish hairs. The hairs on the inner side of the ears are white.

The great length of the skull, 236 mm., is largely due to its thickened condition produced by a life of confinement.

Its teeth have very much the same dimensions as the teeth of *P. cynocephalus*, but with this insignificant difference, that the third upper and second lower premolars do not attain quite to the dimensions of the same teeth in *P. cynocephalus*. The difference, however, is so infinitesimal that the dentition is practically identical with that of the Osi-Tana and Moschi baboons.

When the specimen was sent to Berlin it bore on the stand the name *C. babuin* and the locality "Dongola." Being much puzzled by the locality assigned to it, I wrote to Professor Kraepelin for further information respecting this baboon, and from him I learned that it had not come from Dongola, but from the West Coast of Africa, and that it was well remembered by Dr. Bolau, Director of the Hamburg Zoological Gardens. The following is its history:—

It was presented to the Hamburg Zoological Gardens on the 12th July, 1873, by Messrs. Gaiser and Witt, whose factories (the only ones they possessed) were at Lagos, whence the baboon had been taken to Germany. Dr. Bolau informed Professor Kraepelin that the arrival of the baboon in the Hamburg Gardens was entered in his own register of the reception of animals in the Gardens as having come from West Africa, and that this record of the locality as the native country of the baboon was perfectly accurate. Dr. Bolau recollects it well as a full-grown splendid animal which had lived for nearly fifteen years in the Gardens, and he states that Mr. Gaiser had informed him that it had previously lived for a period of ten or twelve years in confinement in Africa.

The locality whence this baboon was brought to Europe is thus quite assured, but at the same time it has yet to be established that a yellow baboon does exist there. It seems more probable to suppose that it had been carried to Lagos from some port to the south, possibly Angola, which may account for the statement on the stand that it came from Dongola. The characters of this baboon are such that there can be no doubt of its close affinity to the baboons here described, and it is quite possible that on the West Coast, about Angola, the baboons of the East Coast may be represented by a local race of a yellow colour and with a long tail. On the other hand, if *P. cynocephalus* of the East Coast ranges as far west as Dar-Fur, it may be represented to the south-west by baboons of this character.

This baboon would appear to answer to *P. cynocephalus*, Etienne Geoffr. St.-Hil.¹ (nec *Simia cynocephalus*, Linn.), a term which I have purposely omitted from the foregoing synonymy.

¹ Ann. Mus. xix. 1812, p. 102.

C H I R O P T E R A.

Mammals with their anterior extremities modified for aerial flight. Ulna imperfect; radius long and curved, supporting a six-boned carpus with its five digits; first digit usually short, free from the others; the four remaining digits greatly elongated, with a wing-membrane or patagium extended between them and along the radius, ulna and humerus, sides of the body, and hinder extremities; a short antibrachial membrane stretches from the shoulder along the humerus and forearm; an accessory membrane is attached between the hinder extremities, usually supported by a cartilaginous process (the calcaneum) arising from the inner side of the ankle-joint. Knee directed backwards. Mammary glands thoracic and generally postaxillary; pubic teats absent or present. Penis pendent, with or without a bone; testicles abdominal or inguinal; uterus simple or two-horned; placenta discoidal and deciduate. Cerebral hemispheres smooth, not extending backwards over the cerebellum. Dentition: incisors, canines, premolars, and molars—never more than 38 teeth.

This order is resolvable into two suborders, the Megachiroptera and Microchiroptera. The members of the first are frugivorous, and those of the second insectivorous.

Suborder *MEGACHIROPTERA*.

Fruit-eating Bats, usually of large size. Molar teeth with smooth crowns, longitudinally furrowed (cuspidate in *Pteralopex*¹). Osseous palate prolonged behind the last molar; second digit of manus with three phalanges, terminal phalanx generally clawed. Ear-conch usually forming a complete ring at the base. Pyloric extremity of the stomach usually elongated.

The Megachiroptera constitute a single family, viz. the Pteropodidæ, the characters of which are the same as those of the suborder itself.

¹ Thomas, Ann. & Mag. N. H. (6) i. 1888, p. 155.

PTEROPODIDÆ.

This family is composed of two subdivisions, viz. the *Pteropodinæ*, having well-developed molars and a moderate-sized tongue; and the *Megaloglossinæ*, with molars hardly raised above the gums and an immensely elongated tongue. The first of these subfamilies is represented on the African continent by three genera—*Epomophorus*, *Rousettus*, and *Scotonycteris*; while one genus (*Megaloglossus*) of the second subfamily occurs in West Africa only.

Subfamily PTEROPODINÆ.

ROUSETTUS.

Rousettus, Gray, Loudon's Med. Repository (1 April), xv. 1821, p. 299.

Muzzle conical, moderately elongate; nostrils directed forwards and outwards, separated by a deep groove which is prolonged backwards and upwards from the upper lip; chin slightly grooved; ear with a distinct lobe. First digit of manus elongate; second clawed; third metacarpal as long as, or longer than, the second digit. Wings extending from the sides of the back and joined to the hind leg as far as the base of the second metatarsal. Interfemoral membrane traversed about its middle by a strong tendinous band extending from the heel to the side of the tail. Tail very short, its proximal half attached to the under side of the interfemoral membrane, but not contained in it, free in the rest of its extent.

Dentition: i. $\frac{2}{2}$, c. $\frac{1}{1}$, pm. $\frac{3}{3}$, m. $\frac{2}{3} = 34$.

The longitudinal furrow which traverses the molars completely disappears in fully grown animals, the crowns of these teeth becoming flat.

Distributed over Africa; extending into Southern Asia eastwards as far as the Malay Archipelago.

ROUSETTUS ÆGYPTIACUS, E. Geoffr. (Plate XV.)

Vespertilio ægyptiacus, Hasselq. & Linn. Iter Palæst. 1757, p. 197.

Pteropus ægyptiacus, E. Geoffr. St.-Hil. Ann. du Mus. xv. 1810, p. 96; id. Descr. de l'Égypte, Hist. Nat. ii. 1818, p. 134, pl. 3. fig. 3; Desmarest, Nouv. Dict. xxix. 1819, p. 513; id. Mamm. 1820, p. 111; Fischer, Syn. Mamm. 1829, p. 85; Giebel, Säugeth. 1859, p. 999; Unger & Kotschy, Die Insel Cypern, 1865, p. 570; Gasco, Viag. in Egitto, 1876, p. 95.

Pteropus geoffroyi, Temm. Monogr. Mamm. i. 1827, p. 197, tab. 15. figs. 14, 15; Is. Geoffr. St.-Hil. Dict. Class. xiv. 1828, p. 702; Schinz, Mamm. i. 1844, p. 130; Rüppell, Mus. Senck. iii.

ROUSETTUS ÆGYPTIACUS.

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1845, p. 154; Wagner, Schreb. Säugeth. Suppl. i. 1840, p. 358; id. ibid. v. 1846, p. 603; Heuglin, Reise N.O.-Afr. ii. 1877, p. 15.

Xantharpyia ægyptiaca, Gray, Cat. Mamm. B.M. 1843, p. 37; Horsfield, Cat. Mamm. East Ind. Co. Mus. 1851, p. 29; Fitz. & Heugl. SB. Akad. Wissen. Wien, liv. Abth. i. 1866, p. 544; Hartmann, Zeitschr. f. Erdkunde, Berlin, iii. 1868, p. 40; Matschie, Megachirop. Berl. Mus. 1899, p. 66.

Pachysoma ægyptiaca, Tomes, Proc. Zool. Soc. 1860, p. 56.

Cynonycteris ægyptiaca, Peters, MB. Ak. Berlin, 1867, p. 865; Dobson, Cat. Chirop. B.M. 1878, p. 75; Tristram, West. Palest. 1884, p. 25; Jentink, Mus. d'Hist. Nat. Pays-Bas, ix. 1887, p. 263; id. ibid. 1888, p. 151; Noack, Jahrb. Hamb. Anst. ix. 1891, p. 128; Trouessart, Cat. Mamm. fasc. i. 1897, p. 84; Seabra, Jorn. Sci. Lisb. (2) v. 1898, p. 158.

Pteropus (Xantharpya) ægyptiacus, Hartmann, Zeitschr. Ges. f. Erdk. Berlin, iii. 1868, p. 40.

Eleutherura ægyptiaca, Gray, Cat. Monkeys & Fruit-eating Bats B.M. 1870, p. 117.

Cynonycteris collaris, Günther, Proc. Zool. Soc. 1879, p. 741.

1 ad. ♂ and 1 ad. ♀. Belim, Delta. Sir John Rogers, K.C.M.G., Pasha.

2 ad. ♂ and 1 ad. ♀. Mahallet el Kebir.

2 ad. ♂ and 2 ad. ♀. Old Mosque, Cairo. Dr. Walter Innes, Bey.

1 ad. ♂, 5 ad. ♀, 1 juv. ♂, and 3 juv. ♀. Medinet el Fayum.

1 juv. ♀. Minia. Major R. H. Brown, R.E., C.M.G.

1 ad. ♀. Tomb behind Assiut.

Muzzle moderately long, rather broad. Ears oval, not broadly rounded at their tips; internal border much more convex than the external; their length nearly equals the interval between the lower border of the external meatus and the angle of the mouth, and their greatest breadth is a little in excess of half of that interval; naked posteriorly except at their bases; internally sparsely covered with fine hairs, and a line of hairs along the folded portion of the inner margin of the internal border of the conch. Muzzle above and below covered with short hairs. Fur soft and short, longest on the under surface of the neck. Humerus and the proximal half of the forearm well clad with fur. Tibia longer than the thumb, sparsely covered with fine hairs which extend on to the toes. Upper surface of wing-membrane naked between the digits, but more or less sparsely clad with minute hairs on the parts adjoining the haired portions of the limbs, and most so external to the hind limbs. Interfemoral membrane, from the knees to the tail, densely covered with fine fur. Under surface of wing-membrane covered with soft fur immediately external to the forearm and backwards to the knees. Under surfaces of humerus and femur and of proximal portion of forearm more or less covered with fine hair. Under surface of tibia practically nude, also the wing and interfemoral membrane immediately external to it. Fur uniformly brownish with a greyish tint or occasionally markedly brown, the depths of the tints varying in intensity ¹.

¹ [Mr. Walter Draper, writing from "the Barrage," says that these bats are bluish smoke-colour when alive, but the bluish tint disappears soon after death.—W. E. DE W.]

Ears, skin of muzzle, and upper surfaces of wing-bones yellowish flesh-coloured or pale yellowish brown. Wing-membrane almost invariably more or less irregularly spotted with white, but not so markedly as in the Malayan genus *Harpyia*.

The solitary young individual produced by this species is born blind, generally in the month of February or March. At birth, the whole under surface of the body, from the chin to the end of the tail and the under surfaces of the membranes and limbs, are practically devoid of hair. On the upper surface the hair has the same distribution as in adult life, but it is extremely short and adpressed. The muzzle is perfectly nude with the exception of the moustachial and other bristles.

The great size of the pectoral teats of this bat enables the young to have a very firm grasp of their mothers. It is the left horn of the uterus which is generally fertilized.

Measurements of skulls of *R. ægyptiacus* (E. Geoffr. St.-Hil.), *R. collaris* (Illiger), and *R. arabicus*, sp. nov.

	<i>R. ægyptiacus.</i> Cairo. mm.	<i>R. collaris.</i> Cape Town. mm.	<i>R. arabicus.</i> Aden. mm.
Upper border of foramen magnum to tip of premaxillaries . . .	45	42	40·5
Lower border of foramen magnum to tip of premaxillaries (basal length)	41	37·5	36·5
Lower border of foramen magnum to posterior border of palate .	16	15	14
Breadth of palate posteriorly	9	8·5	6·5
„ between last molars	10·5	9·3	8·5
„ „ 2nd premolars	7·5	6·5	5·5
Greatest zygomatic breadth	28·5	26	24·7
Anterior border of orbit to tip of premaxillaries	17·5	15·1	15
Minimum frontal diameter	8·4	9	8
Breadth outside external meatus	19	18	16·5
Front of canine to back of last molar	18	16·5	16
Basi-bregmatic height	15	14·5	13
Extreme length of lower jaw	36	33	31
Vertical depth of lower jaw	18	14·5	14·5
Front of lower canine to back of last molar	19	17·1	17

This bat is found in ancient Egyptian tombs and temples, old mosques, and Sheiks' graves, or in crevices of rocks. In the days of E. Geoffroy St.-Hilaire it frequented the recesses of the Great Pyramid, but now it is not found in that building, at least I failed to find it there, although I sought for it on three occasions, whilst the Arabs I deputed to look for it were equally unsuccessful in obtaining it. It is met with on trees in gardens, and in date-plantations around villages, in sycamore, mulberry, and other trees. It is occasionally found singly, but generally a few are associated together. In clear moonlight nights it may be seen flying about in search of the fruit

of the date-palm, wild figs, and other fruit-bearing trees. Hartmann states that it migrates southward to a distance not yet clearly known.

According to Lataste, the Arabs designate this bat under the names 'Bouchleida' and 'Turtellil.' Messrs. Rothschild and Wollaston (Nov. Zool. viii. 1901, p. 398) say that all bats are known by the name of 'Wât-wât' at Shendi, on the Upper Nile.

This species is distributed over the Delta, and along the valley of the Nile into Nubia, but how far it extends to the south is unknown. It is present in Cyprus and in Syria as far north as the Lebanon district. A bat under this name has been recorded from Abyssinia, where it was obtained by Sir William Cornwallis Harris; it is still preserved stuffed in the British Museum, but it appears to be more allied to *R. collaris* than to the Egyptian bat. Dr. Günther, in describing some mammals from Cyprus obtained by the late Lord Lilford, stated in a footnote to his paper¹ that Dobson, who had examined the Pteropine bats in the collection, had agreed with him "in considering them to be *R. collaris*." Kotschy, who had previously published a list of some of the mammals of Cyprus, had enumerated *Pteropus ægyptiacus* (*R. ægyptiacus*) as one of the bats found in that island. In view of this, Dr. Günther remarked that as *R. ægyptiacus* occurred in Egypt and in Syria it might have been expected that the fruit-eating bat of Cyprus would have been the same species; but he added: "However, singularly enough, the Cyprian specimens (of which thirty-eight are in the collection) exhibit the distinctive character (a somewhat shorter thumb) on account of which *R. collaris* has been separated from *R. ægyptiacus*. *R. collaris* has been found hitherto only in South Africa and in the Gaboon; and before we admit so singular a distribution of two representative species, we must feel disposed to question the specific value of the character by which the two forms have been separated."

As the only alcoholic specimens of this species in the British Museum, when Dobson prepared his Catalogue, were the two male bats from Palestine, the measurements of which are given in the Table on p. 88, he selected one of them to illustrate the characters of the species, but unfortunately the specimens were not adult. This is clearly proved by the condition of the sutures of their skulls, which are disunited. The angle of the lower jaw also has none of the characters of a fully mature individual, while at the same time all the permanent teeth are present, but evidently freshly through the gum and unworn. In both of these specimens the thumb and the tibia are equal in length; but, according to Dobson, the thumb of the male he measured was 1.35 inch, while the tibia was 1.25 inch. He consequently came to the conclusion that the thumb was usually longer than the tibia; this, however, was a mistake, as the reverse is the case in both *R. ægyptiacus* and *R. collaris*. The close approximation in length of the thumb and tibia in the two Palestine specimens is to be explained on the ground of their immaturity, as the thumb of this genus is longer in youth than

¹ Proc. Zool. Soc. 1879, p. 741.

Measurements of *R. ægyptiacus* (E. Geoffr. St.-Hil.) and of some other allied species.

	<i>R. ægyptiacus</i> .								<i>R. collaris</i> .		<i>R. arabicus</i> .							<i>R. leschenaultii</i> .		<i>R. semi-nudus</i> .	<i>R. amplexicaudatus</i> .
	Cyprus.	Cyprus.	Cairo.	Delta.	Palestine.	Palestine.	Cairo.	Cyprus.	Cyprus.	Cairo.	Aden.	Aden.	Aden.	Aden.	Aden.	Aden.	Aden.	Nipal.	Nipal.	Ceylon.	Philippines.
Snout to vent.....	♂. mm. 146	♂. mm. 144	♂. mm. 140	♂. mm. 135	♂. mm. 114	adol. ♂ mm. 112	♀ mm. 140	♀ mm. 138	♀ mm. 137	♀ mm. 134	♂. mm. 128	♂. mm. 125	♀ mm. 124	♂. mm. 63	adol. ♂ mm. 115	adol. ♀ mm. 114	♀ mm. 121	♂. mm. 134	♂. mm. 123	♂. mm. 128	♀ mm. 112
Vent to tip of tail.....	24	22	15	..	15	12	15	19	20	18	15	22	16	8	15	14	17	23	19.3	18	23
Length of head	49	50	49	50	43	39	48	49	50	49	45	43	43	29	44	42	46	44	42	45	41
Height of ear.....	29	25	23	24	20	20	23	21	24	23	20	20	20	11	21	21	21	19	20	19	17
Inner canthus of eye to } tip of snout	19	18	20	18	18	16	20	17	17	19	17	17	16	11	16	16	18	17	16	16	15
Length of forearm.....	100	96	100	99	86	80	94	95	96	93	87	86	89	37	89	85	88	87	12	85	84
" thumb	35	35	35	35	35	34	31	35	35	32	31	30	32	19	29	32	33	29	29	27	27
" 2nd metacarpal..	47	45	47	44	41	37	43	44	45	46	41	40	40	16	41	41	43	39	39	37	37
" 3rd ..	64	63	64	62	56	52	60	63	63	64	59	54	56	24	59	56	60	56	55.5	53	53
" 4th ..	62	61	62	61	54	54	58	60	61	63	58	52	54	23	55	54	58	53	51	53	50
" 5th ..	60	59	60	61	53	52	58	59	60	61	57	51	54	24	55	52	56	52	52	51	50
" tibia	46	41	46	40	35	34	42	42	40	43	39	36	37	16	35	35	38	39	38	38	36
" foot and claws ..	27	25	27	24	24	24	22	24	24	23	25	21	21	17	22	22	23	20.5	22	20	20
Stretch of wing	575	585	575	550	450	480	537	600	562	540	565	515	515	220	512	475	495	535	..	450	478

1 Young with its eyes still unopened found attached to its mother, the preceding female.

the tibia, a condition which becomes reversed in adult age. A comparison, however, between the length of a compound member, such as the thumb, and a simple bone, such as the tibia, could not but be unreliable unless it had previously been ascertained that growth had ceased in all the bones which had formed the subject of comparison.

The same caution is also necessary before deductions can be made regarding the relative proportions which the long bones of the limbs hold to one another in adult life. In certain mammals the absolute length of the tibia in the early stages of development is considerably less than that of the humerus, whereas in adult life the latter bone is ultimately shorter than the former. From these facts, and by a reference to the foregoing table, it will be seen that Dr. Günther was justified in questioning the validity of the supposed diagnostic character laid down by Dobson.

There can be no question as to the specific identity of the Cyprus and the two Palestine bats with those of North-eastern Africa.

This species is closely allied to *R. collaris*, but when examples from Egypt are compared with specimens from South-Africa they are found to have slightly longer and broader muzzles and somewhat longer ears. These differences, however, are so trivial that when extensive materials from the immense area intervening between the Cape and Cairo have been brought together and studied, the probability seems to be that *R. collaris* will be found to merge with *R. ægyptiacus*. Besides its larger size, the chief feature of the skull of the latter as compared with the former, when viewed from above, is its broader muzzle. The teeth also of *R. ægyptiacus* are larger than those of *R. collaris*.

A bat closely allied to *R. ægyptiacus* occurs in S.E. Arabia, but its size is less, and its muzzle is narrower than in *R. collaris*. The ear is more pointed than that of the Egyptian bat, and both its borders are markedly less convex, more especially the inner one, which is nearly straight. The ear is also broader than the ear of *R. collaris*, which is markedly oval compared with the ear of *R. ægyptiacus* and of the bat from Arabia. The crania, when viewed from above, present certain features by which it is possible to distinguish one from the other when the skulls are considered side by side. Thus the skull of *R. ægyptiacus* has a decidedly broader muzzle than that of *R. collaris*, which in its turn has a wider muzzle than that of the Aden bats. When the under surface of the skull is examined, the palatal region is found to conform in its general characters with those of the muzzle seen from above. Thus, the palatal area of *R. ægyptiacus* is broad and spatulate, that of *R. collaris* is less so, while that of the Aden bats is distinctly narrowed anteriorly and less expanded posteriorly between the last molars. The bats from Aden are greyish brown, slightly darker on the top of the head, whilst the area between the shoulders is pale grey with a yellowish tinge, and the longest hair on the neck of males is yellowish brown. These Aden bats were

provisionally referred by Thomas and Yerbury¹ to *R. ægyptiacus*, as there did not seem to them to be any tangible differences between these South-Arabian bats and examples from Egypt; further material, however, has shown their true relationship.

The name *R. arabicus* is proposed for this form; the specimen in the British Museum, ♂ (No. 95.6.1.47), will stand as the type.

Bats of this genus from Nipal have ears resembling those of bats from Aden and Karachi, but their tails are considerably longer. Their skulls, however, are strikingly distinct from the skulls of the Arabian bats, and their teeth are smaller. The last lower molar also is narrow and elongate, and very different from the more rounded last lower molar of *R. arabicus*. These Himalayan bats have been named by Hodgson² *Pteropus pyrivorus*; but of recent years it has been the custom to regard this term as a synonym of *R. amplexicaudatus*, Geoffr.³ The specific identity, however, of the Nipal bat with the typical *R. amplexicaudatus* from the island of Timor is impossible to accept. The comparison which Dobson instituted between *R. ægyptiacus* and *R. amplexicaudatus* led to a considerable misunderstanding regarding the relations which exist between these forms. This appears self-evident from an examination of the materials which he referred to the latter species. The only example in alcohol of the typical *R. amplexicaudatus* to which Dobson had access in the British Museum was an adolescent male, which he unfortunately regarded as an adult female. This specimen has a long tail like that of the type of the species from Timor, which is perfectly distinct from the continental bats referred by Dobson to *R. amplexicaudatus*.

A stuffed specimen in the British Museum from Timor, and a skin of a bat of about the same size from Flores, should be associated with a specimen in alcohol from the Philippines and with a skin from the same islands⁴. The specimens from these three localities possess the essential features of *R. amplexicaudatus*, as each has a long tail, much longer than in any of the other specimens associated with them by Dobson. Five of the latter from the following localities, viz. the Laos Mountains, Sumatra, the Himalayas, and India, are distinguished by short tails and by the dorso-lumbar region being covered with hair to a greater extent than in typical *R. amplexicaudatus*. There is also in the British Museum a set of five larger bats, presented by the Leyden Museum, but without localities, in which the dorso-lumbar region is covered with hair, but much more narrowly than in the other bats. Besides these, there is *R. seminudus*, from Ceylon, with a long, narrow, pointed head and so very little hair on its body generally that it was given this appropriate name by Kelaart⁵. The lobe of the ear is well developed in all of these bats.

¹ Proc. Zool. Soc. 1895, p. 545.

² Journ. As. Soc. Beng. 1835, p. 700.

³ Ann. Mus. xv. 1810, p. 96, pl. iv.

⁴ The tail of this specimen has been lost.

⁵ Prodr. Faunæ Zeylanicæ, 1852, p. 27.

Attention is here called to these facts, as in the most recent work on the Megachiroptera¹ all of these forms, and others equally requiring to be distinguished as at least of subspecific rank, have been referred to *R. amplexicaudatus*. The study of these Asiatic Chiroptera is beset with difficulties, but it would seem that the term *R. amplexicaudatus* should be restricted to the insular bats just indicated, and that the term *R. leschenaultii*, Desm., should embrace under it the bats of the southern parts of the Asiatic continent westward from Burma.

The large fruit-eating bat *Rousettus (Pteropus) stramineus* (E. Geoffr. St.-Hil.)² has been recorded from the Upper Nile region (Sennaar, Kordofan, and White Nile) under a diversity of names.

Botta was the first to obtain it at Sennaar, as recorded by Temminck³. Among the names under which it appears in zoological literature may be mentioned *Pterocyon paleaceus*, Peters, *Xantharpyia leucomelas*, Fitzinger, and *X. palmarum*, Heuglin. According to the last-mentioned author, this bat lives in companies, or in pairs, on the Doleb palm (*Borassus æthiopicus*). It can see extremely well in daylight, but, as a rule, keeps hidden away under the withered leaves of the palms until dusk; it is always awake and stirring on moonlight nights. It usually emits a peculiar cry when it turns quickly on the wing or settles down on a palm-tree. Heuglin relates that a specimen which he had captured and had placed in a small cage made of palm-leaves, in the absence of any better means of confinement, was put in its cage inside a packing-case at night for safety; at dusk it bustled about in its narrow prison, squeaking and screaming. The noise it made attracted many of its fellows on the wing, who flew vigorously and furiously against the box, swooping down upon it like birds of prey. The food of this species consists almost exclusively of the fruit of the Doleb palm, on which it so gorges itself that it can be easily knocked down.

The genus *Epomophorus*, or Epauletted Fruit-Bats, the members of which are all fawn-coloured, is represented in the region of the Atbara and White Nile by a single species, *E. labiatus* (Temminck)⁴. It has also been recorded from the valley of the Bellages in the Sennaar district by Heuglin. It has been mentioned by Hartmann⁵ under the name of *Pteropus whitei*, Bennett. This species flies by day as well as by night, and lives principally on figs, bananas, and the fruits of *Cordia*.

¹ Matschie, Megachiropt. Berl. Mus. 1899, p. 67.

² Ann. du Mus. xv. 1810, p. 95; Sundv. K. Vet.-Ak. Handl. Stockh. 1843, p. 198; Peters, MB. Ak. Berl. 1861, p. 423.

³ Monogr. Mamm. ii. 1835-41, p. 84.

⁴ Monogr. Mamm. ii. 1837, p. 83, pl. 39; Matschie, Megachiropt. 1899, p. 54.

⁵ Zeitschr. Ges. Erdk. Berl. iii. 1868, p. 40.

It may be noticed, in passing, that two other species of *Epomophorus*, viz. *E. anurus*, Heuglin¹, and *E. pusillus*, Peters², occur in the Bahr el Ghazal region.

Bats on the Monuments.

Bats apparently were very seldom represented on the Monuments; indeed, the only instances of their occurrence as yet recorded are from Beni Hasan³ in one and the same tomb, viz. that of Baqt, who was Monarch of the Gazelle Nome early in the XIIth Dynasty. They occur on the north wall of the chamber in a row commencing with several birds, then an unmistakable bat-figure with outstretched wings, followed by a very broken-up figure, unrecognizable, but of which Rosellini⁴ makes a restoration as a bat with folded wings, in his plate of this part of the tomb; another bat with outstretched wings again occurs, but considerably smaller than the first. The birds are continued immediately to the right of the bats; the position of this line of figures is above a row of fishermen in boats, with many kinds of fish in the waters represented beneath them. The illustration given of the scene by the Egypt Exploration Fund (Beni Hasan, ii.) is very minute in its details, but shows well the environment of the bat-figures.

Outline tracings of the two bats, of exact size, were copied for my use, by favour of Mr. Griffith, from a collection of full-sized tracings which Mr. Newberry had made for the 'Survey' of the Egypt Exploration Fund, preserved in their office but not published. These have enabled me to give the exact measurements of the figures. The larger of the bats with wings outstretched measures 530 mm. from tip to tip, and the smaller one 270 mm.

Over the first of these figures the following hieroglyphs are painted, which Mr. Griffith informs me may be rendered 'S'hmw' ('Sakhemu'):

and over the second are the hieroglyphs which may be rendered

'D'gy' ('Dagy' or 'Degy'), probably meaning "concealed" or the "hider," and so appropriate to the habits of this animal.

These ancient figures represent Bats of the family Pteropodidæ. It is possible that they may have been intended for the common frugivorous bat of Lower and Middle Egypt, *Rousettus ægyptiacus*, but this is a mere speculation: no more explicit statement can be hazarded regarding this artistic venture of 4000 years ago.

The figure of the larger bat has been reproduced by Gervais⁵ about six times less than the representation *in situ*, under his description of the "Genre *Rousette*."

¹ Nov. Act. Ac. Leop.-Carol. Nat. Cur. v. xxxi. 1864, p. 12; Matschie, Megachiropt. 1899, p. 54.

² MB. Ak. Berl. 1867, p. 870; Matschie, *op. cit.* p. 58.

³ Beni Hasan, part ii. (Tomb 15) plate iv.

⁴ Rosellini, Mon. Civ. pl. xiv. figs. 4-6.

⁵ Hist. Nat. des Mammifères, i. (1854) p. 186.

Suborder *MICROCHIROPTERA*.

Carnivorous Bats living chiefly on insects, rarely frugivorous. Molar teeth with acutely tubercular, transversely furrowed crowns; osseous palate not prolonged laterally behind the last molar. Second digit of manus always clawless, generally with a single rudimentary phalanx and rarely with two phalanges, or devoid of one. Ear-conch not forming a complete ring at the base, but each border arising separately from the side of the head. Stomach simple, but sometimes (*Desmodontes* of the family Phyllostomatidæ) with a diverticulum at its cardiac end.

Spread over the tropical and temperate regions of both hemispheres ¹.

RHINOLOPHIDÆ.

Nasal apertures situated in a depression on the upper aspect of the muzzle and surrounded by foliaceous cutaneous appendages. Ears large, separated, as a rule, from one another and devoid of a tragus. Second digit of manus represented only by a metacarpal; third digit with two phalanges; premaxillary bone more or less rudimentary, suspended from the nasal cartilages.

Dentition variable, but never exceeding: i. $\frac{1}{2}$, c. $\frac{1}{1}$, pm. $\frac{2}{3}$, m. $\frac{3}{3} = 32$.

Upper incisors rudimentary; first upper premolar minute.

Females with two nipple-like appendages slightly in front of the pubis.

This family is divided into two subfamilies, the *Rhinolophinæ* and the *Hipposiderinæ*.

Distribution.—Temperate and tropical parts of the Eastern Hemisphere. Doubtfully present in the Polynesian Subregion.

Subfamily *RHINOLOPHINÆ*.

First digit of foot with two phalanges; each of the remaining digits of the same member with three phalanges. In the pelvic bones the ilio-pectineal spine and antero-inferior surface of the ilium are not connected to form a preacetabular foramen.

¹ Heuglin held that many of the Insectivorous Bats of the Egyptian Sudan move from place to place like migrating birds, to find their sustenance among the Dipterous and other insects which follow the herds of the Nomads.

RHINOLOPHUS.

Rhinolophus (E. Geoffr. St.-Hil.), Desm. Nouv. Dict. Hist. Nat. 1803, xix. p. 383.

Nose-leaf consisting of three portions, an anterior, a central, and a posterior: the anterior nose-leaf is horizontal, more or less horseshoe-shaped, with a deep incision in its anterior border; it contains within it the openings of the nostrils; the central membrane (the *sella*) rises between and behind the nostrils, is erect in position, flattened in front, and from its back a vertical, laterally compressed process arises, which is either free, or connected with the posterior leaf, which is also erect, triangular in form, with depressions or crypts on its anterior surface. The lower end of the outer border of the conch is expanded to form a large antitragus. Metacarpal of fourth digit longer than that of the second digit. Basioccipital generally narrow between the auditory bullæ; cochleæ prominent, deeply grooved externally; foramen rotundum united with the sphenoidal fissure.

Dentition: i. $\frac{1}{2}$, c. $\frac{1}{1}$, pm. $\frac{2}{3}$ or $\frac{1}{2}$, m. $\frac{3}{3} = 32$ or 28.

Second lower premolar generally minute, placed outside the tooth-row; first upper premolar minute, pointed, either in the tooth-row or placed somewhat externally between the closely approximated canine and the large second premolar.

Males frequently with a bone in the penis.

Temperate and tropical parts of the Eastern Hemisphere. Hibernate in temperate regions.

RHINOLOPHUS EURYALE, Blasius. (Plate XVI. fig. 1.)

Rhinolophus euryale, Blasius, Anz. der bayer. Akad. der Wissensch., July 1853, p. 109; Wiegmann, Arch. für Naturg. i. 1853, p. 49; Fauna Deutschl., Säugeth. 1857, p. 35, figs. 12 & 13; Fitz. & Heuglin, SB. Akad. Wien, liv. i. 1866, p. 548; Peters, MB. Ak. Berl. 1871, p. 308; Dobson, Monogr. As. Chiropt. 1876, p. 51; Heuglin, Reise Nordost-Afr. ii. 1877, p. 22; Dobson, Cat. Chir. B. M. 1878, p. 116, pl. vii. fig. 6; Trouessart, Le Naturaliste, vol. i. 1879, p. 125; Dobson, Bull. Soc. Zool. Fr. v. 1880, p. 236; Lataste, *ibid.* p. 239; Anderson, Cat. Mamm. Ind. Mus. pt. i. 1881, p. 111; Tristram, West. Palestine, 1884, p. 26; Lataste, Act. Soc. Linn. Bord. xxxix. 1885, p. 187; Trouessart, Cat. Mamm. fasc. i. 1897, p. 93; Seabra, Jorn. Sc. Lisb. (2) v. 1898, p. 249.

Hipposiderus euryale, Thomas, Ann. Mus. Civ. Genov. 2^a, xvii. 1896-97, p. 105.

2 ♂ and 2 ♀. Ramleh near Alexandria.

1 ♂. Serapeum near Sakkarah.

Ears acutely pointed, slightly longer than the head; inner margin below the tip slightly convex, then more or less concave; the outer two-thirds markedly convex;

1. RHINOLOPHUS EURVALE. 2. RHINOLOPHUS ANTINORII.

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outer margin concave below the tip, the portion below being very faintly convex and forming an obtuse angle at its junction with the autitragus, which is rather shallow.

Horizontal nose-leaf not covering the sides of the muzzle; a small papilla on each side of the anterior end of the mesial raphe, as in *R. hipposideros*, Bechst.

Sides of the sella straight, not contracted at their middle, but parallel, its summit somewhat rounded and surmounted posteriorly by an acutely-pointed process; posterior leaf moderately long and ending in a subacute point. Lower lip with two grooves. Wings arising from above the ankles, the interfemoral membrane from halfway between the knee and the ankle.

Upper surface pale brown, the lower two-thirds of the hair being greyish. Under surface nearly pure white. Wings and interfemoral membranes darker brown, the free margins of both membranes being greyish. The lower portion of the ear, including the tragus and the nose-membrane, the face, and chin of a yellowish flesh-colour.

Dentition: i. $\frac{1}{2}$, c. $\frac{1}{1}$, pm. $\frac{2}{3}$, m. $\frac{3}{3} = 32$.

Upper incisors small, chisel-shaped. First upper premolar very minute, wedged in between the second premolar and the canine, lying more or less towards the outer edge of the tooth-line. Second upper premolar closely opposed internally to the base of the canine, much longer than the molars. Lower incisors markedly trifid, the first pair placed slightly anterior to the second, than which they are considerably smaller. First lower premolar small, half the height of the third, and closely opposed to the canine. Second lower premolar very minute, lying on the outer side of the tooth-row, wedged in between the first and third premolars; the third premolar large, being slightly higher than the adjoining molar. The second upper premolar is not closely opposed to the canine.

The forearm measures 45 to 47 mm.

The parallel sides and rounded upper margin of the sella, and the subacutely-pointed character of the terminal leaf, at once separate this species from all the others.

This species is distributed over Europe to the south of the Alps and over North Africa. It also occurs throughout Palestine, Syria, and Asia Minor.

In one female from Ramleh the pubic teats are 3 mm. long and 2 mm. in their greatest breadth; but the former measurement must have been greatly exceeded in life, as each is thrown into a number of transverse ridges or folds. Each teat is compressed from before backwards, doubtless due to pressure exercised on it by the mouth of the young.

The skin of the base of the abdomen immediately before these teats is much corrugated transversely and a nearly hairless eminence lies between and behind the teats and immediately before the transverse opening to the vagina, but separated from it by a marked transverse fold. The area external to the teats is also bare. These

teats thus lying free from the surrounding hair are at once accessible to the young at birth. M. R. Rollinat and Dr. Trouessart¹ have pointed out that in the Rhinolophine bats the young are almost always found attached to the pubic teats and not to the pectoral mammæ. They regard them simply as organs for enabling the young to hold on to their mother, and not as lacteal structures.

The bat recorded by Heuglin² from Egypt under the name of *R. capensis*, Licht., is probably this species.

RHINOLOPHUS ANTINORII, Dobson. (Plate XVI. fig. 2.)

Rhinolophus antinorii, Dobson, Ann. Mus. Civ. Genov. 2^a, ii. (xxii.) 1885, p. 16; Trouessart, Cat. Mamm. 1897, p. 95; Thomas, Ann. Mus. Civ. Genov. 2^a, xviii. (xxxviii.) 1897-98, p. 676.

♂. Second Pyramid at Gizeh.

♂. Near Cairo. Hon. N. C. Rothschild, Oct. 1902.

♀. Zoological Gardens, Gizeh. Mr. A. L. Butler, Sept. 1901.

Ear acutely pointed, slightly shorter than the head, internal border very slightly emarginate immediately below the tip, then faintly convex, afterwards straight, followed by a marked convexity passing down to its base; external border marked by a deep convexity below the tip, then sweeping outwards and downwards to the antitragus, which is of moderate depth. Horizontal nose-membrane nearly circular, almost covering the muzzle anteriorly, but not covering its sides, its anterior notch without papillæ. The sella more or less concave on its side, narrowest at its centre, the rounded summit as broad as its base; its height is considerably exceeded by the apex of the connecting process behind, which is obtusely conical when viewed from the side, and rather well clad with long fine straight hairs. Posterior leaf broadly triangular and rather obtusely pointed, sparsely covered with long fine straight hairs. Wings arising from the ankles. Interfemoral membrane arising above the ankle, the extreme tip of tail projecting beyond it. Calcaneum moderately developed.

Uniform pale greyish brown above, darker on the membranes; under surface greyish white. The hairs on the upper lip below the nose-membrane are greyish brown and the claws are yellowish. The fur of the dorsal surface is grey in its lower two-thirds, the terminal third of the hairs being brown.

Dentition: i. $\frac{1}{2}$, c. $\frac{1}{1}$, pm. $\frac{1}{2}$, m. $\frac{3}{3}$ = 28.

The first upper premolar is absent and the second premolar is closely opposed to the canine. Second lower premolar absent.

A bone in the penis of the male.

¹ C. R. Soc. de Biol. (sér. 10) ii. 1895, p. 534.

² Reise N.O.-Afr. ii. 1877, p. 22.

	<i>R. antinorii</i> , ♂, Gizeh. mm.	<i>R. ferrum-equinum</i> , ♂, Sicily. mm.
Snout to vent	48	64
Vent to tip of tail	29	36
Length of head	20	26
Height of ears	20	25
Length of forearm	47	50
„ 1st digit of manus, including metacarpal and claw .	7	9
„ 2nd metacarpal	34	39
„ 3rd „	32	38
„ 4th „	34	40
„ 5th „	34	41
„ tibia	19	23
„ foot	9.5	12
Expanse of wing	285	358

The forearm of the female specimen taken in the Zoological Gardens at Gizeh measures 45 mm.

This is the first published record of the occurrence of this species in Egypt. The type of the species was obtained at Daimba in Shoa.

This species, in so far as the general characters of its soft parts are concerned, is closely allied to *R. ferrum-equinum*; but it is a much smaller animal in every way. Its ears are smaller than those of the latter and are less attenuated at their tips. Its fore limbs, tibiæ, and feet are also considerably shorter, and, moreover, its coloration is different from that of the Horseshoe Bat of Europe. Its dentition likewise at once separates it from that species. Dobson in describing it makes the following remarks:—“It belongs to the same section as *R. ferrum-equinum* and resembles it in the form of its nose-leaf and the general shape of the ear-conch, the latter differing only in its less attenuated tip; but the most notable points of difference are to be found in the much shorter thumb, foot, and tail, and especially in the complete absence of the minute first upper and second lower premolar teeth. The interfemoral membrane is square-cut behind, and the tip of the tail appears on the upper surface of the membrane, which extends for a short distance (about 1 mm.) beyond it. In the absence of more specimens it is impossible to say how far this may be an individual peculiarity. The entire absence of the first upper and second lower premolar is deserving of special notice. I have observed the occasional absence of one of these premolars in the allied species *R. ferrum-equinum* and in *R. æthiops*, but in no instance have these teeth been found altogether wanting.”

[*Rhinolophus clivosus*, described by Cretzschmar (Rüpp. Atlas, pl. 18), came from Mohila in Arabia. Peters (MB. Ak. Wissensch. Berlin, 1866, p. 16) has given some further details of the type specimen, and mentions the exceedingly small first premolars in both upper and lower jaws.

In the British Museum Catalogue (1878) Dobson mentions several specimens of *R. clivosus* from the African continent, whereas in all probability they all belong to the form he afterwards described as *R. antinorii*; this is certainly the case with the specimen he mentions from North Africa received from the Frankfort Museum, which I have examined. In describing this new species from Shoa, Dobson compared it only with *R. ferrum-equinum*, overlooking Cretzschmar's species altogether, which seems to resemble it very closely, possibly only differing in having the minute premolars, a character which may not be very reliable. So far, however, no specimen having these teeth has been found in Africa.—W. E. DE W.]

Subfamily *HIPPÓSIDERINÆ*.

Each digit of the pes with two phalanges. The ilio-pectineal spine connected to the antero-inferior surface of the ilium, forming a preacetabular foramen.

HIPPOSIDERUS.

Hipposiderus, Gray, Zool. Misc. 1831, p. 37.

The nose-leaf consists of three sections, an anterior, median, and posterior ; the first is more or less horseshoe-shaped, flatly applied to the muzzle, with its anterior border not marked with a notch, the nostrils extruded near its centre, separated from each other by a more or less developed ridge, each nostril having its margin or a portion of its margin more or less lamellar ; the median portion or sella is a transverse eminence which divides the anterior from the posterior section of the nose-leaf ; the posterior section of the nose-leaf is usually more or less rounded above, never pointed, rarely tridentate, its upper border projecting somewhat over its anterior surface, which is divided generally into four cellular compartments ; two superimposed lamellar folds lie along the external border of the anterior section of the nose-leaf. The males of some of the species are provided with a frontal sac, rudimentary in females, which lies behind the nose-leaf, and is capable of being erected ; the opening is marked by stiff hairs, and a secretion is poured into the sac by a series of glands which unite with it. Glandular eminences occur above the eyes and at the sides of the posterior section of the nose-leaf.

Dentition: i. $\frac{1}{2}$, c. $\frac{1}{1}$, pm. $\frac{2}{2}$ or $\frac{1}{2}$, m. $\frac{3}{3} = 30$ or 28.

Distribution.—Tropical and subtropical parts of Africa (but reaching 26° N. lat.), Asia, Malaysia, and Australasia.

HIPPOSIDERUS TRIDENS, E. Geoffr. (Plate XVII. fig. 1.)

Rhinolophus tridens, E. Geoffr. St.-Hil. Ann. du Mus. xx. 1813, pp. 260, 265 ; Descr. de l'Égypte, Hist. Nat. ii. 1818, p. 130, pl. 2. nos. 1 & 1', et pl. 4. nos. 2 & 2'' ; Desm. Mammal. 1820–22, p. 126 ; Fischer, Syn. Mamm. 1829, p. 136 ; Griffith, Cuvier's An. King. 1827, v. p. 77 ; Desmarest, Nouv. Dict. 1819, xxix. p. 252 ; Temm. Monogr. Mamm. 1835–41, p. 19, pl. 27. fig. 19 ; Wagner, Schreber, Säugeth. Suppl. i. 1840, p. 423 ; Rüppell, Mus. Senck. iii. 1845, p. 155.

Hipposiderus tridens, Gray, Mag. Zool. & Bot. ii. 1838, p. 493 ; Blanford, Faun. Brit. Ind., Mamm.

1888-91, p. 282; Yerbury & Thomas, Proc. Zool. Soc. 1895, p. 546; Matschie, Säugeth. Deutsch-Ost-Afr. 1895, p. 22.

Phyllorhina tridens, Bonap. Saggio Distrib. Anim. Vert. 1831, p. 16; Peters, MB. Ak. Berl. 1871, p. 314; Dobson, Monogr. As. Chirop. 1876, p. 59; id. Cat. Chirop. B. M. 1878, p. 131, pl. viii. fig. 3; Klunzinger, Zeitschr. Ges. Erdk. Berl. xiii. 1878, p. 62; Anders. Cat. Mamm. Ind. Mus. pt. i. 1881, p. 113; Tristram, Fauna of West. Palest. 1884, p. 26; Lataste, Vert. de Barbarie, Mammif. 1885, p. 65; Nehring, Kat. Säugeth. Kgl. Landwirth. Hochschule, Berlin, 1886, p. 4; Monticelli, Ann. Mus. Civ. Genov. (2) v. 1887-88, p. 522; Trouessart, Cat. Mamm. fasc. i. 1897, p. 96.

Asellia tridens, Gray, List Mamm. B. M. 1843, p. 24; id. Proc. Zool. Soc. 1866, p. 82.

Phyllorhina tridens, var. *murraiana*, Anders. Cat. Mamm. Ind. Mus. i. 1881, p. 113; Murray, Vert. Zool. Sind, 1884, p. 6, pl. i. fig. 2 (head).

1 ♂. Minia. Major R. H. Brown, R.E., C.M.G.

1 ♂. Tomb of Scti the First.

2 ♂ and 3 ♀. Upper Egypt. Col. E. Larkins.

1 ♂ and 1 ♀. Tombs of Assasif, Thebes.

5 ♂ and 5 ♀. Assuan, Tombs in west banks excavated by Sir Francis Grenfell, G.C.B.

1 ♀. Tor, Sinaitic Peninsula.

Internal border of ear convex from the tip inwards and backwards. External border emarginate below the tip, then slightly convex, and afterwards more or less concave as it bends forwards to the side of the head. The height of the ear is half as long again as the interval between the attachment of its external border to the side of the head and the tip of the snout. A shallow pit immediately before the interior border of the margin of the external meatus formed by an outward fold of its rim. Posterior portion of nose-membrane tridentate, the central portion triangular, pointed, the external sections lower and more rounded; a short longitudinal fold connects each eminence with the intermediate portion of the nose-leaf, the three containing between them two cells or pits. The upper margin of the intermediate portion is continuous with the contour of the anterior or nasal portion of the nose-leaf, whilst the outer margin of the tridentate or posterior section of the nose-leaf passes outwards and sweeps forwards transversely on the side of the muzzle above the root of the canine; in its lower portion it encloses a short secondary fold which does not extend downward beyond it, and external to the principal fold there is a very short rudimentary fold. A cell or pit lies below the internal dentation of the posterior section of the membrane; and below it, between the wavy outer border of the downward and forward continuation of the dentate portion, there is a deep channel, and another between the nose-membrane proper and the short secondary fold. The central fold of the tridentate portion is prolonged downwards over the convex face of the intermediate portion of the nose-membrane to the septum, dividing the nostrils, behind each of which there is a depression. The external border of each nostril is raised, terminating in a more or less obtuse point. The nasal portion

1, 1A. HIPPOSIDERUS TRIDENS.
3. PLECOTUS AURITUS.

2, 2A. NYCTERIS THEBAICA.
4. VESPERTILIO INNESI.

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of the membrane, when viewed from above, projects as far forwards as the tip of the snout. Anteriorly its mesial line is generally marked by the presence of a minute papilliform eminence.

The wings arise immediately above the ankles. Ears naked, with the exception of a few fine hairs on the inside margin and at the base of both borders. Upper third of humerus haired, rest of the upper surface and the forearm nude; femur and tibia and under surface of both limbs nude. Upper surface of foot sparsely covered with fine hairs. Interfemoral membrane square. Caudal vertebræ to half of the fifth within the membrane, sixth and seventh free. The free portion of the tail clad with a few long fine hairs.

Hair on upper surface whitish, but narrowly tipped with pale greyish brown or slate-colour, the white appearing largely through the brown. Under surface greyish white. Limbs above and below rich yellowish-red or flesh-coloured. Nose-leaf pale fleshy. Ears greyish. Wing-membrane brownish.

Dentition: i. $\frac{1}{2}$, c. $\frac{1}{1}$, pm. $\frac{1}{2}$, m. $\frac{3}{3}$ = 28.

Measurements.

	♂.	♂.	♀.	♂.	♂.	
	Thebes.	Minia.	Tor, Sinaitic Peninsula.	Aden.	Aden.	Tombs of Assasif.
	mm.	mm.	mm.	mm.	mm.	mm.
Snout to vent	58	54	56	62	62	48
Vent to tip of tail	26	25	25	27.5	27	23
Length of head	21	21	20.2	22.5	22.5	21
Height of ears	18.5	18	19.5	20	19.5	17.5
Length of forearm	50	51.5	53	56	54.5	49
„ 1st digit of manus	9	10.5	10	10	9.2	10
„ 2nd metacarpal	39	39	38	43	41	37
„ 3rd „	36	36	38.5	42	39	36
„ 4th „	34.5	36.5	36.5	40	39	35
„ 5th „	30	30	30	33	34	29.5
„ tibia	20	18.6	20.5	21	21	19.5
„ foot	10	9.6	9.6	10.5	10	9
Stretch of wing	280	281	293	325	315	240

Geoffroy St.-Hilaire states that this species was found in the principal underground chambers and monuments of Egypt, mentioning among them the Tombs of the Kings and the temple of Denderah. In 1880-81 I found this bat in immense numbers in the temple of Denderah, but twelve years later, although I penetrated to most of the chambers in search of bats, I did not meet with a single individual of this species; this was doubtless to be accounted for by the excavations and restorations that had taken place in the interval.

In one of the tombs of Assasif into which I penetrated in 1892 this species occurred in vast numbers, apparently to the exclusion of any other species ; when I had so far advanced into the tomb that artificial light was necessary, the sensation was as if I were in the midst of a cloud of bats. They circled about me with great rapidity, occasionally falling half-stunned by flying against my person, sometimes even against my face. This disagreeable experience, but more especially the overpoweringly sickening stench, intensified by the heat prevailing in the inner recesses of the tomb, drove me forth to the fresh air and blue sky. It occurs even in still greater numbers in the tombs at Mount Grenfell, opposite Assuan, some of which are rarely or never visited.

This species has been recorded from Senegal, Algeria, Tunisia, Southern Syria, and Zanzibar ; and some years ago I described the subsp. *murraiana*¹ from Karachi and Bushire, with which the form from Southern Arabia has been identified by Thomas².

These individuals from Arabia are distinguished from those from Egypt by their greater size, longer forearms and metacarpals (see Table, p. 101), and consequently greater length of wing. The anterior portion of the nose-leaf in all of them is distinctly larger than in the typical form. None of the bats found in India are referable to the typical form, and it will be observed that even the female from Tor, in the Sinaitic Peninsula, conforms to the characters of the foregoing variety. In Egyptian examples of this species the forearm measures as follows : in the male, 49, 49.5, 50, and 51 mm. ; and in the female, 47, 48, 49 mm. ; while the forearm in males from Aden measures respectively 54, 54, 58, and 56 mm.

I am indebted to Prof. Stewart, of the Royal College of Surgeons, for a microscopic section of the pubic teats of this species, which reveals the fact that each is furnished with a duct into which open numerous secondary ducts lined with columnar epithelium, but the existence of glandular structure has not as yet been demonstrated.

According to Temminck there are some bats from Khartum and Kordofan in the Stuttgart Museum, which he states are referable to *Hipposiderus caffer*, Sundevall³.

¹ Cat. Mamm. Ind. Mus. i. 1881, p. 113.

² Proc. Zool. Soc. 1900, p. 99.

³ Öfvers. K. Vet.-Akad. Förhandl. iii. 1846, p. 118.

Families NYCTERIDÆ and MEGADERMATIDÆ.

In the Nycteridæ the nostrils are very small, and are situated on each side of a deep hairless depression on the upper surface of the snout, the point of which slopes downwards and forwards, and is covered with short hairs and a few long fine hairs. The mesial line of the posterior margin, overlooking the pit in which the nostrils lie, has a somewhat backwardly projected process. The nasal pit is the anterior ending of a well-defined deep mesial longitudinal facial furrow, which is divided into two parts. The first part, from the nostrils backwards to about level with the eyes, is not so deep as the section immediately behind it. The latter begins anterior to a transverse line connecting the two small eyes. This hinder portion has its floor at a lower level than the anterior portion. The margins of this great and deep facial furrow are defined externally on each side by three folds of skin. The first is a more or less pedunculated lobe immediately behind the line of the nostrils; its inner surface is perfectly round, flat, and hairless, and is generally opposed to its fellow of the opposite side, so that the openings to the nostrils are reduced to two oblique slits defined posteriorly by these lobes, and anteriorly by the nasal margin of the snout, which has usually a more or less defined backwardly projected eminence. The upper surface of each of these lobes is well covered with hair. Internally to this, and in the bottom of this part of the furrow, there is a hairless fold of skin arising on the inner side of each nasal orifice and curving backwards and outwards, and terminating on the upper edge of the facial furrow, on a line, or nearly so, with the beginning of the portion of the facial furrow lying at a deeper level. A small lobe on the commencement of each of these folds exists opposite to each nostril, and, having a gentle outward curvature, is opposed to the outer wall of the furrow immediately over the nostril. The posterior part of the outer wall of this fold is clothed more or less with hairs. The second portion of the facial furrow is traversed by a median fleshy septum, attached posteriorly to the front of the frontal bone. Each outer wall of this part of the facial furrow curves outwards and backwards, and ends in a free fleshy process that lies opposed to the upper surface of the lateral offshoots of this part of the facial ridge externally to the termination of the foregoing septum. On each side of the septum there is a semicircular pit with a delicate membrane covering its floor. The posterior ending of the septum is practically in the mesial line of the membrane connecting the ears.

The nose-leaf of the Megadermatidæ is structurally widely distinct from that of the Nycteridæ. It attains to a great size, is composed of two portions, the smaller connected with but overlying the larger portion. The latter begins on the upper surface of the snout as a procumbent fold of skin with a more or less free border, and

underneath the free anterior margins of this membrane are the minute nostrils, which are consequently placed completely on the upper surface of the muzzle. The nose-leaf is horseshoe-shaped in the anterior part of the snout, but beyond is prolonged backwards as a free erectile leaf-shaped membrane overlying a deep concavity on the frontal region of the head. Anteriorly this membrane is traversed longitudinally by a pronounced convexity or midrib, resulting from a mesial longitudinal fold, as is seen by its being concave posteriorly. Its anterior end is connected to the posterior border of the more or less cordate second or overlying membrane, which occupies the concavity of the horseshoe-shaped portion of the nasal appendage. This cordate-like membrane is only attached to the horseshoe membrane immediately before and behind the nostrils, but its free border is notched anteriorly, so that each section acts as a valve to protect or to close the nasal passages. In *Megaderma lyra* the anterior border is freer than in *M. spasma* and *M. cor*, and in the mesial line there is a rounded eminence in *M. lyra* that slightly raises it and tends to bring it in contact with the septum dividing the nostrils. Its posterior portion is perfectly free, and the convexities on its outer surface are due to the folding of the membrane and are concave behind. The eyes are very large, and over the inner canthus of each there is a large wart, and from this point a marked fold of skin is attached to the back of the inner half of the erectile leaf-like portion of the nasal appendages. These two folds define a deep recess which passes forwards behind the nose-leaf as far as the attachment of the horseshoe-shaped portion in the mesial line behind the nostrils. These membranes are more or less clad with short hairs anteriorly, but less so posteriorly. The foregoing characters are distinctive of *M. lyra*, *M. spasma*, and *M. cor*. On the other hand, the anterior border of the horseshoe-shaped portion of the nasal appendage, which in the foregoing species has only a feeble free margin, is greatly developed in *M. frons*. It projects upwards as a foliaceous expansion, and is so folded in the mesial line as to give rise to a marked process overlooking the division between the nostrils. The so-called midrib of the erect foliaceous portion of the membrane, which is enormously developed in this species, gradually expands anteriorly into the equivalent of the cordate portion in the other species, which becomes very obscure in *M. frons*, and assumes the character of a basal expansion of the midrib. The anterior free borders of this portion of the equivalent of the cordate membrane are expanded on either side into similar hairless expansions lying over the nasal orifices in close contact with the equally hairless posterior upturned free border of the horseshoe-shaped membrane. The nostrils are thus even more protected than in the other species. The mesial pit behind the membranes is not so much developed as in the other species. In *M. lyra*, *M. spasma*, and *M. cor* the lower lip has a mesial groove with a fleshy eminence on each side of it; the groove does not exist in this species (*M. frons*), but the front of the lip is fleshy.

The construction of the nasal apparatus, as has been seen, is perfectly distinct in the two families. The Nycteridæ are further distinguished from the Megadermatidæ by other structural modifications. The spinal column of the former differs from that of the latter in being prolonged to the extremity of the interfemoral membrane, and the terminal vertebra is T-shaped; whereas although the interfemoral membrane of the Megadermatidæ is quite as well developed as in the Nycteridæ, the terminal caudal vertebræ are rudimentary, and consequently the interfemoral membrane is not traversed. There is also a marked structural modification of the skull; in the absence of ossified premaxillæ the upper incisor teeth in the Megadermatidæ are wanting, while both bones and teeth are present in the Nycteridæ. The Nycteridæ have only the metacarpal representing the second digit of the manus, whereas in the Megadermatidæ a phalange is added. In the two families the fibula is absent.

Dobson, in contrasting *Megaderma* with *Nycteris*, stated that the affinity of the two genera was shown by the peculiar form of the frontal bones, and also by the form and structure of the ears. The structure of the ear in these two bats is, however, perfectly distinct. In the Nycteridæ the inner borders of the ears are never united (though the bases are connected by a low frontal band), and consequently the inner border, as it approaches the base, curves outwards and backwards into the cavity of the conch, and ends in its inner aspect immediately behind the origin of the tragus in a small lobular projection. In the Megadermatidæ, owing to the union of the inner borders of the ears, this arrangement is entirely absent. In the lower portion of the external border of the ear of the Nycteridæ there exists on the inner surface a thin fold of skin variously developed, but always markedly present, which passes downwards along the wall of the conch, and terminates slightly above the outer margin of the external meatus, from which it is separated by a thickened fold of skin that runs backwards to the wall of the conch. A more or less shallow depression is defined by the union of these two folds. The former of these folds is entirely unrepresented in the Megadermatidæ, but there are slight indications of the existence of the latter. In the Nycteridæ the external border of the ear before its attachment to the side of the head develops a well-marked sensory semicircular antitragus, a structure which is absent in the Megadermatidæ in which true sensory hairs in this region of the ear do not occur. In the Nycteridæ the inner and outer surfaces of the ear-conch and of the tragus are covered with circular areas, from the centre of each of which springs a sensory hair, but these structures are completely absent from the thin membranous tragus of the Megadermatidæ.

The foregoing structural differences seem of sufficient importance to entitle the animals which manifest them to be referred to two distinct families, viz., the Nycteridæ and Megadermatidæ, and hence they appear as such in these pages.

E. Geoffroy St.-Hilaire ¹, in 1813, wrote a paper entitled “ De l’Organisation et de la Détermination des Nyctères, une des Familles de Chauve-Souris,” but he did not designate the family by any Latin term. Allan ², in 1864, suggested the name Megadermatidæ for the family of bats indicated by Geoffroy ; but Dobson ³ appears to have been unaware of this, as in 1875 he proposed the term Nycteridæ. As the subfamilies into which Dobson subdivided the Nycteridæ are here regarded as two distinct families, the term Nycteridæ is retained for the group represented by *Nycteris*, and the designation Megadermatidæ is appropriated for those bats represented by the genus *Megaderma*.

¹ Ann. du Mus. xx. 1813, p. 11.

² Monog. of Bats of America, 1864, p. 1.

³ Ann. & Mag. N. H. 1875, xvi. p. 347 ; Palmer, Proc. Biol. Soc. Washington, xii. 1898, p. 110.

NYCTERIDÆ.

Muzzle traversed by a longitudinal furrow. Nostrils deep in the beginning of the furrow, which expands posteriorly on the forehead into a deep pit; sides of the furrow margined by valvular folds. Ears large, separate, but united at their bases over the forehead by a low transverse membrane; tragus short, more or less rounded. Eyes very minute. Tail long, well-developed, and reaching beyond the end of the inter-femoral membrane; terminal vertebra T-shaped. Second digit of manus represented only by the metacarpal. Premaxillæ ossified. Upper incisors present. No pubic teats.

Dentition: i. $\frac{2}{3}$, c. $\frac{1}{1}$, pm. $\frac{1}{2}$, m. $\frac{3}{3} = 32$.

Distribution.—The African continent and Arabia; and in the Oriental Region in the Malay Peninsula and Java only.

NYCTERIS.

Nycteris (Geoffroy St.-Hil.), Desmarest, Nouv. Dict. d'Hist. Nat. xv. 1803, p. 501.

Characters, those of the family.

NYCTERIS THEBAICA, E. Geoffr. (Plate XVII. fig. 2.)

Nycteris thebaica, E. Geoffr. St.-Hil. Ann. du Mus. xx. 1813, p. 20, pl. i. (fig. of head); Descr. de l'Égypte, Hist. Nat. ii. 1818, p. 119, Atlas, pl. i. nos. 2 and 2', & pl. iv. nos. 1 to 1''; Sund. Kgl. Ak. Handl. Stockh. (1842), 1843, p. 198; Wagner, Schreber, Säugeth. Suppl. i. 1840, p. 438; id. op. cit. v. 1855, p. 645; Rüppell, Mus. Senck. iii. 1845, p. 155; Fitz. & Heugl. SB. Ak. Wien, liv. i. 1866, p. 547; Peters, MB. Ak. Berl. 1870, p. 903; Heuglin, Reise Nordost-Afr. 1877, ii. p. 18; Dobson, Cat. Chir. B. M. 1878, p. 165; Giglioli, Ann. Mus. Civ. Genov. (2) vi. 1888, p. 26; Dobson, Ann. Mus. Civ. Genov. (2) ii. (xxii.) 1885, p. 17; Nehring, Kat. Säugeth. Kgl. Landwirth. Hochsch. 1886, p. 4; Monticelli, Ann. Mus. Civ. Genov. (2) v. (xxv.) 1887-88, p. 522; Bocage, Jorn. Sc. Lisb. (2) i. 1890, p. 5; Yerbury & Thomas, Proc. Zool. Soc. 1895, p. 546; Thomas, Ann. Mus. Civ. Genov. (2) xvii. (xxxvii.) 1896-97, p. 105.

Nycteris geoffroyi, Desm. Mamm. 1820, p. 127; Fitz. & Heugl. SB. Ak. Wien, liv. i. 1866, p. 547.

Nycteris albiventer, Wagner, Schreb. Säugeth. Suppl. i. 1840, p. 439; Fitz. & Heugl. SB. Ak. Wien, liv. i. 1866, p. 547.

Nycteris labiata, Heuglin, Nov. Act. Leop.-Carol. Nat. Cur. xxix. 1861, p. 5; id. Reise N.O.-Afr. ii. 1877, p. 18.

(?) *Nycteris angolensis*, Peters, MB. Ak. Berl. 1870, p. 903.

Nycteris revoilii, Robin, Bull. Soc. Philom. (7) v. 1881, p. 90; id. Ann. Sc. Nat. (6) xiii. art. ii. 1882.

3 ♂ and 2 ♀. Karnak.

1 ♂. Khayzam, Luxor.

♀. Zoological Gardens, Gizeh. Mr. A. L. Butler, Aug. 1901.

♀. Near Cairo. Hon. N. C. Rothschild, Oct. 1902.

Eye very minute. Ears very much longer than the head, the extreme height considerably more than one-half the length of the body from snout to vent, their extreme breadth equal to two-thirds of their length; oval in form, with the apex slightly indicated; fold on inner surface of conch along external border well-developed. Tragus expanded and broad in its free portion, broadest at the middle of its inner margin; its posterior border is markedly convex and sweeps round to the anterior border, which is only concave at its base; a prominent, anteriorly folded lobe on the posterior border of the tragus below its free portion. Inner border of the ear fringed with fine ciliary white hairs directed outwards, backwards, and upwards, longest at its base, and becoming very short towards the tip; the rest of the surface of the ears nude, with the exception of a few straggling sensory hairs. The fur is very soft, pale at the base, tipped with smoky fawn, the darker tips being very feebly defined on the face, around the ears and the back of the head, and the whole of the under parts, the almost colourless basal portion of the exceedingly soft fur showing largely on the surface. Muzzle yellowish flesh-colour. Wing-membranes pale brownish, and the ears still paler, the under surface of the limbs being more or less tinged with yellowish. The four upper incisors are bicuspidate. The second lower premolar is very small, and may sometimes be, according to Dobson, quite internal to the tooth-row. In the skull of one male this tooth is partially in the line of the inner half of the tooth-row, whilst its inner half is internal to the tooth-row; and in a female, likewise from Karnak, this tooth is in the line of the other teeth, so that no importance is to be attached to this variable character.

This bat frequents the ruins of Karnak and also those of Thebes, and I have caught it on the wing in the portico of a house not many miles from the former locality. Nothing is known of its habits, but it is in full activity in February.

Native name unknown.

This species is not confined to the African continent, as it is extremely common in the Hadramut, Southern Arabia, and is found at Aden and in the Sinaitic Peninsula. In Egypt proper it has hitherto only been recorded from Thebes and its neighbourhood. To the south it occurs at Dongola, Sennaar, and possibly Kordofan. To the east of the Upper Nile Valley it (or a slightly modified form) has been obtained at Mt. Wagga, near Berbera in Somaliland, at an elevation of 6000 feet above the sea, and as far south as Zanzibar.

Measurements.

	Khayzam.	Luxor.	Karnak.	Hadramut.
	♂.	♂.	♀.	♂.
	mm.	mm.	mm.	mm.
Snout to vent	48	47	49	47
Vent to tip of tail	52	51	52·5	53
Length of head	21	21	21	21
Height of ear	30	28	30	35
Long diameter of eye	...	..	1	...
Inner canthus of eye to tip of snout	9	10	8·3	10
Height of tragus	8	7	8·3	9
Greatest breadth of tragus	4	4	4	4
Length of forearm	44·5	43	44	45
„ 1st digit of manus	11·3	11	12	11
„ 2nd metacarpal	35·5	36·5	37	41
„ 3rd „	33	33	33·5	35
„ 4th „	35·3	35	35	36·5
„ 5th „	35·5	35·5	36	36
„ tibia	22·5	23	23	23
„ foot	11	11	10·5	11
Stretch of wing	280	279	280	273

The specimens from Hadramut, the measurements of one of which I have included in the above Table, have somewhat larger ears than the typical *N. thebaica*, but beyond this and their paler colour they are inseparable from Egyptian individuals.

E. Geoffroy St.-Hilaire in describing *Nycteris thebaica* gives a somewhat elaborate account of a power which he said this bat possessed of inflating itself hypodermically, and states that it had a sort of pouch on each side of the mouth communicating with a great membranous sac formed by the skin of the body and capable of being filled with air. I have carefully searched for this cheek-pouch and for openings leading to a sac, but without success. I had at my disposal rich materials for my search in quest of these structures, as I had over fifty examples in my possession from the Hadramut. No trace of an opening or of a sac could be detected; but to verify my observations I submitted two bats to Dr. W. G. Ridewood, of the British Museum, for his examination, accompanying the bats with the volume in which E. Geoffroy St.-Hilaire recorded his remarks. After Dr. Ridewood had examined them, he wrote to me as follows:—“I am sorry I must confess to complete inability to discover the openings in the cheek-pouches described by Geoffroy.”

In the British Museum there are three skins of bats from Kordofan, and one stuffed specimen from Sennaar, referred by Dobson to a species which he called *N. æthiopica*,

and which is probably identical with the bat called by Fitzinger¹ *Plecotus æthiopicus*. As in *N. thebaica*, the upper incisors are bifid and the second lower premolar is slightly internal to the tooth-row. In the specimen marked "type," the second lower premolar is half internal to the tooth-row, but in the specimen 48.8.19.11 it is wholly internal, and only differs from the same tooth in typical *N. thebaica* in being larger; but in a specimen in alcohol received by the British Museum from Zanzibar after Dobson's catalogue had been published, this tooth is only slightly internal to the tooth-row, and in an example of *N. thebaica* this tooth has much the same characters as in the last-mentioned specimen.

N. æthiopica, however, seems to be distinguished from *N. thebaica* by its more broadly oval ears, by the greater development of the inward curvature of the internal border of the ear in its lower half, and by the greater size of the lobe or projection associated with it. The tragus has also a different form from that of *N. thebaica*, as it is more forwardly curved, and instead of being rounded anteriorly it ends in a more or less defined point, below which its border is concave from before backwards. This bat, in whatever light it may be considered, either as a species or as a local race, unquestionably attains to a decidedly greater size than *N. thebaica*. The tragus of *N. macrotis*, Dobson, from West Africa, has much the same form as that of *N. æthiopica*, but the ears of the former are considerably larger. *N. æthiopica* extends from Kordofan and Sennaar to the south-east as far as Zanzibar and Nyassaland.

Another species of this genus also occurs in the Nile Valley at Khartum, viz. *N. hispida*, distinguished by the tragus attaining its greatest width opposite the base of its inner margin, by its inner margin being concave, by the trifid upper incisors, and by the second minute lower premolar being in the tooth-row.

Dobson, who relegated *N. fuliginosa*, Peters, and *N. damarensis*, Peters, to *N. capensis*, Smith, as synonyms of that species, was inclined to the opinion that *N. capensis* itself, when a sufficient number of specimens were available for comparison, might turn out to be only a variety of *N. thebaica*, and that *N. angolensis*, Peters, would also have to be included.

¹ SB. k. Akad. Wien, liv. i. 1866, p. 546.

MEGADERMATIDÆ.

Face supporting an erect nose-leaf consisting of an anterior and posterior portion, with the nostrils in a concavity on the upper surface of the snout, concealed by the free anterior margins of the procumbent proximal portion of the nose-leaf. Ears large, united to each other directly by their inner borders; tragus large, membranous, and generally asymmetrically bifurcate. Eye large. Tail rudimentary, not traversing the interfemoral membrane. Second digit of manus with a single phalanx. Premaxillæ cartilaginous. No upper incisors. Females with pubic teats at all ages, as in Rhinolophidæ.

Dentition: i. $\frac{0}{2}$, c. $\frac{1}{1}$, pm. $\frac{2}{2}$, m. $\frac{3}{3}$ = 28.

Distribution.—Ethiopian and Oriental Regions, and Ternate (Wallace).

MEGADERMA.

Megaderma, Geoffroy St.-Hil. Ann. du Mus. xv. 1810, p. 197.

Characters, those of the family.

No species of this family occurs in Egypt proper, but the following bat is found to the south of Berber.

MEGADERMA FRONS, E. Geoffr.

Megaderma frons, E. Geoffr. St.-Hil. Ann. du Mus. xv. 1810, p. 192.

Heuglin¹, who has recorded this bat from Khartum, states that it is one of the commonest bats in the Upper Nile region. They are found hanging by one foot on the horizontal branches of the almost bare mimosa trees, and are consequently much exposed to the direct rays of the sun.

He further mentions that this species flies about even in the daytime, and can see well in the full glare of sunlight. He asserts that it dashes through the thick bushes with a restless wavy flight, but with the utmost dexterity, not even touching a single leaf in its course. A very similar observation was recorded by Speke² some years before Heuglin wrote, as he had noticed this bat at Meninga, rising seemingly

¹ Reise Geb. des Weissen Nil, 1869, p. 327.

² Proc. Zool. Soc. 1864, p. 99.

from the ground, and alighting sometimes in the bushes and sometimes again in the grass. In view of this habit, Dobson suggested that *Megaderma frons* probably hunts for grasshoppers and small mammals, like *M. lyra*, which, Blyth pointed out, lives on similar food and even preys on its own kind.

Megaderma cor, which has the anterior nose-leaf somewhat elongatedly cordate and the posterior erect portion roundly ovate, is present in Abyssinia, in which region *Megaderma frons* also occurs.

VESPERTILIONIDÆ.

Nostrils at the extremity of the snout, crescentic or circular; muzzle devoid of foliaceous appendages; eyes minute; a tragus present. Two phalanges in the third digit of the manus. Interfemoral membrane ample, inclosing the entire tail, or with the last vertebra projecting beyond it. Premaxillæ not forming a median palatal suture. Two to four upper incisors separated by a wide space in the mesial line, placed in pairs or singly against the canines. Upper premolars one to three on each side. When more than one upper premolar are present, the anterior is usually minute and often lies internal to the tooth-line. Either two or three lower premolars on each side.

The members of this family are widely distributed over the tropical and temperate regions of the world.

They are divided into two sections, viz., the Plecotine and Vespertilionine.

Plecotine Section.

This division is based on the common Long-eared Bat, *Plecotus auritus*. Ears very large, united at their bases across the forehead; nostrils lunate, with or without cornua.

PLECOTUS.

Plecotus, E. Geoffr. St.-Hil. Descr. de l'Égypte, Hist. Nat. ii. 1818, p. 112.

Forehead raised above the level of the face. Ears enormously elongated; external border of the ear arising shortly behind the angle of the mouth; a well-marked lobule directed forwards and outwards near the base of the inner border at the point of attachment of the transverse fold; tragus very long; a well-developed cup-shaped lobule at the base of the external margin of the tragus. Nostrils on the upper surface of the muzzle, lunate, each with a well-defined cornu. Groups of gland-masses on the snout not raised. The antibrachial membrane continuous from the shoulder to the base of the first digit of the manus. Wing-membrane rising from the side of the metatarsal of the first toe. Penis club-shaped, pointed, and with a bone. Lower incisors trifid.

Dentition: i. $\frac{2}{3}$, c. $\frac{1}{1}$, pm. $\frac{2}{3}$, m. $\frac{3}{3}$ = 36.

PLECOTUS AURITUS, Linn. (Plate XVII. fig. 3.)

- Vespertilio auritus*, Linn. Syst. Nat. 1766, p. 47; Schreber, Säugeth. i. 1775, p. 163, tab. 50; Erxleben, Syst. An. 1777, p. 141; Zimm. Geogr. Gesch. ii. 1780, p. 411; Bechstein, Naturgesch. i. 1801, p. 1143; Hermann, Obs. Zool. 1804, i. p. 16; E. Geoffr. St.-Hil. Ann. du Mus. viii. 1806, p. 197; Kuhl, Deutsch. Flederm. 1817, p. 19; Desm. Mamm. 1820, p. 144; Temm. Monogr. Mamm. ii. 1835-41, p. 181, pl. 48. fig. 4 (head).
- Vespertilio auritus*, var. *egyptius*, Fischer, Syn. Mamm. 1829, p. 117.
- Vespertilio auritus*, var. *austriacus*, Fischer, op. cit. p. 117.
- Plecotus auritus*, E. Geoffr. St.-Hil. Descr. de l'Egypte, Hist. Nat. ii. 1818, p. 118; Atlas, pl. 2. nos. 3 and 4; Fleming, Phil. Zool. ii. 1822, p. 179, pl. i. fig. 1; Gray, Zool. Journ. ii. 1825, p. 109; Fleming, Brit. An. 1828, p. 7; Jenyns, Trans. Linn. Soc. xvi. 1833, p. 54; Bonap. Fauna Ital. 1832-41, p. 98; Sowerby, Lond. & Edin. Phil. Mag. (new ser.) viii. 1836, p. 265; McGillivray, Jard. Nat. Lib. vii. 1838, p. 85; Keys. & Blasius, Wieg. Arch. 1839, p. 306; Blasius, Fauna Deutsch. 1857, p. 39 (woodcut); Giebel, Säugeth. 1859, p. 933; Kinahan, Proc. Nat. Hist. Soc. Dublin, ii. 1859, p. 154; Blyth, Cat. Mamm. As. Soc. Mus. 1863, p. 35; Peters, MB. Ak. Berl. 1866, p. 18; Tristram, Proc. Zool. Soc. 1866, p. 92; Jerdon, Mamm. Ind. 1867, p. 47; Loche, Expl. Sc. de l'Alg., Mammif. 1867, p. 78; Bell, Brit. Quad. 1874, 2nd ed. p. 72; Hutton, Proc. Zool. Soc. 1872, p. 704; Dobson, Monogr. As. Chir. 1876, p. 84; Cat. Chir. B. M. 1878, p. 178; Anders. Cat. Mamm. Ind. Mus. i. 1881, p. 123; Scully, Proc. Zool. Soc. 1881, p. 199; Lataste, Vert. de Barbarie, Mamm. 1885, p. 66; Blanford, Fauna Brit. Ind., Mamm. 1888-91, p. 297; Siepi, C. R. Congr. Int. de Zool., Paris, 1889, p. 53; Anderson, Proc. Zool. Soc. 1892, p. 6; Trouessart, Cat. Mamm. 1897, p. 104.
- Vespertilio otus*, Boie, Isis, 1825, p. 1206.
- Vespertilio cornutus*, Faber, Bull. Sc. Nat. (Férussac), ix. 1826, p. 341; Isis, 1826, p. 515.
- Plecotus communis*, Lesson, Man. de Mamm. 1827, p. 95; Gray, List of Mamm. B. M. 1843, p. 25.
- Vespertilio brevimanus*, Jenyns, Bull. Sc. Nat. (Férussac), xxiv. 1831, p. 139; Trans. Linn. Soc. xvi. 1833, p. 55.
- Plecotus aegyptiacus*, Is. Geoffr. St.-Hil. Mag. Zool. (Guérin), 1832, pl. 3; Fitz. & Heugl. SB. k. Akad. Wien, liv. i. 1866, p. 545.
- Plecotus peronii*, Is. Geoffr. St.-Hil. Mag. Zool. (Guérin), 1832, pl. 3. fig. 1.
- Plecotus christii*, Gray, Mag. Zool. Bot. ii. 1838, p. 495; List Mamm. B. M. 1843, p. 25.
- Plecotus bonapartii*, Gray, Mag. Zool. Bot. ii. 1838, p. 495.

- 1 ♂. Mena House Hotel.
- 1 ♂. Second Pyramid, Gizeh.
- 1 ♂. Minia. Major R. H. Brown, R.E., C.M.G.
- 1 ♂. Tomb of Seti the First. Thebes.
- 1 ♀. Tor, Sinaitic Peninsula.

Ears nearly as long as the body and head, ovate, broadly rounded at their tips.

Fur ashy grey or greyish brown above, greyish white below. The basal portion of the fur very dark brown.

Inner upper incisor bifid, inner cusp much longer than the outer. Outer upper incisor small, lying outside the external cusp of the former, but not so long as it. First upper premolar small, close to the canine, conical, about one-third the length of the second upper premolar, which is very large and longer than the molars. Lower incisors markedly trifid. First lower premolar less than half the height of the canine lying close to it. Second lower premolar half the size of the first, separated slightly from the third, which is large and nearly as high as the adjoining molar. In one specimen (Tor, Arabia) the second premolar has its crown partially hidden by the crown of the first premolar, which is placed external to it.

	Gizeh, Egypt.	Duirat.	Devonshire.
	♂.	♂.	♂.
	mm.	mm.	mm.
Snout to vent	45	45	43
Vent to tip of tail	50	49	44.5
Length of head	19	19	18.4
Height of ear.	35	35	35
„ tragus	18	18	17.3
Breadth of tragus	6.5	6	5
Inner canthus of eye to tip of snout	6.2	7	6.6
Length of forearm	40.5	40	38
„ thumb	8	9	10
„ 2nd metacarpal	34	33	31.6
„ 3rd „	36	35	33
„ 4th „	35	34.5	32
„ 5th „	33.5	33.6	31
„ tibia	19	18	18
„ foot	8	10.5	10
Stretch of wing	256	262	248

Geoffroy was under the impression that the examples of the long-eared bat found in Egypt were smaller than the European bats, but this does not appear to be the case. The snouts of bats from Devonshire (England) are much broader than those of Egyptian individuals, whilst in bats from Duirat, on the confines of Tripoli, the snouts are intermediate between the two.

This species has been met with in Egypt in the recesses of the Pyramids and in those of other monuments, also in houses and in caverns. These are much the same conditions as those in which it is found in Europe, where it is also known to live in trees hollowed by decay or by age. The large ears, equalling the body of the animal in length, are held horizontally forward in flight; and the flight, which is rapid and

irregular, has the fluttering character of that of the Pipestrelle. This bat is active in Europe in the summer months, but hibernates during winter. In Egypt, however, I found it quite lively from December to February. The subject of hibernation in the different species of bats is one well worthy of investigation.

In repose the ears of this bat are contracted along the upper border and across the line of transverse striation, so that they are partially folded back towards the sides of the neck, allowing the tragi to project freely by themselves like small independent ears, the little lobule towards the base of the inner margin of the ear also appearing in profile. Whenever the animal awakes or rouses itself from repose, the ears assume the erect position covering the tragi, and in death the ears always assume the erect attitude.

Distributed over the Palæarctic region; it also ranges to the heights of Abyssinia and Shoa, and on the westward side of the African continent to Teneriffe.

A nearly allied species described by Hodgson¹ from the Himalayas under the name of *P. homochrous*, and of which the type specimen is in the British Museum, is a very dark-coloured small-footed form, being practically uniformly black-brown above and below. Hodgson in all probability miscounted the teeth in the molar series, for he records them as $\frac{4}{5}$; the skull of the type specimen, however, is not in the British Museum. The ears of *Plecotus auritus* in the dry skin are just as he describes them in the Himalayan species, "touching with proximate edges over the forehead, but not united."

I am indebted to Professor Lorenz for the information that the bat mentioned by Fitzinger² under the name of *Plecotus æthiopicus* is not a *Plecotus* at all, but is in all likelihood an example of *Nycteris thebaica*.

¹ Journ. As. Soc. Beng. xvi. pt. ii. 1847, p. 894.

² SB. k. Akad. Wien, liv. i. 1866, p. 546.

OTONYCTERIS.

Otonycteris, Peters, MB. Akad. Berl. 1859, p. 223.

Forehead not raised above the level of the face. Ears very large, directed nearly horizontally, united across the forehead by a well-developed fold of skin as in *Plecotus*. The external border of the ear terminates some distance behind the mouth and there is a well-developed inwardly folded somewhat fleshy lobe opposite to the point of the base of the tragus and opposable to it. No nodule near the base of the inner border of the ear at the point of attachment of the fold of skin connecting the ears. Tragus very large, directed upwards and outwards, with a minute angular lobule at the base of the external margin. Nostrils simple, crescentic, on the side of the snout. Two shallow rather indistinct furrows on the upper surface of the snout from behind its base, surrounding a somewhat hourglass-shaped raised interspace more or less well haired, each furrow continued backwards and outwards towards the upper aspect of the inner canthus of each eye. Antibrachial membrane shallow, continuous from the shoulder to the base of the first digit of the manus. Wing-membrane arises from the side of the metatarsal of the first toe as in *Plecotus*. A small calcaneal lobe halfway between the heel and the tail. Penis with two well-marked lobes, the glans projected forward between the lobes, and furnished with a bone; the middle of the dorsum of the penis with a large supplementary haired process. Two pairs of teats on the pectoral area.

Dentition: i. $\frac{1}{3}$, c. $\frac{1}{1}$, pm. $\frac{1}{2}$, m. $\frac{3}{3} = 30$.

The lower incisors are bifid, the inner chisel-like division of the crown of the teeth being the larger and longer of its two sections. The upper incisors have a strong external basal tubercle or cusp. The canines are short and strong. In form the skull (see Pl. XVIII. figs. 1*b* & 1*c*) is more or less musteline, the muzzle being short and broad, and closely similar in all its characters to the skull of *Pipistrellus*.

In Blanford's definition of this genus¹ it is said, "ears large, separate," but in a footnote it is added, "according to Dobson there is hidden amongst the hairs of the forehead a very low band that connects the ears, but practically they are separated." In dried skins all trace of the connecting fold of skin disappears, but it is clearly preserved in alcoholic specimens, so there is no doubt it was upon specimens in the former condition that Dr. Blanford founded his remarks.

The three females from Siwah in alcohol, one female skin from Gilgit obtained by Colonel J. Biddulph in July 1876, and another specimen from Fao in the Persian

¹ Fauna of Brit. Ind., Mamm. p. 299.

Gulf, also in alcohol, show two pairs of pectoral nipples, one placed a short distance above the other, a unique condition in the order Chiroptera, or, indeed, in any of the higher Mammalia, but whether both pairs have functionally active milk-ducts has to be ascertained.

OTONYCTERIS HEMPRICHI, Peters. (Plate XVIII. fig. 1.)

Otonycteris hemprichii, Peters, MB. Ak. Berl. 1859, p. 223; Dobson, Cat. Chir. B. M. 1878, p. 182; Lataste, Bull. Soc. Zool. de France, 1880, p. 232. (fig. of head and of lower incisor teeth); id. op. cit. p. 237, et Vert. de Barbarie, Mammif. 1885, p. 66; Scully, Proc. Zool. Soc. 1881, p. 199; Blanford, Fauna of Brit. Ind., Mamm. 1888-91, p. 300; Trouessart, Cat. Mamm. 1897, p. 105.

Plecotus ustus, Fitz. & Heugl. SB. k. Akad. Wien, liv. i. 1866, p. 546; Heuglin, Reise N.O.-Afr. ii. 1877, p. 30.

3 ♀ from the Oasis of Siwah.

Snout not abruptly truncated in front, muzzle with a mesial depression, a furrow above the upper lip. Inner margin of nostrils slightly swollen and projected forwards beyond the outer margins, separated by a shallow mesial furrow. Grooves on the upper surface of the muzzle feebly indicated. Ears rounded at the tips, slightly if at all emarginate below the tip on the external border, which is moderately convex as it approaches the head. Tragus when laid forwards reaching the nostril. Upper surface very pale brownish above; under parts white.

Nothing is known regarding the habits of this bat. The male and female obtained by Lataste at Ourgla, in the Algerian Sahara, were caught in a house in which he was sleeping. They entered his chamber, in which a candle was burning, through the open door. The first suspended itself to the ceiling, and while it was being caught the second entered.

This bat has been recorded from the Western Himalayas (Gilgit, 5000 ft.), Libyan Desert (west of Alexandria and Oasis of Siwah), Lower Nubia (Wadi Halfa), and Algerian Sahara (Ourgla).

The specimens of this bat obtained by me from the Oasis of Siwah, all females, were originally preserved in alcohol, but in the transit across the desert the alcohol evaporated, and the specimens were more or less dried up. The desiccating action much contracted the front of the muzzle, at least I suppose so, because a male of this species from Ourgla preserved in excellent condition in alcohol, and for permission to examine which I am indebted to M. Lataste, presents a muzzle with the nostrils well apart and consequently not nearly so pointed as in the Siwah specimens. I have accepted this Ourgla individual as yielding the essential features of the muzzle of *O. hemprichi*, Peters.

1-1c. OTONYCTERIS HEMPRICHI. ♀ SIWAH OASIS.
2, 2A. " ♂ OURGLA, ALGERIA.
3, 3A. " PETERSI, sp. nov. ♀ FAO, PERSIAN GULF.

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Measurements.

	Siwah.			Ourgla.	Persian Gulf.
	♀.	♀.	♀.	♂.	♀.
	mm.	mm.	mm.	mm.	mm.
Snout to vent	74	73	72	66	69
Vent to tip of tail	51	50	49	47	55
Length of head	27	27	26	26	26
Height of ears	35	37	36	35	34
Breadth of ears, greatest . . .	27	27	26	26	27
Height of tragus	18	17	17	17	16
Breadth of tragus, greatest . .	5	5	5	5	4
Length of forearm	61	61	57	59	60
„ 1st digit	11	11	11	12	14
„ 2nd metacarpal	54	52	52	54	54
„ 3rd „	56	54	54	54	54
„ 4th „	54	51	52	52	54
„ 5th „	52	51	50	48	50
„ tibia	24	23	22	25	26.5
„ foot	12	11	11	11	12
Stretch of wing	365	355	325	360	375

Measurements of the skull of a female.

	mm.
Occipital crest posteriorly to tip of premaxillary	23.3
„ to posterior border of premaxillary notch	21
Upper border of foramen magnum to tip of premaxillary	22
Lower border of foramen magnum to tip of premaxillary	20
Length of mesial line of palate	8.3
Breadth of palate between canines	3
„ „ „ last molars	5.3
„ across muzzle at canines	6
„ „ postorbital process	8.5
Least breadth behind postorbital process	4.5
Greatest breadth behind root of zygoma	11.7
„ zygomatic breadth	14.7

The skin of a female bat of this genus was obtained at an elevation of 5000 ft. at Gilgit, in the North-western Himalayas, in July 1876, by Colonel J. Biddulph. From its dried condition it is difficult to compare this skin, more especially the ears, with the specimens from the Oasis of Siwah, in that part of North-east Africa where the types of the genus were obtained; but the muzzle in its dried-up condition closely resembles the muzzles of these three specimens, so much so that the Gilgit skin must

be regarded as specifically identical with the three Siwah specimens and with M. Lataste's male from Ourgla in the Algerian Sahara.

I am indebted to Professor Lorenz for the information that the type of *Plecotus ustus*, Heuglin, preserved in the Vienna Museum is a specimen of this species from Wadi Halfa.

The British Museum has received, in alcohol, a female of this genus from Fao, in the Persian Gulf, which differs in some respects from the North-African and Himalayan representatives of the genus. A figure of this specimen has been given for the purpose of comparison (Plate XVIII. fig. 3).

The muzzle is broad and abruptly truncated in front, shelving downwards and backwards, without any mesial depression or furrow above the upper lip, and the nostrils are only slightly projected forwards beyond their outer margin, but are not separated by a mesial furrow. The ears also are somewhat shorter than those of *O. hemprichi*, and the tragus when laid forwards falls considerably short of the nostrils. This bat is thus distinguished from *O. hemprichi*, and the modifications it offers are more than can be legitimately ascribed to individual variation; beyond the differences already mentioned, its first digit, including its metacarpal, is somewhat longer than that of *O. hemprichi*. This individual from the Persian Gulf seems to represent a local race, which may be indicated as *O. petersi*, sp. nov.

Vespertilionine Section.

Nostrils simple, opening by crescentic orifices at the end of the snout. Forehead not grooved. Ears generally of moderate size.

VESPERTILIO.

Vespertilio, Linn. Syst. Nat. 10, i. 1758, p. 31 (*nec* Dobson).

Body thick and heavy; head broad and flat; muzzle obtuse, with glandular eminences between the eyes. Ears separate, short, broad, triangular, obtusely pointed; tragus usually short and incurved, with the outer margin more or less convex and the inner concave or straight. Legs short; a postcalcanear lobe generally present; feet short and broad.

Dentition: i. $\frac{2}{3}$, c. $\frac{1}{1}$, pm. $\frac{1}{2}$, m. $\frac{3}{3} = 32$.

Outer upper incisors well developed, or if small, distinct.

Almost cosmopolitan in its distribution, but most common in temperate and subtropical regions of the Eastern Hemisphere; some species, however, extend to the Western Hemisphere.

In text-books the next genus (*Pipistrellus*) will be found linked to *Vespertilio* (= *Vesperus* of Dobson) as a subgenus of the very large and unwieldy genus *Vesperugo*; but by most systematic workers it is now considered more convenient to regard the two as distinct genera, although the known characters which separate them are slight. As regards the species of the two genera which are found in Egypt, they are clearly separated by the absence or presence of a bone in the penis; this peculiarity, however, has not yet been investigated in the large majority of the species of the world; so it cannot be here given as a character of universal generic value.

VESPERTILIO INNESI, Lataste. (Plate XVII. fig. 4.)

Vesperugo (*Vesperus*) *innesi*, Lataste, Ann. Mus. Civ. Genov. ser. 2, iv. (xxiv.) (1886), Feb. 2, 1888, p. 625, woodcuts, dent. and head; Noack, Jahrb. Hamb. Anst. 1891, ix. p. 139, pl. i. figs. 6 to 9, fig. mal.; Trouessart, Cat. Mamm. 1897, p. 108.

♂, ♀. Cairo. Dr. Walter Innes, Bey.

Head flat, but the frontal region slightly raised; muzzle rather broad, with the

lateral glandular eminences well developed. Nostrils crescentic, opening anteriorly, and separated by a nearly flat interval equalling the vertical depth of the front of the muzzle between the nostrils. Ears slightly shorter than the head; the internal border somewhat emarginate below the rounded tip, then convex and slightly concave, followed by a marked anterior convexity sweeping backwards to the attachment of the conch. External border of ear slightly concave in its upper half, and markedly convex as it bends downwards and forwards to its point of attachment over the angle of the jaw in a straight line below the attachment of the internal border, and considerably behind a vertical line drawn through the outer canthus of the eye; before its attachment is a large well-marked lobe. The tragus is slightly bent forward, somewhat falciform, and is broadest immediately above its base; it has a well-marked anteriorly curved small lobe at its base. Thumb with a small callosity at its base, and another at the base of the metatarsus. Wing-membrane arising from the side of the metatarsus at the base of the proximal phalanx. Postcalcanal lobe feeble. Last vertebra of tail and sometimes half of the penultimate vertebra free, in the latter case the free portion nearly equals the length of the thumb.

Sides of the head from the ear to the tip of the muzzle nearly nude, but the upper surface, from a little way before the ears, covered with fur. Inner surface of the conch with straggling white hairs, most numerous towards the internal border; upper half of back of ears nude. Wing-membrane on its under surface close to the body, from behind the humerus to the femur, clad with fur, but not very thickly; a few straggling hairs occur here and there on the under surface of the wing, and similar hairs on the under surface of the interfemoral membrane.

Buff colour above, nearly pure white on the under surface; wing-membranes and ears reddish brown.

Inner upper incisor strongly bicuspidate somewhat antero-posteriorly, and more or less grooved to the cingulum; outer incisor small, opposed to the side of the posterior cusp of the inner. Upper premolar large, somewhat longer than the molars, closely opposed to the canine. Last molar narrow antero-posteriorly, almost lamellar. Lower incisors markedly trifid, more or less overlapping. First lower premolar rather less than half the height of the second, and placed in the tooth-row.

Nothing is known regarding the habits of this species. The types were obtained in Cairo, and were named in honour of the collector, Dr. Walter Innes; and since then another example has been procured by Dr. Noack from Egypt, but from what part of the country has not been stated.

As pointed out by Lataste in the original description, this species is closely allied to *V. serotinus*, but the differences enumerated by him as existing between the two forms seem sufficient to entitle both to specific rank until the range of variation among the members of this genus is better understood.

The ear of *V. serotinus* is more erect than in this species and the external border is attached to the side of the head considerably in advance of the attachment of the internal border. The ear is also differently set on to the head, as the anterior convexity at the base of the inner border does not project beyond the eye as in *V. innesi*.

Measurements of an adult male and female.

	♂. mm.	♀. mm.
Length of body and trunk	55	56
„ tail	43	47
„ head	19·5	20
Ear, external margin ¹	16	16
„ internal margin	11	12
Greatest breadth of tragus	2	2
Length of tragus	7	7
„ forearm	41	44
„ thumb and nail ²	6·2	6
„ 3rd finger	63	68
„ 5th finger	48	55
„ tibia	18	20
„ foot and nails.	8·3	10
Expanse of wing	265	290

No bone in the penis.

Dobson in his description of *V. serotinus* says that the outer margin of the ear ends directly below the posterior border of the eye, but in the two specimens of *V. innesi* it is attached to the side of the head considerably behind the eye.

¹ Measured from the origin of the ear to its tip.

² Free portion of digit only measured.

PIPISTRELLUS.

Pipistrellus, Kaup, Skizzirte Entw.-Gesch. u. natürl. Syst. der europ. Thierw. 1st Th. 1829, p. 103.
[Miller, Ann. & Mag. N. H. (6) xx. 1897, p. 379.]

General characters as in *Vespertilio*, but the first pair of small upper premolars absent. This genus represents the *Vesperugo sens. strict.* of Dobson.

Dentition: i. $\frac{2}{3}$, c. $\frac{1}{1}$, pm. $\frac{2}{2}$, m. $\frac{3}{3} = 34$.

PIPISTRELLUS KUHLI, Natt. (Plate XIX. fig. 1.)

Vespertilio kuhlii, Natt. Kuhl, Deutsch. Flederm. Wetterau, Ann. iv. 1817, p. 55; Desm. Mamm. 1820, p. 140; Fischer, Syn. Mamm. 1829, p. 106; Temm. Monogr. Mamm. ii. 1835-41, p. 196, pl. 51. figs. 5 & 6; Schinz, Säugeth. i. 1844, p. 157.

Vesperugo kuhlii, Tristram, Proc. Zool. Soc. 1866, p. 93; Dobson, Monogr. As. Chir. 1876, p. 94; Heuglin, Reise N.O.-Afr. ii. 1877, p. 31; Dobson, Journ. As. Soc. Beng. xvi. pt. ii. 1877, p. 311; Cat. Chir. B. M. 1878, p. 230; Günth. Proc. Zool. Soc. 1879, p. 741; Dobson, Bull. Soc. Zool. France, v. 1880, p. 235; id. Report Brit. Assoc. 1880, p. 187; Lataste, Bull. Soc. Zool. Fr. v. 1880, p. 238; Anderson, Cat. Mamm. Ind. Mus. 1881, i. p. 131; Scully, Ann. Mag. N. H. (5) viii. 1881, p. 223; Tristram, West. Palest. 1884, p. 27; Lataste, Mamm. de Barbarie, 1885, p. 70; id. Mamm. de la Tunisie, 1887, p. 2; Jentink, Mus. des Pays-Bas, 1887, p. 278; Blanford, Journ. As. Soc. Beng. lvii. pt. ii. 1888, p. 267; Siepi, C. R. Congr. Int. de Zool. Paris, 1889, p. 54; Bocage, Journ. Sc. Lisb. (2) i. 1890, p. 18; Blanford, Fauna Brit. Ind., Mamm. 1891, p. 315; Noack, Jahrb. Hamb. Anst. ix. 1891, p. 138; Anderson, Proc. Zool. Soc. 1892, p. 6; Trouessart, Cat. Mamm. 1897, p. 114.

Vespertilio pipistrellus, E. Geoffr. St.-Hil. Descr. de l'Egypte, Hist. Nat. ii. 1818, p. 116, pl. 1. nos. 3 & 3', et pl. 4. nos. 5 to 5".

Vespertilio vispipistrellus, Bonap. Fauna Ital. 1832-1841, p. 100.

Vespertilio pipistrellus, var. *egyptius*, Fischer, Syn. Mamm. 1829, p. 105.

Vespertilio marginatus, Cretz. Rüppell's Atlas nördl. Afr. 1826, p. 74; Rüppell, Mus. Senck. iii. 1845, p. 156.

Romicia calcarata, Gray, Mag. Zool. & Bot. ii. 1835, p. 495; Peters, MB. Ak. Berl. 1866, p. 680.

Vespertilio albolimbatus, Kuster, Isis, 1835, p. 75; Heuglin, Fauna Roth. Mer., Peterm. Mittheil. 1861, p. 14.

Vesperugo marginatus, Wagner, Reisen Regensch. Alger, 1836-38, 1841, iii. p. 39; Fitz. & Heugl. SB. k. Akad. Wiss. Wien, liv. i. 1866, p. 546.

Vesperugo ursula, Wagner, Schreber's Säugeth. Supp. i. 1840, p. 505; Fitz. & Heugl. SB. Ak. Wiss. Wien, liv. i. 1866, p. 546; Heuglin, Reise N.O.-Afr. ii. 1877, p. 32.

Pipistrellus vispipistrellus, Loche, Expl. Sc. Alg., Mamm. 1867, p. 77.

Pipistrella minuta, Loche, Expl. Sc. Alg., Mamm. 1867, p. 78.

Vesperugo (Pipistrellus) leucotis, Dobson, Journ. As. Soc. Beng. xli. pt. ii. 1872, p. 222.

Vesperugo kuhlii, var. *leucotis*, Dobson, Blanford, Zool. East. Persia, ii. 1876, p. 23.

1

2

3

4

1. PIPISTRELLUS KUHLI.	2. PIPISTRELLUS RUEPPELLI.
3. SCOTOPHILUS SCHLIEFENI.	4. COLÆURA AFRA.

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- 7 ♂ and 7 ♀. Suez and its neighbourhood.
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 2 ♂ and 3 ♀. Cairo. Dr. Walter Innes, Bey.
 1 ♂. Minia. Major R. H. Brown, R.E., C.M.G.
 1 ♂. Tel el Amarna. Prof. W. M. Flinders Petrie.
 2 ♀. Khayzam and Luxor.—1 ♂. Fayum.
 1 ♀. Gizeh. Capt. S. S. Flower.

Muzzle more or less rounded; glandular surfaces at its side variously developed; forehead slightly raised above the level of the muzzle; ears shorter than the head, not reaching to the nostril when laid forward, twice as high as the length of the interval between the eye and the snout, triangular, tips rounded, inner margin of conch very convex at its base; upper third of the outer border nearly straight below the tip and then convex to a notch, before it sweeps forwards to be attached over the side of the base of the lower jaw, slightly below the level of the angle of the mouth, and somewhat behind the vertical of the attachment of the inner portion of the ear. Tragus more than three times as long as broad, somewhat falcate, tip obtusely rounded; anterior border nearly straight or faintly concave; posterior border convex, especially in its lower portion above the notch which defines the lobule at its base.

Wings extending from the base of the toes; calcaneum long, with the posterior lobe moderately developed as an elongated semioval. Nine caudal vertebræ, all of which are inclosed within the interfemoral membrane, but the fleshy tip of the tail is free.

The fur extends on to the upper and under surfaces of the wing outwards to a line drawn between the middle of the humerus to above the knee. The proximal third of the interfemoral membrane is clad with fur on both surfaces, fairly thickly above, sparsely below. The greater part of the back of the ears is nude, but the inner surface is thinly clad with fine hairs.

The basal two-thirds or so of the fur above and below brownish black, the terminal third on the upper surface rusty fawn, on the lower surface ashy white, paler on the abdomen and the under surface of the thighs, but the whole more or less strongly washed with rust-colour. Ears and muzzle blackish: wings and interfemoral membrane brown, but the margins are more or less whitish.

Inner upper incisors simple, long, acutely pointed; outer incisors short, little more than one-fourth the length of the inner, to the external bases of which they are closely opposed. The first upper premolar is very small, lying internal to the tooth-row, wedged in between the second premolar and the canine. Second upper premolar close to the canine, longer than the molars. Lower incisors trifid; the two outer pairs are placed transversely to the line of the jaw, the inner portions of each pair being overlapped to half the width of the tooth by the outer portion of the teeth in

front of them. First lower premolar little more than half the size of the second, close to the canine. In an adult female of this species from Suez the outer upper incisors are so small that they are scarcely visible even with the aid of a lens, and on the right side of the upper jaw the first premolar is absent.

Measurements.

	♂. mm.	♀. mm.	♀. mm.
Snout to vent	42	45	45
Vent to tip of tail	35	38	41
Length of head	15	16	16
Height of ear from margin of meatus internally	12	12	12
Length of tragus	6	7	7
Breadth of tragus	2	2	2
Eye to snout	6	6	6
Length of forearm	34	35	35
„ 1st digit of manus, including metacarpal	7	7	7
„ 2nd metacarpal	31	32	32
„ 3rd „	32	32	32
„ 4th „	32	32	31
„ 5th „	31	32	32
„ tibia	13	14	13
„ foot	7.5	8	8
Stretch of wing	235	235	235

A bone in the penis.

This bat is generally found in the cracks and crevices of buildings, and Lataste¹ mentions that in a fort near Biskra (Algeria) and in old ruined tombs at Ourgla he generally found only a single individual in a hole. It also frequents the date-palm. Parturition takes place in the month of May in Egypt, and two are born at a time. Whether it hibernates in Egypt is unknown.

It is distributed over Europe, south of the Alps and Pyrenees; over Northern and North-eastern Africa; also over Southern Asia as far east as Kachar.

The specimens from Ramleh and Cairo are russet-brown above, this colour in the bats from the former locality being very intense between the eyes and on the head generally, whereas in the specimens from the margin of the desert about Luxor and Khayzam the colour generally is much paler.

On the other hand, the specimen from the Fayum has the muzzle, ears, and membranes almost black, but the limbs themselves brownish. In the russet-brown and paler specimens there are distinct indications of a white margin to the wing-membranes, whilst in the dark-coloured individuals this characteristic marking is

¹ Bull. Soc. Zool. Fr. v. 1880, p. 238.

ill-defined. All these specimens have the simple upper incisor of the typical *P. kuhli*, and all their measurements agree with those distinctive of the species.

I have compared the type of *V. marginatus*, Cretzschmar, preserved in the Frankfort Museum, with these specimens, and I find it agrees with them in all its structural features. In the text of Rüppell's 'Atlas,' it is stated that the type came from Arabia Petræa; but on the specimen itself, Egypt is given as the locality.

Dobson has referred the *Vespertilio pipistrellus* of E. Geoffroy St.-Hilaire to *Vesperugo pipistrellus* (= *Pipistrellus pipistrellus*), but I think it will more probably prove to belong to the species under notice; and since making this identification, I have observed that Lataste¹ had arrived at a similar conclusion in 1885. Geoffroy regarded it as a variety of the common Pipistrelle of France, with the same figure and proportions, but differing from it in the pelage being of an ashy colour, whereas the European bat is brown.

PIPISTRELLUS RUEPPELLI, Fisch. (Plate XIX. fig. 2.)

Vespertilio temminckii, Cretz. (nec *Vesp. temminckii*, Horsf. 1824), Rüppell's Atlas nördl. Afr., Zool. 1st Abth. 1826, p. 17, pl. 6; Temminck, Monogr. Mamm. ii. 1835-41, p. 210; Schinz, Syst. Säugeth. i. 1844, p. 165.

Vespertilio rüppellii, Fischer, Syn. Mamm. 1829, p. 109.

Vesperugo rüppellii, Wagner, Schreber's Säugeth. Suppl. v. 1855, p. 745; Fitz. & Heugl. SB. Akad. Wien, liv. i. 1866, p. 546; Heugl. Reise N.O.-Afr. ii. 1877, p. 32.

Vesperugo sennaariensis and *Vesperugo hypoleucus*, Fitz. & Heugl. SB. Akad. Wien, liv. i. 1866, p. 546; Heugl. Reise N.O.-Afr. ii. 1877, p. 32.

Vespertilio (Alobus) temminckii, Peters, MB. Ak. Berl. 1867, p. 707.

Vesperugo temminckii, Dobson, Cat. Chir. B. M. 1878, p. 233; Jentink, Mus. des Pays-Bas, 1887, p. 278; Bocage, Jorn. Sc. Lisb. (2) i. 1890, p. 18; Noack, Jahrb. Hamb. Anst. ix. 1891, p. 140; Matschie, Säugeth. Deutsch-Ost-Afr. 1895, p. 23; Trouessart, Cat. Mamm. fasc. i. 1897, p. 115.

♂. Luxor.

Forehead raised above the facial portion of the skull. Glandular eminences on muzzle well-developed; the breadth of the face at the anterior angle of the eye is one-fourth more than the interval between the outer angle of the eye and the tip of the snout. The ears when laid forward reach to near the nostrils, and are more or less triangular in form, but rounded at their tips. Inner portion of conch very slightly, if at all, convex below the rounding off of the tip, but markedly convex at its basal bend backwards; outer border of conch slightly convex, terminating slightly behind the eye and somewhat below the level of the mouth, the notch above the lobe of the

¹ Étude de la Faune des Vertébrés de Barbarie, p. 71.

conch being not deeply cut. Tragus foliate, half the length of the ear, with a markedly concave anterior border, a rounded tip, and the middle of its posterior border convex, but somewhat concave below this and the lobule at the base.

Posterior margin of the interfemoral membrane with a number of irregularly distributed papillary eminences.

The wing-membrane arises from the base of the toes, and from the middle of the humerus to the knee it is more or less covered with fur above and below; the interfemoral membrane is well clad above as far as a point on a line between the heels, the rest naked. Eight caudal vertebræ only, the tip of the tail free.

The semi-naked muzzle, the lower lip, the ears inside and outside, the upper surfaces of the limbs and digits blackish brown. Fur on the upper surface of the body dark brown at the base with pale brown tips; the fur on the under surface of the body from the throat to the tail, and on the under surface of the wing-membrane, pure white; wing-membrane pale brown.

The inner upper incisor strongly bifid at its apex and grooved nearly to its base, the cusps placed somewhat antero-posteriorly, the anterior the longer; second incisor small, less than half the length of the posterior cusp of the first incisor, against the side of which it is closely opposed. First upper premolar minute, conical, close behind the canine, somewhat towards the inner side of the tooth-row, sometimes visible from without in the interspace which separates the second upper premolar from the canine; second upper premolar considerably longer than the molars. Lower incisors not deeply trifid. First lower premolar half the size of the second.

Measurements.

	Luxor. ♂. mm.
Snout to vent	46
Vent to tip of tail	33
Length of head	15
Height of ear from margin of meatus internally	11
Length of tragus	5
Breadth of tragus	1.8
Eye to snout	6
Length of forearm	31
„ 1st digit of manus, including metacarpal and claw	7
„ 2nd metacarpal	30
„ 3rd „	31
„ 4th „	30
„ 5th „	30
„ tibia	12
„ foot	8
Stretch of wing	212

A bone in the penis.

This species, under the name of *Vesperugo temminckii*, has been recorded from Bagamoyo, Lake Albert Nyanza, Galabat (eastern confines of Abyssinia), Sennaar, Khartum, and northwards to Berber and Dongola, and now at Luxor.

P. rueppelli is closely allied to *P. pulcher*, Dobson, from Zanzibar, but it is distinguished from it by its shorter and somewhat differently shaped ears, longer forearm, by the much feebler papillation of the posterior border of the interfemoral membrane, and by its less numerous caudal vertebræ.

The male generative organ of this bat, as in other members of the genus allied to it, is remarkable for its great length, as in the present male, which measures 46 mm. from snout to vent, this organ is 13 mm. long, while the bone which occupies its distal end is 7 mm. in length. It is covered with white hairs directed towards the base of the organ. In Dobson's definition of *Pipistrellus* a bone is excluded from the penis.

The types of this species, seven in number, were obtained by Rüppell in the palm-groves and gardens of Dongola. The specimen here described was caught in the hotel belonging to Messrs. Cook & Sons at Luxor, situated in a well-wooded garden, consisting chiefly of date-palms.

GLAUCONYCTERIS.

Glauconycteris, Dobson, Proc. Zool. Soc. 1875, p. 383.

The species of this genus are mostly remarkable for having the veins and lines on the flying-membranes of a different colour from the main part of the wings, and for the extremely short and broad facial portion of the skull.

One species, *G. floweri*, de Winton¹, has lately been recorded from the White Nile, one specimen being taken at Abu Zeit by Capt. Stanley Flower and a second at Wad Mariun by Mr. H. F. Witherby.

Messrs. Rothschild and Wollaston also obtained specimens of this bat at Shendi. In the 'Novitates Zoologicæ,' vol. viii. 1901, p. 397, the following field-note is published:—"Common at Shendi, but hard to procure. This bat hides by day in the acacia thickets low down near the roots of the trees. At dusk it crawls up the branches and takes flight, uttering a very characteristic squeak, which it continues to make on the wing. Its very low flight and habit of frequenting the dense and thorny acacia bushes make this bat a difficult species to collect."

This new form is remarkable for the shagreening of the skin of the forearms, legs, and tail.—W. E. DE W.

¹ Ann. Mag. N. H. ser. 7, vol. vii. 1901, p. 46.

SCOTOPHILUS.

Scotophilus, Leach, Trans. Linn. Soc. xiii. 1822, p. 69.

Muzzle short, conical, nearly naked; nostrils with their inner margins projecting, lunate, opening laterally or sublaterally. Ears longer than broad, usually much shorter than the head; tips rounded; outer border arising behind and below the level of the mouth in a distinct convex lobe. Tragus generally tapering, more or less bent inwards. Tail contained within the interfemoral membrane, except its slender distal end. Membranes leathery.

Dentition: i. $\frac{1}{3}$, c. $\frac{1}{1}$, pm. $\frac{1}{2}$, m. $\frac{3}{3} = 30$.

Distribution.—Ethiopia, Oriental and Australian Regions.

SCOTOPHILUS SCHLIEFENI, Peters. (Plate XIX. fig. 3.)

Nycticejus schliefenii, Peters, MB. Ak. Berl. 1859, p. 224; Heuglin, Reise N.O.-Afr. ii. 1877, p. 34; Matschie, Säugeth. Deutsch-Ost-Afr. 1895, p. 24.

Vesperugo (Scotozous) schliefenii, Dobson, Monogr. As. Chir. 1876, p. 118; Cat. Chir. B. M. 1878, p. 244; Trouessart, Cat. Mamm. fasc. i. 1897, p. 117.

Scotophilus pallidus, Dobson (*partim*), Cat. Chir. B. M. 1878, p. 264.

Scotophilus schliefeni, Matschie, SB. Gesellsch. naturf. Fr. Berl. 1893, no. 1, p. 26; Yerbury & Thomas, Proc. Zool. Soc. 1895, p. 546.

Scotophilus pallidus (nec Dobson), Thomas & Doria, Ann. Mus. Civ. Genova, (2) iv. 1886, p. 206.

Scotophilus minimus, Noack, Zool. JB. ii. 1887, p. 280.

1 ♀. Suakin. Major Penton, R.A.M.C., D.S.O.

1 ♀. Suakin, Government House.

Forehead distinctly raised above the level of the face; muzzle broad, rounded, with the glandular eminences prominent and raised above the mesial line of the face, so as to constitute a furrow from between the nostrils and each eye. Ears more or less triangular, tip broadly rounded; inner border more or less slightly convex, base broadly rounded; outer border nearly straight in its upper half, then abruptly convex from behind forwards to a notch on a line with the base of the tragus, and attached over the base of the angle of the lower jaw a short distance behind and below the level of the angle of the mouth, and anterior in position to the attachment of the inner border of the ear, and only slightly behind the vertical of the external canthus of the eye. Tragus shortly falcate, bent forwards, concave anteriorly, convex posteriorly, and rounded at its tip, its breadth less than one-third its length. Wings arising from

the base of the toes, claw of pollex small. Calcaneum moderate; postcalcaneal lobe narrow, semi-oval, elongate. Eight caudal vertebræ, half of the terminal vertebra free.

Fur on the wings above and below extending outwards from the middle of the humerus to the lower third of the femur. Base of the interfemoral membrane above and below nude, with the exception of a few straggling hairs.

Basal and terminal portions of fur light yellowish-brown above or fawn-coloured; under parts paler or ashy white. Muzzle fleshy brown; membranes light brown, with a whitish margin.

Single upper incisor perfectly simple. Upper premolar large, longer than the molars, close to the canine. Lower incisors markedly trifid, the cutting-edges of the second pair being parallel to one another and overlapped by the first pair to half their width, the third pair similarly placed with reference to the second. First lower premolar small, about half the size of the second, which equals the first molar in height.

Measurements.

	Suakin.	
	♀. mm.	♀. mm.
Snout to vent	43	47
Vent to tip of tail	32	33
Length of head	14	16
Height of ear from margin of meatus internally	10	11
Length of tragus	5	5
Breadth of tragus	2	2
Eye to snout	6	6
Length of forearm	32	33
„ 1st digit of manus, including metacarpal and claw	6	6
„ 2nd metacarpal	31	32
„ 3rd „	31	32
„ 4th „	30	32
„ 5th „	31	32
„ tibia	13	14
„ foot	7	7
Stretch of wing	215	223

This species was placed by Dobson in one of the divisions of the large genus *Vespertilio*, and in transferring it to its proper place Thomas¹ says:—“This species has ordinarily no minute anterior upper premolar, and the corresponding tooth in the lower jaw is as small and almost as much crushed in between its neighbours as is the

¹ Ann. Mus. Civ. Genova, ser. 2^a, ix. 1889-90, p. 87.

case in several of what are admittedly *Scotophili*. It is true that it has occasionally an anterior upper premolar; but this only occurs in one of the many specimens known, and may be simply an individual variation."

The two examples of this species from Suakin were both obtained in houses. The one procured by myself was knocked down from among a crowd of *Colëura afra*, which issued at sundown from the underground cellars of Government House.

This species has been recorded from Cairo, Kordofan, Suakin, Assab, Tigré, Mombasa, and German East Africa; also from Aden and Arabia. Colonel Giffard also found it in the Gold Coast Hinterland; so in all probability the species extends across the continent south of the Sahara.

BARBASTELLUS.

Barbastellus, Gray, Zool. Journ. ii. 1826, p. 243.

BARBASTELLUS BARBASTELLUS, Schreb.

Vespertilio barbastellus, Schreb. Säug. i. 1775, p. 168, pl. 55.

Vespertilio leucomelas, Cretz., Rüppell's Atlas nördl. Afr. 1828, p. 73, tab. 28 *b*; Temm. Monogr. ii. 1825-41, p. 204.

Synotis leucomelas, Heuglin, Reise N.O.-Afr. ii. 1877, p. 30.

The bat described by Cretzschmar from Arabia Petræa has been identified as a specimen of the Barbastelle (*B. barbastellus*) of Europe. Heuglin records it from Massowah, so there is every probability that this species, occasionally at any rate, finds its way to the neighbouring country of Egypt.—W. E. DE W. "

NOCTILIONIDÆ¹.

No facial cutaneous foliaceous appendages ; nostrils simple, opening at the extremity of the muzzle which is obliquely truncated and projects more or less beyond the lower lip. Tragus distinct, occasionally minute, usually well developed, and frequently expanded above. First phalanx of second digit of manus folded in repose on the dorsal surface of its metacarpal. Tail sometimes perforating the interfemoral membrane and appearing on its upper surface, or terminating in it ; and sometimes strongly developed and extending far beyond the posterior border of the membrane.

Teeth varying in number ; generally a single pair of upper incisors separated from the canines and from each other in the middle line, but sometimes deciduous. No pubic teats.

Distributed throughout tropical and subtropical regions of both hemispheres.

This family is divided into two subfamilies, the *Noctilioninæ* and *Molossinæ*.

Subfamily NOCTILIONINÆ.

Tail slender, perforating the interfemoral membrane and appearing on its upper surface or terminating in it ; legs long, fibulæ very slender ; upper incisors weak.

COLËURA.

Colëura, Peters, MB. Ak. Berl. 1867, p. 479.

Premaxillaries ossified. Muzzle broad, anteriorly pointed ; forehead concave ; tragus longer than broad ; no radio-metacarpal pouch ; legs long ; fibulæ very slender ; tail short, last caudal vertebra projecting on the upper surface of the interfemoral membrane. Lower incisors and canines close together ; upper incisors equally distant from each other and from the canines.

Dentition: i. $\frac{1}{3}$, c. $\frac{1}{1}$, pm. $\frac{2}{2}$, m. $\frac{3}{3} = 32$.

Distribution.—East Africa, the Seychelles, and Southern Arabia.

¹ In 1898 Mr. T. S. Palmer (Proc. Biol. Soc. Washington, xii. 1898, p. 109) pointed out that the above family name has priority to Emballonuridæ, Dobson, 1875, as it had been based by Gray (London Med. Repository, xv. 1821, 1st April, p. 299) on another genus of the family 50 years before Dobson wrote.

COLËURA AFRA, Peters. (Plate XIX. fig. 4.)

Emballonura afra, Peters, Reise Mossamb., Säugth. 1852, p. 51, pls. xii., xiii. figs. 18 & 19.

Colëura afra, Peters, MB. Akad. Berl. 1867, p. 479; Dobson, Cat. Chir. Brit. Mus. 1878, p. 365; Matschie, Säugth. Deutsch-Ost-Afr. 1895, p. 26; Yerbury & Thomas, Proc. Zool. Soc. 1895, p. 546; Thomas, Ann. Mus. Civ. Gen. (2) xviii. (xxxviii.) 1897-98, p. 677.

2 ♀. Suakin. Colonel Sir Charles Holled Smith, K.C.M.G.

4 ♂ and 6 ♀. Government House, Suakin.

Ears shorter than the head, rounded at the tip; inner border nearly straight, rising from the side of the forehead some distance above the eyes; external border broadly convex from the tip, with a shallow notch opposite the tragus, attached on a level with the angle of the mouth, but some way behind it, and behind a line drawn vertically to the posterior border of the eye. Tragus more than twice as high as broad, of nearly uniform breadth throughout, anteriorly concave, posteriorly convex, with a minute eminence on its external border immediately above a corresponding notch near its base, with the tip sharply rounded off from behind forwards. Crown of head abruptly raised above the flattened forehead. Muzzle broadly triangular viewed from above, with the tubular valvular nostrils opening forwards and outwards, and separated from each other by a well-defined mesial furrow. The muzzle projects somewhat beyond the lower lip, and on its under surface there is a median fleshy eminence; front of the lower lip fleshy, with a distinct median groove generally more or less defined, but usually not traversing the front of the lip.

The wing-membrane arises from above the ankles. Calcaneum nearly as long as the lower leg.

The fur extends on to the wing-membrane as far as a line drawn from the middle of the humerus to the distal third of the femur, and on to the interfemoral membrane as far as the exit of the tail.

A well-defined fringe of short forwardly and downwardly directed hairs along the upper lip.

General colour of fur dusky brown, hardly, if at all, paler on the under surface. Membranes and ears of much the same tint, but the margin of the wing-membrane edged with whitish.

The upper incisor on each side is removed somewhat from the canine. It is a short cylindrical tooth with a sharp point. The canine has a sharply pointed, downwardly directed process on the inner side of the cingulum. The first upper premolar is small, and lies in the tooth-line; it is about the height of the cingulum of the second premolar, which gives off anteriorly a sharp point like the one on the canine. The

anterior part of the cingulum of the lower canine has likewise a sharp process. The lower incisors are trifold. The first lower premolar is about half as high as the second.

Measurements.					Mozambique.
	Suakin.				
	♂.	♂.	♀.	♀.	♂ (co-type).
	mm.	mm.	mm.	mm.	mm.
Snout to vent	53	50	56	51	56
Vent to tip of tail	17	21	18	18	15
Length of head	20	21	21	21	21.5
Height of ear from point of attachment behind mouth	17	16	18	17	16
Height of tragus from lower border of meatus	5	5	5	5	5.5
Breadth of tragus at middle	2	2	2	2	2
Length of forearm	47	49	49	48	50
„ lower leg	19	18	19	18	17
„ foot	9	10	10	10	11.5

At the time of my visit this bat occurred in immense numbers in some disused chambers and cellars in Government House, Suakin. Leaving the dark recesses in which they secreted themselves during the day, they issued forth about sundown to the open air through a small open court, in which it was possible to knock them down as they whirled about in rapid succession. Yerbury found this bat associated with *Triænops persicus* and *Hipposiderus tridens* at Aden in a lofty cave communicating with the sea, and also living by itself in another cave above sea-level. In January the females were in a gravid condition, each containing one foetus.

This species was first described from Mozambique by Peters, but since then it has been recorded from the Zambesi, the island of Pemba, from Aden, and Somaliland.

The Suakin specimens have been compared in the foregoing Table with one of the types in the British Museum, presented by the late Dr. Peters.

C. afra is distinguished from *C. seychellensis*, Dobson, by its larger and broader ears and tragus, and much shorter forearm.

The presence or absence of a groove in the upper lip is not a reliable guide to the recognition of the species of the genus *Colëura*, for, as already stated, it is more or less present in *C. afra*; indeed a trace of it is only rarely absent.

TAPHOZOUS.

Taphozous, E. Geoffr. St.-Hil. Descr. de l'Egypte, Hist. Nat. ii. 1818, p. 126.

Premaxillaries cartilaginous; upper incisors deciduous. Muzzle conical, broad posteriorly; nostrils valvular, circular, with projecting inner margin. A deep hollow on the frontal region between the eyes. Eyes rather large. Crown of the head slightly elevated. Ears separate, the inner margin rising between the frontal hollow and the eye, the outer margin from a small lobe behind the mouth but at a lower level. Tragus short, expanded above, its sides more or less concave. Front of lower lip with a naked triangular area traversed mesially by a more or less marked groove. A glandular sac between the angles of the lower jaw, present in the majority of the species, but only fully developed in adult males, rudimentary in females; this sac is absent in some species, in which its place may be taken by the openings of small glandular pores, associated with which are long hairs producing a kind of beard. The tail perforates the interfemoral membrane about the middle, three or four vertebræ extending beyond it, but retractile into the membrane.

Dentition: i. $\frac{1}{2}$, c. $\frac{1}{1}$, pm. $\frac{2}{2}$, m. $\frac{3}{3}$ = 30.

Distribution.—Ethiopian, Oriental, and Australian Regions, and the southernmost part of the Palæarctic Region.

Monticelli¹ believed that he had found in the size of the feet of the species of *Taphozous* a constant character which enabled the two sections of the genus to be easily distinguished, the two sections being the subgenera *Taphozous* and *Taphonycteris*. In the first of these, however, he included two subgroups, one with very long feet and the other with very small feet; but how the first of these is to be readily distinguished by its feet from the second subgenus, *Taphonycteris*, in which the feet are characterized as being large, is difficult to understand. This was offered as an improvement on Dobson's system of division, which was established on the presence or absence of a radio-metacarpal pouch in the two groups. This arrangement was not based on a question of degree in the development of the pouch, but on its presence or absence; whereas Monticelli's supposed improvement rested on the feet being small, large, or very large, terms extremely difficult to define, so as to convey a clear understanding of the limits of the respective terms. A similar difficulty exists in defining the degree of development of the gular sac when present in the different species. Difficulties of this kind bring out the artificiality of the so-called synopsis whenever there is an intergradation of specific characters, resulting from the slight divergences in those groups of individuals which we denominate species.

¹ Ann. Mag. Nat. Hist. (6) iii. p. 488.

TAPHOZOUS PERFORATUS, E. Geoffr. (Plate XX. fig. 1.)

Taphozous perforatus, E. Geoffr. St.-Hil. Descr. de l'Egypte, Hist. Nat. ii. 1818, p. 126 ; Atlas, pl. 3. no. 1, and pl. 4. nos. 4 to 4'' ; Desm. Nouv. Dict. xxxii. p. 448 ; id. Mamm. 1820, p. 131 ; Dict. des Sc. Nat. t. lii. p. 221, c. fig. ; Temm. Monogr. ii. 1835-41, p. 281, pl. 60. figs. 13-14, cranium ; Schinz, Säugeth. i. 1844, p. 210 ; Rüppell, Mus. Senck. iii. 1845, p. 155 ; Wagner, Schreber's Säugeth., Suppl. v. p. 684 ; Fitz. & Heugl. SB. k. Akad. Wiss. Wien, liv. i. 1866, p. 545 ; Gasco, Viaggio in Egitto, pt. i. 1876, p. 96 ; Heuglin, Reise N.O.-Afr. ii. 1877, p. 25 ; Anderson, Cat. Mamm. Ind. Mus. pt. i. 1881, p. 143 ; Nehring, Cat. Säugeth. 1886, p. 4 ; Monticelli, Ann. & Mag. Nat. Hist. (6) iii. p. 488 ; Jentink, Mus. d'Hist. Nat. Pays-Bas, ix. 1887, p. 286 ; Yerbury & Thomas, Proc. Zool. Soc. 1895, p. 547.

Taphozous senegalensis, Fitz. & Heugl. SB. k. Ak. Wiss. Wien, liv. i. 1866, p. 545.

1 ♂. Tomb of the Hyæna, Gizeh.

1 sex? Beni Hasan. Mr. M. W. Blackden.

2 ♂. Tombs opposite Assuan.

4 ♂ and 5 ♀. Cavern in desert hills east of Philæ.

Snout pointed, triangular. Upper and lower lips rather thick ; muzzle generally covered with small glandular eminences, one more prominent than the others above the eye anteriorly. Lower lip with two smooth, slightly prominent, fleshy areas separated from each other by a short, narrow, haired interspace forming an obscure groove. Ears broad, but considerably shorter than the head, when laid forwards reaching only a little more than halfway between the eye and the nostril ; anterior border attached by a fold of skin arising above the eye, straight in its upper two-thirds and papillate, rounded off above into the broad external section of the conch ; the posterior border of the ear is first slightly convex, followed by a feeble concavity, beyond which it is broadly rounded backwards and then forwards to its attachment some distance behind and below the angle of the mouth ; the lobular portion of the conch is more or less folded inwards towards the tragus. Tragus contracted at its middle, expanded in its upper portion, the breadth of which equals three-fourths of the entire height measured from the margin of the meatus ; stem of tragus haired externally, no lobule at its base. No gular pouch is present in the adult male, but a feeble transverse fold of skin can be detected in the position it occupies in those species distinguished by its presence.

The wing-membrane arises from between the base of the metacarpals and the tibia. A well-developed radio-metacarpal pouch is present. Feet moderately developed. Under surface of chin with glandular eminences, and two short parallel ridges corresponding to a short ridge on the ramus of each jaw behind the symphysis. Face from before the frontal pit only sparsely covered with short hairs, and the chin partakes of the same

General colour of the fur of the upper surface and of the throat smoky brown,

1. TAPHOZOUS PERFORATUS. 2. TAPHOZOUS NUDIVENTRIS.

3. RHINOPOMA MICROPHYLLUM.

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greyish or paler on the rest of the under side, especially on the wing-membrane and the lower portion of the abdomen and on the interfemoral membrane. The basal two-thirds of the fur are white, the terminal third brown. Membranes greyish brown, limbs pale reddish brown.

This species is an inhabitant of the tombs of the ancient Egyptians, and of recesses in rocks, and is occasionally met with in small caverns in the rocky desert. In some of the larger tombs it occurs in great numbers. E. Geoffroy St.-Hilaire discovered it in the Tombs of the Kings at Thebes and in the deep recesses of the Temple of Kom-Ombo. Since his day it has been observed in the Pyramids of Gizeh, in the tombs at Beni Hasan, and in small caverns in the desert to the south-east of Philæ, at Dongola, and Sennaar; and it also extends into Southern Arabia (Aden).

T. perforatus is distinguished from *T. mauritanus*, E. Geoffr. St.-Hilaire, by its more triangularly pointed snout, smaller ears with a more or less papillate inner margin, smaller feet, broad club-shaped tragus, and different coloration. In both of these species the radio-metacarpal pouch is fairly well developed, whereas in *T. nudiventris*, Cretz., also distinguished by very large feet, this pouch is usually small.

In Dobson's Catalogue¹ only three specimens in the collection of the British Museum were referred to *T. perforatus*, and it is noteworthy that they were not from Egypt, the region whence the species was described by E. Geoffroy St.-Hilaire, but from West Africa. I am led to make this remark because the Egyptian and Suakin bats herein described do not fully agree with Dobson's description, which undoubtedly was founded either wholly or partially on these specimens from West Africa. Dobson characterized the males of his *T. perforatus* as having a large gular sac, whereas in my Egyptian specimens that structure does not exist, and in Geoffroy's description of the species no reference is made to its presence. However, in the area behind the chin which the sac should occupy there is a feeble transverse fold of skin in the Egyptian specimens, but nothing more.

There is also another point in which the Egyptian bats differ from Dobson's account of *T. perforatus*, as he says that the wing-membrane arises from the tibia about $\frac{1}{4}$ of an inch above the ankle and that consequently it starts from the middle of the tibia. In Geoffroy's figure the wing-membrane is represented arising between the ankle and the dorsum of the foot, which is exactly what occurs in my specimens. The position of attachment of the wing-membrane to the ankle is subject to slight variations, but not to the extent that would have to be accepted were these bats to be regarded as specifically identical with the West-African bats described by Dobson.

In Dobson's Catalogue, there is no reference to the "Lérot-volant," first described by Daubenton², who received it from Adanson, who had obtained it in Senegal. E. Geoffroy

¹ Cat. Chirop. B. M. 1878, p. 383.

² Hist. Acad. Roy. des Sc. (année 1759), 1765, Mém. p. 386.

St.-Hilaire, in describing *T. perforatus*, pointed out that this West-African bat (in all likelihood identical with the specimens from that area of Africa described by Dobson) was in many respects like the Egyptian bat. Desmarest¹, however, in 1820, described the Senegal bats under the name of *T. senegalensis*, a name which does not appear in Dobson's catalogue. The latter author's West-African bats should doubtless have appeared under the last-mentioned specific term, and not under that of *T. perforatus*, E. Geoffr. St.-Hil., a species which at that time was unrepresented in the British Museum.

[An examination of the two skins in the British Museum, which are presumably the individuals upon which Dobson based his description, leaves it still doubtful whether the West-African form differs materially from examples taken in Egypt. Owing to the closing in of the membranes in these dried specimens, the development of the gular sac and the position at which the wing springs from the leg are not clearly shown to differ.—W. E. DE W.]

TAPHOZOUS NUDIVENTRIS, Cretzschm. (Plate XX. fig. 2.)

Taphozous nudiventris, Cretz. Rüppell's Atlas nördl. Afr. 1826, p. 70, pl. 27*b*; Temm. Monogr. Mamm. ii. 1835-41, p. 280, pl. lx. figs. 10 to 12 (skull); Rüppell, Mus. Senck. iii. 1845, p. 155; Wagner Schreber's Säugeth. Suppl. v. p. 684; Fitz. & Heugl. SB. k. Akad. Wien, liv. i. 1866, p. 544; Tristram, Proc. Zool. Soc. 1866, p. 93; Dobson, Proc. Zool. Soc. 1875, p. 553; Monogr. As. Chirop. 1876, p. 171; Cat. Chirop. B. M. 1878, p. 387; Heuglin, Reise N.O.-Afr. ii. 1877, p. 26; Anderson, Cat. Mamm. Ind. Mus. pt. i. 1881, p. 148; Tristram, West. Palest. 1884, p. 28; Nehring, Kat. Säugeth. K. Landw. Hochsch. Berl. 1886, p. 4; Jentink, Mus. Pays-Bas, ix. 1887, p. 287; Monticelli, Ann. & Mag. N. H. (6) iii. 1889, p. 488; Noack, Jahrb. Hamb. Anst. ix. 1891, p. 137; Thomas, Proc. Zool. Soc. 1894, p. 449; Trouessart, Cat. Mamm. 1897, p. 140.

Taphozous kachhensis, Dobson, Proc. As. Soc. Beng. 1872, p. 152; Journ. As. Soc. Beng. xli. pt. 2, 1872, p. 221; Murray, Hist. Zool. Sind, 1884, p. 18; Blanford, Fauna Brit. Ind., Mamm. 1891, p. 349.

Taphozous nudiventris, subsp. *kachhensis*, Dobson, Proc. Zool. Soc. 1875, p. 554; Monogr. As. Chir. 1876, p. 172; Cat. Chir. B. M. 1878, p. 388; Anderson, Cat. Mamm. Ind. Mus. pt. i. 1881, p. 148.

Nycticejus serratus, Heuglin, Reise N.O.-Afr. ii. 1877, p. 35.

Taphozous perforatus. var. *assabensis*, Monticelli, Ann. Acc. o. Costa d. Aspir. Nat. Era. (3) vol. i. 1885, p. 78, pl. vii.; id. Atti Soc. Ital. vol. xxviii. 1885, p. 169.

♂. Cairo.

♀. Gizeh. Capt. S. S. Flower, May 1901.

¹ Mamm. 1820, p. 130.

Snout triangular, rather long and pointed, its breadth at the angle of the mouth is very slightly in excess of the distance between the posterior border of the frontal pit and the tip of the snout. Lower lip devoid of a groove, or if indicated, only very feebly so. Ear more or less triangular, with well-rounded tip, the greatest breadth opposite the lower portion of the inner border of the conch, where the breadth equals about three-fourths of the height measured from the meatus. The inner border is thickened, more or less crenated, and nearly straight; the outer border is very faintly concave, broadly rounded in its lower two-thirds, and attached at a distance behind the angle of the mouth equal to half of the interval between the outer and inner attachment of the ear. The interval between the tips of the ears, when they are laterally spread out, is equal to one-half of the interspace between the snout and the point where the tail emerges from the interfemoral membrane. Height of the tragus equal to one-third of the height of the ear, its narrowest breadth being about one-half of the breadth of its terminal expansion. Lobe at base well defined, triangular. Wings arising from the proximal end of the lower third of the tibia. Radio-metacarpal pouch small. Feet large.

Fur confined to the back, not extending to the wing-membrane on the upper surface, but spreading on to the wing below between the middle of the humerus and femur. A feebly haired area exists more or less from the elbow to the opening to the radio-metacarpal pouch. The under surface of the forearm is thickly covered with hair. Sacral region of back, and upper and under surface of interfemoral membrane, naked. Lower portion of abdomen, before the genitalia and behind the anus, and along the thighs, nude, with the exception of a sparse clothing of short hairs. Muzzle from the attachment of the ears forwards practically nude, with the exception of a very sparse clothing of minute hairs with some longer ones intermixed; chin similarly clad. Gular pouch moderately developed in the male, less so in the female. A second small rounded gular pouch a short distance behind the former, opening by an orifice little more than 1 mm. in diameter, the area around it being almost completely nude.

Ears nude towards their tips externally; sparsely clad internally with short hairs.

Basal half of the upper fur white, broadly tipped with greyish brown, so that the general colour of the upper surface is greyish brown. Under surface with the fur also white in its basal half, succeeded by pale greyish brown, more or less tipped with whitish, so that the general surface below is speckled greyish and whitish. Wing-membrane pale brown colour, greyish brown below; the border of the wing, between the fifth digit and the heel, with an irregular whitish border.

The upper incisors are lost in adults, and in old males the second upper premolar is separated from the canine by a marked interval, through which the first upper premolar can be seen.

Measurements.

	♂, Cairo.
	mm.
Snout to vent	93
Vent to tip of tail	34
Length of head	33
Inner canthus of the eye to snout	13
Height of ear	22
„ tragus	6
Breadth of tragus	5
Snout to eye	13
Length of forearm	75
„ pollex, including claw and metacarpal	15
„ 2nd metacarpal	61
„ 3rd „	64
„ 4th „	54
„ 5th „	44
„ tibia	31
„ foot	18
Stretch of wing	470

This species is found living in much the same conditions as *T. perforatus*.

Rüppell discovered it in the Pyramids of Gizeh; many years ago I obtained it in numbers in the recesses of the ruins at Karnak. It is exceedingly plentiful in the Upper Nile Valley, in the Sheik-el-Akabah district, and in the ruins of Gebel Auli, where Capt. S. S. Flower found it in large numbers in the spring of 1900. It is found in Somaliland and the coast district about Assab; Colonel Yerbury met with it, associated with *Rousettus arabicus* (*supra*, p. 90), in a cavern on the banks of the Wadi Jughur at Lahej near Aden. Canon Tristram saw it living “in myriads” in caverns on the shores of the Lake of Galilee. It has also been recorded from the Euphrates Valley, and Kach in North-western India. The specimen reported by Dobson from Gambia is more probably *T. senegalensis* than this species.

[In the female collected by Capt. Flower at Gizeh the forearm measures 70 millim.; it bears the note “Knocked down on road after sunset.”—W. E. DE W.]

RHINOPOMATIDÆ.

A short triangular nose-leaf. Tail exceedingly slender and very long, projecting far beyond the short interfemoral membrane. Ears united. Second digit of manus with two phalanges.

Distribution.—North Africa (Algeria); North-east Africa, Egypt and Kordofan; Palestine; Arabia; India to Malayan Peninsula.

RHINOPOMA.

Rhinopoma, Geoffr. St.-Hil. Descr. de l'Égypte, Hist. Nat. ii. 1818, p. 123.

The generic characters are the same as those of the family.

The bat described by Brünnich as *Vespertilio microphyllus*, upon which Geoffroy created the genus *Rhinopoma*, differs so materially in many important details of its structure from other bats, that Stoliczka¹ was led to regard it provisionally as the representative of a distinct family, manifesting a close relationship to some of the genera of the Noctilionidæ on the one hand, and affinities with the Megadermatidæ on the other.

The nose-leaf of *Rhinopoma* has its nearest representative in the large nose-leaf of *Megaderma*, which has likewise broadly united ears. The notching of the free end of the tragus of the former is a feeble equivalent of the bifid tragus of the latter.

RHINOPOMA MICROPHYLLUM, Brünn. (Plate XX. fig. 3.)

Vespertilio microphyllus, Brünnich, Dyrenes Hist. og Dyre.-Sam. Universt. Natur.-Theater, i. 1782, p. 50, pl. vi. figs. 1-4.

Rhinopoma microphyllum, E. Geoffr. St.-Hil. Descr. de l'Égypte, Hist. Nat. ii. 1818, p. 123; Atlas, pl. l. nos. 1 to 1" (wrongly figured as *Taphien filet*), et pl. 4. nos. 6 to 6"; Desm. Dict. des Sc. Nat. xlv. (1827) p. 370; id. Nouv. Dict. xxix. 1818-19, p. 256; id. Mammif. 1820, p. 129; Licht. Verz. Doubl. Zool. Mus. Berl. 1823, p. 4; Fischer, Syn. Mamm. 1829, p. 123; Rüppell, Mus. Senck. iii. 1845, p. 155; Fitz. & Heugl. SB. k. Akad. Wien, liv. i. 1866, p. 547; Tristram, Proc. Zool. Soc. 1866, p. 93; Loche, Expl. Sc. Algér., Mammif. 1867, p. 79; Dobson, Monogr. As. Chir. 1876, p. 174, figs. *a*, *b*, & *c*; id. Cat. Chir. B. M. 1878, p. 400; Gasco, Viaggio in Egitto, pt. i. 1876, p. 96; Heugl. Reise N.O.-Afr. ii. 1877, p. 24; Tristram, West. Palest. 1884, p. 29;

¹ Journ. As. Soc. Beng. xli. pt. 2, 1872, p. 221.

Murray, Vert. Zool. Sind, 1884, p. 18; Jentink, Mus. d'Hist. Nat. Pays-Bas, ix. 1877, p. 288; Anderson, Cat. Mamm. Ind. Mus. i. 1881, p. 149; Lataste, Faune de Barbarie, Mammif. 1885, p. 75; Monticelli, Ann. Mus. Civ. Genova, 1887, ii. (v.) p. 523; Blanford, Fauna Brit. Ind., Mamm. 1891, p. 351, figs. 116 (skull), 117 (head); Noack, Jahrb. Hamb. Anst. ix. 1891, p. 133; Thomas, Proc. Zool. Soc. 1894, p. 449.

Rhinopoma hardwickii, Gray, Zool. Misc. 1831, p. 37; Blyth, Journ. As. Soc. Beng. xiii. pt. 1, 1844, p. 492; Elliot, Madr. Journ. L. S. x. p. 97; Cantor, Journ. As. Soc. Beng. xv. 1846, p. 178; Blyth, Cat. Mamm. As. Soc. Mus. 1863, p. 23; Jerdon, Mamm. Ind. 1867, p. 29; Stoliczka, Journ. As. Soc. Beng. xli. pt. 2, 1872, p. 221.

Rhinopoma lepsianum, Peters, MB. Ak. Berl. 1859, p. 222.

Rhinopoma microphyllum, subsp. *hardwickii*, Dobson, Monogr. As. Chirop. 1876, p. 176.

Rhinopoma senaariense, Fitz. & Heugl. SB. k. Akad. Wien, liv. i. 1866, p. 547; Heugl. Reise N.O.-Afr. ii. 1877, p. 24.

Rhinopoma longicaudatum, Fitz. & Heugl. SB. k. Akad. Wien, liv. i. 1866, p. 547; Heugl. Reise N.O.-Afr. ii. 1877, p. 24.

Rhinopoma cordofanicum, Heugl. Reise N.O.-Afr. ii. 1877, p. 24.

1 ♂. Egypt.

1 ♂ and 1 ♀. Belim. Sir John Rogers, K.C.M.G., Pasha.

1 ♂. Cairo. Dr. Walter Innes, Bey.

4 ♂ and 3 ♀. Second Pyramid, Gizeh.

1 ♂. Beni Hasan. Mr. W. M. Blackden.

3 ♀. Tombs of the Kings, Thebes.

5 ♂ and 3 ♀. Tombs opposite to Assuan.

1 ♂ and 1 ♀. Small cave in desert hills to east of Philæ.

Many specimens. Abu Roash. Capt. S. S. Flower, May 1901.

Do. do. Near Cairo. Hon. N. C. Rothschild, Oct. 1902.

Snout upturned, rather broad, abruptly truncated, projecting much anterior to the lower lip, terminating in a fleshy expansion occupying the front of the muzzle, the upper border of which is more or less triangular, free, and erect or posteriorly recumbent, with an elongated pit behind it in the old males; the nostrils open on either side of the mesial line of this fleshy snout as oblique valvular slits; the inferior border of each nostril has a distinct notch in its centre. Sides of the face between the snout and the eye, below and above the eye, and between the eye and the buccal opening and backwards to the ear, covered with minute glandules. A marked truncated, triangular furrow below the nasal fleshy appendage, the sides of the triangle directed backwards along the upper lip, its mesial line below the appendage occupied by a vertical ridge. Front and lower lip with a smooth fleshy eminence more or less traversed by a longitudinal groove.

Forehead but little raised above the level of the face, with a deep frontal pit connected to the pit behind the nasal membrane by a broad furrow less deeply sunk. Ears united to each other by their inner borders immediately behind the frontal pit, to

the sides of which the intervening membrane is attached. A pit-like depression on each side of the forehead behind the connecting aural membrane.

Ears large, generally longer than the head, occasionally only reaching to the nose-leaf; from the mesial line of the connecting membrane to the external border considerably longer than the distance between the external attachment of the ear and the end of the snout; when expanded their inner borders with the connecting band form almost a horizontal line from side to side. Inner border of ear slightly convex; outer border slightly emarginate below the tip, broadly rounded in its lower portion towards its attachment, which lies about on a level with the angle of the mouth; the base of the ear is devoid of a lobule, and is removed from the angle of the mouth about the distance that the inner canthus of the eye is remote from the outer border of the nasal membrane. Tragus erect, nearly three times as high as broad, somewhat falcate; tip more or less notched; upper half of the inner border concave, lower half convex; outer border convex, with the margin forwardly curved, a prominent triangular lobe at the base; the height equals the distance between the eye and the tip of the snout; the base of the tragus is immediately above the origin of the outer border of the ear. Tail equalling or exceeding the length of the head and body, more than three-fourths of its entire length free.

First digit of manus with a callosity on the metacarpo-phalangeal joint. Wing-membrane arising from the upper portion of the lower fifth of the tibia. Interfemoral membrane short, perforated by the tail on the dorsal surface close to its free margin.

Head, anterior to the ears, practically nude, but the margins of the frontal and fronto-nasal pits sparsely covered with curved hairs. A few long hairs on the sides of the snout. A patch of downwardly directed hairs on the mesial line below the nose-leaf and similar forwardly and downwardly directed short hairs along the upper lip. Anterior surface of the membrane connecting the ears, and the anterior half of the inner aspect of the ears, sparsely covered with short hairs. Distal half of the posterior surface of the ear nude, but the posterior aspect of the connecting membrane and base of ear covered with fur. A few straggling hairs upon the tragus. Chin nearly nude as far back as on a line between the angles of the jaws. Fur not extending from the side of the back on to the wing-membrane; lower portion of back (sacral region) and interfemoral membrane perfectly nude. A few hairs on the under surface of the wing-membrane external to the sides of the body. Upper surface of tip of tail with a few long hairs.

Tibia long and straight; foot long and slender, rather more than one-half of the tibia in length.

General colour ashy or mauve-brown, dusky white below; under surface of limbs and accumulation of fat about the base of the tail yellow; upper surface of limbs brown, also the wings, the interfemoral membrane, and the ears.

Dentition : i. $\frac{1}{2}$, c. $\frac{1}{1}$, pm. $\frac{1}{2}$, m. $\frac{3}{3} = 28$.

Upper incisors simple, cylindrical, far removed from the canines, directed outwards and downwards. Upper premolar very large, very much longer than the molars, with a prominent cusp anteriorly at its base. Lower incisors broad, moderately trifold. First lower premolar well developed, not so long as the molars. Second lower premolar cylindrical, resembling a canine, and as long as the molars.

Females with prepubic teats in addition to the pectoral mammæ.

Measurements (in millim.).

Males.

	3.	3.	3.	3.	1.	3.	3.	7.	4.	4.	7.	4.	4.	4.	2.	5.	3.	10.
Snout to vent.....	49	52	52	54	54	55	55	56	58	59	59	60	60	61	65	68	71	76
Vent to tip of tail ..	60	62	61	61	50	57	59	76	71	71	63	76	71	73	71	66	73	60
Free portion of tail..	50	46	47	47	..	45	45	59	56	54	51	61	57	58	56	50	55	42
Length of forearm..	51	51	54	54	..	53	52	57	56	56	57	60	58	60	61	66	71	66

Females.

	9.	3.	6.	3.	3.	9.	9.	4.	4.	6.	4.	6.	6.	8.	7.	8.	8.	8.	4.	2.	7.
Snout to vent	47	48	50	51	51	52	52	53	54	54	55	56	57	57	57	57	59	60	61	66	68
Vent to tip of tail ..	60	54	61	61	57	59	59	63	62	..	68	57	60	68	64	66	68	66	57	67	59
Free portion of tail ..	52	44	50	50	44	51	50	51	48	..	55	46	46	56	49	47	57	50	50	55	43
Length of forearm ..	50	50	52	51	51	50	50	53	54	52	52	54	54	56	56	54	57	59	57	62	65

The numbers over the columns indicate the following localities :—

1. Egypt, Geoffroy's specimen.	6. Thebes.
2. India : type of <i>R. hardwickii</i> , Gray.	7. Mt. Quarantania, Palestine.
3. Assuan.	8. Midian, Catacombs of Maghair.
4. Pyramids of Gizeh.	9. Maskat, Arabia.
5. Cairo.	10. Kach, Sindh.

The fact that the smallest and also the largest Egyptian males are from one and the same tomb, the series of measurements ranging from 49 to 71 mm. are merely indicative of difference of age, but, as shown above, 76 mm. is about the maximum length of the body and head of this bat in Egypt and in India. The difference between the largest male and largest female is only 8 mm. in favour of the former.

The highly sensitive and mobile snout and nose-leaf pierced by transversely valvular nostrils of *Rhinopoma* led Geoffroy to state that he should not be at all astonished were it ascertained that this bat lived on aquatic insects which it caught on the surface of the water. The close proximity of the Nile to its haunts would afford it a rich supply of food. In connection with this supposition, the fact that Stoliczka found this species in Kach living in wells becomes of considerable interest.

This species is found in Egypt in caverns and in the monuments, and under similar conditions also in India. Capt. S. S. Flower found it plentiful at Gebel Auli, in the

Sudan. Cantor mentions that numbers inhabited the subterraneous Hindu places of worship within the Fort at Allahabad and that it was obtained in a cave on an island in the Girbee River, in lat. 8° N., in the Malayan Peninsula. It has also been recorded from Socotra.

Three and a half centuries ago Belon encountered this bat in one of the chambers of the Great Pyramid. He says in his old French :—"Quand nous fu/mes retournez en la premiere cauité, & marchants plus outre, trouua/mes quelque petite e/space à main gauche, qui a ain/i e/s/te rompue; car autrement elle e/t toute ma/siue. Nous y trouua/mes des Souriz chauues differentes aux no/s/tes, & à celles que i' auoye auparauent veues dedens le labyrinthe de Crete: car les no/s/tes n'ont la queue plus longue que les ae/s/les, mais celle de la Pyramide, ont une queue qui pa/s/s/e quatre doigts outre les ae/s/les, longue comme aux Souriz" ¹.

A year later he again indicated it very clearly in his work 'De la Nature des Oiseaux' ².

Hasselquist also obtained this bat in one of the small Pyramids of Gizeh. The specimens he had collected were unfortunately omitted by Linnæus from the 'Iter Palæstinum' and from the 'Systema Naturæ.' They were preserved in the Royal Museum at Copenhagen, and when Brünnich ³ described the contents of that Museum, in 1782, he found Hasselquist's specimens there, naming them *Vespertilio microphyllus* and gave a very good figure of one of them. All these facts were pointed out by E. Geoffroy himself, but, strange to say, they have been almost completely overlooked, so that he has generally been credited with the naming of the species, instead of Brünnich.

Dobson, in his Catalogue, placed side by side, for comparison, the measurements of two perfectly adult animals, the sex of which he did not indicate (one from Egypt and the other from Kach), for the purpose of proving the undoubted identity of *R. hardwickii* with the Egyptian bats. The first of the two specimens he stated to be "the type of the species preserved in the Paris Museum"; but, apart from the fact that the type has always been in the Copenhagen Museum, the measurements of the Paris specimen given by Dobson preclude its having been the individual described by E. Geoffroy St.-Hilaire, because the latter author says that the bat he had before him when he wrote was only 54 mm. long, whereas Dobson's specimen measures 76 mm. from snout to vent. The comparison, however, instituted by Dobson proves that individuals of this species in India and in Egypt attain to equal dimensions.

In the foregoing table of measurements I have included the specimen described by Geoffroy, and also one of the types of *R. hardwickii*, Gray, with other individuals from

¹ Observ. de Plus. Singularitez &c. 1554, p. 114/2.

² 1555, liv. ii. chap. 39.

³ *Op. cit. supra.*

the Pyramids, Thebes, Assuan, the caverns of Mt. Quarantania overlooking the Plain of Jericho, and from Maskat. Although the female bats from the last locality are amongst the smallest of their sex, the condition of their teats proves that they have all been mothers. It is thus quite evident that this species begins to breed at a very early age, as seems to be the case with bats generally, and when one reflects how densely packed together the sexes are—thousands in comparatively limited areas, in the case of very many species—there is nothing remarkable in their so doing; but what is more astonishing is the extent to which inbreeding must exist. This species of bat has doubtless inhabited the Pyramids for nearly 3000 years, as it was some time in the XXth Dynasty that the Great Pyramid was rifled for the first time, an episode in its history which was the means of this and of other species of bats becoming tenants of its recesses and chambers. There they have remained ever since, and the original pairs that first gained possession bred, and their descendants have continued to do so exclusively among themselves, as bats do not copulate on the wing; and, moreover, there is no evidence that the Microchiroptera migrate from place to place. As all the colonies of the different species of bats at present tenanted the ruins of Egypt have doubtless had a similar history, it would be of great interest to compare examples of these with specimens of the same species that were in the flesh 3000 years ago, but whose skeletons have been handed down to us in the form of mummies. The incessant inbreeding of these bats, and the uniformity of the conditions under which they have lived, would render such a comparison of the highest interest; but so slow is variation, that in all probability no difference would be detected between the recent bat and its ancestor in an unbroken line of 3000 years.

In the case of *Rhinopoma*, so well defined from all other bats, such a comparison would be of especial interest.

In a female captured by me in Belzoni's Tomb (Tombs of the Kings) there is an entire absence of the tail, not attributable to any injury but to suppression.

In the males a great deposit of yellow fat, such as is present also in the members of the genus *Taphozous*, involves the greater part of the interfemoral membrane from the point of exit of the tail forwards to the lower part of the belly. It also invests the groin, and part of the abdomen and one half of the thigh. In adolescents it is less developed and it is entirely absent in the young. In one of the youngest males from Upper Egypt there is no trace of it in the interfemoral membrane, but the upper half of the thigh is much swollen by a deposit of fat. It is quite as well developed in the adult females as in the males. In the female in which the tail has been completely suppressed there is but little fat present.

What function this substance performs in the economy of the animal is still unknown. Dobson suggested that it "is laid up on the approach of the hibernating season." The specimens which suggested this possible explanation to Dobson had been obtained

during the winter by Stoliczka, who had collected them in Kach, and had found them hibernating. The specimens procured by me in Egypt were met with, in full activity, flying about in December and in the beginning of March. When disturbed in the daytime they flew out in great numbers into the bright sunshine, but after flying about for a little they generally found their way back again to their haunts, whilst a few remained outside seemingly dazed by the light. In view of the considerable temperature which distinguishes the caverns in Egypt and the recesses of the monuments, an interesting research would be to find out what species of the Chiroptera really hibernate under these conditions. Whenever I have penetrated into deep recesses tenanted by bats between the foregoing periods and lit a candle, or it may be a flambeau, in a large chamber or cavern, I have invariably found the bats therein to be in full activity.

[There is an entire absence of fat in the specimens collected by Capt. Flower in May, while the deposit is greatly developed in those collected by Mr. Rothschild in October. This store of fat is no doubt drawn upon during the season of least activity when food is scarce. The absence of the tail is of not infrequent occurrence in this bat.—W. E. DE W.]

Cantor¹, in 1846, pointed out that in this bat there is a small cæcum, which he said was a “true cæcum, the existence of which in all Chiroptera has erroneously been denied or [said to be] restricted to the cardiac cæcum observed in the genera *Vampyrus* and *Pteropus*.”

Dobson², however, states that the Chiroptera have no cæcum, but he admitted the existence of a cæcal appendage about the beginning of the rectum in *Megaderma*. He could not detect the existence of such an organ in the specimens of *Rhinopoma* he examined, but in those individuals I have examined I have found it well-marked and developed about 12 mm. above the anus. The presence of this structure in these two genera is a further illustration of their close relationship, which is also evinced in the character of their nose-leaf. The finely notched end of the tragus of *Rhinopoma* seems to be only an extreme modification of the bifid tragus of *Megaderma*.

In *Rhinopoma*, as in some of the genera of the Rhinolophidæ and in *Megaderma*, the females are provided with prepubic teats. I am indebted to the courtesy of Professor C. Stewart for a section through one of these teats, which clearly demonstrates that it is perforated by a main duct opening externally by a single orifice, and that into this main channel a number of secondary ducts open, all lined with epithelium. Unfortunately I have not been able to obtain any clear indication of the glandular substance itself, which doubtless does exist, but would require fresh specimens for its demon-

¹ Journ. As. Soc. Beng. xv. 1846, p. 178.

² Cat. Chirp. B. M. 1878, p. xxiv.

stration. In all likelihood, the young at birth seize these teats for a two-fold purpose, viz. : as a source of nourishment lying close at hand, and as a means of assisting them to hang on to their mothers during flight. As they gain strength they find their way forwards to the pectoral teats ; but as the young of all bats are equally helpless at birth the restriction of pubic teats to certain families of bats is an enigma for the present.

MOLOSSIDÆ.

Tail thick, produced far beyond the posterior border of the interfemoral membrane (except in *Mystacops*¹); legs short and strong; fibulæ well developed; feet broad; first toe, and generally the fifth, thicker than the others and furnished with long, curved hairs; well-developed callosities at the base of the thumb; upper incisors strong.

NYCTINOMUS.

Nyctinomus, E. Geoffr. St.-Hil. Descr. de l'Égypte, Hist. Nat. ii. 1818, p. 128.

Muzzle broad, very obliquely truncated, projecting considerably beyond the lower lip; nostrils terminal, more or less circular; upper lip expansible, deeply grooved with vertical wrinkles. Ears large, broad, thick, and united more or less by the bases of their inner margins, with distinct antitragus. The proximal half of the tail enclosed within the interfemoral membrane, the remainder free. Upper incisors separated in the middle line.

Dentition: i. $\frac{1}{2}$ or $\frac{1}{3}$, c. $\frac{1}{1}$, pm. $\frac{1}{2}$ (?) or $\frac{2}{2}$, m. $\frac{3}{3} = 28$ to 32.

Distribution.—Tropical and warmer parts of both hemispheres.

NYCTINOMUS ÆGYPTIACUS, E. Geoffr.

Nyctinomus ægyptiacus, E. Geoffr. St.-Hil. Descr. de l'Égypte, Hist. Nat. ii. 1818, p. 128; Atlas, pl. 2. no. 2; Dcsm. Mamm. 1820, p. 116.

Dysopes geoffroyi, Temm. Monogr. Mamm. i. 1827, p. 226, pl. xix.; Wagner, Schreber, Säugeth., Suppl. i. 1840, p. 469; ibid. vol. v. 1855, p. 703; Rüppell, Mus. Senck. iii. 1845, p. 155; Gasco, Viaggio in Egitto, 1876, t. i. p. 96; Henglin, Reise N.O.-Afr. ii. 1877, p. 28.

(?) *Dysopes rupelii*, Temminck, Monogr. Mamm. i. 1827, p. 224, pl. xviii.

Nyctinomus geoffroyi, Fitz. & Hcugl. SB. k. Akad. Wien, liv. i. 1866, p. 545.

E. Geoffroy St.-Hilaire gave the length of the type specimen as 80 millim., which he said was the dimensions of the *Nyctinomus* of Bengal, but he gave no other measurements. The accompanying figure (p. 152) is taken from the original plate, reduced by one-third diameter.

¹ This term was substituted by Flower and Lydekker ('Mammals Living and Extinct,' 1891, p. 661) for *Mystacina*, Gray, used by Dobson, as the latter term was preoccupied by Boie, 1822.

This species is said to inhabit old edifices and caverns, and to live by preference on moths; and Geoffroy adds:—"Ils attendent que la nuit paraisse pour se livrer à toutes les inspirations de leur bien-être; c'est à quoi nous avons fait allusion, en leur donnant le nom de nyctinome."

Fig. 1.

E. Geoffroy St.-Hilaire does not state in what part of Egypt he met with this bat, and it is strange that no museum, that I am aware of, possesses a specimen which may undoubtedly be ascribed to Egypt proper.

The flight of the bats of this genus, owing to their having narrow wings, is direct and devoid of all fluttering motion, and Swinhoe states that it can easily be distinguished on a cloudless evening high in the air, owing to the character of the organs of flight.

Swinhoe¹ has observed in the Amoy bat, described by Blyth as *N. insignis*, that the creature when irritated had the habit of exposing its tail by extruding and again drawing it within the interfemoral membrane, and of sinking its eyes into their sockets and thrusting them out again. This appearance was probably due to the contraction of the membrane around the eyes, which were noticed to be hidden in the recess formed by the protruding ears.

There is a curious discrepancy between Geoffroy's and Temminck's description of the type of the genus, said to be preserved in the Paris Museum. The former author, in his account of the bat, says that the ears were "unies l'une et l'autre par leurs bords internes," whereas Temminck describes them as "leur bord interne non réuni."

The latter author also directed attention to the fact that, whereas Geoffroy stated in

¹ Proc. Zool. Soc. 1870, p. 620.

his description of the species that there were two upper and four lower incisors, his drawing of the skull showed the presence of six lower incisors. Temminck's explanation of these seeming discrepancies was that Geoffroy's figure had been taken from the skull of a very young subject provided with six lower incisors, whereas the specimen he had examined was of more advanced age, and had been furnished with four incisors; and he held that if Geoffroy had examined a greater number of individuals he might have met with others in which a second pair of incisors had been lost, thus giving rise to the formula $\frac{1-1}{1-1}$, and that if he had met with still older individuals he might have found that the lower incisors had been entirely lost.

Temminck received from Cretzschmar a *Nyctinomus* sent from Egypt by Rüppell. He recognized it to be an example of *N. ægyptiacus*, E. Geoffr. St.-Hil., in a complete state of development of the incisors—that is to say, with the talon of the canines very strong, the canines little separated, and only two lower incisors pushed in advance of this talon.

He pointed out that this feature in the dentition of *N. ægyptiacus* was not confined to it, but that other species of the genus of the Old and the New Worlds had two, four, and six incisors in the lower jaw—the first presenting all the characters of fully-grown individuals, the last very often offering indications of youth, although externally it might be difficult to distinguish them at first glance from adults; and he held that it would be necessary to examine a very large number of individuals of all ages in order to establish a fixed rule as to the characters of the dentition of Chiroptera, and of the species of *Nyctinomus* in particular. To subject this group to the rule adopted generally in the case of mammals, and to classify them generically according to the number and the form of their teeth, appeared to Temminck, after very numerous observations, to be very hazardous.

Dobson accepted Peters's subdivision of *Nyctinomus* into two subgenera, *Nyctinomus* and *Mormopterus*. In the first of these he allocated *N. africanus*, *cestoni*, *ægyptiacus*, *tragatus*, *plicatus*, and fourteen other species, one of the leading features of this group being that the members of it are provided with $\frac{2}{2}$ premolars. *N. ægyptiacus*, the type of the genus *Nyctinomus*, was, however, provided with only $\frac{1}{2}$ premolars. On the other hand, Peters's subgenus *Mormopterus* had assigned to it the same number of premolars as Geoffroy said existed in *Nyctinomus*; it had, moreover, $\frac{2}{6}$ incisors, the number of these teeth represented in Geoffroy's figure of *N. ægyptiacus*, which, according to the latter author, had united ears, but which Temminck and Dobson described as having had separate ears, one of the features of *Mormopterus*!

The genus *Dinops*, Savi¹, had the exact dentition assigned by Dobson to his

¹ Nuov. Giorn. di Letter. n. 21, 1825, p. 230; Bull. Sc. Nat., Juillet 1826, p. 386.

subgenus *Nyctinomus*, but differed in that respect from *Nyctinomus*, Geoffroy. It was characterized also as having united ears. It is evident, if the premolar dentition is reliable as a subgeneric character, that the *N. ægyptiacus*, Geoffroy, is not *N. cestoni*. The *Dysopes rupelii*, Temminck, was regarded by Dobson as a synonym of *N. cestoni*; but Temminck explicitly stated that its ears were not united by their internal borders, but at the same time he considered it as nearly allied to *N. ægyptiacus*. This seems probable, because its dentition was seemingly $\frac{1}{3}$, $\frac{1}{1}$, $\frac{2}{2}$, $\frac{3}{3}$, which is exactly the dentition of *N. ægyptiacus* according to Geoffroy's figure. Is it possible that the union or disunion of the ears falls under the variations to be looked for in this genus, and that the variation of the premolars from $\frac{1}{2}$ to $\frac{2}{2}$ is of little significance?

In view of these discrepancies, it is extremely difficult to differentiate between *N. cestoni* and *N. ægyptiacus*, and I believe the difficulty arose in attempting to separate what are in reality only local races of one and the same species.

[I cannot agree with the views expressed above as to the possible identity of *N. ægyptiacus* and *N. tæniotis* (= *N. cestoni*), and the theory of the shedding of the incisors, expressed by Temminck, is in no way borne out by the facts elicited by an examination of the specimens at my disposal. I believe that when specimens of this larger species are rediscovered in Egypt they will turn out to be referable to a species, of which there are several specimens from Cape Colony in the British Museum, with four lower incisors (the number given by Geoffroy in the description of the species). This view was expressed by me in the 'Annals and Magazine of Natural History,' ser. 7, vol. vii. 1901, p. 37. The South-African specimens closely agree with Geoffroy's figure, and so differ from the southern European species, *N. tæniotis*. As to the number of upper premolars, I believe two will be found in all species of the genus; but in some species the first is so exceedingly minute, that the aid of a strong lens is required to detect it even in a well-prepared skull. So that the presence of this tooth may have been easily overlooked.

Dobson gave the following description of the type specimen of *N. ægyptiacus* preserved in the Paris Museum:—

"Much smaller than *N. africanus*. Ears quite separate, but close together by the bases of their inner margins; outer and inner margins of the ear-conch evenly convex, forming almost an arc of a circle above; antitragus half-oval, separated by a deep notch posteriorly; tragus broad and rounded off above. Lips with vertical wrinkles. No gular sac in male or female.

"Wing-membrane from the lower part of the tibia near the ankle. Fur deep smoke-brown above, paler beneath. Wing-membrane on the upper surface is covered with fur as far as a line drawn from the middle of the humerus to the knee; beneath

the fur extends outwards to a less distance, ending by an abrupt, well-defined, straight margin. Measurements: head and body 66 millim.; tail 41; head 25; ear 23; tragus 5×3.2 ; forearm 49.5; thumb 5.5; 3rd finger metacarp. 49, 1st phal. 19, 2nd phal. 20; 4th finger metacarp. 45; 5th finger metacarp. 29; tibia 13; hind foot 8.5."

As a synonym of *N. tæniotis* Dobson gave *N. midas*, Sundev. (K. Vetensk.-Ak. Handl. Stockh. 1842, p. 207), from Sennaar; but this is a very distinct species with exceedingly powerful teeth, and belongs to a group having completely ossified premaxillæ, while in *N. tæniotis* and its allies there is a large vacuum in the palate between and behind the incisors.

There is still another species of this genus which, at any rate occasionally, occurs in Egypt. The only specimen known is a skin in the British Museum collected by Mr. Francis Galton above Assuan (First Cataract). It is mentioned in Dobson's Catalogue, p. 428, and is rightly described as being nearly related to *N. pumilus*, Cretzschmar (Rüpp. Atlas, pl. 27), from Massowah. In the paper already referred to I have further shown that these two forms have much in common, especially the complete ossification of the palate, but further material is necessary to show their true relationship. This Assuan specimen is a very small bat with a forearm only 43 millim. in length; it has been called *N. pumilus*, subsp. *major*, in Trouessart's Cat. Mamm. 1898, p. 146.—W. E. DE W.]

INSECTIVORA.

ERINACEIDÆ.

ERINACEUS.

Erinaceus, Linnæus, Syst. Nat. x. 1758, vol. i. p. 52.

Dentition: i. $\frac{3}{2}$, c. $\frac{1}{1}$, pm. $\frac{3}{2}$, m. $\frac{3}{3}$ = 36.

The first pair of upper incisors are very much larger than the others, tusk-like, and widely separated from one another; the canines scarcely differ from the teeth on either side of them and are in most cases double-rooted; the second upper premolar is sometimes very small and deciduous; the third upper and first lower premolars are distinctly longer than the teeth on either side of them; the inner lower incisors are large and projecting. Tail very short, somewhat vestigial.

Distributed over the temperate portion of the Palæarctic Region, the whole of the Ethiopian Region, and the western portion of the Oriental Region as far as the peninsula of India proper.

ERINACEUS AURITUS, Gmelin. (Plate XXI.)

Erinaceus auritus, S. G. Gmelin, Nov. Comment. Petrop. xiv. 1770, p. 519, tab. xvi.; Pallas, ibid. p. 573, tab. xxi. fig. 4; Geoffroy St.-Hilaire & Audouin, Descr. de l'Égypte, Hist. Nat. ii. 1829, p. 737, pl. 5. fig. 3; Audouin, ibid. pp. 745, 746, Suppl. pl. 1. fig. 2 (skull and teeth); Fitzinger. (*Hemiechinus*) SB. Akad. Wissensch. Wien, lvi. i. 1867, p. 859; Dobson, Monogr. Insectiv. p. 16; Anderson, Proc. Zool. Soc. 1895, p. 420.

Erinaceus libycus, Hempr. & Ehr. Symb. Phys. decas ii. 1832; Fitzinger. (*Hemiechinus*) SB. Akad. Wissensch. Wien, lvi. i. 1867, p. 867; Dobson, Monogr. Insectiv. p. 16 (nec syn.).

Erinaceus platyotis, Sundev. Sv. Vet.-Ak. Handl. Stockholm, (1841) 1842, p. 232; Fitzinger. (*Hemiechinus*) op. cit. p. 863.

Erinaceus ægyptius, E. Geoffroy, Cat. Paris Muscum, nomen nudum; Rüppell, Mus. Senck. iii. 1845, p. 159; Fitzinger. (*Hemiechinus*) op. cit. p. 868.

Erinaceus frontalis, Dobson (nec *E. frontalis*, A. Smith), Monogr. Insectiv. 1882, p. 18.

Erinaceus brachydactylus, Tristram (nec *E. brachydactylus*, Wagner), Survey of Western Palestine, 1884, p. 25; Hart, Fauna and Flora of Sinai, Petra, &c. 1891, p. 238.

2 ♂ and 2 ♀. Margin of desert near Cairo.

1 ♂. Abu Roash, N.W. of Gizeh.

1 ♀ imm. Suez. Mr. Theodor Meyer (German Consul).

2 ♀. Desert near Alexandria.

ERINACEUS AURITUS.

4 1/2

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1 ♂ and 1 ♀. Maryut.

1 ♂ and 2 ♀. Alexandria.

2 ♀. Gizeh.

No bare area on the forehead; spines longitudinally grooved, nodose.

Head rather short; muzzle moderately long and pointed, more so in some specimens than in others; ears very large, erect, high above the spines, somewhat pointed, but rounded at their tips, external margins straight or slightly emarginate, height 35 to 38 mm.; tail short, nearly nude in some specimens, haired in others.

Fur soft and silky. The spines not extending on to the forehead in front of the inner border of the ears. Spines on the back 15 to 19 mm., those between the ears 13 to 17 mm. in length; diameter of spines 1 to 1.2 mm.; with 20 to 26 longitudinal nodose ridges.

Limbs moderately long; fore foot large, fingers long; claws strong, long and curved; pollex well developed, its claw rather long, as long as the claw of the 3rd finger; the claw of the 5th finger nearly as long as that of the 1st; on the fore foot there are two prominent tubercles close together side by side, immediately below the wrist, the inner the smaller. Hind foot with hallux well developed; toes long, claws long; third and fourth toes subequal, the fourth sometimes the longer; two minute nearly obsolete tubercles rather close together external to the hallux and placed obliquely, the external being the more distal.

The front of the face below the eyes, the fore feet, and the hind limbs from the middle of the tibia downwards are pale brown; the rest of the fur whitish. The skin of the back of the ear, the anterior surface of the ear along its internal and external border dusky brown; the middle area of the front of the ear yellowish white. Tail dusky brown. Spines with yellowish-white tips; a brown band below, twice as broad as the yellow tip, succeeded by a broadish yellow band, the base of the spines generally dusky. The head-spines have the same markings.

The extent to which the apex of the spine is tipped with white is very variable; also the intensity of the dark brown band below the tip varies greatly, in some cases it is nearly black.

	Gizeh.	Abu Roash.	Alexandria.	Alexandria.	Near Cairo.
	♀.	♂.	♀.	♀.	♀.
	mm.	mm.	mm.	mm.	mm.
Snout to vent	146	180	154	143	128
Vent to tip of tail	21	29	23.5	25.5	19.5
Height of ears	35.5	39	38	34.5	34.5
Elbow to tip of 3rd finger	61	..	64	57	55
Fore foot	21	..	22	19.5	20
Hind foot	32	33	..	29	30.6
Anterior angle of eye to snout	24	..	25	20	21
Lower border of external meatus to snout	42.3	..	44	41	42

The skull is rather narrow, with moderately broad muzzle; the greatest diameter is found towards the maxillary portion of the zygomatic arch; the auditory bullæ are moderately developed, the postglenoid process of the squamosal and the mastoid process are about equal in size and are not inflated; the pterygoids are solid with deep lateral fossæ; the palatal foramina entire and well defined; the second upper premolar is three-rooted, well formed, and placed in line with the other teeth.

Measurements of skulls.

	♂.	♀.	
	Alexandria.	Cairo.	Astrakan, Russia.
	mm.	mm.	mm.
Greatest length (bone only)	47	45	46
„ width	27	26·5	29
Basal length (middle line)	44	41	(c.) 43
Palatal length	25	24	25·5
Width outside <u>m. 1</u>	17	17·5	18
„ „ auditory meatus	22·5	23	23

I never personally captured the hedgehog of Lower Egypt, but no difficulty was ever experienced in obtaining examples by the aid of native collectors.

This species frequents the margin of the desert, as at Abu Roash, where it was found among fallen blocks of rock; it is also not uncommon in the stony, semi-arid areas of the Delta. The fact of its habits being almost exclusively nocturnal is the real explanation of the little that is known about it.

Its native name, 'Konfud' or 'Ganfud,' كنفد, is a term likewise applied to the hedgehog of the Upper Nile, *E. æthiopicus*, Ehr.

The distribution of this species in the north-east corner of Africa has yet to be worked out. It occurs in the eastern portion of the Libyan Desert, as well as in Lower Egypt, but how far it extends southwards in the direction of Nubia has yet to be ascertained; at Dongola it is replaced by the species next described in this work. To the north-east of Egypt it has a wide distribution, even to Central Asia, the Caucasus, and into Russia; it is also found in the island of Cyprus.

In the types of *E. libycus* preserved in the Berlin Museum the spines are somewhat more coarsely grooved than in an example collected by Eversmann in the Kirgis Steppe, and the nodosities separating the furrows are more strongly pronounced. These features of the spines are variable when a considerable number of individuals are examined. The number of ridges is also variable. In the types of *E. libycus* there are 22 ridges on the spines. In a specimen from Russia which I have examined the spines are somewhat longer than in the Egyptian examples, but the number of ridges is practically the same, namely 23. In hedgehogs from the Kirgis Steppe there are 21 ridges on some of the spines, and 25 on others. In this species the apical

third of each spine is more or less devoid of nodosities, the ridges giving place to a fine transverse striation. I have seen specimens from Astrakan and Babylon agreeing exactly with the Egyptian animals; the skull of a Babylon specimen differs in no way from a skull of an Egyptian specimen.

The original types of Sundevall's *E. platyotis* are in the Stockholm Museum. Professor F. H. Smitt had the courtesy to send me the following remarks regarding these two specimens, which were obtained from Egypt by Hedenborg:—"The limit of the spines on the forehead is undivided, straight across the forehead, just behind the line between the ears, *without any division into lateral groups or any median bare area*. According to your wish, I herewith enclose four spines from one of the type specimens." There can therefore be no doubt that these hedgehogs belong to the species under notice.

The specimen which formed the groundwork of Dobson's description of *E. frontalis* in his Monograph of the Insectivora appears in the British Museum list of Mammalia for 1843 under that name, as coming from the Cape of Good Hope; but it is not stated that it was presented by Dr. Andrew Smith, whereas other mammalian specimens given by that traveller to the National Collection bore, as a rule, a statement to the effect that they were gifts from him. This specimen in no way agrees with Smith's¹ description of his species. It is at once distinguished by its much larger ears, which stand up high above the spines, whereas in the figure of the South-African hedgehog (Ill. Zool. S. Afr. 1849, pl. 3) the ears are represented amidst the spines. The marked difference, too, between the description of the colour of *E. frontalis* of Dobson and the colour of the figure given by Smith of his hedgehog can never be explained as attributable to the fading of the specimen in the Museum, as suggested by Dobson. Dobson's so-called *E. frontalis* is unquestionably an example of the Egyptian hedgehog, *E. auritus*, and as such never came from South Africa. It has no bare area on the forehead; the spines do not extend on to the forehead in front of the ears; the large ears project above the spines which are nodose and similarly coloured to those of typical Egyptian examples, with which the coloration of the haired parts is also identical; and, moreover, it has a well-developed pollex. (Unfortunately the hind feet are absent, so nothing can be said regarding its hallux.)

On the other hand, the hedgehog from Benguella in the British Museum, which Dobson erroneously considered to be identical with *E. diadematus*, Fitz., under which he placed it, is not only, as he thought, probably identical with *E. frontalis*, Smith, but is absolutely so. Its ears are shorter than the interaural spines, and its coloration agrees with Smith's description of *E. frontalis*, and, as in that species, the hallux is well developed, which is not the case with *E. diadematus*, Fitz., which I had the privilege of examining in London, thanks to the great courtesy of Dr. Ludwig Lorenz, of the Vienna Museum. *E. diadematus*, Fitz., is identical with *E. albiventris*, Wagner.

¹ S. Afr. Quart. Journ. vol. i., Oct. 1831, p. 10.

ERINACEUS ÆTHIOPICUS, Ehrenberg. (Plate XXII.).

Erinaceus æthiopicus, Hemp. & Ehr. Symb. Phys. dec. ii. 1832; Heuglin, Reise N.O.-Afr. vol. ii. 1877, p. 37; Anderson, Proc. Zool. Soc. 1895, p. 420.

Erinaceus auritus, Rüppell, Neue Wirbelth. 1835, p. 40 (in part.), nee *E. auritus*, Pallas & Geoffr. St.-Hil.; Tristram, Survey of Western Palestine, 1884, p. 25.

Erinaceus senaariensis, Hedenb. Isis, 1839, p. 8.

Erinaceus brachydactylus, Wagner, Sehreb. Säug. Suppl. ii. 1841, p. 24; Heuglin, Reise N.O.-Afr. vol. ii. 1877, p. 37.

Hemiechinus pallidus, Fitz. SB. Akad. Wissensch. Wien, lvi. i. 1867, p. 866.

Hemiechinus brachydactylus, Fitz. SB. Akad. Wissensch. Wien, lvi. i. 1867, p. 864.

Erinaceus deserti, Loehe, Cat. Mamm. et Ois. Algérie, 1858, p. 20; Dobson, Monogr. Insectiv. pp. 12, 13 (nee *eranium*); Lataste, Aet. Soc. Linn. de Bordeaux, t. xxxix. 1885, p. 202; Lataste, Explor. Se. Tunisie, Zool. Mamm. 1887, p. 5, et Suppl. pp. 39-41.

Erinaceus platyotis, Dobson, Mon. Insectiv. i. 1882, p. 12 (nec Sund.).

Erinaceus algirus, Dobson, op. cit. p. 12 (*eranium*).

1 ♂. Suakin. Major Penton, R.A.M.C., D.S.O., June 1893.

2 ♂, 2 ♀, and 2 ♂ imm. Suakin, 3/1/94.

1 ♂. Durrur, 23/1/94.

Bare area on the head well developed, beginning between the eyes and prolonged backwards to the nape, expanded between the ears and narrowing to a point. Spines longitudinally grooved, nodose. Head long and pointed; ears very large and broad, rounded at their tips, the middle of their external borders nearly straight. Tail rather long, well haired. Fur soft and silky. There are from 17 to 22 longitudinal ridges on the spines; those on the back 21 to 28 mm. in length, those between the ears 20 mm. high; diameter of spines about 1 mm. or rather more; the spiny tract does not extend on to the forehead anterior to the inner borders of the ears. Limbs decidedly long. Fore foot short and broad; pollex well developed; claws strong, short; a large broad pad below the wrist, extending from the proximal pad of the pollex almost to the external border of the foot, and sometimes divided into two sections, the larger being external. Hind foot small; hallux very small. The rather small plantar pad longitudinally divided, the inner portion slightly the larger, with numerous small granular eminences between it and the digital pads. The mesial line of the tarsus towards the heel nude, the sides of the plantar surface and before the heel thinly clad with short hairs.

The face between the eyes forwards to behind the angle of the mouth, the lower lips, the chin, the lower halves of the fore limbs, the hind limb from the knee downwards, the area around the genitalia, and the tail, dark brown; the rest of the fore limbs, the forehead in front of the ears, the throat, chest, belly, and sides, white, with the exception

ERINACEUS ÆTHIOPICUS.

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of a few dusky hairs below the lateral spines; in some individuals there are spots on the throat, chest, and belly; the mesial area of the inner surface of the ears white; occasionally a dark spot on the forehead and another on each side of it. Spines broadly tipped with white, with three obscure brown bands, subapical, submesial, and basal; or the spines may be wholly yellowish white, with the exception of a very feebly indicated, almost obsolete, darker subapical area.

In some specimens, chiefly males, there is a pale yellowish broad longitudinal area along the back, with a brown area external to it, the sides of the animal being yellowish; in others there is only the pale dorsal band: these variations are due to the extent to which the yellow tips of the spines are developed in these areas.

In other specimens the fur generally, instead of being white, is dirty yellowish, darker from the snout to the eye and below the eye; and rusty brown, more or less, on the fore limbs, rump, hind feet, thighs, tail, and belly between the thighs.

Measurements.

	Durrur. ♂. No. 70. mm.	Suakin. ♂. No. 24. mm.	Suakin. ♀. No. 27. mm.	Tunisia. ♂. mm.
Snout to vent	185	180	180	143
Vent to tip of tail	22	17	17·8	19
Height of ear	37	38	37·3	35
Breadth of ear	24	23	20	24
Snout to eye	25	25	23	23
External meatus to snout	50	49	49·7	50
Elbow to tip of 3rd finger	62	62·3	61	60
Length of fore foot	21	21·2	18	21
„ hind foot	30·2	30	27	29
Hallux, excluding claw	2·4	2·1	2	2
Pollex, excluding claw	4	3·9	3·9	3·8

The skull of *E. æthiopicus* is readily distinguished from that of *E. auritus* by its shorter and more pointed muzzle, and by the greater breadth of the squamosal portion of the zygomatic arch as compared with the anterior portion. But when the palatal aspect of the macerated skull is examined it will be found to differ in a very marked degree. The auditory bullæ are enormously inflated, and all the surrounding bones in the skull are similarly modified to assist in enlarging these chambers; the base of the squamosal is greatly enlarged and bullate; the pterygoids are hollowed out and inflated so that the lateral fossæ are quite obliterated, the auditory chambers extending within the whole length of these bones¹. The second upper premolar

¹ This extraordinary development of the auditory chamber is found in the nearly allied hedgehog from Southern Arabia, *E. dorsalis*, Anders. & de Wint. (Ann. Mag. Nat. Hist. ser. 7, vol. vii. 1901, p. 42); and to a slightly modified extent in the Indian species *E. micropus* and *E. pictus* (two species which differ from one another only in the very extraordinary character of the absence of the malar bone in the former).

is very small, imperfectly double-rooted, and lying towards the outer border of the tooth-row.

Measurements of skulls.

	Suakin.	Durrur.	Tunisia.
	♂.	♂.	? sex.
	mm.	mm.	mm.
Greatest length (bone only)	45	45	44.5
Greatest width	26.5	27	29
Basal length (middle line)	42	42	42
Palatal length	24.5	23.5	23.5
Width outside <u>m. 1</u>	17	17	17
„ „ auditory meatus	25	26	25.5

Nothing is known regarding the habits of this species, beyond the fact that it occurs in the Suakin plain, where it is found wherever there is cover afforded by shrubs. It is apparently a more or less desert form, as it occurs on the sterile ground about Dongola and in the Bayuda desert. [Messrs. Rothschild and Wollaston found this species plentiful in the neighbourhood of Shendi.—W. E. DE W.]

This hedgehog was first described by Ehrenberg from specimens obtained at Ambukol (Dongola district). Mr. Matschie has been so good as to allow me to examine the type preserved in the Berlin Museum. Whilst there can be no question regarding the specific identity of the Suakin hedgehog with this type, it is evident that Ehrenberg's description was based on the specimen after it had been stuffed and not on the living animal or on one preserved in alcohol.

Some years after Ehrenberg's journey to Dongola, the Upper Nile area was visited by Dr. Pruner; some of the hedgehogs collected by the latter traveller came under Wagner's observation and were described by him as *E. brachydactylus*, whilst another specimen in the same collection and from the same region, but quite young, was referred by Wagner to *E. æthiopicus*, Ehr. A hedgehog identical with this species was collected by Mons. M. Botta in Upper Egypt, and is preserved in the Paris Museum, where it stands under the name of *E. auritus*.

Three specimens from Sennaar are preserved in the British Museum. Heuglin obtained at Sennaar a young hedgehog also belonging to this species, which from the pale colour of its spines was named by Fitzinger *E. pallidus*, the type of which I have examined. [The locality Sennaar in both these cases seems to be doubtful, as the next species (*E. albiventris*) is the common hedgehog of the White Nile to the south of Khartum. But, as in other cases, the locality "Sennaar" of the older writers may be interpreted "Upper Nile" or Sudan.—W. E. DE W.]

There is also a hedgehog in the Berlin Museum collected by Heuglin and said to have been obtained by him in Egypt. This is evidently an error, because this

species does not occur in Egypt properly so-called. It was in all likelihood found by him in the same region in which he procured the last-mentioned specimen. Although it bears the name of *E. libycus*, it is perfectly apparent that it is not that species, as it corresponds to the present one.

Heuglin's two specimens are of considerable interest, as they suggest that the species found in the Tunisian and Algerian Sahara, known as *E. deserti*, Loche, is only a local race of the eastern Sudan form. The latter departs in certain particulars from the Tunisian hedgehog, as its ears are larger and the longitudinal ridges on its spines less numerous; but in this latter respect there is no sharp line of demarcation between the two, as the ridges in the Sudan specimens number 18 to 22 and in those from Tunisia 22 to 24.

The skulls of Tunisian and Eastern Sudan hedgehogs are identical in their general features, but the teeth of the latter are slightly smaller.

This hedgehog is of special interest when it is studied in connection with the forms already indicated of *E. dorsalis*, *E. micropus*, and *E. pictus*. The type of skull is the same in all—that is, the pterygoids are dilated, and the cavity enters into the formation of the auditory chamber in the dried skull; but what the exact relationship of this extended bullate cavity is to the rest of the true auditory apparatus has yet to be definitely ascertained by dissections of fresh skulls. As no other existing mammal, that I am aware of, has its pterygoids dilated to assist in the perfection of the sense of hearing, it would appear to be a legitimate inference that *E. æthiopicus* is a more highly specialized and more recent form than *E. europæus*, Linn.

All the known extinct hedgehogs have pterygoids like the last-mentioned species, and until fossil remains of hedgehogs with the type of auditory apparatus found in *E. æthiopicus* are met with of older geological date than the extinct representatives of *E. europæus*, it is logical to assign the *E. æthiopicus* type to a more recent origin. In *E. macracanthus* and *E. jerdoni* the pterygoids do not present the same degree of hollowing out as in *E. micropus*, while at the same time the skulls unquestionably belong to the same type as that of the latter species; and consequently in the structure of the pterygoids they serve to connect the extreme modification of these bones presented by *E. æthiopicus*, *E. dorsalis*, *E. micropus*, and *E. pictus* with that distinctive of *E. europæus*.

The occurrence in Southern and North-western India of hedgehogs closely allied in skull-characters to *E. æthiopicus* of Africa and its near ally of Arabia, *E. dorsalis*, is of extreme interest and very suggestive of the close relationship which is now recognized to have existed at no very remote period between the fauna of the Africo-Arabian region and that of Southern India.

ERINACEUS ALBIVENTRIS, Wagner.

Erinaceus albiventris, Wagner, Schreb. Säug. Suppl. ii. 1841, p. 22; Anderson, Proc. Zool. Soc. 1895, p. 420.

Erinaceus pruneri, Wagner, Schreb. Säug. Suppl. ii. 1841, p. 23.

Erinaceus heterodactylus, Sundev. Vetensk.-Akad. Handl. (1841), Stockholm, 1842, p. 227.

Erinaceus diadematus, Prinz Paul, Rüppell, Mus. Senck. t. iii. 1845, p. 159 (nomen nudum); Fitzing. SB. Ak. Wien, 1867, lvi. i. p. 853.

This is the only other species of hedgehog which occurs in the Nile Valley. It is the smallest member of the genus and belongs to the group of which the European hedgehog (*E. europæus*) is the type; having spines which are not outwardly grooved and are free from nodosities, the skull characterized by very small auditory chambers, and the postglenoid process of the squamosal smaller than the mastoid. The ears are shorter than the spines, and the fur is harsh; the feet and toes are very short. This species is, moreover, distinguished from all other members of the genus by the absence of the hallux or first toe of the hind foot.

The specimen upon which Wagner founded this species came, in all probability, from Senegambia. It has the whole of the fur cream-white. The Nile Valley and East-African specimens, which may be more definitely registered as *Erinaceus albiventris* subsp. *pruneri*, have the front of the face to around the eyes, the chin, the ears, and the lower portions of the limbs brown.

This species is found to the south of Khartum. Mr. H. F. Witherby¹ obtained several specimens at Gebel Auli; it ranges into Somaliland and as far south as Kilima-njaro.

Hedgehogs are found represented in tombs of some of the earliest Dynasties, and are usually associated with agricultural or hunting scenes. In the Tomb of the Overseer or Master-huntsman, Amten or Meten, we find, in the inner grave-chamber, in which the deceased is almost invariably portrayed with the surroundings of his home-life, a pictorial record which includes some small desert animals, amongst which are recognizable a *hedgehog*, a *hare*, and a *jerboa*. This tomb is of the IVth Dynasty and occurs at the Pyramids of Abusîr. The portion of the inner chamber is in the Egyptian collection at Berlin² and is figured by Lepsius³.

In the Tomb of Ptah-hotep at Sakkarah, of the Vth Dynasty, we find on the east wall a hunting-scene⁴, in which two hedgehogs are represented, the first emerging

¹ Bird Hunting on the White Nile, 1902, p. 59.

² Kgl. Ægypt. Mus. Berlin. Kat. (1899) no. 1105, pp. 45 & 46.

³ Denkm. Abth. ii. Bl. 3.

⁴ Egypt Expl. Fund, Ptah-hotep I. pls. xxii. & xxvi.

from a hillock and having an insect, probably a grasshopper, in its mouth, and behind this is the perfect figure of the second. There also occur in one of the mural paintings at Beni Hasan, in the Tomb of Chnem-hotep¹, of the XIIth Dynasty, two of these animals being carried in a basket.

Another example is given in a fine hunting sculpture from Thebes of the XIIIth Dynasty, where a hedgehog is figured, according to Prissé's drawing², as having an insect in its mouth, and in this respect resembling the early representation in Ptah-hotep's tomb.

Hartmann has indicated that two species of hedgehogs can be distinguished in tombs of the Pyramids of Gizeh, Abusîr, and Sakkarah, viz. *E. libycus* and *E. æthiopicus* of Ehrenberg.

The representations at Beni Hasan are not determined.

¹ Beni Hasan, I. pl. xxx.; Lepsius, Denkm. Abth. ii. Bl. 3.

² Art Egyptien, ii. pl. 24.

SORICIDÆ ¹.

CROCIDURA.

Crocidura, Wagler, Isis, 1832, p. 275.

Shrews with entirely white teeth, either 28 or 30. The nostrils are somewhat tubular and horny, opening laterally at the end of the snout, with a notch between them. The ear is well developed, with two deep ledge-like flaps on the inner side, the upper one forming a complete pouch, the lower one free on its inner border. A scent-gland, absent in the females of some species, is present on the side of the body (abdomen). The genito-urinary and anal orifices both open into a shallow cloaca. Tail tapering, thick at the base, somewhat sparsely clothed with short hair, interspersed with long, fine, outstanding hairs.

This genus is divided into two groups—*Crocidura*, with 28 teeth, having only 3 unicuspid between the large hooked incisors and the large last premolar; and *Pachyura*, with 30 teeth, with 4 unicuspid, the last very small.

CROCIDURA (CROCIDURA) OLIVIERI, Less. (Plate XXIII. fig. 1.)

“*Grande Musaraigne*” (*Sorex*), Olivier, Voy. Emp. Othoman, ii. (Egypte) p. 94, pl. 33. fig. 1.
Sorex olivieri, Lesson, Man. Mamm. 1827, p. 121.

♀. Zagazig. Lent by Cairo Museum (Dr. Walter Innes, Bey). In alcohol.

2 ♂, 2 ♀. Cairo, May and June, 1901. Lent by Hon. N. Charles Rothschild. Skins with skulls.

Size large; ears well developed; tail rather long. The upper parts uniform rich dark brown; the under side grey-drab with slight silvery sheen. Tail dark, with very short close-lying black-brown hairs, and fine, longer, outstanding hairs scattered over the proximal two-thirds of its length. Whiskers dark at the base, very fine and glistening silvery in their terminal half. The scent-gland is small and not conspicuous, placed on the border-line of the dark upper and lighter under surfaces, halfway between the knee (femoro-tibial joint) and the elbow. The skin of the snout, ears, feet, and tail is dark blackish in the preserved specimens.

From the dried skins the measurements are:—Head and body 110–120 millim.; tail 60–70; hind foot 18–20.

The specimen in spirit from Zagazig is barely full-grown, and gives the following measurements:—Head and body 94 millim.; tail 53; hind foot 17.5. This specimen

¹ Except where otherwise stated, this section of the Insectivora was written by W. E. de Winton.

1. *CROCIDURA* (croc.) *OLIVIERI*. 2. *CROCIDURA* (croc.) *RELIGIOSA*.
3. *CROCIDURA* (pach.) *CRASSICAUDA*.

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fell from the talons of an eagle-owl shot at by Dr. Walter Innes. In it I am unable to discover the lateral gland.

All the skulls of this species at my disposal are imperfect, but the most important dimensions are :—

	Cairo.	Zagazig.
	mm.	mm.
Greatest breadth of maxillæ	8·9	8·2
Interorbital breadth	5·5	5
Breadth of snout	3	3
Tip of first incisor to tip of large premolar	6·5	6·5

The British Museum contains a nice series of this shrew, obtained in the month of May by Messrs. J. W. H. & R. J. Cuninghame near Mena House, where they were found in the dry wells. Further than this, the habits of this shrew are unknown. Mr. R. J. Cuninghame was unable to discover the whereabouts of the animal in winter; it is certain they did not live in the wells, which were full of water at that season.

I am not aware of any published account of recent specimens of this shrew; like the next species, it was hitherto known only in the mummy state.

Olivier found this shrew embalmed in the subterranean rock-tombs at Sakkarah, near Aquisir. The following is an abridged account of the incident as told at length in Chapter VIII. of the ‘Voyage en Egypte’ :—

“After passing through many chambers we stopped in one of more than thirty feet wide. The whole of one end was filled with jars piled up one upon the other to the ceiling.

“These jars were from twelve to eighteen inches long. The mouth was wider than the base, and was from five to seven inches in diameter. They were made of very coarse, reddish terra cotta, with a convex lid of the same material, fixed to the jar with a sort of greyish clay. The mummy which they covered was wrapped in bandages of linen or cotton, of rather fine texture, and enveloped in a thread network more or less well made. In most of these jars was found the mummy of an Ibis, the majority of which were in a bad state of preservation. On opening a mummy perfectly resembling the others, we were surprised to find, instead of an Ibis, the bones of a little quadruped. It was easy to judge by their number that several individuals had been embalmed together; for we took out six entire heads besides others which were broken. These were the remains of a shrew much larger than the European species, unknown to naturalists, so, to enable anyone to recognize it again, we here give a description :—

“The head measures from an inch to fifteen lines in length, and about six lines in breadth behind. In the middle and in front it is very narrow. The upper jaw has two incisor teeth, long, strong, sharp, a little curved, notched about the middle of their antero-posterior length, where they receive the two lower incisors. Immediately

behind these are three canines [unicuspids] on each side and four maxillary teeth [large premolar and molars]; these latter are broad, and, as it were, bristling with points of unequal length and unequal size. The last molar is smaller than the three teeth preceding it. The lower jaw has two incisors, as long as those of the upper jaw, two strong canines on each side, and three molars, also strong but not so broad as those above. The skull is slightly enlarged in the figure. The feet have five toes, well formed, armed with thin and hooked nails. The fur of the animal, which is preserved is red and very fine. The tail appears to be about as long as the body."

[According to Sir J. Gardner Wilkinson¹, the shrew-mouse held a conspicuous place amongst the sacred animals of Egypt, and on the authority of Herodotus he relates that the Shrews were taken when they died to Buto for burial, because they were sacred to the goddess of that city. Plutarch² has observed that this animal received divine honours among the Egyptians, as it was believed to be blind, and because darkness was more ancient than light.

There are numerous figures of shrews in the 'Salle des Dieux' in the Louvre, Paris, some large, others very small. All of them have been the covers of small sarcophagi containing mummified individuals probably representing four species.

In the Egyptian Collection in Berlin, besides the mummies brought by Passalacqua, there are some packets of compressed mummified shrews from an animal-grave in Achmim³.—G. S. A.]

CROCIDURA (*CROCIDURA*) *RELIGIOSA*, Is. Geoffr. (Plate XXIII. fig. 2.)

Sorex religiosus, Is. Geoffr. Mém. Mus. xv. 1827, p. 128, pl. 4. fig. 1.

4 ♂, 6 ♀. Lent by Hon. N. Charles Rothschild. Cairo, May 1901.

One of the smallest of shrews; tail long; upper side blue-grey, with a slight wash of brown; lower side silvery grey; the feet pale, nearly naked.

Measurements taken from specimens in spirit:—Head and body 50 millim.; tail 31–32; hind foot 9–9·5; forearm and hand 12–13; ear 6; snout to hinder border of ear 17–19; snout to eye 8·5–9.

Length of skull (c.) 16 millim.; breadth (c.) 7; breadth across maxillæ 5; inter-orbital breadth 3·9; breadth of snout 2; tip of incisor to tip of large premolar 3·3.

Since Isidore Geoffroy wrote his paper on the shrews, and described and figured the mummified specimens found by Passalacqua in the tombs at Thebes, no mention of this

¹ Ancient Egyptians, iii. p. 270.

² Œuvres Mêlées, t. i. p. 199, traduit 1784, Symp. iv. Quæst. v.

³ Tiernumien, Kgl. Mus. Kat. p. 317.

small species as occurring in a living state has been made. The discovery is entirely due to Mr. Charles Rothschild, who has taken an immense amount of trouble in obtaining specimens of various animals of which I stood in need for the purposes of completing this book. I have been unable to examine any of these shrew-mummies, but no hesitation is felt in applying the name originally given to the dried remains to the species now living. The larger shrew, of about the size of the common European species (*C. russula*), described by Geoffroy (*op. cit.* p. 143, pl. 4. fig. 2), would point to the probability of an as yet unknown species occurring at the present day in Egypt, while the very large species also figured by him is probably the remains of the shrew next described (*Cr. crassicauda*).

Dr. Anderson has the following note on a specimen in the Stuttgart Museum labelled *Crocidura aranea* (= *russula*):—

“Cairo, Dr. Klunzinger.—Snout to vent 44·5 millim.; tail 32. Pale sandy brown above, with an almost golden satiny sheen. Under surface dusky white. Tail clad with short greyish-brown hairs, and with numerous long, fine, dark brown hairs. Ears rather large.”

By the kindness of Dr. K. Lampert, the Curator of the Stuttgart Museum, this specimen was sent to Dr. Anderson in London by post, but by some mischance the parcel was lost and never reached its destination. The size of the animal seems to agree with the species under notice; the coloration does not fit so well, but the specimen was probably faded. However, in any case it could not have been a specimen of *C. russula*.

CROCIDURA (PACHYURA) CRASSICAUDA, Licht. (Plate XXIII. fig. 3.)

Sorex giganteus, Is. Geoffr. Mém. Mus. xv. 1827, p. 137 (partim), pl. 4. fig. 3.

Sorex crassicaudus, Lichtenstein, Darstell. Säug. pl. 40. fig. i. (1828).

Suncus sacer, Ehrenb. Symb. Phys., Mamm. ii. fol. k (1832).

Sorex indicus, Rüpp. Neue Wirbelth. 1840, p. 40.

Pachyura gigantea, Fitz. & Heugl. SB. Ak. Wien, liv. i. 1866, p. 565.

Pachyura duvernoyi, Fitz. SB. Ak. Wien, lvii. i. 1868, p. 136.

Pachyura crassicauda, Fitz. SB. Ak. Wien, lvii. i. 1868, p. 137.

♀. Suakin. Colonel Sir C. Holled Smith, K.C.B. Brit. Mus. No. 92. 7. 20. 1.

♂. Houses of Suez.

One of the largest of shrews. The tail is very thick at the base, gradually tapering. The skin is very pale, covered with fine silvery hair, but not so as to hide the minute scales; there are fine longer outstanding hairs scattered over its whole length; the skin likewise of the snout, ears, feet, &c. is pale drab or yellowish white

in the preserved specimens. The scent-gland, large and conspicuous in both sexes, is placed a little behind the shoulder. In the female there are three pairs of inguinal mammæ situated very far back. The colour of the fur is uniform pale grey, washed with brown or drab in the spirit-specimens.

Measurements taken from specimens preserved in alcohol.

	♂. Suez.	♀. Suakin.
	mm.	mm.
Head and body	115	103
Tail	74	65
Hind foot	20	20
Ear	14	11
Snout to hinder border of ear-conch	36	35
„ eye	18	16
Breadth of tail at base	9.5	5.5

Measurements of the skull of the female from Suakin:—Greatest length 30 millim. ; greatest breadth 12.5 ; maxillary breadth 9.5 ; interorbital breadth 6 ; breadth of snout 3.7 ; basal length 28 ; length of palate 13 ; tip of incisor to tip of large premolar 6.6.

There can be little doubt that the large mummified shrew figured by Geoffroy was the remains of a specimen of this species, although the locality would suggest the greater probability of it being a specimen of *C. olivieri*. Its greater size, however, and the fact of the gland being so clearly shown in the dried mummy induce me to refer it to *C. crassicauda*. The examination of the skull would, of course, at once settle the question, the one having four unicuspid teeth, the other three on either side of the upper jaw.

This species is very closely allied to *C. cærulea* of India, and it is thought by some writers that it has been introduced to the Red-Sea littoral by ships—a theory which is not at all unlikely to be true, seeing that a trade has been carried on between these two countries for some thousands of years.

CARNIVORA.

Suborder *CARNIVORA VERA*.

FELIDÆ.

FELIS.

Felis, Linnæus, Syst. Nat. x. 1758, p. 41.

Feline Carnivora, with claws completely retractile and inner cusp of upper carnassial tooth well developed.

Dentition: i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{3}{2}$, m. $\frac{1}{1} = 30$.

FELIS LYBICA, Meyer. (Plate XXIV.)

“Booted Lynx,” Bruce, Travels Source of the Nile, 4to, 1790, vol. v. p. 146.

Felis lybica, Meyer, Syst. Zool. Entd. Neuholland u. Afrika, 1793, p. 101.

“Caracal aux Oreilles Blanches,” Buffon, Hist. Nat. 4to, 1776, Suppl. vol. iii. p. 233.

Felis caligata, Temminck, Monogr. Mamm. no. 4, 1824, vol. i. p. 123 (1827); Blanford, Geol. Zool. Abyssinia, 1870, p. 228; Heuglin, Reise N.O.-Afr. 1877, vol. ii. p. 56; *et auct.*

Felis maniculata, Temminck, op. cit. p. 128; Cretzschmar, Rüpp. Atlas, 1826, Taf. i.; Fitzinger, SB. Akad. Wissensch. Wien, liv. i. 1866, p. 558; id. ibid. lix. i. 1869, p. 681; Blanford, op. cit. p. 226; Heuglin, op. cit. p. 56; *et auct.*

Felis rüppelii, Schinz, Cuv. Thier. 1825, vol. iv. p. 509.

“Chat aux Oreilles Rousses” ou “Chat Botté,” Cuvier, Hist. Nat. Mamm. livr., Sept. 1826.

Felis bubastis et *Felis dongolanæ*, Hemp. & Ehrenb. Symb. Phys. dec. ii. 1832.

Felis pulchella, Gray, Charlesw. Mag. Nat. Hist. i. 1837, p. 577.

Felis libyca, Is. Geoffroy St.-Hil. Descr. coll. V. Jacquemont, iv. 1844, p. 56; Lataste, Act. Soc. Linn.

Bord. xxxix. 1885, p. 226; id. Expl. Sci. Tunis., Mamm. 1887, p. 16 (nee *F. libycus*, Olivier).

Lynx caligata, Fitzinger & Heuglin, SB. Ak. Wissensch. Wien, liv. i. 1866, p. 558.

Description of a flat skin without the head, Suakin, Major Penton, R.A.M.C., D.S.O.

Pale sandy coloured, with a rather rufous dorsal line from behind the shoulders to the tail and with the body-markings arranged in transverse bands, more or less continuous or interrupted, of a paler rufous-sandy than the dorsal line. Feet black below, and the legs with the usual markings. The rufous dorsal line is prolonged on to the tail, where it becomes more yellowish with black hairs intermixed. Tail long, with a black tip and usually with three distinct black rings above it separated by greyish-white intervals.

Measurements of specimens caught at Tamai, Suakin Plain, 25th & 28th Jan., 1894.

	No. 75.	No. 85.
	♂.	♂.
Snout to vent	580	560
Vent to tip of tail	355	375
Height of ear	58	62
Greatest breadth across head	95	80
Snout to eye	34	31
Length of eye	23	20
Eye to external meatus	52	48
Length of tarsus	141	145

The male No. 85 has a distinct pencil of hairs at the ear-tips, measuring 20 mm. in length.

Colour of eye bright yellow.

Munich Museum.

Felis maniculata, Rüpp. Nubia Sup., 1839.

This specimen is about the size of a large domestic cat, of a pale yellowish sandy colour minutely speckled by the paler subapical bands to the tips of the hairs, with indications of reddish-yellow lines on the head and still paler but similarly coloured spots or bands on the sides, so obscure as almost to be invisible, but becoming very distinct on the fore and hind limbs, where they are transverse. Belly white, with obscure reddish spots. A red area between the eye and the nose and above the eye ; a narrow red line from the hinder angle of the eye directed obliquely downwards, with some faint reddish markings on the white of the cheeks. The middle of the back from behind the shoulders reddish ; this tint is prolonged on to the first half of the tail, and is followed by a greyish sandy area, with some indications of dark banding ; then with two blackish bands separated from each other by greyish areas ; tip of tail black. The hinder parts of the fore and hind feet (tarsus) dark reddish brown, almost black. Ears not tufted, with whitish hairs anteriorly and reddish hairs on their hinder surfaces. Chin and throat whitish, with a narrow reddish collar on the sides of the neck. The tail is about the length of that of a domestic cat.

[Form generally much like that of the domestic cat, but with longer legs and tail. The general body-colour grizzled sandy fawn ; the ears orange-red, with rather browner hairs at the points, 10 mm. in length in some individuals ; the dorsum of the nose and the area in front of the eyes reddish brown ; the face between and above the eyes, the upper lips and cheeks very pale buff ; two small but conspicuous elongated spots of warm brown upon the forehead, one above the anterior canthus of each eye ; a narrow red line from the hinder angle of the eye directed obliquely downwards to the back of

FELIS LYBICA. SUAKIN PLAIN.

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the lower jaw, where it meets a similar line which originates in the moustachial area; chin pale buff-white; two transverse lines of reddish on the throat; lower parts whitish, more or less washed with yellow-fawn, with rather obscure reddish markings; fore and hind limbs banded with somewhat obscure darker stripes, with one very distinct broad black band on the inner side of the fore leg just below, and another, generally less defined, above the elbow; the plantar surface of the fore and hind feet black, continuing, in the latter, in a narrow median line to the heel. The individual hairs of the whole of the upper part of the body are banded after the following pattern: the base of the hair is smoke-brown, followed by an extensive area, of more than half the length of the entire hair, of either buff or cinnamon, a narrow black ring, a broader pale buff ring, and a black tip. Along the whole of the dorsal line the broad lower pale portion of the fur is reddish cinnamon-coloured, giving a richer somewhat rufous tone to the back, while on the sides this part of the fur is pale buff. The tail is coloured like the back for more than half its length, becoming greyer posteriorly; towards the extremity there are usually three conspicuous black bands, with the spaces between them whitish grey, and a black tip about an inch or more in extent.

The above description is taken from specimens evidently in full coat and applies equally to individuals from such widely separated localities as Shebel L'Anserin in Tunisia, Suakin, Adegat in Abyssinia, and Machakos in British East Africa. In specimens from the Suakin Plain, which are in very short fur, killed on the 25th and 28th of January (or only one month later than others from the same locality in the longer coat), the whole of the skin is thickly barred with somewhat indistinct but clearly traceable stripes—transverse on the body, longitudinal on the head and neck,—slightly darker than the general body-colour, which is altogether more yellow and not so grizzled as in the specimens in longer fur.

On looking more closely into the colour of those with the heavier coat, the fine bands are always distinctly traceable on the head and neck and are found to be more or less conspicuous on the body generally in proportion as the hair is shorter or longer.

The skull of *F. lybica* is very broad in the orbital region, the breadth of the zygomatic arches anterior to the ascending postorbital processes being not markedly less than in the squamosal region. The postorbital processes are very long, almost meeting in some individuals. The muzzle is extremely short. The nasals are slightly depressed as far as their connection with the premaxillæ, but then rise abruptly and again sink towards their junction with the frontals; so that the front of the face falls away at an angle of 45° from the plane of the forehead, which is flattened over the orbits. Viewed in profile the orbital cavities almost reach the line of the forehead. The length of the nasal bones is somewhat variable; they are generally rather abruptly truncated posteriorly and end in a line with the ascending processes of the maxillæ, but in some instances they may be slightly longer and in others rather shorter.

Measurements of skulls.

	Suakin.	Suakin.	Abyssinia.	Abyssinia.
	No. 75.	No. 85.	Brit. Mus.	Brit. Mus.
	♂.	♂.	♂.	♀.
	mm.	mm.	mm.	mm.
Basal length	87	84	88	81
Greatest breadth	72	72	70	65
Breadth of brain-case	46	48	46	43
Lachrymal fossa to tip of nasal	18·5	18	21	18·5
Least interorb. breadth	18·1	20	20	17
Front of canine to back of <u>pm.</u> ³	33·5	32	32	30
Length of <u>pm.</u> ³ (outside)	12·5	12	12·1	11·2

This cat inhabits dry situations in rocky or wooded districts. Major Penton says that in the country about Suakin it is called by the Hadendowahs ‘Kafab,’ and that it lives in deep holes which extend underground for a considerable distance. These habitations are probably burrowed out by other animals.

Messrs. Rothschild and Wollaston found this species on both sides of the Nile near Shendi (Nov. Zool. viii. 1901, p. 328), and say: “the natives call this animal ‘Qutt gabali,’—*i. e.* mountain or wild cat. At Cairo this name is applied to *Felis chaus*.”

Bruce was the first traveller who furnished a description of this cat, under the name of the “Booted Lynx,” which he found at Ras el Feel, in Abyssinia. The figure given by him has the ear-tufts very much exaggerated; this misrepresentation and the fact that it was called a lynx have caused much confusion. Bruce did not employ scientific names, and Meyer took the opportunity of naming all the animals mentioned in his book.

Rüppell was the next traveller to send specimens to Europe; these were obtained in Libya and Ambukol about 1822. Temminck in 1824 brought out the first parts of his “Monographies,” containing No. 4, on the Cats; in this work he gave the scientific name of *F. caligata* to the “Booted Lynx” of Bruce, at the same time saying that *F. libycus* of Olivier belonged to the same species, which was a misstatement; he then proceeded to describe the cat sent home by Rüppell under the name of *F. maniculata*, a name the collector had himself written on the labels. Temminck’s separate monographs were collected into book form and republished in 1827. Schinz (not knowing of, or disregarding, Temminck’s work) called these same specimens after the collector, *F. rüppelii*; one of these was well figured and described, under the name of *F. maniculata*, in the Atlas to Rüppell’s Travels, written by Cretzschmar. This species is again mentioned under two fresh names by Hemprich and Ehrenberg in a note on the cats, following the description of the leopard (*F. pardus*), in which they say that specimens had been sent by themselves to the Berlin Museum as early as 1822.

Dr. Blanford mentions the difference between the cats of the coast-region and those of the highlands of Abyssinia, and preferred to distinguish the two forms under the two names used by Temminck; but with more material to work on it is clearly shown that the low-ground animals are in no way inferior in size, and that a complete gradation takes place between the short- and long-furred forms. As is well known, the length, and especially the denseness, of the fur has an enormous effect on the apparent size of a cat, and the difference in size between the sexes is very considerable.

The typical form of this species is found on the east of the African continent from Egypt to Nyassaland. The material available is insufficient to show finally to what extent the various forms of this cat, which are distributed over a very much wider area, differ from one another; but there is ample to show that *F. margarita*, Loche¹, from the Algerian Sahara, and *F. obscura*, Desmarest², from Cape Colony, among others, are only slightly modified local forms or subspecies. The last-mentioned form is commonly known as *F. cafra*, Desmarest³; but as the former name was given two years earlier to a melanistic specimen of the same species, it is obvious that this name, though founded on a variety, cannot be set aside; the South-African form should therefore stand as *F. lybica* subsp. *obscura*.

Canon Tristram found a cat closely resembling the typical form in Moab, and Colonel Yerbury obtained specimens at Lahej in Southern Arabia.

When single specimens are received from distant localities it is difficult to know whether they are typical of a race peculiar to that district or possibly hybrids with the domestic cat. This is always a very difficult point to settle, for, as is well known, the domestic cat almost always gets tainted by the wild cats of the country. In reference to the present species, Emin Pasha found that his domestic cats bred freely with the wild species in Niam Niam, and Capt. Stanley Flower informs me that he has seen domestic cats near Suez which can scarcely be distinguished from *F. lybica*.

The Plate was drawn from a specimen living in the Zoological Gardens of London, obtained on the Suakin Plain and presented to the Society by Dr. Anderson.

This species is generally supposed to be the main origin of the domestic breed of cats. Temminck was the first to publish this fact. Dr. Nehring (Verh. Berlin. Anthropol. Ges. 1889, p. 558), in a paper on the skulls of cats from Bubastis, Beni Hasan, and Siut, expresses the view that this species was the original stock of the domestic breed of the western civilization, while the domestic cat of China had a perfectly distinct origin.

The remains of cats were found in such large quantities at Bubastis that cargoes were sent to Europe to make manure, and they were largely used also by the natives to fertilize the land in the immediate neighbourhood. The Museums of Europe contain

¹ Rev. Zool. 1858, p. 49, pl. i.

² Encycl. Méth., Mamm. 1820, p. 230.

³ Op. cit. Suppl. 1822, p. 540.

³ Herod. 2. 66.

FELIS CHAUS subsp. NILOTICA. LOWER EGYPT.

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This specimen only differs externally from a male in the British Museum from Rajputana, No. 85.8.1.18, in being darker.

The Rajputana specimen has the following measurements appended to it:—

	mm.
Snout to insertion of tail	669
Length of tail	305
„ tail with hair	310
„ ears	74
„ hind foot	165

This Egyptian cat, in colour, most resembles another cat from the low country between Colombo and Kandy, in Ceylon, an area which in its moist nature corresponds somewhat to the damp sugar-cane fields of Egypt, in which this cat is generally found.

Güldenstaedt gives the following measurements of his *Felis chaus*:—

	mm.
Apex of nose to anus	762
Height at shoulder	483
Length of tail	285
Length of tarsus	158

Measurements of skulls.

	Egypt.	Egypt.	Gülden-	Sambar,	Kishnagarh.
	♂.	♀.	staedt's	Rajputana.	
	mm.	mm.	type.	♂.	♂.
			mm.	mm.	mm.
Incisors to ant. margin of foramen magnum .	108	96	106	99	98
Premaxillaries to occipital crest	129	117.5	..	123	120
Maximum zygomatic breadth	84	76	82	76	77
Length of osseous palate	48	43	..	42.3	42
Breadth between upper molars	42	37	37.7	35	35
„ at infraorbital foramina	36	31	31	30	32
„ above aural apertures, projection of					
squamosal	49	41.5	47	42	42
Intertemporal constriction	35	38	..	35.2	35
Interorbital constriction	22.5	21	..	19	21
Length of last 3 teeth, 2nd and 3rd premolars					
and molar	28	24.5	..	22	22
„ 2nd premolar	10.6	9.5	..	8.5	8.8
„ 3rd premolar	16	14.3	..	13	12.5
„ molar transversely	4.3	5	..	3.8	3.3

The measurements of the skulls in the foregoing table prove that the Egyptian race is larger than the Indian and that its teeth are also more powerful. In its teeth it most approaches the cat from the Caucasus, a skull of which in the British Museum

(1172 *d*) has the third upper premolar 14·8 mm. long, while in the Indian cats that tooth seldom, if ever, exceeds 13 mm.

A male from Persia, No. 53.1.6.86 in British Museum, has a basal length of 100 mm., and the third upper premolar 14·3 long, thus approaching the Caucasian and Egyptian races.

The skulls of the Indian form are always distinguished by the upper half of the nasals being arched when viewed in profile, the area between the arched portion and their extremities being concave. In the Egyptian skulls, male and female, the arching and concavity are absent, the skull sloping down evenly from the frontal.

In the British Museum there are the skin and skull of a male cat obtained by Tristram at Jericho, No. 64.8.17.4. The skin is exactly the same as that of the Egyptian examples of *F. chaus*. The skull has the same form in the fronto-nasal region as in the skull of my Egyptian specimen, but although a much smaller skull, its third upper premolar is considerably larger. The Egyptian male skull has an extreme length of 129 mm., and the Jericho male skull only 112 mm. The third upper premolar of the former measures 16 mm., and that of the latter 18 mm.; the lower premolars of the Jericho cat are also absolutely larger than those of the big Egyptian cat. In the Egyptian skull the canines are fully through the jaw and finally rooted, whereas in the Jericho skull they are only two-thirds through. The latter skull would probably have grown considerably larger, whereas the Egyptian skull had evidently attained its limit of growth. In the Jericho skull there is a well-pronounced mammillary process at the base internally of the first trenchant cusp of the second upper premolar. A similar process is also developed in the skull of a female from Egypt, No. 92.5.22.1, but in the adult male it is absent on the left and very feebly indicated on the right. In the skull 1172 *d*, from the Caucasus, this process is tolerably well developed, and it is also indicated on the left side in the Persian skull 53.1.6.86.

In ten skulls from India there is no trace of the process in the second upper premolar, and all the skulls have a convexity at the middle of the nasals and a concavity in front of it, indeed a *nez retroussé*; whereas the Egyptian, Palestine, and Persian skulls do not show these features; the convexity is there but not the concavity.

There is another peculiarity in the dentition of the skull from Jericho, viz., that the first upper premolar is placed transversely to the other teeth. In the specimen from Persia the first premolar on the left side is placed distinctly obliquely, and that on the right less so.

Undoubtedly the most remarkable skull is the one from Jericho, which has teeth absolutely larger than in specimens from Egypt, although the skull is much smaller. With only one Palestine skull at my disposal it is impossible to say whether the great size of the teeth in this specimen is merely individual or whether it is distinctive of the Palestine cats as a whole; I mean those with the external features of *F. chaus*.

There can be no question, I think, that all these cats are examples of one species; but, at the same time, if the skull of an Egyptian animal is compared with, say, a skull from Rajputana, India, the differences are so great in the details I have indicated that they might be regarded as specifically distinct, although there are connecting-links through Persian and Caucasian skulls. It is probable that if skulls of *F. chaus* (or *F. jacquemontii*) from Bengal were compared with the Egyptian skulls, the differences would be still greater. As names have been applied to these extremes in the distribution of the species, the western form found in Egypt and still further to the west may be denominated *Felis chaus* subsp. —, the Caucasian and Persian form with smaller teeth *Felis chaus* subsp. —, and the Indian form *Felis chaus* subsp. —.

[The above notes were evidently written before my revision of this group was published in the 'Annals and Magazine of Nat. Hist.' ser. 7. vol. ii. 1898, p. 293, and it is therefore the more satisfactory to find that precisely similar conclusions are arrived at.

The cats being of general interest, I have thought it necessary to make the following supplementary notes rather fuller than usual.

Felis chaus is very considerably larger than *F. lybica*. Form strong; legs long; tail short, about reaching the hocks. The general body-colour grizzled sandy fawn, with no conspicuous markings; the ears red-brown, with black tips, bases, and a small spot towards the middle of the outer border; the forehead and occiput very inconspicuously striped; the face between the eyes pale buff; a conspicuous dark brown lachrymal patch. The dorsal line more richly coloured reddish, with dark under-fur; the tail similarly coloured for a short distance, then greyer, with two very narrow black bands close to the short black tip; the under side of the tail is uniform grey from its base to the black tip. The sides of the body near the belly are very indistinctly spotted; these slightly darker marks show more distinctly when viewed from behind, as they owe their existence, to a certain extent, to the darker colour of the under-fur.

The legs are more rufous than the body, the feet foxy red; the upper parts of the legs are marked with inconspicuous bands, one far blacker and broader than the rest on the inner side of the forearm, and sometimes a second about the elbow. The chin very pale buff, the throat grizzled and dark, somewhat like the upper surface; the chest in the middle line and the belly pale fawn, very inconspicuously blotched with darker colour. On either side of the chest, under the fore legs, there is a very pale patch where the hairs are almost white to their bases; this is intensified by its proximity to a patch behind the elbow, where the hairs have only buff tips and are otherwise soot-coloured to their bases; a similar dark patch occurs on the back of the hind legs just above the hocks.

The spotting of the belly and flanks of this cat is about as distinct as the very similar markings on a young lion. In specimens in shorter coat the general colour is less grey, and the spotting of the flanks in particular more distinct.

The skull is very readily distinguished from that of *F. lybica* by its more projected facial portion, the less expanded malars, the rounded forehead, and the usually shorter and more sharply-pointed postorbital processes. The teeth of a female of this species are much larger than those of the largest male of *F. lybica*. The zygomatic arches gradually narrow from the squamosal region, and the orbits are not laterally expanded. The nasals are gradually tapered posteriorly, and extend generally well behind the level of the maxillary processes. Viewed in profile the orbit does not nearly reach the line of the forehead, and the face-line, although slightly bowed, slopes gradually away from the summit of the forehead to the end of the nasals.

Mr. R. J. Cuninghame gives the following measurements and weights of fresh-killed specimens taken in cultivated land on the margin of the desert near Cairo, and now in the British Museum:—

	♂.	♂.	♀.	♀.
	98.6.5.1.	98.6.5.2.	98.6.5.4.	98.6.5.3.
	mm.	mm.	mm.	mm.
Head and body . . .	720	760	620	520
Tail	270	280	210	215
Hind foot	170	174	145	140
Ear	64	72	63	65
Weight	11 lbs. 2 oz.	14 lbs. 3 oz.	8 lbs. 7 oz.	8 lbs.

The last female was very young, the milk-canine still being in place, with the permanent canine about one-third extruded in front of it.

Measurements of skulls.

	Brit. Mus. No. 98.6.5.1. ♂. Cairo. mm.	(Dr. Anderson.) ♂. Heluan. mm.	Brit. Mus. No. 98.6.5.4. ♀. Cairo. mm.	Brit. Mus. No. 98.6.5.3. ♀ juv. Cairo. mm.
Basal length	112	109	91	84
Zygomatic breadth	84.5	82.5	71	65
Breadth of brain-case	54.5	53.5	49	48
Lachrymal fossa to tip of nasal . .	27	24.5	21	19
Least interorbital breadth	24.9	22.1	19	17
Front of canine to back of <u>pm.</u> 3 . .	41.7	41.9	35	35
Length of <u>pm.</u> 3 (outside)	15.5	16.5	14	15

This cat inhabits low marshy ground and is very partial to reed-beds, sugar-cane, bean-fields, or any similar thick cover. It has not been recorded from any other part

of the continent of Africa and its range in Egypt is confined to the Delta and to the Nile Valley for a short distance only to the south of Cairo.

Cats of this species (in the larger sense) were first described by Gldenstaedt from specimens obtained by Pallas on the shores of the Caspian Sea. Pallas called the same animal by a different name in his own account of the animals obtained during his travels. A nearly-allied form of lighter build, and having very much smaller teeth, occurs in India, and has received several names, the first of which is *affinis* of Gray¹. Hence this Indian race is now known as *Felis chaus* subsp. *affinis*.

About the end of the eighteenth century Olivier found this cat frequenting the corn-fields between Alexandria and Siwah, and although he was unable to obtain a specimen by the aid of his own rifle, a skin was procured from some Bedouins who had found the animal on the borders of the desert. The skin was unfortunately headless and so no description of this important feature was possible. The name Olivier bestowed upon it had unfortunately been given by Meyer, with only a slight difference of spelling, to the animal collected by Bruce.

Brandt also distinguished the Egyptian animal, obtained by Rppell at Lake Menzaleh, by a separate name; but, in naming it after the collector, he likewise overlooked the fact that this name had already been bestowed by Schinz on the smaller long-tailed cat, *F. lybica*; so the name he applied likewise cannot be used.

By many writers this species has been confused with the "Booted Lynx" of Bruce, which in reality was a specimen of *F. lybica*. In all probability Bruce had seen specimens of *F. chaus* in Egypt, and had been struck by their lynx-like form and moderately-tufted ears, and possibly made notes at the time, but had not preserved a specimen; then, on getting a somewhat similarly coloured cat in Abyssinia, which he brought home, he fell into the error of supposing it to be of the same species. He probably also had recollections of the ears of the Caracal with its long tufts, thus the description, based upon both the skin and his notes, may account for the long tail of one species and the tufted ears—but exaggerated—of the other being combined in the figure he has given of his "Booted Lynx."

The Egyptian animal closely resembles the typical form from Transcaspia in colour; it is, however, rather larger, the ears are less rufous, and the chest more grizzled. A comparison between the skulls of *F. chaus* subsp. *nilotica* and of typical *F. chaus* shows that, besides the greater size of the teeth of the former, the profiles differ considerably. Looking at the skulls in true profile, the highest point of the cranium in the typical *F. chaus* is equidistant between the tip of the nasals and the occiput, that is, just *behind* the postorbital processes; while in *F. chaus* subsp. *nilotica* the highest point is *just in front* of a line drawn between the points of these processes, and so noticeably nearer

¹ Illust. Ind. Zool. i. pl. iii. (1830).

to the point of the nasals than to the occiput. In shape the nasal bones of typical *F. chaus*, again, incline towards those of the Indian race, *F. chaus* subsp. *affinis*, in which the face-line falls away from that of the forehead, much as in *F. lybica*, and as in that species there is a concavity near the point of the nasals.

Another local race is found in Palestine: the single specimen in the British Museum, referred to by Dr. Anderson on a former page (p. 178), was obtained near Jericho by Canon Tristram; it has been named *F. chaus* subsp. *furax*, de Winton¹. The skull of this subspecies closely resembles that of the Egyptian form, but the teeth are very much larger; in fact, in proportion to its size, this cat has larger teeth than any living member of the family Felidæ, its teeth being little smaller in actual size than those of a female leopard (*F. pardus*).—W. E. DE W.]

FELIS LEO, Linn.

Felis leo, Linnæus, Syst. Nat. x. 1758, p. 41.

Sonnini ('Voy. Egypte,' ii. 1799, p. 199) mentions the lion as one of the large Carnivora which approaches the confines of Egypt, but, if entering, does not long remain within the country; he says the Egyptians call it 'Sabbé.'

Burckhardt ('Travels in Nubia,' 1819, p. 391), speaking of the mountains of Negeyb, between Shendi and Takah, says: "Lions and Leopards occur in plenty in this district; I never saw any of these animals, but heard their howlings every night. Some of the Sheikhs, but very few, have lion-skins in their tents. As the inhabitants have no weapons but swords and lances, it rarely happens that any of these animals are killed in these countries."

Rüppell ('Reisen in Nubien, Kordofan, &c.' 1829, p. 121) mentions the lion as one of the animals met with on the route from Debbah, by Simrie and Hazara, to El Obeid.

Hoskins ('Travels in Ethiopia,' 1835, pp. 96 & 129) says that, according to the natives, lions prowled all over the plain in the neighbourhood of the ruins at Wadi Outaib, or Mecaurat, a little above Shendi. Hoskins observed traces of them in his tent at these ruins, and two had been seen within 100 yards of it, and he heard them roaring. He also mentions that lions infested the road to Sennaar and the west side of the Atbara, but that they did not occur on the route from Metammeh to the wells of Gagdul.

Hartmann ('Zeitschr. Gesellsch. Erdk. Berlin,' 1868, p. 46) gives a capital notice of the lion and its distribution in this part of Africa, and mentions some of the monuments on which it is represented in Egypt.

¹ Ann. Mag. Nat. Hist. ser. 7 vol. ii. 1898, p. 293.

Heuglin ('Reise N.O.-Afr.' ii. 1877, p. 51) says that lions occur as far north as the hills of Beni Amer; he gives the Arab names of 'Asad,' 'Sabua' or 'Lebuah.'

James ('Wild Tribes of Soudan,' 1883, p. 229) mentions that two officers of "the Blues," who had travelled with him from Suez to Suakin, shot a lion in the Khor Baraka, two days' journey from Suakin. One of them gave a most graphic account of their adventures in 'Bailey's Magazine,' 1881, 1882, or 1883.—W. E. DE W.

FELIS PARDUS, Linn.

Felis pardus, Linnæus, Syst. Nat. x. 1758, p. 41; Heuglin, Peterm. Mittheil. 1861, p. 14; Reise N.O.-Afr. ii. 1877, p. 52.

Felis pardus, var. *nimr*, Hemp. & Ehrenb. Symb. Phys. dec. ii. 1832, pl. 17.

Felis leopardus, Hartmann, Zeitschr. Gesellsch. Erdk. Berlin, iii. 1868, p. 52.

Ehrenberg separated the African leopard from the Asiatic form, and the distinguishing subspecific name *nimr*, which he bestowed upon the former, is generally applied to this race with solid spots on the shoulders. It is mentioned as occurring in the Province of Dongola.

The skin of a young animal which was purchased in the Sudan, and which lived in the Zoological Gardens at Gizeh for some months, was acquired by Mrs. Anderson. This species is of the usual African type.

Hoskins ('Travels in Ethiopia,' 1835, p. 111) says that the leopard occurred on the plain to the east of Shendi.

The same writer also says (p. 129) that no leopards occurred on the route from Metammeh to the wells of Gagdul.

Holroyd (Journ. Roy. Geogr. Soc. 1839, p. 163), in his notes on a journey to Kordofan in 1836-37, says the Bayuda bend of the Nile abounds in herbaceous plants and one or two varieties of Mimosa, and that among many objects of great interest in this area is the leopard.

The Leopard is often represented in hunting-scenes on the walls of tombs both in Lower and Upper Egypt.—W. E. DE W.

FELIS SERVAL, Schreb.

Felis serval, Schreb. Säug. iii. 1778, p. 407, pl. cviii.

Felis (Galeopardus) serval, Heuglin, Reise N.O.-Afr. ii. 1877, p. 55.

Heuglin records this species from Werne in Takah, and gives the Arab name 'Badj.'

FELIS CARACAL, Güldenst.

Felis caracal, Güldenstaedt, Nov. Comm. Petrop. xx. 1776, p. 500; Schreb. Säug. iii. 1778, p. 413, pl. 110; Blanford, Mamm. Brit. India, 1888, p. 88; Lydekker, Allen's Naturalist's Library, "Cats," 1895, p. 188.

Felis caracal, var. γ . *nubicus*, Fischer, Synops. Mamm. 1829, p. 210.

Felis (Lynx) caracal, Heuglin, Peterm. Mittheil. 1861, p. 14; Reise N.O.-Afr. ii. 1877, p. 55.

Caracal berberorum, Matschie, SB. naturf. Fr. Berlin, 1892, p. 114.

Dr. Anderson has the following notes on two specimens:—

"The head-skin of *Caracal* from Suakin, obtained by Major Penton, R.A.M.C., D.S.O.

"Some of the hairs of the ear-pencils are 50 mm. long, but the general length of the tuft is about 40 mm. The head is rather rufous yellow.

"1 skin, ♂. Mts. north of Tor, Sinaitic Peninsula. Mr. Th. Meyer, German Consul, Suez.

"This specimen is uniform rufous fawn. The ear-pencils are about 60 mm. long, tipped with rufous, the basal portion being yellowish white and black, the latter predominating. There is a considerable amount of grey mixed with the black of the back of the ears.

"A specimen of this species coloured like the foregoing was also obtained from some Arabs in the Wadi Hoaf, Heluan; and Mr. J. C. Mitchell thinks it came from the banks of the Gulf of Suez, near Suez on the Ataka side."

Rüppell ('Reisen Nub., Kordof., &c.' 1829, pp. 63–67) mentions *Felis caracal* as one of the animals hunted in the months of May and June in the western deserts of the Dongola district.

Heuglin records this species from Takah, and says it probably occurs all along the Egyptian coast north of Massowah. The Arab name is rendered 'Om risád.'

Hartmann (Zeitschr. Ges. Erdk. Berlin, iii. p. 58) mentions that this animal is represented on the walls of the tombs at Beni Hasan.

The Caracal is closely allied to the Lynx, as is shown in its general build and long tufted ears; but it has no long hair on the throat forming a ruff. The skull has also the peculiarities of the Lynx, the ascending processes of the premaxillæ being long and frequently meeting the frontals, the first upper premolar usually absent in the adult, and the inner cusp of the carnassial small.

The skull is readily distinguished from that of *F. chaus* in being broader in proportion to its length, more powerful throughout, the nasals broad and truncated, the stronger zygomatic arches, and the postorbital processes (both frontal and malar) shorter. The squamosal process is not cut away on the upper side of the arch, but tapers very slightly and has a broad termination in the base of the ascending process of the malar. On the palatal aspect the most obvious differences, besides the peculiar character of the teeth, are the greater posterior projection of the palate and the lateral contraction of the presphenoid anteriorly and posteriorly.—W. E. DE W.

CYNAILURUS.

Cynailurus, Wagler, Syst. Amphib. 1830, p. 30.

Claws not wholly retractile; inner cusp of upper carnassial tooth almost entirely wanting; infraorbital foramen small and often divided into more than one opening. Legs and tail long.

CYNAILURUS JUBATUS, Erxleben.

Felis jubata, Erxleb. Syst. Regn. Anim. 1777, p. 510.

Felis guttata, Hermann, Obs. Zool. 1804, p. 38.

Cynailurus jubatus, Wagler, Syst. Amphib. 1830, p. 30.

Cynælurus guttatus, Heuglin, Peterm. Mittheil. 1861, p. 14; Reise N.O.-Afr. ii. 1877, p. 53.

Cynailurus sæmeringii (Rüppell), Fitzinger, SB. Ak. Wissensch. Wien, vol. xvii. pt. i. 1855, p. 245.

Felis megabalia (Heuglin), Hartmann, Zeits. Ges. Erdk. Berlin, 1868, iii. p. 55.

Heuglin gives the following locality for the Chitah: Southern Takah and Eastern Sudan not north of 19° N.; and the Arab name 'Fahad' or 'Fah'ad.'

Rüppell ('Reisen Nub., Kordof., &c.' 1829, pp. 63-67) mentions *Felis guttata* as one of the animals hunted in the months of May and June in the western deserts of the Dongola district.

Mrs. Anderson obtained a skin and skull of a young animal from the Zoological Gardens at Gizeh, which was said to have been obtained in Kordofan.

Hartmann (*op. cit.* p. 57) records the excellent representations of this animal in the tombs at Beni Hasan.—W. E. DE W.

VIVERRIDÆ.

Subfamily *VIVERRINÆ*.

VIVERRA.

Viverra, Linn. Syst. Nat. x. i. 1758, p. 43.

Dentition: i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{4}{4}$, m. $\frac{2}{2}$ = 40.

Form heavy, entirely digitigrade; claws small and only partially retractile, not adapted for climbing. Large external scent-pouch opening beneath the anus.

VIVERRA CIVETTA, Schreb.

Viverra civetta, Schreb. Säug. vol. iii. 1778, p. 418, pl. cxi.; Rüppell, Neue Wirbelth. 1835, p. 34.

Dr. Anderson made the following note on a specimen of the Civet labelled "Kordofan, Dr. Rüppell, 1825," in the Senckenberg Museum, Frankfort-on-Main:—

"This is a large animal, measuring from snout to vent 666 millim.

	mm.
Height of ear	51
Breadth of ear	37
Tarsus	112

"The lower lip and the parts around the nose as far as the back of the moustachial area are white. The chin, upper part of throat, cheeks, and between the eyes and slightly behind and partially above them dark brown; but, with the exception of a short dark narrow band directed upwards to the ear, the area of the head, behind the dark brown, is whitish grey to the vertex and downwards behind the brown of the upper throat. Below this is a brown collar prolonged downwards from below the ear, through the white of the side of the neck, which in its turn forms a white collar behind the former, passing round the front of the chest; and behind this again is another narrow brown band from the side of the neck on to the chest, with a white band behind it on the front of the shoulders.

"Rüppell says that he met with the Civet in the southern districts of Abyssinia, Sennaar, and Kordofan, where it lived in holes in the ground, and was often kept in a state of domestication for the sake of its musk."

GENETTA.

Genetta, Cuvier, Règne Animal, vol. i. 1817, p. 156.

The Genets have semi-retractile claws and the same number of teeth as the Civets, but are distinguished by their more elongated form, more plantigrade mode of progression, and more arboreal habits. The hind feet have a naked area in the centre between the toes and the heel. The external scent-pouch is wanting.

Great uncertainty exists as to the number of species into which the Genets should be divided, and until far more specimens with authentic data are brought together nothing can be done to settle this question. Broadly speaking, there are three well-marked forms, defined by characters of the skull and teeth—*G. genetta*, Linn., inhabiting Southern Spain and Africa north of the Sahara; *G. tigrina*, Schreber, inhabiting Southern Africa; and *G. senegalensis*, Fischer (= *G. pardina*, Is. Geoffroy St.-H.), found over the whole of tropical Africa. This latter species has numerous local races, and the genet of Upper Egypt (*G. dongolana*), and also the Abyssinian genet (*G. abyssinica*), described below, belong to this group. In some localities there seem to be individuals of widely different tones of colour and patterns of marking, but differences of sex, seasonal change of fur, and other important influences have yet to be properly understood.

The black dorsal line is composed of rather stiffer and more glossy hair than the rest of the body. The hairs composing this line may be very considerably longer than the surrounding fur; the under-fur, when present on this area, is only scanty, and likewise jet-black. At certain periods, however, the hair on this dorsal line is glossy, adpressed, and much shorter than the surrounding fur, with no trace of under-fur.

The median dorsal stripe in the Nile-Valley species is more distinct from the body-fur, in colour and texture, than in any of the other forms of genet, and the general colour of the animal seems to be fairly constant.

The skull is considerably narrower than that of *G. genetta*, the nasals shorter and narrower, being especially more tapered posteriorly, the auditory bullæ slightly more inflated, the paroccipital processes short and entirely absorbed in the back wall of the bullæ. There is a very small bony prominence on the posterior border of the coronoid process of the mandible.

In *G. genetta*, of Spain and North Africa, the hair is harsh, both dorsal and side stripes black, many stripes on the neck, the spots small, the tail banded with narrow indistinct rings. The skull is long, the nasals rather broad, but narrowing slightly posteriorly; the auditory bullæ moderately inflated; the paroccipital processes reaching to the base of the bullæ, the extreme end of this process free or forming a roughened knob. There is a well-marked small process on the posterior border of the coronoid process of the mandible. If a genet occurs in Lower Egypt it will almost certainly prove to belong to this species.

The South-African genet (*G. tigrina*) is much like the typical form, but the dorsal line is alone really black, the side spots are larger and more or less ringed and tipped with brown: the two outside stripes on the neck are always broader than the inner ones, and in some specimens are the only stripes represented. The skull is short and broad; the teeth about equal to those of *G. genetta*; the nasals longer and broader, especially posteriorly, where they do not taper but end off abruptly; the auditory bullæ rather less inflated, and the paroccipital processes still more developed, reaching below the base of the bullæ. The prominence on the back of the coronoid process of the mandible is entirely absent.—W. E. DE W.

GENETTA DONGOLANA, Hemp. & Ehrenb. (Plate XXVI.)

Viverra dongolana, Hemp. & Ehrenb. Symb. Phys. 1832, dec. ii.

Description of a male obtained from the hills of Erkoweet, near Suakin.

Head greyish, with a blackish area between the moustachial region and the eye, a white patch on the cheek below the eye, a similar patch on the side of the nose, and a narrow blackish-brown streak in the mesial line between the eyes. Five narrow rufous lines on the back of the neck, the outermost one passing down over the shoulder and being broken up into rufous-brown spots; a rufous line, more or less distinct, on the side of the neck external to the five dorsal lines. A black dorsal line of long hairs from behind the shoulder to the tail, and the rest of the body covered with elongated rufous-brown spots, with an intermixture of black. The under surface of the fore feet black, and the outer posterior surface of the fore limbs more or less black, with greyish hairs intermixed. Plantar surface of the hind feet, heel, and back of thighs black. Fronts of the limbs greyish, with a few small black spots on the fore limbs. Belly greyish white. Ears nearly white, with a brownish area behind them at their bases. Tail with eight black bars alternating with broad pale areas, white at the sides and reddish yellow on their dorsal surfaces. The black subterminal band and the tip have a few white hairs intermixed.

Measurements of the skull.

	mm.
Basal length	81
Greatest breadth	43
Palatal length	40
Breadth between tips of <u>pms. 1</u>	9·5
„ outside <u>pms. 4</u>	26
Narrowest interorbital breadth	12·7
Breadth of brain-case	30
Length of nasals (middle line)	15·3
Outside length <u>pm. 4</u>	9·5

GENETTA DONGOLANA. SUAKIN.

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This specimen was brought to London, where it lived for some years in the Gardens of the Zoological Society, and is the animal represented in the Plate.

Berlin Museum.

Viverra dongolana, Hemp. & Ehrenb. Nubia. No. 1103. Hemp. & Ehrenb.

This specimen is very pale, and the spots rusty red. The dorsal stripe is broad and nearly black over the rump, but it narrows to a mere line behind the shoulders. There is a good deal of black-brown on the lower half of the tibial portion of the leg and on the under surface of the hind feet.

Genetta dongolana, being such a well-marked race, is worthy of recognition.

Frankfort Museum.

Viverra abyssinica, Rüpp. (type) Neue Wirbelth. 1835, p. 33, pl. xi.

Abyssinia. Dr. Rüppell, 1834.

The general ground-colour of this animal is a pale yellowish sandy. A dark brown band arises behind each ear, and is prolonged backwards as a broad band, more or less broken up into spots over the shoulder. Below it on the side of the neck there is a line of large, more or less connected, spots as far as the end of the humerus. On the hinder part of the neck, immediately above and before the shoulder, two dark bands begin on either side, first as fine lines which rapidly enlarge to about three-quarters of an inch in breadth, separated from each other by a narrower band of the ground-colour of the animal, and curve backwards to the side of the root of the tail. Rising from behind the shoulder in the mesial line of the back, and enclosed by these two lines, is a dark dorsal band prolonged to the base of the tail, and in its middle enclosing a narrow yellowish band. A number of large spots on the outside of the thighs, the fore limbs and the tarsi being unspotted. A few spots on the sides of the belly. The head is pale greyish brown, with a white spot below the eye, and continued downwards to the lip; a faint dark central band from the nose to between the eyes, and a brownish area from the eyes to the nose. The tail with nine yellowish-white and nine broad dark brown rings, one of the latter being terminal. Two dark brown spots on either side of the base of the tail, separated off from the uppermost of the broad lateral bands.

This specimen is fully adult, but its sex is not known.

G. A. Hoskins ('Travels in Ethiopia,' 1835, p. 188) says:—"In the neighbourhood of Dongola there are many gennet cats. They have small thin heads, long backs of a grey colour, with brown spots and a black streak along the centre. Some of them are 18 inches long, besides the tail which measures 12 inches, the colour of the latter being alternately grey and black."

Rüppell, in his 'Neue Wirbelthiere,' p. 33, gives the native name 'Sabat' for this animal in Dongola.

Subfamily *HERPESTINÆ*.

HERPESTES.

Ichneumon, Lacép. 1797 (preoccupied in Insecta).

Herpestes, Illiger, Prodr. Meth., Mamm. 1811, p. 135.

The two species of this genus found within the area treated of in this book show such dissimilarity in shape of body and formation of skull and teeth, that they might be regarded as distinct genera; but this course is not generally followed, owing to the existence of intermediate forms, notably a species found in West Africa, *H. naso*, de Winton (Bull. Liverpool Mus. 1901, vol. iii. p. 35), in which the body-form of *H. albicauda* is combined with the skull and teeth characters of *H. ichneumon*. At the same time, as a registering name for the form of teeth found in *H. albicauda*, the subgeneric name *Ichneumia*, Is. Geoffr., is found useful.

Dentition: i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{4}{4}$, m. $\frac{2}{2} = 40$.

HERPESTES ICHNEUMON, Linn. (Plate XXVII.)

Mus pharaonis, Alpini, Hist. Nat. Ægypt. 1735, t. 14. fig. 3 (*fide* Hasselq.).

Meles (Ichneumon), &c., Linn., Hasselquist, Iter Palæst. 1757, p. 191.

Viverra ichneumon, Linn. Syst. Nat. ed. x. vol. i. 1758, p. 43; Forskål, Descr. Anim. 1775.

Ichneumon pharaon, Lacép. Buffon, ed. 16mo, vol. xiv. 1799, p. 155 (vol. vi. p. 110); Geoffr.

St.-H. Descr. de l'Égypte, Hist. Nat. vol. ii. 1818, p. 137; id. *ibid.* ed. 2, 8vo, vol. xxiii.

1828, p. 166, et Suppl. p. 206; F. Cuv. Hist. Nat. Mamm. 1821.

Ichneumon ægyptiæ, Tiedem. Zool. i. 1808, p. 364.

Herpestes pharaonis, Desm. Encycl. Méthod., Mamm. 1820, p. 213.

Herpestes numidicus, F. Cuv. Hist. Nat. Mamm. iv. livr. 68 (1834).

Herpestes ichneumon, Hemp. & Ehreub. Symb. Phys. dec. ii. 1832, *k*; Thomas, Proc. Zool. Soc. 1882, p. 64.

[Form much elongated and weasel-like; legs very short; feet plantigrade, the soles of the fore and hind feet completely naked to the wrist and heel; ears short, rounded, scarcely appearing above the fur; tail very long, much tapered, with brush-like tuft of long black hair at the end; coat very harsh and straight.

General body-colour dark badger-grizzled, with distinct ticking of the black and white on the head, where the hairs are very short and more finely ringed; face rather darker and less grizzled; all the feet and the tip of the tail black; throat and under side darker than the upper parts. Under-fur brick-red, with dark soot-brown bases on most of the dorsal surface, the brick-red graduating into yellow or buff on the neck and under parts, but the chest and belly often lack this brighter colour, and are therefore

HERPESTES ICHNEUMON.

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almost soot-coloured with faint grizzling. The fur banded black and white, generally with three black broader bands; the shorter hairs on the neck and head usually have the extreme tips also black. When the tip of the hair is light-coloured, as it is over the greater part of the body, it has a yellowish stain, but on the neck and head there is no trace of this stain on the hairs.

Skull long and flat, the facial portion very short, from the back of the orbits to the front of the premaxillæ very much shorter than the cranial portion; forehead rounded, profile evenly and gently sloping to the front of the nasals; the zygomata evenly bowed, very powerful; orbits small, their lower rim on a plane with the squamosal processes of the zygomata; postorbital processes frequently forming a complete circle; the auditory bullæ moderately inflated, the anterior chamber perforated by a single well-marked foramen; the occipital crest very strongly developed. The incisive foramina are short, scarcely longer than broad; there is no postdental shelf of the maxilla. The carnassial tooth or fourth premolar is well developed, about half as long again as the first molar on the outer side; the second molar minute, lying interior to the hinder cusp of the first molar, and rather less than a third of the size of that tooth in superficial extent.

	♀. Cairo. Brit. Mus. No. 98.6.5.5.	Suakin. No. 91.
	mm.	mm.
Basal length	92	92
Palatal length	55	57
Greatest breadth	46.5	50
Cranial breadth	34.5	35
Palatal breadth outside <u>pms. 4</u>	30	31
„ „ „ <u>ms. 2</u>	24.3	25
Lachrymal fossa to front of premaxilla	25.5	25
Outside antero-posterior length of <u>pm. 4</u>	9.7	9.5
„ „ „ <u>m. 1</u>	5.9	5
„ „ „ <u>m. 2</u>	3	2.7

This species is found in the Spanish Peninsula and over the greater part of Africa, with very slight modification in either form or colour. Within the area treated of in this book, it is only found in Egypt proper, so far as is at present known. Native Egyptian name ‘Nems.’

The Plate was drawn from a living female specimen obtained close to Mena House, near Cairo.—W. E. DE W.]

Dr. Anderson left the following notes on specimens examined in the Continental museums:—

In the Frankfort Museum there is a skull, No. IV.N. 5**, labelled “*Herpestes*

caffer, Smith, Abyssinia, Dr. Rüppell, 1841"; also a stuffed female specimen with the skull removed, labelled "IV. N. 36. *H. caffer*, Smith, Schoa, Dr. E. Rüppell, 1832," which is supposed to be the animal whence the skull was obtained. This specimen measures:—

	mm.
Snout to vent	500
Vent to tip of tail	365

A male of *H. caffer*, from the Cape, presented and collected by Herr v. Ludwig in 1837, measures:—

	mm.
Snout to vent	595
Tail with the terminal hairs	580

The dentition of these two specimens, although they are of different sexes, is specifically the same. The skulls so closely resemble those of *H. ichneumon*, that there seems no valid reason why they should not both be regarded as belonging to that species.

In a skeleton with the ligaments intact, preserved in the same Museum and collected by Rüppell in Egypt in 1823, there are 30 caudal vertebræ (the two terminal of which are minute cartilages, the last vertebra being only 1.5 mm. in length, and the penultimate 4.3 mm. long), 3 sacral, 6 lumbar, and 14 dorsal. The measurements of the skeleton are:—from tip of premaxillaries to first caudal vertebra along curve of spinal column 540 mm.; from end of first caudal vertebra to end of last 542 mm.; extreme length of skull from premaxillæ to exoccipital protuberance, 113 mm.; extreme length of lower jaw 78 mm.

Skulls of mummied *Herpestes ichneumon* in Berlin Museum.

	No. 1.	No. 2.	No. 3.	No. 4.
	mm.	mm.	mm.	mm.
Upper border of foramen magnum to tip of premaxillaries . . .	100	105	103	102
Greatest zygomatic breadth	?	57	55	54
Minimum frontal diameter	18	21	23	18

This ichneumon has been accredited with the destruction of the eggs of the crocodile of the Nile—a belief as old as the days of Herodotus,—and thus it prevented the undue increase of that formidable monster. Diodorus Siculus remarks that there would have been no sailing on the Nile but for the ichneumon. The fact that it would eat the eggs of the crocodile, if it came across them when in quest of food, was sufficient to raise it in the estimation of the ancient Egyptians to such a degree that it became a sacred animal.

The cult of the ichneumon arose in the Nome of Heracleopolis in Middle Egypt.

The most probable of the reasons given for its being revered is its ability to successfully combat the asp and to protect itself from its poisonous bite. At the

present time the mongoose is frequently tamed and kept in the houses of the Egyptians to protect them from rats and snakes.

HERPESTES ALBICAUDA, F. Cuv.

Herpestes albicaudus, Cuvier, Règne Anim. éd. 2, 1829, vol. i. p. 158.

Herpestes leucurus, Ehrenb. Symb. Phys. pl. 12, decas ii. 1832, h.

Ichneumia albescens, Is. Geoffr. Mag. Zool. 1839, pp. 16 & 35 (descr., not figure).

Herpestes loempo, Temminck, Esquisses Zool. 1853, p. 93.

Ichneumia nigricauda, Pucheran, Rev. Mag. Zool. 1855, vii. p. 394.

Ichneumia abu-wudan, Fitzinger & Heugl. SB. Ak. Wien, liv. i. 1866, p. 561.

Herpestes (Ichneumia) albicauda, Thomas, Proc. Zool. Soc. 1882, p. 75.

[This animal has nothing of the weasel-like form of the last species, but is more cat-like, standing well up on its toes; the legs are longer, the ears larger, and the fur very much softer, with dense under-fur; the tail is clothed throughout its length with long somewhat pendent hair, slightly narrowing distally, with no brush-like terminal tuft. The soles of the fore feet are naked only to the base of the thumb, and the hind feet only to the base of the first toe, the hair on the back of the tarsus and heel being so dense that it forms a sort of cushion.

The general colour is light grey, washed with black along the dorsal surface, the long hairs being broadly tipped with black: the feet are black; the tail at the base coloured like the back, but posteriorly the hairs lose the black tips and quickly become whiter, those at the extremity being entirely white to the base; the throat and under parts are usually rather paler than the upper surface; the under-fur throughout is dark slate-grey at the base and drab-buff terminally.

In some individuals the tail, instead of becoming white distally, becomes black in precisely the same manner; these black-tailed melanic individuals (var. *nigricauda*) show much more brown in the general body-colour throughout.

In the skull the anterior facial line, to about the middle of the nasals, is very much more horizontal than the frontal line; the forehead is flattened; the zygomata are fairly expanded, but are very much less powerful than in the last species; the facial portion from the back of the orbit to the front of the premaxilla is as long as or longer than the cranial portion; the orbit is large, its lower rim lying below the upper edge of the zygomatic process of the squamosal; the auditory bullæ are fully inflated, and the anterior chamber is furnished with numerous small perforations set in a crescent-shaped shallow fossa below the meatus. The incisive foramina are twice as long as broad; the maxillæ extend backwards to form a distinct post-dental shelf. The carnassial tooth is

small, its alveolar length being but little greater than that of the first molar, while the second molar is but little inferior to the first in length, and fully half as large on the masticatory surface.

Measurements of skull of a specimen collected by Messrs. Rothschild and Wollaston.

	♂. Shendi.
	Brit. Mus. No. 1.5.5.18.
	mm.
Basal length	90
Palatal length	56.5
Greatest breadth	51
Cranial breadth	35
Palatal breadth outside <u>pms. 4</u>	32.3
„ „ „ <u>ms. 2</u>	28.6
Lachrymal fossa to front of premaxilla	32
Alveolar length of <u>pm. 4</u>	8.5
„ „ <u>m. 1</u>	5
„ „ <u>m. 2</u>	4

This species ranges over Tropical Africa and into Arabia. The Dongola district is the only locality within our area in which it occurs.—W. E. DE W.]

Dr. Anderson had the following notes on specimens in the Frankfort Museum :—
Herpestes albicauda, Cuv.; *leucurus*, Ehrenb. ♀. Nubia. Dr. E. Rüppell.

This specimen is a pale sandy colour, palest below, with a mixture above of longer, broadly blackish-brown-tipped hairs on the trunk, many of them with a subapical white band. Head paler than the body. Fore limbs rusty brownish from the elbow downwards, dark rusty brown on the metacarpal area. Hind limbs rusty brown, darkest on the tarsus. Tail brown and white in its proximal half, white in its distal half.

The skull is in the specimen.

	mm.
Snout to vent	440
Vent to tip of tail, without terminal hairs	340

Herpestes albicauda, Cuv., var. *nigricauda*, Puel. ♀. Nubia, Ambukol. Dr. Rüppell, 1824.

This specimen, although its tail is blackish brown throughout, is unquestionably specifically identical with the foregoing. Unlike it, the body is throughout brownish, owing to the prevalence of black-tipped hairs, which are well seen in this specimen with its much more pronounced colouring; for besides the apical black band there is a white band below it, followed by a second black band, and then by the pale basal portion of the hair. The subapical white band confers on this specimen a white

speckling. In some hairs there are as many as seven annuli, counting the pale basal portion of the hair. The apex is always dark-coloured. The long, black-tipped hairs extend on to the head. The portion of the limbs below the elbow and knee are dark russet-brown.

	mm.
Snout to vent	485
Vent to tip of tail	370

The following are the measurements of this and also of another skull from Nubia:—

	Ambukol. IV. N. 4. ♀. mm.	Nubia. Rüpp. V. N. 5. mm.
Premaxillaries to ext. occipital protuberance	99	96
Basal length	92	88
Basicranial length	34·5	33·5
Length of palate	55	53
Breadth of palate between middle of last molars	13	13·5
„ „ anterior end of 3rd premolars	17·5	16
„ „ middle of 1st premolars	13·7	14
„ muzzle external to middle of 2nd premolar	21·5	21
Middle of anterior orbital margin to tip of premaxillaries	33	30
Minimum frontal diameter	18·5	20
Frontal end of maxilla to ant. border of canine	obliterated.	29
Length of frontal in mesial line	„	39
„ nasal in mesial line	„	19
„ premaxillaries	„	21·5
Breadth before infraorbital foramen	23	22
Outer inf. margin of infraorbital foramen to tip of premolar	29·5	28
Depth (vertical) through post. border of infraorbital foramen	20	20
Greatest zygomatic breadth	50	47
Breadth at alveolar border (external) of canines	19	19
„ of skull at posterior root of zygoma (auditory meatus).	32	30
Depth through anterior border of parietal	25	28
Breadth across upper incisors at base	12	11·5
1st premolar, length along cingulum	R. 3	...
2nd „ „ „	6	L. 6
3rd „ „ „	6	L. 6
4th „ „ „	8	L. 8
1st molar, length along cingulum	6·5	L. 6·4
2nd „ „ „	4·5	R. 4
Extreme length of lower jaw	71	65
Height through ascending ramus	26	24

	Ambukol. IV. N. 4. ♀. mm.	Nubia. Rüpp. V. N. 5. mm.
Breadth across lower incisors at base	11·8	11
1st lower premolar, length along cingulum	2·5	2·5
2nd " " " 	5	5
3rd " " " 	5·8	5
4th " " " 	8	L. 8
1st lower molar, length along cingulum	8·5	L. 8
2nd " " " 	7	L. 6·5

The skull of the female from Ambukol proves it to have been fully adult, as the sutures are practically obliterated and the teeth are worn considerably.

PROTELEIDÆ.

PROTELES.

Proteles, Is. Geoffr. Mém. du Mus. Hist. Nat. vol. xi. 1824, p. 354.

Hyæna-like in form, but having five toes on the fore feet.

Skull with no alisphenoid canal. Premolar and molar teeth very small and simple.

Dentition : i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{4}{3}$, m. $\frac{0}{1} = 32$.

PROTELES CRISTATUS, Sparrm. (Plate XXVIII.)

Viverra cristata, Sparrm. Voy. Cape of Good Hope, ii. 1786, p. 177.

Viverra hyenoides, Desm. Mamm. Suppl. 1822, p. 538.

Proteles lalandii, Is. Geoffr. Mém. Mus. Hist. Nat. xi. 1824, p. 371.

Proteles cristatus, Matschie, Säug. Deutsch-O.-Afr. 1895, p. 62.

♀ and juv. Skins and skulls. Suakin. Major R. H. Penton, R.A.M.C., D.S.O.
3 ♂. Suakin.

Dr. Anderson made the following observations at Suakin on freshly killed specimens:—

Ears pointed, but rounded at the tip, emarginate below the tip posteriorly, then convex and rapidly contracted at the base. The muzzle up to the eyes, and partially around them externally, and the chin, nude and dark dusky black. A few hairs on the chin. Four or five strong moustachial bristles on a slight eminence. Canines very long and sharp. The dorsal crest of the young animal is even more developed than in the adult. Measurements:—

	♂ . mm.	♂ . mm.	♂ . mm.
Snout to vent	765	750	683
Above vent to tip of tail, without hair	232	195	233
Length of terminal hair	100	107	100
Height at shoulder	450	432	435
„ at hind-quarters, about	395	360	365
„ of ear (external meatus)	103	104	104
„ of ear behind	125	118	125
Breadth of ear	57	60	58
Eyc to snout	66	66	67
„ ear (external meatus)	64	59	58
Length of eye (canthus to canthus)	22	20	20
Breadth across muzzle at middle	57	50	50
Length of tarsus	140	137	135

The Ard Wolf lives in burrows in pairs. The natives apply to it the name 'Deeb.'

[The skull is not powerful, rather flat, with large and very broad facial portion. The incisors and canines are moderately developed; the second premolar is the largest and most strongly rooted of the upper cheek-teeth; the last tooth in the row is the fourth premolar or carnassial, this tooth is simple and merely vestigial, being usually lost soon after the animal is adult. In the milk-dentition the carnassial is still a three-rooted tooth, although much reduced in size. In the lower jaw there is a considerable distance between the canine and the first premolar; this latter tooth is strongly rooted and larger than the teeth behind it; the first lower molar, corresponding to the carnassial, is exceedingly minute and is lost at an early age. In the milk-dentition the three premolars are double-rooted teeth.

The occurrence of this animal in North-east Africa does not seem to have been noticed by any of the early travellers. Heuglin (Reise N.O.-Afr. ii. 1877, p. 51) casually mentions, when speaking of the Spotted Hyæna: "Im abessinischen Küstenland und in der Gegend von Adowa sollen sich noch zwei weitere hierher gehörige Arten finden, eine kleine, gestreifte (ob *Proteles lalandei*?) und eine sehr grosse, dicht und lang behaarte (*Hyæna fusca*?). *Proteles lalandei* findet sich auch am Weissen Nil."

The range of this animal is the eastern side of the African continent practically from north to south. It lives in holes and feeds on refuse and insects.

Major Penton says that sometimes they utter plaintive cries at repeated intervals throughout the whole night.

The Plate was drawn from an animal living in the Zoological Gardens in London.
—W. E. DE W.]

PROTELES CRISTATUS. SUAKIN PLAIN.

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HYÆNIDÆ.

HYÆNA.

Hyæna, Zimmermann, Spec. Zool. Geogr. 1777, p. 365.

Four toes on both fore and hind feet. Skull without alisphenoid canal.

Dentition : i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{4}{3}$, m. $\frac{1}{1} = 34$.

HYÆNA HYÆNA, Linn. (Plate XXIX.)

Canis hyæna, Linn. Syst. Nat. x. 1758, p. 40 ; Schreb. Säug. iii. 1778, p. 371, pl. xevi.

Hyæna striata, Zimm. Spec. Zool. Geogr. 1777, p. 366 ; Rüpp. Neue Wirb., Säug. 1840, p. 40 ;

Blanford, Geol. Zool. Abyss. 1870, p. 236 ; Fitzing. & Heugl. SB. k. Ak. Wiss. Wien, liv.

i. 1866, p. 553 ; Heugl. N.O.-Afr. ii. 1877, p. 50.

Hyæna dubbah, Meyer, Syst. Summ. Zool. Entdeck. in Neuholland und Afrika, 1793, p. 94.

Hyæna vulgaris, Geoffr. St.-Hil. Descr. Egypte, 1828, ed. 8vo, xxiii. Suppl. p. 213.

The specimen from which the drawing for the Plate was taken has been living for several years in the Gardens of the Zoological Society of London. It was received from Egypt, but a more exact locality is not known.

The hyæna has been casually mentioned by travellers in various parts of Egypt down to the coast at Alexandria.

Capt. S. S. Flower writes :—"I have received both species from both Suakin and Omdurman, but have not been able to discover the actual localities where the individuals were caught. The natives distinguish them apart—*H. striata* being called 'Dab,' while *H. crocuta* is called 'Murphyne.'"

Hoskins, Rüppell, and Heuglin state that hyænas occur between the two above-mentioned localities.

Olivier (Voy. Emp. Othom. ii. 1804, p. 40) mentions their occurrence in the environs of Alexandria.

Burckhardt ('Travels in Nubia,' 1819, p. 79) found them between Assuan and Dongola.

Most travellers translate the Arabic name into 'Dubbah.'

Mr. Beadnell sends the following field-notes on this species :—"The Striped Hyæna is found in the desert-margins of the Nile Valley from Cairo to Esneh (I do not know the country south of Esneh) and the desert surrounding the Fayum. In Baharieh Oasis I observed through my glasses what I am pretty certain was a Striped Hyæna. Twice I have seen their tracks in the western part of the depression of Farafreh Oasis

in the scrubby bushy area round Bir Karaween and Bir Murr. The people of Farafreh also state that one used to visit the village some years ago.

“This hyæna is a very solitary animal, more than two (male and female) seldom or never being seen together. In the Nile Valley and the Fayum they are very common although rarely seen, as they only approach the cultivated lands after dark, where they roam about in search of food all night, returning to the desert before dawn. Their lairs are in nearly all cases at a good distance from the cultivation, generally from five to ten miles away. They always seem to keep away from neighbours of their own species. They commonly select some small hill standing up above the ground-level of the desert, the weathered harder beds of which afford the only protection against the sun. The lair is always marked by an abundance of bones, the remains of the spoil brought up from the cultivated lands. They sleep hard throughout the day, selecting that part of their domicile which offers the greatest comfort, taking into account the direction of the wind, heat of the sun, &c.

“By following up a fresh spoor from the cultivation, and removing one's boots when approaching likely ground, hyænas are generally easily approached, sometimes to within a few yards, before they are awakened. When disturbed they show no fight, but only anxiety to make off with all possible haste. Their pace is very fast, although it appears slow and ungainly, due to the difference in length between the front and hind limbs.

“On one occasion, after a long track of some miles, I saw a fine male in a sort of cave under the projecting bed of limestone on a hill about 30 feet above the general level of the desert. He was afraid to come out, although I had fired at his mate from quite close by. Directly he caught sight of me he crouched down and hid, and did not bolt until I had climbed up to within a few yards of where he was lying; he had to pass within a couple of yards to get out, and although I had practically bearded him in his den, he showed no sign of fight. As he dashed by I fired, but only broke one of his legs, which did not stop him, and down he dashed to the base of the hill, where the Arab who was accompanying me greeted him with a blow from my geological hammer. This diversion gave me time to rush and catch him up, and as he could not go faster than I could run, I was able to keep up and treat him to a succession of heavy blows, until at last he sank down, when I put an end to him with a bullet. Each time I struck him he turned his head and snarled, showing a nasty set of teeth, but beyond this he made no attempt to fight. You will see that this hyæna is a very cowardly animal, which contradicts the statements of the Arabs as to their great ferocity. This specimen weighed $65\frac{1}{2}$ lbs. The skin and skull are now at my home in England.

“The Striped Hyæna keeps itself very clean, and the hair is generally long and well kept. The stomach of this one contained only some balls of hair and a few small

HYÆNA HYÆNA.

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bones; he had evidently not found much food the night before. Unlike jackals, he smelt quite sweet when being skinned. They are credited by the natives with being body-snatchers; and this is probably true.

“The natives are very keen to obtain the heart, which they eat, believing that they thus obtain the courage (*sic*) of the hyæna. They also cut off the whiskers, if they get a chance, and keep them as a charm. The meat is also readily eaten by the poorer among them, and I found myself that the flesh taken from the head was not at all bad.

“Although usually silent, they appear to emit a kind of laughing cry at times. They are never found in the interior of the desert beyond some 10 or 15 miles from the cultivation, except in an exceptional case, when they will follow a caravan if they think there is a sick or dying camel.”—W. E. DE W.

HYÆNA CROCUTA.

Canis crocuta, Erxleb. Syst. Reg. Anim. 1777, p. 578.

Hyæna crocuta, Zimm. Spec. Zool. Geogr. 1777, p. 366; Rüpp. Neue Wirbelth. 1840, p. 40; Heuglin, Peterm. Mittheil. 1861, p. 14; id. SB. k. Ak. Wiss. Wien, liv. i. 1866, p. 553; Blanford, Geol. Zool. Abyss. 1870, p. 235.

The only specimen of the Spotted Hyæna from the district treated of in this book is a puppy in the British Museum, received from Major Penton, R.A.M.C., in 1893, from the neighbourhood of Suakin. The colour is uniform liver-brown, without markings of any kind. The incisors and canines are the only teeth which have cut the gum; the skull is identified as belonging to this species by the breadth of the front of the palate, by the incisive foramina being almost wholly within the premaxillæ, and by the shape of the back of the palate.

The skull of the Spotted Hyæna is very much heavier than that of the Striped Hyæna, with a much broader snout. The teeth are also very much heavier, the carnassials above and below very much larger and longer, and this tooth in the lower jaw wants the middle inner cusp found in *H. hyæna*. In the Striped Hyæna the molar in the upper jaw is usually absent, and if present it is very small, quite vestigial, while in the Spotted Hyæna it is always present and of considerable transverse breadth, extending on to the palate beyond the plane of the inner cusp of the carnassial. The palate and the postnarial opening in the skull of *H. crocuta* are very broad, the posterior border of the palate forming a wide angle, while in *H. hyæna* the opening forms a narrow Roman arch. The postorbital frontal processes are very tardy in development, and the forehead is wider and more rounded in the young of the Spotted Hyæna.

Major Penton sends the following field-notes on this species :—"The Spotted Hyæna is abundant at Tokar, 40 or 50 miles south of Suakin, but at the latter place it is rarely if ever seen. These brutes prowl round in packs of five or six, chiefly in the spring and early summer. In the height of summer they are not so often heard at night. Their cry is one of the most weird of all sounds I have ever heard. The natives dig deep trenches, leaving a small patch of ground in the middle on which a kid is tethered. In this way they often catch them. The natives have also a clever way of catching them by means of a ring of wood with spikes radiating from the sides to the centre, all pointing in the same direction. The ring is put over a hole and a rope also; the hyæna's foot passes through the ring, and in his efforts at getting rid of it the rope tightens. [This is similar to the trap used for gazelles, described by Mr. Jennings Bramly and Mr. Beadnell on a subsequent page (p. 345).]

"The Spotted Hyæna is more ferocious than is generally imagined, and not infrequently one sees men with faces mutilated when children from the attacks of these brutes. Since I have been here two children have been carried off at Tokar."—W. E. DE W.

CANIDÆ.

LYCAON.

Lycaon, Brookes, Griffith's Anim. Kingd. vol. v. 1827, p. 151.

Dog-like in form, but having four toes only on both fore and hind feet as in *Hyæna*. Teeth very massive and rounded, and the skull heavier than in *Canis*.

LYCAON PICTUS, Temm.

Hyæna picta, Temminck, Ann. Gén. Sci. Phys. iii. 1820, p. 54.

Lycaon tricolor, Brookes, Prodr. Anim. 1828, p. 10.

Canis pictus, Cretzschm. Rüpp. Atlas, 1827, pl. 12, p. 35 ; Rüpp. Neue Wirbelth., Säug. 1840, p. 39.

Lycaon pictus, Hemp. & Ehrenb. Symb. Phys. 1832, ii. ff ; Fitz. & Heugl. SB. k. Ak. Wiss. Wien, liv. i. 1866, p. 553 ; Heugl. Reise N.O.-Afr. ii. 1877, p. 48 ; Matschie, Säug. Deutsch.-O.-Afr. 1895, p. 63 ; de Winton, Proc. Zool. Soc. 1899, p. 551.

There does not appear to be any recently published notice of the occurrence of the Hunting-Dog in the Nile Valley, with the exception of the bare mention of the name by Schweinfurth in his list of the carnivorous animals of Khargeh ; but this record requires to be substantiated. Ehrenberg says he often saw packs in Dongola. Heuglin says they are seen on the Plain of Takah and even in Southern Nubia.

Rüppell (Reisen Nub., Kordof., &c. 1829, pp. 63-71) mentions *Canis pictus* as one of the animals hunted in the western deserts of the Dongola district in the months of May and June ; and in Cretzschmar's Atlas, where an excellent illustration of the animal will be found, this dog is said to occur in the desert of Korti and in Kordofan, where it is called by the natives 'Simir.'

The Hadendowahs of Suakin describe a large dog of the neighbouring hills, with white round the neck and on the rump, which they call 'Manoab.' They say it hunts gazelles.

The species, therefore, in the earlier part of the last century, was spread over the eastern side of the African continent practically from north to south.

It is thought by some writers that the large prick-eared parti-coloured dogs in leash represented in the mural paintings at Beni Hasan and elsewhere may possibly be intended for this animal, but this seems doubtful.

CANIS, Linn.

Canis, Linn. Syst. Nat. x. i. 1758, p. 38.

This genus is here to be taken as including only the Wolves and Jackals as well as the Domestic Dogs. Dr. Blanford, in the 'Fauna of British India,' says that the Dogs may be distinguished from the Foxes (*Vulpes*) by the pupil of the eye being round, and in their having generally 10, more rarely 8, mammæ.

Dentition: i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{4}{4}$, m. $\frac{2}{3}$ = 42.

A scent-gland on the dorsal surface of the tail, from which the characteristic "doggy" smell arises.

On Jackals in general.

In describing the jackal of Senegal, which he named *C. anthus*, Cuvier¹ says that it could not be confounded with the jackal properly so called, that is, the Indian jackal, *C. aureus*, which he had previously described and characteristically figured, nor with *C. mesomelas*, as it had not the dorsal marking of that species, while it was much larger than the *Vulpes corsac*. The introduction of *V. corsac* as a basis of comparison, and the statement that his *C. anthus* was much larger than it, suggests that he was dealing with an animal of not any great size. Cretzschmar's figure in Rüppell's 'Atlas' of a so-called *C. anthus* was founded on three specimens from the Bahr-el-Azrek country, and is a considerable modification of Cuvier's figure of the Senegal jackal, the tip of the tail of which is described as having only a few black hairs, whereas the tail of Cretzschmar's figure is wholly black in the latter two-thirds; and besides, this latter figure, instead of having the brownish-grey saddle that occupies nearly the whole of the back of typical *C. anthus*, has on the sides of that region the yellowish and white spots characteristic of *C. variegatus*.

In the British Museum there are two skulls of adult male jackals from Tunis (46.10.30.155 and 48.1.8.1), both distinguished by the expanded zygomatic arch; like the jackal from Egypt, these specimens have large teeth, which, however, vary somewhat in size. In the Tunis skull (46.10.30.155) the fourth upper premolar is 20.4 mm. long, or only 1.1 mm. shorter than the same tooth in a male *C. pallipes*, commonly known as the Indian wolf, No. 91.2.5.1, from Maskat, in Arabia; this is evidently the skull of an animal of the same age as the specimen from Gizeh, and viewed from the under surface they are remarkably alike, although that of *C. pallipes* has a broader palate and altogether more powerful teeth; but the difference between them would appear to be due chiefly to the fact that *C. pallipes* is evidently a larger animal than the Egyptian

¹ Mamm. 1820.

wolf or 'Deib' of the Bedouins. But when these two skulls now under comparison are placed side by side it is seen that the frontal region of the Gizeh skull is but little swollen, and the little swelling that does take place is immediately over the supra-orbital process itself, the centre of the forehead being very widely concave, whereas in *C. pallipes* the swelling rises suddenly from the downwardly-bent process, extending to the mesial line of the forehead, which is consequently more pronouncedly rounded from side to side than in the Gizeh skull.

One of the Tunis skulls, 46.10.30.155, is exactly like the skull of *C. pallipes*, while the forehead of the other Tunisian skull, 48.1.8.1, has the swelling almost confined to the region of the supraorbital process, the middle of the forehead having more the character of the Gizeh skull. This region of the forehead of the Luxor skull has all the characters of the Gizeh male skull. It is evident from a consideration of the similarity of these North-African jackal skulls to that of *C. pallipes*, that the latter is a very closely-allied species, an opinion which Huxley gave expression to some years ago¹.

There exists, therefore, in Egypt, a jackal considerably exceeding in size the dimensions of *C. aureus*, as is shown by the skull-measurements; it extends also to Tunisia and Algeria, but not into the upper valley of the Nile. In Egypt, the animal is pale yellowish, washed feebly, longitudinally, with black, its pale colour being doubtless due to the circumstance that it is found chiefly in the desert; but in Tunisia and in Algeria it occurs, according to Lataste, generally on the *Tell*, *i. e.* the black soil of cultivated land, and consequently the animals from that tract of North Africa are much darker than those of the Egyptian region. The jackal of Tunisia is much more marked with black, and has a distinctly rufous tint on the outside of the fore limbs and on the thighs. This is the animal that has been mistaken in Barbary for *C. aureus*, a species which does not appear to extend its range to North Africa.

The females of the Egyptian and Barbary jackals are very much smaller than the males, and they present the same variations of the forehead; they seem also to differ occasionally considerably in size, as is evident also from the measurements of the hind feet.

Frankfort Museum.

In the Senckenberger Museum there is a stuffed example of a male jackal from Tunis (Gabes), June 1898, which is labelled *Canis aureus*. It is, however, quite distinct from the latter species, and has a strong resemblance in its general features to *C. variegatus*, but differs from it in its greater size and heavier build, its coloration, and shorter and thicker muzzle. It has large ears, nearly quite as large as those of

¹ Proc. Zool. Soc. 1880, p. 278

C. variegatus, and is long-legged. It seems to have been killed while changing its fur, as on the back of the neck, but more especially on a limited area in the middle of the back, behind the shoulders, the fur is much longer than that on the posterior half of the body. Behind the shoulders the fur is variegated much in the same way as in *C. variegatus*, and the coloration of the individual hairs is the same in both. Along the neck the black prevails over the white. On the posterior half of the body the long hairs have been almost completely frayed off, so that the thick woolly under-fur comes nearly to the surface; hence the normal fur is that immediately behind the shoulders and on the neck. From the lower posterior border of the range of the variegated longer hairs on the middle of the back, a more or less distinct lateral line runs backwards along the side of the body, and curves downwards to the side of the thigh. The outside of the fore limb from the humerus downwards is sandy rufous yellow, but with the black spot well defined. The lower half of the thigh is a similar colour but with an intermixture of black hairs; otherwise the lower portions of the fore and hind limbs are concolorous. There is a tendency to form a black pectoral band, as black hairs can be traced round the chest. The back of the ears, the occiput, and the upper surface of the muzzle anterior to the eyes are rufous yellow, but on the forehead to the eyes the rufous is largely intermixed with black-tipped hairs. There is a pale spot over the middle of the upper eyelid; the cheeks are yellowish and white, with short black-tipped hair, conferring on them a greyish hue. The upper lip, chin, and throat are whitish, also the under parts and inner sides of the limbs. The tail is yellow, with here and there broad black-tipped hairs, the tip black, and the spot on its upper surface well defined.

Male. Snout to vent 650 mm.; vent to tip of tail 260; height of ear from external meatus 80, height of ear behind 100; height at shoulder 390. The skull-measurements are given in the table, pp. 208-9.

In the same museum there are two jackals from Sennaar, male and female, obtained by Rüppell in 1825, IV. 0. 10 *a* and *b*. On the under side of the stand of the male there is a MS. label, "*Canis anthus*, F. Cuv. Icon. Rüppell's Atlas, fig. 17. Sennaar. Geschenk von Dr. Rüppell, 1825."

These belong to a species about the size of *Canis aureus*, with moderately long legs, and with ears considerably shorter than those of *C. variegatus*, but longer and narrower than those of the Indian jackal. These two specimens are unquestionably distinct from the large jackal of Egypt.

The male. The upper surface of the head to the occiput, including the backs of the ears (which are not rufous) are sandy-coloured, finely speckled with pale brown and white, due to the fine annulation of the hair over these parts. The apex of each hair is brown, succeeded by a broad white band, followed by a brown band that passes gradually into the pale colour of the basal portion of the hair; these hairs are

about 20 mm. in length. On the back of the neck the hairs are 30 mm. long, with their apical brown portions about 11 mm., and in places, from their being crowded together at the base of the neck when the head is slightly raised, a dark area is produced which is prolonged in a modified degree round the front of the chest as a marked collar. On the back, some of the hairs are 50 mm. long, 10 mm. of the tip being dark brown, succeeded by an almost white band 14 mm., followed by dark brown, which pales into light brown, and ultimately to whitish at the base of the hair. The juxtaposition of the white bands and the dark brown bands gives a brown and whitish mottled appearance to the fur, the general tint of which, however, is sandy yellowish white, profusely and irregularly streaked with brownish. Immediately behind the shoulder there is a pale area in which only a few of the apices of the hairs are brownish, the rest of the hairs being yellowish white. The upper lip, the lower jaw, the cheeks, the throat (with the exception of the dark pectoral band), the chest, and under parts are yellowish white, but on the sides of the body there is no line of demarcation between the colours of the upper and under surfaces of the body. The limbs are yellowish sandy, but on the back of the thighs to the heels and around the genitalia there is a good deal of rusty red. On the fore limb a band of annulated hairs passes down from about the head of the humerus along the outside and then on to the front of the limb to the commencement of the metacarpus. As this band approaches the metacarpus some of the black tips to these hairs are but little more pronounced than in the rest of its course, so that no distinct dark spot is present, and in the female there is not the faintest trace of one. The hairs of the tail are yellowish white, but they terminate in such long blackish-brown tips as to make the tail nearly wholly black, except on its sides for a short way from below the base.

Male. Snout to vent 720 mm.; vent to tip of tail 285; height at shoulder 405.

Female. Snout to vent 680 mm.; vent to tip of tail 240; height at shoulder 385; height of ears in front 64, behind 68.

The female differs from the male in being much paler and more rufous, especially on the hinder quarters, but on the head, neck, and shoulders the two are exactly alike. The pectoral collar is a very pale sandy colour, and there is another similar band on the neck anterior to it. This second collar is prolonged downwards and backwards from the base of the ears.

These much-faded specimens manifest a very faint indication along their sides of a darkening of the colour, which suggests that they may possibly correspond to *C. lateralis*. In the male, as also in the female, there is distinct indication of an oblique darkish band across the thighs.

The measurements of the male skull are given in the following table (pp. 208-9).

The skull of the Sennaar jackal, which has much the same form as the skull of the Tunisian jackal, but is of much smaller size, has not the longer and pointed muzzle of

	Frankfort Museum.	Berlin Museum.
	♂. Tunis.	♂. Sennaar.
	(? <i>C. lupaster</i> .)	No. IV. 0. 10 a.
	No. 26072.	
	mm.	mm.
Premaxillaries to external occipital post. foramen . .	170	145
Lower border of foramen mag. to tip of premaxilla . .	149	135
„ „ post. border of palate .	70	59
Length of palate	78	74
Breadth of palate between middle of last molars . . .	25	25

	Frankfort Museum.		Berlin Museum.
	♂ . Tunis. (? <i>C. lupaster.</i>)	♂ . Sennaar. No. IV. 0.10 a.	Sex? Upp. Nile. No. 26072.
	mm.	mm.	mm.
Breadth of palate between anterior end of 3rd premolars	23	23	23
„ „ „ middle of first premolars .	17.5	17	19.5
„ between inner anterior fangs of 1st molars . .	27	27	23
„ of muzzle external to middle of 2nd premolars .	27	25	25
Supraorbital process to tip of premaxilla	100	84	83
Breadth across supraorbital processes	47	37	35.5
Minimum frontal breadth (approximate)	34	29	29
Frontal end of maxilla to anterior border of canine . .	65	55	52.5
Length of frontal in mesial line	50	43	39
„ nasal in mesial line	53	50	51
„ premaxilla	46	48	40
Breadth before infraorbital foramen	33	28	25
Outer margin of infraorbital foramen to tip of pre- maxillaries	52.5	47	43
Depth opposite post. border of infraorbital foramen . .	27	24	20
Greatest zygomatic breadth	89	75	69
Minimum breadth between orbits	31	24	24
Breadth at alveolar border of canines	27	27	25
„ of skull at root (posterior) of zygoma over meatus	54	49	44
Vertical depth of skull through anterior border of parietal	45	37	39
Breadth across upper incisors at base	19	18.5	? 17
1st premolar, length along cingulum	5.2	4	...
2nd „ „ „	9.5	8.5	7
3rd „ „ „	11	9	...
4th „ „ „	17.5	13.5	14
1st molar, length along cingulum	12.3	12	11
2nd „ „ „	7.5	8	6
Transverse breadth of last molar	11	10	8.5
Extreme length of lower jaw	124	110	103
Height of lower jaw through ascending ramus . . .	43	39	35
Breadth across lower incisors at base	15	14	12.3
1st lower premolar, length along cingulum	4.3	4	3.2
2nd „ „ „	9	7.3	6.5
3rd „ „ „	10	8	8
4th „ „ „	11.3	9.2	9
1st molar, length along cingulum	20	15.3	15
2nd „ „ „	9.8	8.7	8.5
3rd „ „ „	5	4.7	3.8
Breadth between tympanic bullæ at middle	14	9.7	12

An adult male skull of a jackal stated to have been brought from South Arabia by Menges, and to have lived in the Zoological Gardens, Berlin, bears the label "*Canis hadramauticus*, Noack, male, Süd-Arabien, 8326. Menges." On another ticket is written "Kastelan 23. ix. 96, *Canis hadramauticus*, ♂, Schädel, 8327." The skin of this animal is also in the Berlin Museum, and it presents a remarkably strong resemblance to the stuffed type specimen of *Canis lupaster*, Hempr. & Ehr., from Lower Egypt (the Fayum), the skull of which has been removed from the specimen.

Both are adult skulls, but the skull of *C. lupaster* is very much larger. As the jackal called *C. hadramauticus* was young when it was received, its small size may possibly be attributable to the effects of a life of confinement. The general form of the skulls is the same, and both are characterized by short stout muzzles and by considerable zygomatic breadth. The muzzle, however, of *C. hadramauticus* is even shorter than that of *C. lupaster*, and, like that species, the ears are large, so that it is in no way related to *Canis aureus* or to any of its allies. The colour of the head is almost identical with that of the type of *C. lupaster*, but the sides of the face from behind the eyes and above the eyes to the ears have the hairs decidedly black tipped, so that these areas have a greyish-yellow hue. Before the eyes the muzzle is decidedly rather rich yellowish, and above the posterior part of the upper lip and behind the angle of the mouth the parts are white. The chin is dusky yellow, and the throat and chest white, many of the hairs on the latter region having black tips. The hairs of the upper surface of the neck are sandy yellow, many of them with long black tips. There is a distinct tendency to the formation of a dark collar. The upper surface of the back is finely speckled black and white and the sides are sandy grey. The outsides of the fore legs are pale yellowish, passing almost into white on the wrist, but the hairs about the toes are yellowish. The hind legs are coloured much the same as the fore legs, but there is more yellow about the feet. The tail is black-tipped and the black spot upon its dorsum is well defined. Measurements of this male specimen, which is stuffed:—Snout to vent 800 mm.; vent to tip of tail 215; height at shoulder 435; height of ear posteriorly 100; height of ear anteriorly 90.

Measurements of the type skull of *C. lupaster*, Hempr. & Ehr.,
and of the type of *C. hadramauticus*, Noack.

	<i>C. lupaster</i> . mm.	<i>C. hadra- mauticus</i> . mm.
Premaxillaries to crest of occipital protuberance	...	151
Lower border of foramen magnum to tip of premaxillaries . . .	...	140
" " " apical border of palate . . .	...	65
Length of palate	93	76
Breadth of palate between middle of anterior molars	25	26

	<i>C. lupaster.</i>	<i>C. hadra- mauticus.</i>
	mm.	mm.
Breadth of palate between anterior end of third premolars . . .	26	23
„ „ at middle of first premolars	21	20
„ „ between inner anterior fang of first molars . .	32	30
„ muzzle external to middle of second premolars . . .	32	29
Supraorbital process to tip of premaxillaries	110	88
Breadth across supraorbital process	47	42
Minimum frontal diameter	33	31
Frontal end of maxilla to anterior border of canine	88	59
Length of frontal in mesial line	50	49
„ nasal in mesial line (free border)	65	47
„ premaxillæ	52	41
Breadth before infraorbital foramen	36	31
Outer margin of infraorbital foramen to tip of premaxillæ . . .	59	47
Depth through vertical opposite frontal border of infraorbital foramen	28	23
Greatest zygomatic width	97	89
Breadth at alveolar border of canines	32	29
„ of skull above external meatus	...	51
Depth (vertical) through anterior border of parietals	47	44
Breadth across upper incisors at base	22	20
Length of 1st premolar	6	6
„ 2nd „	10·3	9·5
„ 3rd „	12·5	10·3
„ 4th „	20	18
„ 1st molar	13·3	12·3
„ 2nd „	8·5	7
Transverse breadth of 3rd molar	12·6	12
Extreme length of lower jaw	135	110
Height through ascending ramus	49	43
Breadth across lower incisors at base	16	16
Length of 1st lower premolar along cingulum	3·3	4·2
„ 2nd „ „ „	9·2	9
„ 3rd „ „ „	10	9·2
„ 4th „ „ „	12·5	11
„ 1st lower molar along cingulum	22·6	21
„ 2nd „ „ „	10	9·6
„ 3rd „ „ „	5	4·2
Extreme breadth between tympanic bullæ at the middle	...	11
Minimum breadth between orbits	34	29

A jackal in the Berlin Museum from the Caucasus, and therefore typical *C. aureus*,

has very short bright red ears, and the rufous colouring on the legs very brilliant. A skin from near Jaffa has longer ears (but pale yellow) and longer legs than in the previous specimen. The latter is not *C. lupaster*, but another form, the *C. syriacus*, Ehr.

In the Zoological Gardens of Berlin there are two living jackals from Dalmatia, very brilliantly coloured, and with considerably longer ears than typical *C. aureus*, and longer than those of the Syrian jackal. This Dalmatian jackal presents certain of the characters of the *C. tripolitanus*, Wagner, and others of *C. lupaster*.

Paris Museum.

In this Museum there is a female labelled "*Canis anthus* (F. Cuv.), M. Ferdinand, Senegal," while on the under surface of the stand there is in ink "Du Sénégal l'envoyée par M. Ferdinand, février, 1826. 283 femelle, *Canis anthus* (F. Cuv.)," and some one has written *in pencil* "Type."

The specimens in the Paris Museum which constitute the types of species are almost invariably so marked on the label; but this is not the case in the specimen in question. Moreover, the date is sufficient to disprove its claim to that distinction.

	M. Ferdinand's specimen.	The type measured, June 1820.
	mm.	mm.
Snout to vent	690	528
Vent to tip of tail (without terminal hair)	220	254
Height at shoulder	400	381

The ears are broken at the tips, but they are 80 mm. high in front and 100 behind.

It is not a long-legged form like *C. variegatus*, but has more of the character of the jackal of Tripoli. The upper surface of the muzzle before the eyes is rather rich yellowish fawn, a pale tint of which extends below the eyes. Behind the nose, along the upper lip, the chin, and the throat are nearly white. The cheeks are yellowish white. The ears are rufous behind. On the upper surface of the back to behind the shoulder the hair is long, with the apical black band and also the subapical yellow band broad, and as both bands are more or less visible this surface is blotched, so to speak, with yellow and black, much the same as in *C. variegatus*. The rest of the body is pale, speckled greyish yellow and black. The limbs are yellowish externally, this colour being most intense on the lower part of the outside of the thighs. The tail has rather short hair, and is variegated with yellowish and blackish, the tips being black, but only very narrowly so.

[Before the publication of my paper on the African Dogs in the 'Proceedings of the Zoological Society,' 1899, I had come to the conclusion that the large Egyptian

CANIS LUPASTER.

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jackal is not, as has been generally supposed, identical with the true *Canis anthus*, F. Cuv., from Senegal, and in a P.S. p. 537 notice was given of the error of the prevalent opinion. There is no doubt that this view was correct, and further that a small jackal (*C. aureus tripolitanus*, Wagner, Schreb. Säug. Suppl. ii. p. 393), closely resembling true *C. anthus*, occurs in Tripoli. Another question which will have to be settled is, what is the typical form of *C. aureus*, Linn.? the Eastern European form may be known as *C. aureus græcus*, Wagn., the Syrian form as *C. aureus syriacus*, Hempr. & E., and the Indian as *C. aureus indicus*, Hodgson. In the meantime it is quite clear that *Canis lupaster* is the name which must be applied to the Egyptian jackal, and the large jackal found in Tunis undoubtedly belongs to the same species.

It is pretty evident that the jackal of the Sudan, in the neighbourhood of Khartum, is quite distinct from *Canis variegatus*, Cretzschm.; this Sudan species was also obtained by Rüppell and figured by Cretzschmar under the name of *C. anthus*, F. Cuv., a determination which appears to be correct, as, judging from a specimen from Omdurman in the British Museum recently presented by Capt. H. N. Dunn, there seems to be no material difference between this and the typical form from Senegal.—W. E. DE W.]

CANIS LUPASTER, Ehrenb. (Plate XXX.)

Canis lupaster, Hemp. & Ehrenb. Symb. Phys., Mamm. dec. ii. 1832.

Canis sacer, Hemp. & Ehrenb. Symb. Phys., Mamm. dec. ii. 1832.

Lupus anthus, Gray, Proc. Zool. Soc. 1868, p. 502, skull (nec Cuvier).

Dieba anthus, Gray, Cat. Mamm. Brit. Mus. 1869, p. 189.

Canis aureus, auct. (partim), nec Linn.

Canis anthus, Mivart, Canidæ, 1890, p. 41, pl. (partim), skull, fig. 20; de Winton, Proc. Zool. Soc. 1899, p. 535 (partim).

Gizeh, December 22, 1891. Winter pelage.

Fayum. Several specimens, Messrs. Andrews & Beadnell.

The general colour is yellowish grey on the body, rather rufous yellow on the upper surface of the head from before the eyes to the nose, on the back of the ears, between the ears above, and on the outsides and fronts of the limbs. The margins of the mouth, below the rufous areas anterior to the eyes, are greyish white. The forehead has the hair deep brownish black in its lower two-thirds, but so broadly banded with yellow below its black tips that the dark basal colour is completely obscured, and this part of the head has a yellowish appearance speckled with black. Behind the vertex the bases of the hairs become very pale grey, the yellow bands extremely broad, and the black tips more conspicuous, so that the yellow is speckled with black, and as the black tips become massed together in places the yellow pelage has the appearance

of being irregularly marked with black, tending to form lines and spots. A line of this kind is prolonged forwards from near the base of the tail across the thigh in the region of the femoro-tibial joint, and another is also more or less perceptible on the shoulders. The hairs of the tail in its latter half are very broadly black-tipped, and those at the end of the tail are nearly entirely black. There is always the trace, more or less distinct, of a blackish line down the front of the fore leg. The claws are black. The hair on the back of the neck and on the shoulders is longer than on the rest of the body.

The under parts are a paler tint than the upper, the chin and throat being palest.

A male shot at Luxor on the 14th March, 1892, is changing its fur, which is much less dense than in the specimen from Gizeh. The brown-black bases to the hairs of the vertex are absent, and the general colour of the upper surface is nearly uniform yellowish, the black-tipped hairs being very sparsely distributed. The black on the tail also is chiefly restricted to the tip, with the remains of a little black on the upper surface.

The following are the measurements taken from the animal in the flesh :—

	mm.
Snout to vent	890
Vent to tip of tail	336
Tail with hair	420
Height at shoulder	528

The following are the measurements of three adult males from Cairo :—

	mm.	mm.	mm.
Snout to vent	915	945	940
Vent to tip of tail	320	355	335
Length of tarsus	185	178	189
Height of ear	110	109	114

A young male, six days old, littered on the 10th April, 1896, measured as follows :—

	mm.
Snout to vent	184
Vent to tip of tail	65

The eyes and ears of this specimen were perfectly closed, and the ears lay flat against the sides of the head.

This species is supposed not to penetrate into the Nile Valley south of the First Cataract, but definite information on this point is required.

Native name 'Deib' or 'Dib.'

The Plate was drawn from a living specimen obtained in Lower Egypt and presented to the Zoological Society of London by Dr. Anderson.

Mr. H. S. L. Beadnell sends the following field-notes:—

“Jackals are remarkably common in the oases of Baharieh, Dakhel, and Khargeh. They live in the desert surrounding the cultivated land, and descend from the small gullies and hills at sunset, making their way into the palm-groves and gardens, where they often make the night hideous with their howls. At Dakhel they appear to live chiefly on fruit, which is plentiful, and consists of dates, mulberries, apricots, &c. at different seasons.

“In the north of the Fayum the jackals which inhabit the scrub and desert surrounding the lake, the Birket el Qurun (Lake of the Horns), live entirely on fish, with which this lake abounds, and which are easily caught along the shallow margins, and are also commonly seen stranded. One jackal I shot had nothing besides fish and fish-bones in its stomach, consequently the beast had a strong smell.

“I have seen jackals abroad in the daytime, and remember seeing a couple on the plateau near Qabrat, south-west of Assiut, being tormented by a flock of ravens, who were flying round and giving them vicious nips whenever opportunity occurred. Unlike the hyæna, they often congregate together at night near one’s tent, and keep up an infernal din for hours; their cry is usually a long howl broken into a number of yelping notes at the end. Like hyænas, jackals do not penetrate any distance into the desert.”

CANIS VARIEGATUS, Cretzschm. (Plate XXXI.)

“Sea Fox,” Salt, Voy. Abyss. 1814, p. 172, App. iv. p. xl.

Canis variegatus, Cretzschm. Rüpp. Atlas, 1826, p. 31, pl. 10; de Winton, Proc. Zool. Soc. 1899, p. 537.

Canis riparius, Hcmpr. & Ehrenb. Symb. Phys., Mamm. ii. 1832; Blanford, Geol. & Zool. Abyss. 1870, pp. 14 & 240.

Vulpes variegata, Gray, Proc. Zool. Soc. 1868, p. 516.

Canis anthus, Mivart, Canidæ, 1890, p. 41 (partim).

Canis hagenbecki, Noack, Zool. Garten, 1894, p. 244.

♂, ♀, ♂. Plain of Tokar.

In size and weight very much smaller than *C. lupaster*. Form very lank; ears large. Colour pale. The general colour is pale buff, washed and blotched with black on the back and tail. The face in front of the eyes, the crown of the head, the ears, and both fore and hind legs rather warmer in colour or more rufous.

The skull is very little larger than that of the red fox, *Vulpes ægyptiaca*, but is easily distinguished by its arched forehead and less widely expanded maxillary portion of the zygomatic arch. The sagittal crest also ends posteriorly in a point, whereas in

the fox it barely extends so far back as the occipital crest; or this character might be better expressed by saying, the sagittal crest is weaker and shorter in the fox. The teeth and lower jaw are also more powerful in the jackal.

Measurements of an adult male. Tokar, 8.1.94.

	mm.
Snout to vent	760
Vent to tip of tail	270
Snout to eye	85
Eye to ear	75
External meatus to snout	170
Height of ear	95
Breadth of ear	55
Height at shoulder	460
Hind foot (about)	130

Measurements of skulls.

	47. ♂.	48. ♀.	49. ♂.
	mm.	mm.	mm.
Greatest length	161	141	153
„ breadth	80	71·5	81·5
Basal length	146	128	137
Length of palate	80	71·5	75·5
Breadth of brain-case	50	47	50
Least temporal constriction	33	28·5	32·5
Width across postorbital processes	40	36·5	42·5
Least interorbital breadth	28·5	24·5	28·3
Breadth of upper jaw outside <u>pms. 4</u>	45	41	44
„ „ „ <u>pms. 1</u>	22	21	23
Length of <u>pm. 4</u>	14·5	14·3	13·5

So far as is at present known, this large-eared and long-legged jackal is confined to the coast-land from Suakin to Berbera in Somaliland.

Notes made by Dr. Anderson on specimens contained in the Continental Museums, having a bearing on this species :—

Frankfort Museum.

Three specimens, marked respectively :—

- IV. 0 a. Nubia, Rüppell, 1824.
- IV. 0 b. Sennaar, Rüppell, 1823.
- IV. 0 c. Thal Ailat, Abyssinia, Rüppell, 1834.

All are marked “*originals*,” or types.

CANIS VARIEGATUS. SUAKIN PLAIN.

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All of these specimens are distinguished by their rather finely pointed muzzles, large ears, and long legs. In their present condition they are sandy coloured, more or less variegated with black; the semi-nude abdomen and well-developed teats prove the Sennaar¹ specimen to be a female, the other two are unmistakably males.

In the specimen from Nubia the black variegation is confined to the middle of the back. In the Sennaar individual it involves the whole of the sides of the body as well, being sharply differentiated off from the sides of the belly; in the Abyssinian jackal, the variegation is more or less marked over the back and sides, but much less so than in the second specimen, and it shows a distinct tendency to form a black pectoral band. The black spot on the middle of the dorsum of the tail is well defined in all, and the tip of the tail is blackish brown. The dark marking on the front of the fore limb, which is absent in *C. mesomelas*, is present in all, but on one leg (left) of the Sennaar specimen it is almost obliterated, while quite distinct on the right leg, so that the absence or presence of this mark has still to be studied most carefully.

	Nubia. IV. 0 a.	Sennaar. IV. 0 b.	Abyssinia. IV. 0 c.
	♂.	♀.	♂.
	mm.	mm.	mm.
Snout to vent	630	640	620
Head to tip of tail	235	240 (c.)	235
Height at shoulder	395	390	368
„ of ear from front of external meatus	80	77	80
„ „ base behind	105	102	105

The variegation of the fur is due generally to the hairs of the black patches having two black annuli, viz.: a broad terminal black band succeeded by a broad yellow band, followed by a broad black band, below which is the broad yellow basal portion of the hair. These long annulated hairs attain to 100 mm. in length. In the yellow areas of the body the hairs are shorter and have only one narrow apical black band. The ears posteriorly are very faintly rufous; the dentition of all the specimens is that of adults. There is a fine underlying soft fur of a greyish tint.

Berlin Museum.

Canis riparius, Ehr. ("Sea-Fox," Salt). Abyssinia, Hemprich & Ehr.

Two specimens Nos. 858 and 859, the latter being the larger of the two and the one from which the skull has been removed.

Both specimens are females. They are distinguished by long legs and fine, pointed muzzles; the markings on the back, the general colour of the fur, and the large ears are the same as in the types of *C. variegatus*.

¹ [The locality "Sennaar" must not be too literally construed; for in most cases there is little doubt that it implies the district between Berbera and Khartum.—W. E. DE W.]

Skull-measurements.

	Frankfort Mus.	Berlin Mus.		
	Type of	Co-type of	Type of	
	<i>C. variegatus.</i>	<i>C. hagenbecki.</i>	<i>C. riparius.</i>	<i>C. mengesi.</i>
	♂.	♀.	♀.	♀.
	mm.	mm.	mm.	mm.
Premaxillaries to crest of occipital protuberance .	160	156	...	133
Lower border of foramen magnum to tip of premaxillaries	140	136	...	122
Lower border of foramen magnum to apical border of palate	64	62	...	55
Length of palate	76	73	73	66
Breadth of palate between middle of anterior molars	22.5	19.3	17.5	21
Breadth of palate between anterior end of third premolars	21.5	19	19	17
Breadth of palate at middle of first premolars . .	19	15.5	15	14
„ „ between inner anterior fang of pms. 4	24.5	22	22	22
Breadth of muzzle external to middle of second premolars	26	23	24	22
Supraorbital process to tip of premaxillaries . .	96	91	91	79
Breadth across supraorbital processes	43	34	40	36
Minimum frontal diameter	31	27	29	28
Frontal end of maxilla to anterior border of canine.	64	63	60	51
Length of frontal in mesial line	44	43	46.5	46
„ nasal in mesial line	54	51	53	39
„ premaxilla	49	44	48	39
Breadth before infraorbital foramen	28	26	28	24
Outer margin of infraorbital foramen to tip of premaxilla	51.5	49	47	41
Depth through vertical opposite frontal border infraorbital foramen	24	24	24	21
Greatest zygomatic width	83	75	80	70
Minimum breadth between orbits	25	...	28.5	22.2
Breadth at alveolar border of canines	26	24	23	23
„ of skull above external meatus	50	45	47 ?	42
Depth (vertical) through anterior border of parietal.	43	38	45	38
Breadth across upper incisors at base	17	16	16	17
Length of 1st premolar	5.5	5	5.2	5
„ 2nd „	9	8	8.7	8.5
„ 3rd „	10.5	9.6	10	10
„ 4th „	17	14.6	15	15

Skull-measurements (*continued*).

	Frankfort Mus.		Berlin Mus.	
	Type of	Co-type of	Type of	
	<i>C. variegatus.</i>	<i>C. hagenbecki.</i>	<i>C. riparius.</i>	<i>C. mengesi.</i>
	♂.	♀.	♀.	♀.
	mm.	mm.	mm.	mm.
Length of 1st molar	12	11	11	10
„ 2nd „	7·6	6·5	6	6
Transverse breadth of 3rd molar	11	10·2	10·5	9·6
Extreme length of lower jaw.	107	112	108	95
Height through ascending ramus	41	40	40	36
Breadth across lower incisors at base	14	13·5	12·5	12·5
Length of 1st lower premolar	4·5	4	5	4·5
„ 2nd „ „	8·5	8	8	8
„ 3rd „ „	9·5	9	9	9
„ 4th „ „	10·6	...	10	10
„ 1st lower molar	18	17	17	16·5
„ 2nd „ „	8	9	9	7·5
„ 3rd „ „	4	4·3	4	3·5
Breadth between tympanic bullæ at middle	8	9	8?	8·5

It is evident that the skull also of *C. riparius* when it is directly compared with the skull of the type of *C. variegatus* is only distinguishable from it by characters which are explicable by the difference of its sex. Measurements of this skull are given in the foregoing table.

In the Berlin Museum there is the skull of a jackal from Somaliland which Mr. Matschie informs me may be regarded as a co-type of *C. hagenbecki*, as it was one of Menges's specimens from the same locality as that which yielded *C. hagenbecki* and was obtained at the same time as the latter. The skull is that of a female and has a long pointed muzzle, resembling that of *C. riparius*, but even more pointed. In view, however, of the similarity of the pelage of jackals referable to *C. hagenbecki* to the pelage of jackals conforming to the external characters of *C. variegatus*, one does not seem justified in separating them. The measurements of this co-type are given above.

Canis mengesi, Noack.

Small Somali jackal, female, Schmidt, 1882. Skull 6073.

Length of specimen :—Snout to vent 510 mm.; tail 223; height at shoulder 290; ears posteriorly 90; ears anteriorly 75.

Greyish yellow throughout on the trunk, but many of the hairs with long black tips; slightly rufous on the upper surface of the muzzle and white along the upper lip and on the side of the face below the eyes; chin and throat white, but a brown area on the

middle of the upper lip. Sides of head below the ears yellow, back of ears yellow with black hairs intermixed. Insides of ears clothed with white hairs. A tendency to form a dark collar. Fore limbs bright yellowish, but with a faintly dark area down the front to near the wrist. Outsides of hind limbs yellow. Under parts white, with the exception of the base of the throat in front. Tail concolorous with the body, towards the tip broadly marked with dark blackish brown; the black spot on its dorsal surface well defined.

This is a short-legged jackal and cannot possibly be the female of *C. variegatus*¹.

¹ In my paper on African Canidæ, *C. mensesi* was doubtfully referred to this species. Further material has enabled me to see my mistake, and I fully agree with the view here expressed.—W. E. DE W.

VULPES.

Vulpes, Fleming, Hist. Brit. Anim. 1828, p. 13.

The Foxes are very nearly related to the Dogs, and are generally included in the genus *Canis*. That they should be separated is certainly desirable, but in studying the genus in its wide sense, including the whole of the Dogs and Foxes of the world, the line of demarcation will be found very difficult to define. As already mentioned under *Canis*, Dr. Blanford, following Desmarest and Fleming, gives characters which, if found constant, will form a sufficient distinction between the two groups. Thus the pupil of the eye in *Vulpes* is vertically elliptical in a strong light, and there are only six mammæ. Dentition as in *Canis*.

The skull is generally much flattened; the maxillary portion of the zygoma is expanded so that the inner surface below the orbit faces upwards.

Tail-gland generally strongly developed.

VULPES VULPES, Linn.

Canis vulpes et alopes, Linn. Syst. Nat. x. i. 1758, p. 40.

On the Red Foxes in general, from material contained in the British Museum.

The skulls of the Scottish, South German, and Tuscany foxes belong all to one type, and are distinguished from the skull of the Nile Valley form by the somewhat greater arching of the forehead. In the skull of a Genoese fox this arching is less, and also in the skull of a fox from Sardinia. These two skulls are very slightly broader across the zygomata than the three first-mentioned skulls, which in their turn are a little broader and heavier than the skulls of Egyptian foxes. The latter are distinguished by the long, narrow, and more pointed character of their muzzles, and by the mesial area of the skull posterior to the nasals being but feebly, if at all, arched. The concavity or depression, however, at the middle of the nasals varies considerably, and in a fine old skull collected in Egypt by Dr. Hedenborg (British Museum, 46.6.2.31) the depression is absent, so that the line from the centre to the end of the nasals slopes gradually down without any swellings or depressions in its course.

When very much irregularity occurs it is not so much brought about by the arching of the frontals as by the depression of the nasals and contraction of the superior maxillæ in a line between the second and third premolars.

Among the European skulls I have examined, the one which shows this depression least is a fox from Genoa, whereas it is much accentuated in the skull of the South-German fox with swollen frontals. The skull of the Scottish fox has the posterior half of the frontals slightly arched, but anterior to the postorbital process this skull and the one from Genoa are practically identical. The measurements, however, given

Measurements in millimetres

	Bedrashen, Sakkarah, Egypt. 4.3.93. Adult ♀.	North of Scotland. 79.9.25.80. Adult ♀.	South Germany. ♂.	Assuan, Egypt. 92.7.15.6. ♂.	Egypt (Hedenborg). Stockh. Mus. 46.6.2.31. Old ♂.	Maskat, Arabia. 91.10.7.25. Adult ♂.	Genoa, Italy. ♂.	Tuscany, Italy. ♀.	Sardinia. 88.12.1.2. Adult ♂.
Occipital protuberance to tip of premaxillary.....	153	149.5	145	145	143.5	143	142.4	140	136
Zygomatic breadth	79	76.5	77	74.5	72	74	70.2	76	77.5
Length of palate	73	75.5	72	73	71	74.3	65.7	71	67.5
Breadth of palate	41	40	40	38	37	37	35.5	39	38
Basiscranial axis	45	47.5	50	49	..	..	46.5	49	49
Extreme length of lower jaw..	111	110.5	106.5	109.5	109.5	109.5	98.5	103.5	100
Length of upper tooth-row ..	55	54	55	53	54	51	47.5	53	49.8
„ lower „ ..	59.5	61	60	59	61	57	54.5	56	55.3
„ 4th upper pre- molar	13	13	14	12	*	12	11	13.5	13
„ 1st upper molar ..	9.5	9.5	9.6	9.5	..	9	9.5	10	9.3
Breadth of 1st „ ..	13	13	13	13	..	12.6	11.5	13	12.5
Length of 2nd „ ..	6.3	6	5.9	6	..	5.7	5	5.8	5.6
Breadth of 2nd „ ..	9	9	9.3	9	..	9	8.5	8.5	9
Length of 1st lower molar ..	15	15	16	15	..	14.3	14	14.8	14
„ 2nd „ ..	7.3	7.5	7.7	7	..	7	7.5	7.2	7.2
„ 3rd „ ..	3.7	3.8	3	3	..	3.9	4	3	3

* Teeth too decayed

of skulls of Foxes.

Murrie, Punjab.	Gizeh, Egypt.	Gizeh, Egypt.	Shiraz, Persia.	Banias, Palestine.	Tangiers, Morocco.	Algiers, Barbary.	Wells of Moses.	Sambhar, Rajputana.	Sambhar, Rajputana.	Sambhar, Rajputana.	Sambhar, Rajputana.
90.11.11.1. ♂.	92.7.15.2. Adol. ♂.	92.7.15.3. Adol. ♀.	Adult ♂.	♂.	51.4.23 14. ?	56.3.12.14. ♂.	59.12.3.1. Adult ♀.	85.8.1.63. Old ♂.	85.8.1.62. ♀.	♀.	85.8.1.61. ♀.
134.4	134	134	131	131	131	125	123.5	122	117	113.7	113.5
71.5	70.5	71	71	73.5	70.2	66	68	67.5	60.2	62	62
67	67	66	67	67	65.7	61	61	60	57.3	58	57.5
37	38	37	36	37	35.5	33.6	35	34	32	32	32.5
46	46	46	46	46	46.5	46	46	45	42	43	43
99	97	98	97.5	97.9	98.5	96	94	90	84	..	84.7
51.5	51	51	52	48	47.5	48	48	45	44	45	45
56	54	58	55.5	54	54.5	52.3	57.5	50	49	49	49.3
11.9	12.5	13	13	12.3	11	11	12.9	10.5	10	10.2	10.5
9	9.1	9	10.5	8.9	9.1	8.9	9.3	8.5	8.7	8.5	8.5
11.8	12.3	12.9	14	12	11.5	12.2	12.5	12	11.5	11.5	11.5
5.4	5	5.5	6	5	6	5.5	6	5.5	5	6	5.5
8	8.5	8.5	9.2	8.4	8.5	9.2	9	8.5	8	8.5	8.5
14	14.5	14.9	15.5	14.8	14	14	14.3	12.3	12.5	12.5	12.5
7	7	7.3	7	7.1	7.5	6.1	7.4	6.2	7	6	6.2
2.5	3	3	3.5	3	4	3	3	3	3.5	2	2.5

to be measured.

in the accompanying table of the skulls (pp. 222-3) show how they run one into another. It will be observed that the male Sardinian fox is the only one among the European foxes which is an exception to this, as its skull is considerably smaller than that of any of the other males, and in its dimensions only slightly exceeds that of the small adult female Egyptian fox. It will also be observed that the tarsus of this animal is much shorter than that of any of the other European foxes, and that in this respect the fox approaches the one found in Barbary. The fourth upper premolar tooth of the latter, however, is smaller than the corresponding tooth of the Sardinian animal, and the skull, although like it in form, is altogether smaller. The Algerian fox, moreover, in the form of its skull is closely allied both to the Egyptian and European foxes, so much so, indeed, that there is no character to distinguish it except it be that the fourth upper premolar is slightly smaller than in the others; but this is so trivial that no importance can be attached to it.

The colouring, however, of the Algerian fox distinguishes it from the Egyptian fox, as the hairs on the upper surface are devoid of the white subterminal bands or tips which give to the fur of the common European and Egyptian foxes its speckled appearance¹.

It appears from the measurements of the skull of *V. persica* and foxes that can be grouped with it, such as the fox of Palestine, that this series of Asiatic foxes stands intermediate in size between *V. vulpes* and *V. leucopus*, the latter being essentially a dwarf fox with much smaller fourth premolars than those foxes referable to *V. vulpes*, of which *V. nilotica* and *V. persica* are undoubtedly geographical races. It would appear that the fox found at Maskat, which Dr. Blanford was disposed to regard as *V. leucopus*, unquestionably belongs to the Egyptian type of *V. vulpes*, and is a giant compared with *V. leucopus*, with a much larger fourth premolar, the dimensions of which equal the corresponding tooth in the fox from Assuan.

A female fox from the Wells of Moses has the same size of fourth premolar as the adult female from Gizeh², but its tarsus is 19 mm. shorter, and 5 mm. shorter than the longest tarsus of five specimens of *V. leucopus*, and 1 mm. shorter than the shortest tarsus of these five animals. Notwithstanding this short tarsus, so much shorter than that of the other examples of the Egyptian fox, I am disposed to regard it only as an individual variation, which may possibly be also the explanation of the short tarsus of the Sardinian fox registered in the table (p. 222).

The fox of Palestine is represented in the British Museum by one specimen collected

¹ The above is my experience, but I observe that Cretzschmar's figure of *Canis niloticus* is brilliantly coloured and shows no speckling of the fur, and in this respect resembles a skin of the Algerian fox in the British Museum.

² This fox, in its general coloration, except its limbs, which are rufous externally, has a strong resemblance to a fox from the country N.E. of the Salt Range, Punjab, referred to *V. pusilla*, Blyth, but undoubtedly belonging to *V. leucopus*, which is distinguished by the white on the inner side of its fore legs and front of its hind legs; but the Gizeh fox has a little white in these parts, and patches of greyish black down the front of its fore legs.

by Canon Tristram. The skull is exactly like that of *V. persica*, and the coloration of the animal has the dull brown and greyish colour of the foxes of that region.

Lataste¹, in discussing the relationship of the foxes of Barbary to those of Europe, by means of characters drawn from their skulls, remarks: "J'ai cependant fini par trouver, dans la denture et dans la forme d'une partie du crâne, deux caractères qui me semblent assez nets et assez constants pour établir, enfin *a posteriori*, la distinction spécifique du Renard d'Europe et de celui du nord de l'Afrique"; and he gives expression to their characters as follows:—

"1°. Le palais du *C. niloticus* est plus étroit et ses dents tuberculeuses supérieures sont plus développées; de telle sorte que la distance réciproque des deux tuberculeuses antérieures est, chez le *C. niloticus*, toujours sensiblement et parfois beaucoup *inférieure*, tandis qu'elle est, chez le *C. vulpes*, toujours considérablement *supérieure* à la longueur du bord externe de l'ensemble des deux tuberculeuses de chaque côté."

M. Lataste says the foregoing character was verified in the five Barbary and Tunisian foxes referred by him to *V. nilotica*, and in five foxes from Southern Europe (Girond, Bouches du Rhône; Italy, Trieste and Tuscany; and Sardinia), one from Denmark, and another European fox the locality of which I cannot trace², all of which were referred to *Vulpes vulpes*.

In order to test the value of this character I have tabulated the measurements indicated by Lataste, drawn from fifteen foxes from various localities:—

		Breadth between 1st upper molars. mm.	Length of upper molars. mm.	Palatal breadth in excess of molar length. mm.	Palatal breadth less than length of molars. mm.
South Germany	♂	17·5	15·3	2	...
Genoa	♂	20	14·5	5·4	...
Sardinia.	♂	17·4	14·9	2·5	...
Assuan, Egypt	♂	16·5	15·5	1	...
Maskat	♂	15·9	14·7	1·2	...
Gizeh, Egypt	♂	16·9	14	2·9	...
Scotland	♀	19	15·5	3·7	...
Tuscany, Italy	♀	18·2	15·8	2·4	...
Gizeh, Egypt	♀	15·5	14·5	1	...
Wells of Moses	♀	14·4	15·3	...	1·1
Muree, Punjab	♂	18·4	14·4	4	...
Shiraz, Persia	♂	14·6	16·5	...	1·9
Banias, Palestine.	♂	16·5	14	2·5	...
Tangiers, Morocco	...	15·3	15·1	0·2	...
Algiers, Algeria	♂	14	14·3	...	0·3

¹ Expl. Sc. Tunisie, Zool. Mamm. 1887, p. 11.

² By a typographical error the No. 2492 is twice mentioned in the Nos. of the foxes of Europe used by Lataste for comparison.

From this table it appears that the foxes of the Nile Valley conform in their inter-molar palatine breadth, and its relation to the external length of the two molars, to the foxes of Europe—*i. e.*, that the palatine breadth is in excess of the length of the molars; whereas in the one fox from Algeria mentioned in the table, and therefore presumably identical with the foxes from Algeria and Tunisia regarded by Lataste as the same as the *V. nilotica* (= *V. ægyptiaca*, Sonn.), the relation of the breadth of the palate to the length of the molars is, as stated by Lataste, the reverse of the former, viz., the palatal breadth, at the point indicated, is less than the length of the molars. It is, however, so little that, in view of the fact that the skull of a Tangiers fox cannot possibly be distinguished from the skull of the Algiers fox in its other characters, and that it has its palato-molar width very slightly exceeding its molar length, thus conforming to the relation subsisting between these parts of the skull in the European and Egyptian foxes, it would appear that this is not a stable character, and that the importance which M. Lataste attached to it is not sanctioned by facts.

It is noteworthy that the female fox from the Wells of Moses, which has its teeth of about the same size as those of the Egyptian foxes, has its palato-molar breadth less than its molar length, in this conforming to the proportions of these parts in *V. persica* and in the foxes of Tunisia and Algeria observed by Lataste; while the length of its tarsus is even less than that of *V. leucopus*, to which the animal externally has a strong resemblance, with the exception of the colour of its limbs. Its skull, however, would attain a greater size than any of the skulls of *V. leucopus* in the British Museum, as it is not yet mature.

There can be no doubt that the skulls of the Barbary foxes are in their general form more akin to those of the foxes of Egypt than of Europe, the difference to which I refer as existing between the Algerian and Egyptian skulls and those of Europe being that the latter are slightly more arched in the fronto-parietal region than the former, and are altogether higher in the frontal region and broader; but even these characters are variable.

I do not consider that any importance can be attached to the second character selected by M. Lataste as a means of separating the Barbary foxes from the European, as in some skulls of the latter the posterior borders of the bullæ fall within the posterior border of the glenoid cavity, while in others they fall short of it or just reach it. The extent to which the bullæ appear to approach the posterior border of the glenoid cavity depends largely on the degree of development of the posterior glenoid process, which is subject to variation. At present the materials at my disposal are not sufficient to determine the exact relationship which the small fox from the Wells of Moses bears to the fox of Egypt, to *V. persica*, to *V. leucopus*, or to the fox of Barbary and Morocco; but I think the facts I have brought forward tend to prove that the fox of Lower Egypt is only a very slight modification of *V. vulpes*, so trifling as

VULPES VULPES subsp. ÆGYPTIACA. BEDRASHEN.

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not to be worthy of specific rank. The tables I have given of the skull-measurements of animals from various parts of Europe, North Africa, and Western Asia show how the foxes of these various regions run one into another, and how little, at the same time, is the variation observable in the measurements of their skulls, if we except the small race found in Rajputana and in the Punjab.

Since the cusps on the teeth of the Algerian specimen show as yet no signs of wear, I judge from this and the general condition of the skull that the animal, had it lived, would have attained a greater size. Its skull is only 3 mm. shorter than a male skull of the typical Egyptian form from Gizeh; but its fourth premolar, like that of the Tangiers skull, is sensibly smaller than the corresponding tooth in the foxes of Egypt; these two specimens in the size of their teeth resembling the fox of Genoa.

The great variation in size which occurs among the foxes of Lower Egypt, even in very restricted areas, is seen by contrasting the large female skull from Bedrashen, near Sakkarah, with the other female skull from Gizeh.

VULPES VULPES, subsp. ÆGYPTIACA, Sonn. (Plate XXXII.)

Canis ægyptius, Desmar. Nouv. Dict. Hist. Nat. xxiv. Tab. Méth. 1804, p. 18, nom. nud.

Canis ægyptiacus, Sonnini, Nouv. Dict. vi. 1816, p. 524.

Canis vulpes, Geoffr. & Audouin, Descr. de l'Égypte, Hist. Nat. vol. ii. 1818, p. 749.

Canis niloticus aut *ægyptiacus*, Desmar. Mamm. 1820, p. 204.

Canis niloticus, Cretzschm. Rüpp. Atlas, 1826, p. 41, pl. 15; Hempr. & Ehrenb. Symb. Phys., Mamm. dec. ii. 1832.

Canis vulpecula, *C. anubis*, *C. sabbar*, Hempr. & Ehrenb. loc. cit.

Vulpes niloticus, Smith (H.), Jardine's Nat. Libr. x. 1840, p. 248, pl. xxi*.

Canis vulpes ægyptiacus, de Winton, Proc. Zool. Soc. 1899, p. 543.

2 ♀. Kafr Amar. 20.2.93.

1 ♀. Bedrashen. 4.3.93.

1 ♂. Margin of desert, Bedrashen. 5.3.93.

Fayum. Messrs. Andrews and Beadnell.

Upper surface greyish yellow, the back with a broad longitudinal mesial line from the head to the base of the tail. This line is more or less of a rusty red, or almost chestnut colour, but it merges, on its borders, with the greyish yellow external to it. On the whole of the upper surface, dorsal stripe included, the long hairs have subapical greyish-yellow bands, which give a variegated appearance to the fur. The short wavy under-fur is dark purplish or brownish red in its lower part, passing to rusty red at the tips, and, as this shows through the long hair, there is a more or less rusty tint added to the greyish yellow. The area above, below, in front of, and behind the eyes is rich rufous brown, but the margin of the mouth above and below and the chin are

dirty white. The ears are blackish brown behind and yellowish white in front. The sides of the body and of the belly are pale yellowish, with the straggling long hairs yellow-banded and black-tipped. The throat, chest, and centre of the belly are purple-blackish, but the hairs are occasionally yellow-tipped. The limbs are rather rufous externally, paler on the inner side, and there is generally an irregular dark band down the front of the fore limb. The tail is rufous or rusty yellow, sometimes washed with black, and with a white tip.

In some specimens the black of the under parts is only feebly developed, and the sides of the throat and belly are whitish, the abdomen itself being yellowish.

In the adult male from Bedrashen, from which the Plate was coloured, the back of the ears, the throat, and belly are deep black, but on the lower part of the neck a few white hairs are intermixed. The chin to behind the angle of the mouth and the upper lips are greyish white. The muzzle below the eyes and the front of the head are rufous yellow, with the usual yellowish tips to the hairs, but the occipital region is bright rufous. There is a darkish area behind the eye, and the conches of the ears are yellowish white. There is a decided rufous area down the middle of the back, the shoulders are greyish yellow, and a blackish area runs down the middle of the front of the fore limbs, and there is a slight amount of black on the front of the tarsus.

All the females have black on the under parts as in the male, but not nearly so dark, and their heads vary much in colour, one being very pale yellow on the upper surface, whilst it is darker in the others.

[The cubs of this species are uniform pale buff-fawn in colour; there is only very slight indication of black on the backs of the ears. When about half-grown the legs, face, and back become more rufous, the annulated coarser body-hairs begin to appear, the backs of the ears become mixed with black, and the under parts more pure white. The black fur on the belly seems to be a character which is not developed till maturity.

Major Hodgson has sent the mask of a specimen of this fox from Dongola, where, for a season or two, hunting was obtained by the British officers, but the hounds have since all succumbed to the heat.

Messrs. Rothschild and Wollaston obtained specimens at Shendi in 1901; this is the most southerly point from which the Red Fox has been recorded.

In Egypt this species appears to be confined to the Nile Valley.—W. E. DE W.]

*Notes on type specimens in the Berlin Museum collected by Hemprich and Ehrenberg,
all referable to the Red Fox of the Nile Valley.*

Type of *Canis sabbar*, H. & Ehr. ♂. Dongola, Hemprich & Ehrenberg.

Mr. Matschie informs me that this is the type of *C. sabbar*, H. & E., which was sent

to the Museum under the name of *C. vulpecula*, Ehr. It now stands in the Museum as "*C. niloticus*, Geoff. *Canis vulpecula*, Ehr. Dongola, Hemprich & Ehrenberg."

It is a male, and the skull is in the specimen. The hair is rather sparse, and on the whole of the upper surface from between the ears to the base of the tail, and on the sides as well, the general colour is a cinnamon-red; the colour is much darker on the neck, where it is almost black-brown, and is prolonged slightly below on to the throat as a collar; the outer surfaces of the sides and limbs are paler. A few straggling golden-coloured hairs occur on the back and sides. Behind the shoulders the colour is pale yellowish, and on the lower part of the front of both fore and hind feet there is an intermixture of dark brown hairs. From the vertex between the ears forwards, the top of the head is rather rich rufous yellow, brightest before and around the eyes. The upper lip, the lower half of the cheek, the whole of the lower jaw, throat, and sides of the neck, chest, and belly, also the inner sides of the limbs and fronts of the thighs, white. The lower portion of the tail is concolorous with the back, but on the remainder nearly all the long hairs have been lost, and only the uniformly-coloured yellowish thickly-matted under-fur remains. The backs of the ears are brownish. The animal was evidently changing its coat.

Type of *Canis anubis*, Ehrenberg. Fayum, ♀, Hemprich & Ehrenberg.

A fox evidently changing its coat. From between the ears backwards and behind the shoulders there is a long, dark cinnamon-brown area of the same character as that which occurs in the type of *C. sabbar*. The under surface of the belly is suffused with orange-red, becoming very brilliant chestnut-red in front of the thighs and in the middle line between them. From the larynx backwards to the chest the hairs are deep chestnut-red. This skin probably shows the commencement of the summer pelage, as the fur is evidently thin and sparse.

Type of *C. vulpecula*, Ehr. ♀ juv. Fayum, Hemprich & Ehrenberg.

Pale yellowish on the sides generally, but on the back with the usual character of fur. White below and on the inner sides of the limbs.

VULPES FAMELICA, Cretzschm. (Plate XXXIII.)

Canis famelicus, Cretzschm. Rüppell's Atlas, 1826, p. 15, pl. v.; Mivart, Canidæ, 1890, p. 144, pl.; de Winton, Proc. Zool. Soc. 1899, p. 546.

Megalotis famelicus, Smith (H.), Jardine's Nat. Libr. ix. 1839, p. 235.

Fennecus famelicus, Lesson, Tabl. Règ. Anim. 1842, p. 39.

Durrur, ♀, skin and skull. 28.1.94.

A very much smaller animal than the Red Fox. The ears are large; the legs rather short; the tail very full and bushy; the fur generally very long, soft, and dense. The general colour is soft fawn, more or less interspersed with coarser grizzled hairs, producing a steel-blue tint. The head is of a pale yellow fawn-colour, as also the back of the ears; the face paler yellowish buff, with strong brown patches immediately above the whiskers; this dark colour, slightly modified, encircles the eyes. Along the dorsal line the fur is redder than on the sides of the body, the under-fur being here tipped with reddish brown, while it is blue-grey throughout on the sides. The legs are pale, with reddish-brown patches on the back of the hind legs above the heels. The tail has a well-developed white tag; the gland on its dorsal surface is generally marked by a depression in the fur, and the fur beneath is found to be clogged with a yellow substance, which gives off a distinct aromatic odour. Soles of the feet densely clothed and padded with hair.

A specimen in the British Museum, presented by Mr. R. J. Cuningham, bears the following particulars on the label:—"Trapped on edge of Desert near Cairo, 18 Jan., 1898, ♀. Head and body 415 mm., tail 305, hind foot 97, ear 87. Weight 2 lbs. 9 oz."

Measurements of skull:—Greatest length 103 mm.; greatest breadth 55; breadth of brain-case 40; narrowest temporal constriction 19·5; width of postorbital processes 23; least interorbital width 18; basal length 93·5; length of palate 50; greatest width outside ms. 1 32·1; outside pms. 1 15.

Teeth rather large in proportion to the size of the skull, resembling in form those of *V. ægyptiaca*, but much smaller.

This particularly handsome species has a very wide range. There is a specimen in the British Museum from Afghanistan. It is known to occur in Somaliland. Information as to habits and distribution in the Nile Valley is much needed.

The specimen, a female, from which the Plate was drawn was obtained at Durrur.—W. E. DE W.

Dr. Anderson made the following notes on this species:—

1 ♀ and 3 juv. (2 ♂ and 1 ♀). The female escaped at night.

The young animals newly born: ears and eyes closed. The general colour is black

VULPES FAMELICA. DURRUR.

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fuliginous all over, with the exception of a broad frontal band extending from the eye to the ears and across the temples, on which it is most pronounced, downwards to the angle of the mouth; the tip of the skin of the almost hairless tail white.

The black fuliginous colour is due to the long fur, the thick under-fur being not so dark and even tending to grey.

Frankfort Museum.

1. *Megalotis famelicus*, Rüppell, Icon. Rüppell's Atlas, taf. 5. This is a male, although it is not marked as such.
2. Nubia, Dr. Rüppell, 1823.
3. Another, marked ♀, 1823. The two latter are marked "original," i. e. "types."

The first, the largest of these specimens, is smaller than *Vulpes ægyptiaca*, and is distinguished from it by its much larger ears. All the specimens are of a pale sandy colour, finely speckled brown and white on the dorsal region, and the cross-band on the shoulder visible; but owing to the age of the specimens (70 years), the colour has evidently much faded. The upper lip, the cheeks, the sides of the neck, the area behind the ears, the throat, chest, lower parts of sides and belly, the inner sides of the fore limbs, the fronts and inner sides of the hind limbs and feet, pale yellowish white; the front of the fore limbs of the largest and smallest specimens being tinged with pale brown, finely white-speckled, while the long hairs around the toes are slightly rufous. A narrow pale dusky rufous band separating the neck from the chest. A narrow area above the eyes, and a broader space behind and below them and prolonged to the nose, bright rufous, but the extent to which this band is developed varies. Backs of the ears concolorous with the rufous-yellow or sandy colour of the top of the head. The middle of the dorsal region, the outsides of the fore limbs, the lower half of the outside and back of the thighs, and the back of the tarsus rufous. The tail is pale yellowish sandy, washed with reddish brown, the tip being nearly white.

	♂.	♀.
	mm.	mm.
Snout to vent, about	498	425
Tail, approximately	310	312
Height of ears	101.5	84
Breadth of ears	56	45

The skulls are in the specimens, so that it is impossible to say anything about them.

VULPES PALLIDA, Cretzschm. (Plate XXXIV.)

Canis pallidus, Cretzschm. Rüpp. Atlas, 1826, p. 33, pl. xi.; Mivart, Canidæ, 1890, p. 142, pl.; de Winton, Proc. Zool. Soc. 1899, p. 544.

Canis pygmæus, Hempr. & Ehrenb. Symb. Phys. 1832, nom. nud.; spec. in Mus. Berol.

Cynalopex pallidus, Smith (H.), Jardine's Nat. Libr. ix. 1839, p. 228, pl. 17.

Vulpes pallidus, Gerrard, Cat. Bones Brit. Mus. 1862, p. 87.

Fennecus pallidus, Gray, Proc. Zool. Soc. 1868, p. 520.

The muzzle is very sharp and pointed, and the eyes large and dark, the eyelids, and especially the inner canthus, being black. The ears are much smaller than those of *V. famelica*. The general colour is pale sandy yellow, with the hairs on the back very slightly washed with blackish, and occasionally also, but to a less degree, those on the front of the legs. The head is paler than the body, being almost white. The ears are large and rounded at their tips, and are densely margined all round with very short soft hairs, forming a distinct border; their inner surface is nearly white, almost translucent, and veined. There is a more or less rusty area along the outside of the fore and hind limbs. The tail generally is the colour of the body, with a broad black tip, and a mesial interrupted blackish area on the upper surface. All the under parts and the inner sides of the limbs are cream-white.

These foxes are smaller than the little *V. bengalensis*, to which they are very similar in colour, with the exception of being slightly paler; the tails of the two are similarly coloured. They are slender little animals, about the height of a domestic cat. The tail is long and bushy, and the ears, although large, are not larger in proportion to the body than those of a European fox, indeed they are relatively slightly smaller.

The skull of this species is distinguished by the relatively slight expansion of the zygomatic region and by the peculiar swelling of the posterior half of the nasals involving the superior or fronto-nasal wing of the maxillary, anterior to this there being a distinct contraction and depression of the nasals. The interfrontal suture in its lower half and the proximal half of the suture of the nasals present a deep furrow. These features are distinctive of all the skulls, and in the skull of *V. bengalensis* they are more or less present, but the zygomatic breadth of the latter is greatly in excess of that of *V. pallida*. There can be no doubt as to the close affinity of these two species of foxes.

The specimens I obtained agree exactly with the type of the species in Frankfort. This fox is extremely common on the plain behind Suakin. It is gregarious and lives in large societies in great burrows. In four days I had twelve living specimens brought to me, nearly all males. It is known to the Hadendowahs by the name 'Barshoam'¹.

¹ [This is the name generally applied to the *jackal* in the Sudan.—W. E. DE W.]

VULPES PALLIDA. SUAKIN PLAIN.

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The following measurements were taken immediately after death :—

	♂.	♂.	♂.	♂.	♀.
	mm.	mm.	mm.	mm.	mm.
Snout to vent	498	493	471	470	463
Vent to tip of tail	293	280	285	290	255
Eye to snout	47	48	45	47	43
„ ear, inner margin of meatus	48	50	48	48	42
Height of ear from inner margin of meatus	68	67	63	64	61
„ behind	85	81	80	81	80
Breadth of ear across post. lobe	47	45	40	43	37
„ above „	37	37	33	34	30
Height at shoulder	253	238	230	240	230
Weight kilogr.	2	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{8}$

[Messrs. Charles Rothschild and A. F. R. Wollaston (Novitates Zool. viii. 1901, p. 399) say :—“ This pretty fox, known to the natives as ‘ Barsān,’ is fairly common near Shendi on both banks of the river. They make burrows in the opener parts of the desert and live in colonies. They swim readily, a specimen which escaped entered the Nile and swam easily.”

Rüppell says the Arabs of Kordofan call this fox ‘ Abu Hossein.’

Mr. H. F. Witherby found the skulls of this species in the nest of a kite on the White Nile below Khartum.]

VULPES ZERDA, Zimm. (Plate XXXV.)

“ L’Animal anonyme,” Buffon, Hist. Nat. Suppl. iii. 1776, p. 148, pl. xix.

“ *Vulpes minimus saarensis*,” Skjöldebrand, K. Sv. Vet.-Ak. Handl. 1777, p. 265, pl. vi.

Canis zerda, Zimm. Geogr. Gesch. ii. 1780, p. 247; Cretzschm. Rüppell’s Atlas, 1826, p. 5, pl. 2;

Mivart, Canidæ, 1890, p. 147, pl. ; de Winton, Proc. Zool. Soc. 1899, p. 548.

“ Fennec,” Bruce, Travels, vol. v. 1790, p. 128, pl.

There is no authentic record of the Fennec having been discovered in a wild state by any European traveller. All the specimens which have been brought home have been obtained from Arabs. Rüppell obtained three specimens at Ambukol and Korti; Cretzschmar says that the only information sent with them was that they live in the sandy parts of the desert in burrows.

Capt. S. S. Flower says he believes this animal is to be found within the Province of Gizeh, as it is frequently brought in and offered to the Zoological Gardens.

Mr. H. S. L. Beadnell sends the following note, but at the same time it does not seem certain that the true Fennec is wholly referred to, for the difference between *V. famelica* and this species does not appear to be understood :—

"The Fennec Fox is found right away in the interior of the desert, also in the oases of Baharieh, Farafreh, Dakhel, and Khargeh. They appear to be capable of existing without water for long periods. One I caught about 20 kilom. north of the Fayum cultivation, unfortunately with a damaged leg, made no attempt to bite when handled, although very frightened. I have seen tracks three days E. of Assiut, in the middle of the desert."

Dr. Anderson obtained living specimens at Cairo which were said to come from the desert to the west of the Pyramids. He states that the Fennec seems to be very imperfectly known, and that it is important that its true characters should be better understood, as both *V. pallida* and *V. famelica* are confounded with this animal at Suakin.

The Plate was drawn from specimens living in the Zoological Gardens in London, which were received from Cairo through Mr. Jennings Bramly and presented to the Society by Dr. Anderson.—W. E. DE W.

VULPES ZERDA.

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MUSTELIDÆ.

Subfamily *MUSTELINÆ*.

PUTORIUS.

Putorius, Cuvier, Règ. Anim. vol. i. 1817, p. 147.

Size small. Form very long and slender, limbs very short. Upper surface of the body not striped.

Dentition: i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{3}{3}$, m. $\frac{1}{2}$ = 34.

PUTORIUS AFRICANUS, Desm. (Plate XXXVI.)

Mustela africana, Desm. Nouv. Dict. Hist. Nat. 1818, xix. p. 376.

Mustela subpalmata, Hempr. & Ehrenb. Symb. Phys. 1832, dec. ii.

Mustela vulgaris, Rüpp. Neue Wirbelth., Säug. 1836, p. 35.

Putorius africanus, Thomas, P. Z. S. 1895, p. 128.

Mustela boccamela, Sundev. K. Vet.-Ak. Handl. 1842, p. 215.

♂ ad. Old Cairo. Mr. J. R. Gibson. 24.2.94 (figured).

♂ ad. Cairo.

Head small, oval, not nearly so broad across the malar arches as in the South European weasel. The upper border of the ear nearly straight and the posterior border much the same and of much the same length and directed obliquely downwards and forwards, the tip between the two borders rounded. In a Sardinian specimen the upper border of the ear is longer than the posterior border and slightly convex, while the posterior border is considerably rounded. The colour, brown above and white below, with one or more brown spots behind the chin or further back, the chin being white. A little white about the toes. The tip of the tail darker than the rest of the body.

	Cairo.	
	♂.	♂.
	mm.	mm.
Snout to vent	270	260
Vent to tip of tail, without hair	115	108
Snout to eye	16	...
Eye to ear	15	...
Height of ear	21.5	21
Length of tarsus, without claws	48	47
	2 H 2	

[Only differing from the common weasel of Northern Europe (*P. nivalis*) in being larger, *i. e.* of about the same size as the stoat (*P. erminius*). Upper surface uniform light chestnut-brown, lower surface more or less white. The amount of white on the belly variable, as in the European weasel; the chin usually white with two or three brown spots; the back of the fore limbs and under surface of the fore feet usually with more or less white; hind limbs entirely brown; the tail is coloured like the back, but towards the extremity the hairs are a somewhat richer brown and rather longer, but do not form a distinct brush. In the males the white on the under parts is usually more or less stained of a reddish orange-colour, just as males of the stoat are stained lemon-colour beneath in Northern Europe. The skull is very similar to that of *P. erminius*, with perhaps a greater development of the occipital ridges.

Measurements of skulls.

	Old Cairo (figured).	Gizeh. 92.7.15.7.	Abu Roash. 92.7.15.8.
	♂.	♂.	♀.
	mm.	mm.	mm.
Greatest length.	51	46.2	45.7
Breadth of zygomata	28	25.5	24.5
Cranial breadth (mastoids)	25.5	23.2	22
Basal length	47	43	43
Palatal length	22.3	20.7	20.3
Interorbital breadth (narrowest)	11.7	10.5	9.9

Rüppell says:—"I cannot agree with Herr Ehrenberg in separating the Egyptian animal from the European. It is, moreover, not indigenous to Egypt, but has been introduced into the towns and breeds there, where its pursuit of the rats makes it very useful."

Desmarest's description of his *Mustela africana* was founded on a specimen in the Paris Museum received from Lisbon: the locality given was Africa; so that there is every probability that it was a specimen of the weasel found in the island of St. Thomé, where so much trade was carried on by the Portuguese.

The typical weasel of Northern Europe (*P. nivalis*, L.) is a small animal with a short tail; in Southern Europe the weasels (*P. boccamela*, Cetti) are larger with a longer tail, and seem to be barely separable from the weasels of Morocco, Algiers, and Tunis (*P. numidicus*, Puch.). In Malta a larger form is found which does not appear in any way distinct from the animal found in Egypt and also on the island of St. Thomé, off the West Coast of Africa. These latter animals are fully as large as, or larger than, the stoat (*P. erminius*, L.) of Northern Europe. The identity of the weasels of Malta, Egypt, and St. Thomé has been advocated by Mr. Thomas (P. Z. S.

PUTORIUS AFRICANUS.

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1895, p. 128), and therefore there can be little doubt that the name *Mustela africana*, Desm., is applicable to the weasel of Egypt. There appear to be so many intermediate forms of weasel that it is extremely difficult to say whether the different forms should be regarded as species or whether they should be considered as belonging to one species having a very extended range, with many local races varying in size and proportionate length of tail.

Mr. Charles Rothschild has kindly lent, for the purposes of this work, a series of both males and females of this animal from the neighbourhood of Cairo. The great difference between the size of the sexes is very marked, the females being quite as small in proportion to the males as are those of the smaller species of Northern Europe. The specimens are unfortunately skins, without record of measurements taken in the flesh.—W. E. DE W.]

ICTONYX.

Ictonyx, Kaup, Thierreich, vol. i. 1835, p. 352.

Fore feet larger than the hind feet, with more powerful claws. Hair rather long and loose. Upper surface of the body longitudinally striped, lower surface black.

Dentition: i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{3}{3}$, m. $\frac{1}{2}$ = 34.

Very great confusion has been caused by the coupling the name 'Zorille' with the African striped polecats. This name was applied by Buffon (Hist. Nat. 4to, 1765, vol. xiii. p. 302, pl. 41) to the small Central American skunk latterly known as *Spilogale*.

A very excellent plate was given of this animal, with a full explanation of the origin of the name — 'Zorilla' being the local name for skunks used by the Spanish-speaking inhabitants of the country. Schreber and Gmelin applied this word as the specific scientific name of this skunk, viz. *Viverra zorilla*.

About the end of the century a specimen of the South-African somewhat similarly marked animal was brought home by a ship coming from Bombay which no doubt called at the Cape; this specimen fell under the notice of Shaw, who figured it ('General Zoology,' Mammals, pl. 94) under the name of "Striated Weasel," a name which he used for the small American skunks, considering it as only a variety of those animals with four white dorsal stripes instead of the usual five. About this date Bowdich discovered a nearly allied form on the banks of the Gambia in West Africa, and sent specimens to London.

In 1820, Desmarest wrote his volume on Mammals for the 'Tableau Encyclopédique et Méthodique,' basing his description of the Zorille (*Mustela zorilla*) on the African animal, at the same time adhering to the impression that it was the same as that described by Buffon, who, he said, had erroneously considered that the Zorille was an American animal.

In 1826, Isidore Geoffroy St.-Hilaire (Dict. Class. Hist. Nat. vol. x. p. 209) gave an excellent treatise on the Martens (*Mustela*) and allied species. He treated the 'Zorille' of Africa as a subgenus allied to the Skunks, carefully distinguishing between the specimens from South Africa and those collected by Bowdich in Senegambia. He nevertheless confounded them with the American animal, as is proved by the citation of 'Le Zorille' of Buffon and *Viverra zorilla* of previous authors as types of his new subgenus *Zorilla*.

In 1835, Kaup in his 'Thierreich' made a new genus especially for the South-African animal, calling it *Ictonyx capensis*, and not recognizing any other species. These names, both generic and specific, are the first properly applied to this animal.

In 1836, Lichtenstein published a paper on the Skunks, recognizing the African Zorilles as a distinct species under the name of *Mephitis africana*. He gave a full account of the confusion caused by former writers in confounding this animal with the somewhat similar animal found in America, and admitted having fallen into the same error himself when writing the 'Darstellung' a few years previously, where he called the African animal *Mephitis zorilla*.

In 1838, Wiegmann wrote his 'Archives Naturgeschichte,' in which he gave a most excellent treatise on the weasel kind, placing the various genera—even the Ratel (*Mellivora ratel*)—in their true relationship, and creating a new genus (*Rhabdogale*) for the African animal, recommending "Gestreifte Wiesel," or "Striped Weasel," as a popular name, so as to avoid the confusion with the American animal, which had pre-emptive right to the term Zorille. Wiegmann evidently did not know of Kaup's previously published work.

In 1840, Wagner wrote the second volume of his Supplement to Schreber's 'Säugethiere,' using the term *Rhabdogale mustelina* for this animal and giving a good history of what was then known of the different forms. Unfortunately the plates illustrating this work had been prepared some years previously, and the plate 133 A, representing this species in two different forms, bears the name *Mustela zorilla*. The lower figure is undoubtedly meant for the Cape species, and the upper figure is probably intended for the smaller rather differently marked form, which he mentions as having been obtained by Dr. Pruner on the Upper Nile. A second plate (133 B) bears the name *Rh. multivittata* and represents an animal almost the counterpart of that described by Sundevall as *Ictonyx frenata* from Sennaar, ?=*I. libyca*, Ehrenb.

The most important synonymy of the South-African species is as follows:—

ICTONYX CAPENSIS, Kaup.

Viverra striata, var., Shaw, Gen. Zool., Mamm. vol. i. pt. 2, 1800, p. 387, pl. 94 (fig. sup.).

Viverra zorilla, Thunb. Mém. Acad. St. Pétersb. 1811, p. 306 (partim).

Mustela zorilla, Desm. Enc. Méth., Mamm. 1820, p. 181 (nota, nec fig.); Rüpp. Neue Wirbelth., Säug. 1836, p. 35; Wagner, Schreb. Säug. Suppl. pl. 133 A (1835, *fide* Sherborn).

Mephitis zorilla, Licht. Darst. Säug. t. 48. fig. 2 (1827–34).

Putorius zorilla, A. Smith, S. Afr. Quart. Journ. ii. 1834, p. 84.

Ictonyx capensis, Kaup, Thierr. i. 1835, p. 353; Sundev. K. Vet.-Ak. Handl. 1842, p. 214.

Mephitis africana, Licht. Abh. Akad. Berlin, 1836, p. 284.

Rhabdogale mustelina, Wagner, Schreb. Säug. Suppl. ii. 1841, p. 219; Heugl. Reise N.O.-Afr. ii. 1877, p. 39.

Zorilla variegata, var. *a. capensis*, var. *β. senegalensis*, Lesson, Mamm. 1842, p. 71.

W. E. DE W.

ICTONYX ERYTHREÆ, de Winton. (Plate XXXVII.)

Ictonyx erythreæ (misprinted *erythræa*), de Winton, Ann. Mag. Nat. Hist. ser. 7, vol. i. 1898, p. 248.

♂ (in alcohol). Low hills behind Suakin. General Sir A. Hunter.

There is a white head-spot elongated antero-posteriorly, somewhat diamond-shaped, beginning a little way before the level of the antecanthus of the eyes in the mesial line and prolonged backwards to the centre of the forehead. A broad white band starting from behind and a little way above the eye is prolonged obliquely downwards and backwards below the ear, but not beyond the posterior margin of the conch, unless occasionally to a limited extent in scattered white hairs. The ear black, with the exception of its upper border, which is white. The white oval frontal spot and the white band from the side of the head to the ear are surrounded with black; the muzzle, lips, chin, throat, and the whole under surface brownish black; part of the sides and the limbs being jet-black. The occipital region is pure white and all the back yellowish white, with the exception of three narrow black bands, which run parallel to one another as far as the middle of the back, where the outer band of each side becomes outwardly divergent and much broader, passing obliquely downwards for a short way, then upwards to the side of the rump, the central line remaining uninterrupted and becoming broader on the loins and again narrow and prolonged a short way on to the tail. The tail is long and pointed, the hairs somewhat pendent; it is black beneath at its base, but in the rest of its extent is nearly pure white, most of the hairs being dark only at their extreme bases.

The nose of this animal in profile is *retroussé*. Bone of penis curved and 57 mm. long.

Measurements of an adult male.

	mm.
Snout to vent	390
Vent to tip of tail	290
„ „ with hair	342
Snout to eye	29
Length of eye	8
Eye to lower border of external meatus of ear	31
Height of ear	28
Breadth of ear	19
Length of tarsus, without claws	60
„ „ with claws	63
„ claws of fore feet	13

ICTONYX ERYTHREÆ.

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Measurements of skulls.

	♂. mm.	♀. Type. mm.
Greatest length (premaxillæ to condylar proc. of occipital) . .	66	55·5
„ breadth (zygomatic)	43·5	34·5
„ „ (mastoids)	35·5	28
Interorbital breadth	18	14·5
Temporal constriction	13·5	14·5
Basal length	60	52
Palatal length	31	25
Breadth outside <u>pms. 1</u>	15	12
„ <u>pms. 3</u>	23·5	20·5
Alveolar length of <u>pm. 3</u>	7·5	6·5

The large male skull is not so large as skulls of females of the Cape species, *I. capensis*, nor as that of the type of *I. senegalensis*, which is also a female, but the zygomata are very broad in proportion.

[The neighbourhood of Suakin is the only locality within our boundary in which this species has been found. Mr. Witherby obtained skulls of apparently the same species from the nest of a kite to the south of Khartum on the White Nile.—W. E. DE W.]

Rüppell (Neue Wirbelth., Säug. 1836, p. 35) says of this species: “Common in Nubia, Sennaar, and Kordofan. Arab name ‘Abu afene.’ Lives in burrows: a terror to poultry. Mammæ 6 on the belly.”

Hadendowah name ‘Gailīb’ or ‘Galeleeb.’

In the skull of the Suakin *Ictonyx* and its allies there is a postorbital swelling and then a contraction of the brain-case, the brain-case being also swollen on the parietal region, so that from the postorbital contraction the skull expands and then contracts and expands again, and then contracts from the swelling of the parietal backwards to the occipito-parietal ridge. This is the general form of the brain-case of *I. capensis* and *I. senegalensis*, and beyond the lesser size there is not a single character by which the skull of *I. erythræ* can be distinguished from the skulls of those animals.

Ictonyx senegalensis is closely allied to *I. capensis*; these forms are not distinguishable by size, but only by the greater amount of black covering the upper surface of the head, the smaller size of the preaural white band, and particularly by the more pronounced character of the black dorsal bands in the South-African as compared with the Western form.

A specimen in the British Museum, No. 87.12.1.20, from Lado on the Nile, close to Gondokoro, collected and presented by Emin Pasha, differs only from *I. senegalensis* in having the interaural black band broader than in the Western form. In this respect it is intermediate between *senegalensis* and the Southern form, as it is also in having the frontal spot somewhat larger and tending to unite with the white preaural band; the two bands, however, are not joined, except by a few white hairs which occur among the black in the intervening space. In a specimen from Ukamba, 92.12.3.9, the white frontal spot is practically united with the white preaural band, but the line of union is still indicated by the presence of black hairs among the white. From the way in which these two forms pass into one another and into *I. senegalensis*, as shown by an immature specimen from Cape de Verde, in which there is the same tendency in the white frontal spot to unite with the preaural white band as occurs in the Ukamba specimen, it is evident that the latter cannot be separated from *I. senegalensis*. The Lado specimen has the interaural black band broader than in the Senegal and Ukamba specimens, and in this respect approaches the South-African form, but the white frontal spot is considerably larger than in the Senegal animal. Besides the more pronounced dorsal bands, the only point therefore in which the South-African form differs from these is in the much greater amount of black than white on the head; but in four specimens in the British Museum from South Africa there is distinct evidence that the extent of white in animals from that region is subject to variation.

All these forms, as already said, are large animals, but the typical *I. senegalensis* is larger than the form found in the Nile basin, which may be indicated as subsp. *intermedia*, nov. The Suakin form is still smaller, but it is distinctly closely related to this latter race from Lado, and like it the frontal and preaural white areas show a tendency to unite, by the presence of a few white hairs. The interaural black band also is broad as in that race, but it shows a tendency to be divided in the mesial line by a backward prolongation of the white frontal spot. This is only feebly indicated by the presence of a few white hairs among the black, but no actual division has taken place and the band is broad in the mesial line. It is possible that forms may turn up with these patches actually divided. This small eastern race, which extends the distribution of this species from Cape de Verde to the Red Sea, has been distinguished by de Winton under the name of *I. erythreæ*.

[Although there is no doubt that the *Ictonyx* found at Suakin is nearly related to the form from Senegambia, and there is every likelihood of the discovery of further intermediate forms, still, in the meantime, it is considered advisable to treat the Suakin race as a species.—W. E. DE W.]

ICTONYX LIBYCA, Ehrenb. (Plate XXXVIII.)

Mustela libyca, Hemp. & Ehrenb. Symb. Phys. dec. ii. k, 1832.

Mephitis africana, var. β , Licht. Abh. Ak. Berl. 1836, p. 284.

? *Ictonyx frenata*, Sundev. K. Vetensk.-Ak. Handl. 1842, p. 212, pl. iv. f. i.

Zorilla vaillantii, Loche, Rev. et Mag. Zool. 1856, p. 497, pl. 22.

Zorilla frenata, Gray, Proc. Zool. Soc. 1865, p. 151.

Rhabdogale multivittata, Wagn. Schreb. Säug. Suppl. ii. 1841, pl. 133 B, p. 221.

A young one from the margin of the Libyan Desert, Gizeh, Dr. Walter Innes, Bey.

Head sharply triangular, with the nose sharp and projecting; ears rounded. Claws of fore foot rather long, moderately curved and sharp. Claws of hind foot much shorter. A white band extends from before the ear, a little above the eye, across to the other ear, thence descending behind the angle of the mouth. A white band also runs forward to a little in front of the symphysis of the lower jaw and is continued backwards to the oral angle. This band is separated from the margin of the mouth by a narrow black band arising at the angles of the mouth anterior to the white bands, and passing as a broad blackish-brown band across the eyes, but not continuing to the sides of the nose and upper margin of the mouth, which are white. The fur on the body is from about 40 to 50 mm. long, and sometimes even longer. Behind the white frontal line there is a broad black band, which is succeeded between the ears by a broad white band, continued along the side of the neck to the front of the shoulder and separated from its fellow of the opposite side by a blackish-brown narrow longitudinal line, more or less broken up with white. The rest of the upper surface of the body is covered with elongated white and black spots, arranged more or less longitudinally, there being three bands more prominent than the rest—viz., one broad white band passing from above the shoulder to the groin and another on the middle of the back,—but they also are more or less broken up by the length of the fur. The fore leg, the hind leg from the knee, and the whole of the under parts from behind the white chin are black. The tail is abruptly rounded and clad with long hair; those of the upper side are white at their base, with a broad black ring and long white tip; those on the lower side are less pure white basally, and have black tips which increase in extent towards the distal end of the tail, so that beneath the tip of the tail the hairs are nearly wholly black, thus producing an effect suggestive of the animal having trailed its tail in some black substance or having singed it by fire.

Measurements.

♂. Head and body 270 mm., tail 165, hind foot 37, ear 20×18 , bone of penis 38.

♀. Head and body 240 mm., tail 138, hind foot 34, ear 19×18 .

Measurements of skulls.

	♂.	♀.
	mm.	mm.
Greatest length (premaxillæ to occipital condyles)	53·5	51
„ breadth (zygomata)	35	31·5
„ „ (mastoids)	34	29·2
Interorbital breadth	15·2	15
Temporal constriction	12·7	11·7
Basal length	50	48·2
Palatal „	26·5	23·7
Breadth outside <u>pms. 1</u>	11·5	11
„ „ <u>pms. 3</u>	20	20
Alveolar length of <u>pm. 3</u>	6·2	6

In *I. libyca* the skull from behind the postorbital contraction is triangular in form, the brain-case expanding regularly to the outer posterior angle of the parietal, *i. e.* there is no swelling immediately behind the postorbital contraction, the narrowest part of the skull occurring here. The region of the skull from the inferior border of the occipito-parietal crest to the posterior border of the external auditory meatus is much swollen, forming a prominent bullate expansion, a feature which is not found in the skull of any other African *Ictonyx*. Furthermore, the skull of *I. libyca* is distinguished from that of all other members of the genus by the great development of the tympanic bullæ, which, as compared with the skulls of the other forms, encroach on the mesial line of the base of the skull, greatly reducing the extent of the exposed area of the basioccipital and basisphenoid bones, and this narrowing affects also the formation of the posterior portion of the mesopterygoid fossa, the pterygoids being much closer together than in the skulls of other species.

[This species has not been authoritatively recorded in the Valley of the Nile to the south of the First Cataract. It ranges into Tunisia. The specimen obtained by Hedenborg, which Sundevall described under the name of *I. frenata*, is supposed to have come from “Sennaar.” Information is required as to the distribution of this and of the foregoing species.—W. E. DE W.]

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MELLIVORA.

Mellivora, Storr, Prodr. Meth., Mamm. 1780, p. 34.

Size large, form very massive and heavy, fore-quarters more powerful than the hind-quarters. Ear-conch almost absent. Dorsal surface of the body grey. Face, sides, limbs, and the whole of the under parts black.

Dentition : i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{3}{3}$, m. $\frac{1}{1}$ = 32.

The skull is heavy and, apart from the absence of the second lower molar, is chiefly characterized by the extreme width of the base, the shortness of the postorbital processes, and the roundness of the premolars; it is exceedingly like that of the South-American genera *Galera* and *Galictis*, which are simply enlarged forms of *Ictonyx* so far as their skulls go; and the fact that the smaller of these South-American genera, *Galictis* (Grisson), is almost identical in colouring with the Old-World genus *Mellivora*, is a circumstance of particular interest.

A glance at the generic names mentioned in the synonymy of the African species will show that great uncertainty has existed as to the true relationship of this animal. Even in the latest text-books it has been placed among the Badgers, while, in truth, it is nothing but a giant weasel modified for digging, and quite closely related to *Ictonyx*. This fact is recognized in the latest arrangement of the exhibition series in the British Museum.

Since so much confusion exists as to the relationship of the different members of the *Mustelidæ*, a rearrangement of the subdivisions is here given:—

Subfamily LUTRINÆ. The Otters.

Genera : *Lutra*, *Latax*.

Subfamily MELINÆ. The Badgers.

Genera : *Meles*, *Mydaus*, *Helictis*, *Arctonyx*, *Taxidea*.

Subfamily MUSTELINÆ. The Weasel Tribe.

Genera : *Mephitis*, *Conepatus*, *Galera*, *Galictis*, *Mellivora*, *Ictonyx*, *Mustela*, *Putorius*, *Pæcilogale*, *Lyncodon*, *Gulo*.

W. E. DE W.

MELLIVORA RATEL, Sparrm. (Plate XXXIX.)

“ Fizzler Weasel,” Pennant, Synops. Quad. 1771, p. 234.
Viverra ratel, Sparrm. Act. Stockh. i. 1777, t. 4. f. 2; K. Vet.-Ak. Handl. 1777, p. 49, t. 4. f. 3.
Viverra capensis, Schreb. Säug. iii. 1778, p. 450, t. 125.
Viverra mellivora, Gmel., L. Syst. Nat. i. 1788, p. 91.
Ursus melivorus, Cuv. Tabl. Elém. Hist. Nat. 1798, p. 112.
Taxus mellivorus, Tiedem. Zool. i. 1808, p. 377.
Gulo capensis, Desm. Encycl. Méthod., Mamm. 1820, p. 176.
Gulo mellivorus, Rüpp. Neue Wirbelth., Säug. 1836, p. 35.
Ratelus mellivorus, Wieg. Arch. Naturg. iv. i. 1838, p. 278.
Ratelus capensis, Heugl. Reise N.O.-Afr. ii. 1877, p. 38.

Form somewhat badger-like but heavier, with blunt rounded nose; ears almost without external conch; fore limbs, with feet and claws, very much more powerful than the hinder extremities; coat rather short, harsh, and straight, without wool-hair. The dorsal area, from the forehead on a line with the posterior canthus of the eye to the base of the tail, grey, formed of a mixture of black and white hairs in about equal proportions; the remainder of the animal coal-black.

The margin of the light dorsal area is square-cut across the forehead; its lateral border, being about 12 or 15 mm. above the corner of the eye, passes along the upper margin of the suppressed ear-conch, and backwards in a straight line through the middle of the shoulder, slightly descending on the trunk and gradually rising to the base of the tail. The margin of this area, excepting on the haunches, is almost pure white; the tail is black, the grey sometimes extending along half its length. Occasionally the tail has also a grey or white tip.

Dr. Anderson gives the following measurements of two freshly-killed specimens:—

		Suakin Hills, 15.1.94.	
		♂.	♀.
		mm.	mm.
Snout to vent		618	610
Vent to tip of tail, without hair		165	158
Snout to eye		53	51
Length of eye		11	10
Eye to ear, external meatus		49	42
Length of tarsus		104	95

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Measurements of skulls.

	B.M. No. 97.11.5.18.		
	Fish R.,		
	Grahamstown.	Suakin.	Mr. Mason,
	♂ .	♀ .	Suakin.
	mm.	mm.	mm.
Greatest length (premax. to occipital condyle) .	147	117	138
„ breadth at mastoids	93	64.5	82
„ „ zygomata	91	64	77
Basal length	135	108	130
Palatal „	72	53	66
Alveolar length of <u>pm.</u> 3	13	12	13

The measurements given above show the extremes in size of African specimens as represented in the collection of the British Museum.

Hadendowah names, ‘Weelahoar’ and ‘Magoon.’

Rüppell, in the ‘Neue Wirbelthiere,’ says that “the Arabs call this animal ‘Abu Keem;’ it lives in holes in the ground and feeds on gerbils, hares, and even tortoises.”

Heuglin (Verhandl. K. Leop.-Carol. Ak. Naturf. xxix. 8, Jena, 1861, p. 19, fig. skull) gives the Arab name of the Ratel as ‘Abu Djaga;’ and says that it feeds on all sorts of larvæ and grubs, and is particularly fond of the honey and wax of bees, also of mice and other small animals, and will eat flesh and any carrion. It does not climb.

The specimens from Suakin are the only ones known within our boundary.—
W. E. DE W.

Suborder *PINNIPEDIA*.

PHOCIDÆ.

There does not appear to be any published record of the capture of a seal on the coast of Egypt. In the 'Symbolæ Physicæ' Ehrenberg says:—"We heard that one small species of seal resembling *Calocephalus vitulinus* was sometimes captured in the Libyan Sea, near Alexandria, but we did not see it." The seal referred to is no doubt the Monk Seal, *Monachus monachus* (*M. albiventer*), since this is the only species which enters the Mediterranean.

No seal is known to occur in the Red Sea.—W. E. DE W.

RODENTIA.

Suborder *SIMPLICIDENTATA*.

SCIURIDÆ.

XERUS.

Xerus, Ehrenb. Symb. Phys. dec. i. gg (1832).

Squirrels with short, flattened, bristly hair. Ears very short. Claws only slightly curved.

Dentition: i. $\frac{1}{1}$, pm. $\frac{1}{1}$, m. $\frac{3}{3}$ = 20.

XERUS RUTILUS, Cretzschm.

Sciurus rutilus, Cretzschm., Rüpp. Atlas, 1826, p. 59, pl. 24.

Sciurus brachyotus, Hemp. & Ehrenb. Symb. Phys. pl. (1828).

Sciurus (*Xerus*) *brachyotus*, Hemp. & Ehrenb. Symb. Phys. dec. i. text (1832).

Sinkat, inland from Suakin. Major Penton, R.A.M.C., D.S.O. British Museum, No. 93.6.7.5.

Size about that of the Common Squirrel of Europe. Ears very short. Tail very bushy and long. Claws moderately curved. The whole body covered with harsh, flattened, bristle-like, short hair; the front and back surfaces of the hairs concave.

The colour of the dorsal surface almost uniform reddish brown ticked with buff-white, the hairs being brown from the base with the extreme tip whitish. A dirty white patch around the eye; the whole of the under parts rather thinly clad with dull white hairs. The tail covered with long hairs, ringed brown and buff-white in their basal half, followed by a very broad brown ring and a broad whitish tip.

Approximate measurements taken from the co-type in the British Museum, collected by Rüppell at Massowah:—Head and body 220 mm.; tail 210, with terminal hair 273; hind foot 57; forearm and hand 70.

In the specimen from Sinkat, which is young and in a poor state of preservation, the ear-conch has shrunk almost completely away; but in Rüppell's specimen the conch has a free margin of about 5 mm., and this is the normal state.

The habits of the animal are mostly terrestrial; it feeds on fallen fruit and roots and lives in burrows. According to Major Penton, it occurs in the granite mountains. Ehrenberg says it climbs upon the lower bushes and shrubs; in the Symb. Phys. he figures it on *Rhamnus napica*.

Another member of this genus is found in Sennaar, *X. erythopus*, Desm. (*Sciurus albobittatus erythopus*, Desm. Nouv. Dict. Hist. Nat. x. 1817, p. 110: syn. *Sc. leuco-umbrinus*, Rüpp. Neue Wirb. 1838, p. 38). This species is almost fawn-colour above with no pale specks, and with a narrow white stripe running along the side from the shoulder.—W. E. DE W.

MYOXIDÆ.

No member of this family has been recorded from Egypt proper, but mention is made of the occurrence of the following species within the political bounds of the country.

ELIOMYS.

Eliomys, Wagn. Abh. Ak. Münch. iii. 1843, p. 176.

Infraorbital foramina moderate in size and narrow. Postnarial opening moderate; pterygoid fossæ well developed; bullæ large and inflated. Angle of lower jaw perforated.

Dentition: i. $\frac{1}{1}$, pm. $\frac{1}{1}$, m. $\frac{3}{3} = 20$.

ELIOMYS MELANURUS, Wagn.

Eliomys melanurus, Wagn. Abh. Ak. Münch. iii. 1843, p. 176, pl. iii. fig. 1.

♂ ♀. Nehel, Sinai, March 1898. Mr. W. Jennings Bramly.

Size about that of the Common Garden Dormouse of Europe. Ears very large, practically naked. Colour pale chinchilla-grey washed with brownish. Black eye-stripe passing under the ear. Tail thin and pale grey for less than an inch at the base, then coal-black and bushy, the hairs gradually increasing in length to about 20 mm. at the tip.

Approximate measurements:—Head and body 110–115 mm.; tail without terminal hair 100; hind foot 25; ear 26.

GRAPHIURUS.

Graphiurus, F. Cuv. & Geoffr. Hist. Nat. Mamm. livr. 60, 1829 (1845).

Infraorbital foramina large and expanded. Postnarial opening very wide; pterygoid fossæ rather shallow; auditory bullæ inflated but not large. Angle of lower jaw solid.

GRAPHIURUS OROBINUS, Wiegman.

Myoxus orobinus, Wiegmann, Arch. xi. i. 1845, p. 149.

This is a small grey species with short round ears; it has been recorded from Sennaar.—W. E. DE W.

MURIDÆ.

Subfamily GERBILLINÆ.

In this subfamily the infraorbital foramina are very narrow, pear-shaped, with long lateral wings. Molars with inward foldings of the enamel of the sides of the teeth forming a somewhat similar pattern above and below. Auditory bullæ usually large.

Dentition: i. $\frac{1}{1}$, m. $\frac{3}{3}$ = 16.

GERBILLUS.

Gerbillus, Desmarest, Nouv. Dict. Hist. Nat. xxiv. 1804, Tab. Méth. p. 22.

Tail long, well clothed with hair which is somewhat longer towards the extremity, forming a terminal pencil. Hind legs and feet considerably elongated; soles of feet hairy, granular, without pads. Incisors with a deep median groove. Molars with irregular deep lateral infoldings of the enamel; the front portion of the first molar considerably narrower than the second.

GERBILLUS GERBILLUS, Oliv. (Plate XL.)

Dipus gerbillus, Olivier, Bull. des Sc. Phil. Paris, vol. ii. 1801, p. 121; id. Voy. Emp. Oth. ii. (Egypte) 1804, p. 90, pl. 28. fig. 1 & pl. 33. fig. 2.

Gerbillus ægyptius, Desm. Nouv. Dict. Hist. Nat. xxiv. 1804, Tab. Méth. p. 22; F. Cuv. Trans. Zool. Soc. ii. 1838, p. 141, pl. 25. figs. 1-5.

Meriones longicaudus, Wagner, Arch. f. Naturg. viii. i. 1842, p. 19; id. Schreb. Säug. Suppl. iii. 1843, p. 477.

♂. Beltim. In alcohol.

2 ♂, 2 ♀. Desert to the east of Ain Musa. In alcohol.

♀. Mersa near Suez. In alcohol.

♂. Sakkarah. In alcohol.

2 ♂, 2 ♀. Gizeh. In alcohol.

10. Moghara. Dr. C. W. Andrews. In alcohol and skins.

4. Fayum. Dr. C. W. Andrews and Mr. H. S. L. Beadnell. In alcohol and skins.

1. Abu Roash. Capt. S. S. Flower. In alcohol.

Snout rather pointed, the distance from the anterior angle of the eye to the snout being slightly more than three times the interval between the posterior angle of the eye and the ear. Ear of moderate size, broadly rounded at the tip, the anterior margin

GERBILLUS GERBILLUS.

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nearly straight or very slightly concave; posterior margin nearly vertical in its upper half, but gradually rounded off into the upper margin. The ear laid forwards reaches to the anterior angle of the eye, or nearly so. The fore limb is short, the length from the elbow to the tip of the middle finger falling short of the distance between the heel and the end of the fifth toe. Fingers moderately long, the third the longest, the second slightly shorter than the fourth, the fifth considerably shorter than the second; the first reduced to a rudiment, consisting chiefly of the flattened nail. On the palm there is a swollen eminence with a prominent tubercle behind it, larger than the thumb which it resembles. This eminence and the under surfaces and sides of the fingers are covered with rather strong pure white hairs, those on the centre of the fingers directed forwards and those on the sides curving downwards. The claws are rather long and not much curved, the third being the longest. The lower third of the radial portion of the arm and the upper surface of the hand are clad, but not very densely, with pure white hairs.

The hind foot, considering the size of the animal, is rather powerful, and the toes are long, the third toe in length equalling one-half of the distance between its base and the heel. The third and fourth toes are of equal length, or one may be a little longer than the other. The second is shorter than either of them, and the fifth only reaches, without its claw, to the penultimate joint of the fourth. The end of the claw of the hallux reaches only to the penultimate joint of the second toe. There is an anteriorly four-lobed swollen eminence in the centre of the sole, the four lobes corresponding to the bases of the first, the second, the third, and the fourth and fifth toes; this eminence is well clad with hairs directed forwards, and the sides of the toes with longish, stiffish hairs, curving downwards and forwards, to a much greater extent than in the manus. No tarsal tubercle is present. The whole of the tarsus, except a narrow linear area at the heel, is sparsely clad with short white hairs, and the lower half of the tibial portion of the leg and the upper surface of the foot are covered with short fine white hairs. The skin of the tail is annulated as in mice, but the rings are hidden by the short hairs which clothe it. Towards the end of the tail the hairs gradually become longer, reaching 12 mm. in length, so that it terminates in a pronounced pencil of hairs. The short hairs on the upper surface of the tail are rich fawn-coloured, those on the lower surface silvery white, but as they become longer to form the pencil, those on the dorsum form a narrow line of blackish hairs. The hairs of the pencil are adpressed to the tail except in the case of the blackish-brown hairs, which are semi-erect.

The only portion of bare skin on the snout is a middle area immediately above and below the nostrils, which are placed transversely. There is no cleft towards the incisors, the front of the muzzle being covered with short white hairs. The moustachial hairs are numerous and long, directed outwards, the majority of them being white.

The ears externally and internally are nearly nude, fleshy white in colour, being very sparsely covered with short white hairs, but a few more numerous reddish hairs clothe the very limited area on the outer side of that part of the inner border that is folded over. A number of longish hairs fringe the lower portion of the anterior border of the conch, the remainder of the ear being finely fringed with minute hairs, the longest of which are at the base of the posterior border.

The general colour of the upper parts is rich reddish fawn, and of the under parts pure white; there is a whitish area below and above and behind the eye, and a pale area in front of it, but there is a narrow fawn-coloured streak passing obliquely downwards from the eye, separating the white areas at the back and under surface of the eye. There is also behind the ear a tuft of nearly pure white hairs. The margins of the eyelids and the eye itself are black. The incisors are yellow.

Measurements taken from specimens preserved in alcohol.

	Sakkarah.	Gizeh.		
		♂.	♂.	♀.
	mm.	mm.	mm.	mm.
Head and body	87	84	85	75
Tail	118	115	127	120
Hind foot	27	28	30	27
Ear	13	13	13	11

Skull-measurements.

	Gizeh.		
	♂.	♂.	♂.
	mm.	mm.	mm.
Greatest length	28·5	27	28
„ breadth	15·5	15·1	15·5
Least supraorbital constriction	5·5	5·6	6
Length of nasals	10·3	10	10
Basal length	23·8	22	23·8
Length of incisive foramina	4·8	4	4·5
„ molar series	3·9	3·8	3·9

The skull is almost a miniature representation of that of the larger species, *G. pyramidum*, but differs from it in its comparatively greater interorbital breadth and in the relatively shorter and somewhat more depressed nasal portion.

This gerbil inhabits sand-dunes and lives in colonies.

Arabic name ' Baiyondeh.'

GERBILLUS PYRAMIDUM, Geoffr. (Plate XLI.)

Gerbillus pyramidum, Is. Geoffr. Dict. Class. H. N. vii. 1825, p. 321 ; F. Cuv. Trans. Zool. Soc. ii. 1838, p. 141, pl. xxv. figs. 6-9 ; *et auct.*

- 7. Abu Roash.
- 5. Pyramids of Gizeh. In alcohol.
- 4. Gizeh. Capt. S. S. Flower. Skins.
- ♀. Tcl el Amarna. Dr. Flinders Petrie. In alcohol.
- 14. Near Cairo. Dr. C. W. Andrews. Skins.

The proportions of the distance between the ear and the eye, and between the latter and the end of the snout, are much the same as in the previous species. The ear is of moderate size, but not quite so rounded at the tip as in *G. gerbillus*, the posterior margin being feebly concave towards the tip. When laid forward, the ear reaches to near the anterior angle of the eye, so that in this respect the two species are alike. The proportions of the forearm and hand to the length of the tarsus and foot are the same as in *G. gerbillus*, as are also the proportions of the fingers and the structure of the palm, but the palmar cushions and the under surfaces of the fingers are more sparsely covered with hair. The structure of the hind foot is the same as in the previous species, and also the proportions of the toes, and the third and fourth toes are liable to the same variation in their length, either one being occasionally longer than the other, or the two may be of the same length. It is, however, distinguished by the more nude character of the sole of the foot as compared with *G. gerbillus*. Its tail, also, has the same structural character as that of *G. gerbillus*, and the hairs on it have a similar distribution. The snout and ears, as regards the extent to which they are covered with hair, are the same in both species, but the ears of *G. pyramidum*, instead of being white, have their tips and external margins dusky. Some of the moustachial hairs are black, and are usually not so long as in *G. gerbillus*.

The general colour of the upper parts is a rich fawn on the sides, washed with blackish on the top of the head and back, owing to the hairs on those parts being tipped with black. There is no white spot before the eye, but there are pale spots above, below, and behind it, and some of the hairs behind the ear are white. The eyelids and the area around the eyes and a narrow line descending obliquely downwards from the eye are more or less dusky black. The under surface is pure white, or with an admixture of yellowish, and in some specimens there are feeble traces of fawn-coloured spots. The upper surfaces of the fore and hind feet are clad with short white hairs, much the same as in *G. gerbillus*, and the upper surface of the tail is concolorous with the back, the under surface paler or sometimes nearly white ; the long hairs near the end being distributed as in the foregoing form, but darker in colour.

Measurements taken from specimens in alcohol.

	Abu Roash.			Gizeh.	
	♂. mm.	♂. mm.	♀. mm.	♂. mm.	♀. mm.
Head and body	107	113	93	113	100
Tail	153	155	134	156	138
Hind foot	34	33·5	32	33·5	32·5
Ear	17	17	15	16·5	15

Measurements of skulls.

	Abu Roash. mm.	Near Cairo. mm.
Greatest length	36	35·5
„ breadth	19·5	18·5
Least supraorbital constriction	7	7
Length of nasals	14·5	14
Basal length	30·1	29·5
Length of incisive foramina	7	6·1
„ molar series	5	4·6

Habits much the same as the last species.

Arabic, 'Dimsi.'

GERBILLUS PYGARGUS, F. Cuv.

Meriones gerbillus, Cretzschm. Rüpp. Atlas, 1828, p. 77, pl. 30. fig. *b*.

Gerbillus pygargus, F. Cuv. Trans. Zool. Soc. ii. 1838, p. 142, pl. 25. figs. 10-14.

(?) *Gerbillus burtoni*, F. Cuv. Trans. Zool. Soc. ii. 1838, p. 145, pls. 22, 23.

(?) *Meriones venustus*, Sundev. Vet.-Ak. Handl. Stockh. 1842, p. 230, tab. ii. fig. 2.

(?) *Meriones dongolanus*, Heugl. Reise N.O.-Afr. ii. 1877, p. 79.

♂. General Sir C. Holled Smith. Suakin.

2 ♂. Major Penton, R.A.M.C., D.S.O. Suakin. In alcohol.

4. Plain of Tokar. In alcohol.

7. Plain of Suakin. In alcohol.

Rather smaller than *G. pyramidum*, and differing from that species in its lighter and brighter colour, owing to the almost entire absence of the dark tips to the hairs on the dorsal region. The black ring round the eye and the dark streak behind the eye are also absent. The half- or three-parts-grown young may be distinguished from specimens of *G. gerbillus* by the grey of the under-fur showing on the surface. The soles of the hind feet of this species are even less covered with hair than those of *G. pyramidum*.

GERBILLUS PYRAMIDUM.

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Gen. Sir Holled Smith, when Governor of Suakin, was the first to record this species in that district; the specimen was forwarded to the British Museum through Dr. Anderson in 1892.

Dr. Anderson obtained many specimens on the plains of Suakin and Tokar in January 1894, assisted by Sir Archibald Hunter and his officers. Major Penton states that gerbils swarm at Durrur, and devour the crops to such an extent as to be a perfect pest.

Messrs. Rothschild and Wollaston found this species plentiful about Shendi.

Measurements of specimens preserved in alcohol, from Suakin.

	♂.	♂.	♀.
	mm.	mm.	mm.
Head and body	107	97	102
Tail (without terminal hair)	146	152	145
Ear „ „	17	15.5	16
Hind foot	29	30	27.5

Measurements of fresh-killed specimens, from Shendi, as recorded on the collectors' labels of specimens in the British Museum.

	♂.	♂.	♀.
	mm.	mm.	mm.
Head and body	100	91	90
Tail (without terminal hair)	148	150	145
Ear	14	13	14
Hind foot	28	28	28

Measurements of skulls.

	Suakin.	Shendi.		
	♂.	♂.	♂.	♀.
	mm.	mm.	mm.	mm.
Greatest length	32.5	33	31.5	31
„ breadth	17	16.9	16.5	16.8
Least supraorbital constriction	6.5	6.1	6.1	6.1
Length of nasals	12.7	13.1	12	...
Basal length	27.3	28.5	26	26
Length of incisive foramina	6	6	5.9	6.1
„ molar series	4.5	...	4.5	4.5

The description given by Frederic Cuvier of *G. burtoni*, and the figure of the teeth, do not fit this species satisfactorily, yet we are assured by Lataste (Cat. Mamm. Tunisie, 1887, p. 25) that the type in the Paris Museum belongs to a gerbil of this form, so *G. burtoni* may be regarded also as a synonym.

Dr. Anderson has the following note on this specimen :—

“ *Gerbillus burtoni*, F. Cuv. Type. Mort à la ménagerie le 22 Fév., 1838, mâle, Gerbille du Sennaar, M. Burton.

“ This specimen has lost one half of its tail.

	mm.
Measured along curve of back	130
Tarsus	30
Ear	14

“ The skull measures as follows :—

	mm.
Foramen magnum to tip of premaxillaries	39
„ „ posterior end of palate	10·5
Length of snout from end of nasals to lachrymal notch	12
Breadth above zygoma	14
Length of dental row, upper	4·5
„ osseous palate from behind incisors	15·3

“ I am inclined to regard this as an example of the large form of *Gerbillus* found at the Pyramids.”

In the Berlin Museum there is a specimen collected by Hemprich and Ehrenberg in Upper Egypt, which has been identified by Sundevall as his *Meriones venustus*. Of this specimen Dr. Anderson says:—“ Seems to agree in every way with those found at the Pyramids; snout to vent 88 mm., vent to tip of tail 113, height of ear 11, breadth of ear 6·5, length of tarsus 27.” Dr. Anderson did not then realize the distinction between *G. pyramidum* and *G. pygargus*, so we may conclude that this specimen belongs to the latter form, as also, in all probability, does the true *G. venustus*, Sund., from Sennaar.

A note written by Dr. Anderson at a later date is as follows:—“ In the British Museum there is one of Rüppell’s original examples of *Meriones gerbillus* [nec *Dipus gerbillus*, Olivier], and therefore a co-type of *G. pygargus*, F. Cuv., which was founded on that form. It was captured in Nubia. In external character it resembles the small bright-coloured gerbil of the Pyramids in that the fur has no black tips to the hairs, and the ear is white. The skull has been removed from the skin, and the state of the teeth shows that the animal was comparatively young. The teeth are much larger than those of *G. gerbillus*, and we have Cretzschmar’s measurements to show that this Nubian form is a much larger species than *G. gerbillus*. In size this specimen resembles *G. pyramidum*, but the character of its fur is entirely different, since the fur of *G. pyramidum* is invariably tipped with black, which gives a generally variegated or speckled appearance to the upper surface. Until further materials bearing on

this Nubian form have been obtained, it may be as well to retain it under F. Cuvier's name, *G. pygargus*."

I do not think there is much doubt that the gerbil from Dongola, mentioned by Heuglin, also belonged to this species; but until specimens have been obtained from that locality it is impossible to say definitely.—W. E. DE W.

GERBILLUS ANDERSONI, de Winton.

Gerbillus andersoni, de Winton, Ann. Mag. Nat. Hist. ser. 7, vol. ix. 1902, p. 45.

2 ♂, 3 ♀. Mr. J. Ker. Mandara. In alcohol.

This species is best described as a miniature of *G. pyramidum*, having the dark tipped fur, the dark whiskers, the black-bordered ears, and the inclination to yellowish stain on the white of the under side characteristic of that species.

The extent of the hair on the soles of the feet and the slight development of the brush-hairs towards the end of the tail are also much as in *G. pyramidum*. In size it closely resembles *G. gerbillus*, but the ears are longer.

Measurements taken from specimens preserved in alcohol.

	♂.	♂.	♀.	♀.
	mm.	mm.	mm.	mm.
Head and body	85	89	89	87
Tail	125	117	120	115
Hind foot	27	27	27.5	27
Ear	15.5	16	15.5	15.5

A three-parts-grown female has the hind foot 25 mm. in length.

Skull-measurements.

	mm.	mm.	mm.
Greatest length	30	30	30
„ breadth	16	16	16
Least supraorbital constriction	5.5	6	5.9
Length of nasals	12	12	12
Basal length	25	24	25
Length of incisive foramina	5.5	...	5.5
„ molar series	4.3	4.3	4.4

The skull is rather larger than that of *G. gerbillus* and is readily distinguished by its longer nasal portion, the more expanded maxillary portion of the zygomata, the larger teeth and longer incisive foramina.

The type of the species is a skin, number 92.7.1.5 in the British Museum, collected

and presented by Dr. J. Anderson; it was obtained, as were all the other specimens, at Mandara, east of Alexandria.

Dr. Anderson has the following note on this species:—" *Gerbillus* ——. Small, red; the 'Zug' of the Bedouins at Ramleh. No. 156. This example, a mature male, was found in burrows in a barley-field in which *Psammomys* occurred. The gland on the belly of this species is relatively more developed than in the other species of *Gerbillus*, measuring 36 mm. in length, and 7 mm. broad."

The specimen mentioned by Lataste in a note on p. 25 of the 'Catalogue Mammifères de la Tunisie' possibly belonged to this species; but if so it must have been very young. Under no circumstances can the gerbil from Alexandria be considered the typical form of Olivier's *Dipus gerbillus*, for the traveller himself distinctly gives the name to the animal which he found near Memphis. M. Lataste does not appear to have read Olivier's book and attributes the generally admitted type locality to an invention of Desmarest, whereas that naturalist was correctly quoting Olivier.

Dr. Anderson when in Paris took the following notes on the skull of the specimen mentioned by Lataste:—

"The skull of the small *Gerbillus* from Alexandria mentioned by Lataste, Cat. Mamm. Tunisie, pp. 24–25, has the following measurements:—

	mm.
Foramen magnum to tip of premaxillaries	20
„ „ end of osseous palate	7·5
Behind incisors to end of osseous palate	10·2
Length of osseous snout to lachrymal notch	8·5
Breadth above zygoma	12·2
Length of upper dental row	3·9
Anterior palatine foramina	4·7

"This is a short skull, broad behind, and with rather a short obliquely oval zygomatic arch. The anterior palatine foramina are long. The laminae of the teeth are well separated. The osseous bullæ are moderately sized. The incisors are deeply grooved. This is the specimen which Lataste considered to be the *G. gerbillus*, Olivier."—W. E. DE W.

DIPODILLUS.

Dipodillus, Lataste, Le Naturaliste, 1881, p. 506.

Form somewhat similar to *Gerbillus*, tail more crested and tufted with longer hairs. Soles of feet either moderately hairy or naked, with six pads. Brain-case and auditory bullæ very full; teeth as in *Gerbillus*, but pattern of molars usually rather less complicated, and the three divisions of the first molar subequal.

DIPODILLUS QUADRIMACULATUS, Lataste. (Plate XLII.)

Gerbillus quadrimaculatus, Lataste, Le Naturaliste, 1882, p. 27.

♂, 2 ♀. Trapped under a shelving rock below a cliff in Wadi Hoaf, Heluan. In alcohol.

The general colour of the upper surface is pale yellowish fawn, palest on the head and most yellow along the side of the body. Whitish around the eyes. Pure white on the under surface, inner side of limbs, and back of thighs. The distal part of the tail clothed with long greyish hairs. Ears somewhat livid towards the tips. Moustaches long.

Four tubercles on the sole of the hind foot, one of them being placed between the third and fourth toes, the other three at the bases of the first, second, and fifth toes. Two tarsal tubercles, one slightly external to and slightly above the tubercle at the base of the fifth toe, the other further back in a line with the pollex. Ear, when laid forwards, reaching almost to the middle of the eye. Manus and pes naked.

An abdominal gland. The female has 8 mammæ. The female No. 98 was gravid with 4 foetal young.

Measurements.

	No. 97.	No. 98.	No. 99.
	♂.	♀.	adol. ♀.
	mm.	mm.	mm.
Snout to vent	96	95	86
Vent to tip of tail, without hair	129	121	117
Length of head	...	31	30
Snout to eye	15	16	15
Eye to ear	8	7	8
Height of ear	14	14	14
Length of ear	10	9	10
„ tarsus	25	24	22

[Measurements of skull :—Greatest length 27·5 mm.; greatest breadth 15; length of

nasals 10·5; frontal constriction 5; basal length 23; palatal length 11·5; incisive foramina 5; length of molars 4; width outside molars 5·7.

The facial portion of the skull is long, the nasals are slightly dilated in the middle of their length, the maxillary portion of the zygomatic arch is wide and the squamosal portion is distinctly wider than the cranium; the base of the skull is broad, and the auditory bullæ large and full.

F. Cuvier mentions "*Meriones quadrimaculatus*, Ehrenberg," as a synonym of *Gerbillus ægyptius* in his paper on the Gerbils, published in the Trans. Zool. Soc. vol. ii. It was most probably only a manuscript name and may or may not have been applied to a gerbil of this group; but Lataste has employed it for a Mouse-Gerbil from Egypt, of which he did not know the exact origin, and to which he linked a very incomplete skull and a lower jaw of doubtful origin which was found in the same drawer in the Paris Museum. This name is now more definitely fixed on the animal under notice.—W. E. DE W.]

DIPODILLUS AMÆNUS, de Winton.

Dipodillus amænus, de Winton, Ann. Mag. Nat. Hist. ser. 7, vol. ix. 1902, p. 46.

2 ♂, ♀. Province of Gizeh. Dr. C. W. Andrews and Mr. H. S. L. Beadnell.

Smaller than *D. quadrimaculatus*; form compact; ears small; tail about half as long again as the head and body; hind feet long, with the three proximal pads very ill-defined. Colour very dark; the fur mouse-grey tipped with reddish fawn, the latter colour predominating on the sides. A very pale almost white patch on the buttocks. Tail dark blackish above, fawn beneath; the pencil and crest black-brown. The face is handsomely marked; the tip of the nose and the front portion of the moustachial area is pale to white; a very distinct dark nose-spot commences immediately above the nostrils, and fades away into the general rich colour of the forehead; dark branches of this spot extend down the hinder part of the moustachial area; there is a pale spot immediately in front of the eye; the cheek beneath the eye is red-fawn, with a distinct dark smoky patch behind the eye and beneath the ear. The ears dark blackish, except at their bases. The whole of the under parts and the hands and feet white.

Measurements taken from specimens preserved in alcohol.

	No. 1 (type).	No. 2.	No. 3.
	♂.	♂.	♀.
	mm.	mm.	mm.
Head and body	72	74	73
Tail	112	92 imperfect.	105 imperfect.
Hind foot	23·5	21 5	23
Forearm and hand	23	23	23
Ear	11	11	11

DIPODILLUS QUADRIMACULATUS.

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Measurements of skull of ♂ No. 2 :—Greatest length 26 mm. ; greatest breadth 15 ; breadth of brain-case 13·5 ; temporal constriction 5·2 ; length of nasals 10 ; basal length 22 ; length of palate 10 ; incisive foramina 4·5 ; molar series 3·6.

The only three specimens known were preserved in alcohol along with other small animals. The labels unfortunately perished, so that the exact locality from which they were obtained is unknown.—W. E. DE W.

DIPODILLUS WATERSI, de Winton.

Gerbillus (Dipodillus) watersi, de Winton, Nov. Zool. vol. viii. 4, 1901, p. 399, pl. xx.

Durrur, Jan. 28, 1894.

Size, smallest of the known species of this genus found upon the African continent. Soles of feet naked ; the usual six tubercles on the sole of the hind foot are surrounded by a finely granulated or shagreened surface. Tail long, the longer hairs towards the extremity forming a moderate crest and pencil. The colour dun-fawn above, with the usual characteristic pale spots above the eyes and behind the ears ; the cheeks and the area beneath the eyes dull fawn ; the whiskers mostly black ; the whole of the under parts white, clearly defined from the dark colour of the upper surface. Tail distinctly bi-coloured, dark, often blackish, above, pale fawn or sometimes whitish beneath. The colour generally brighter than in *D. quadrimaculatus*, and the white around the eyes and at the base of the ears more pure.

Measurements taken from specimen in alcohol :—Head and body 77 mm. ; tail without hair 108 ; hind foot 21 ; ear 10.

Measurements of skull :—Greatest length 25 mm. ; greatest breadth 14 ; length of nasals 9 ; frontal constriction 4·6 ; basal length (c.) 20 ; length of palate 10·5 ; incisive foramina 4 ; molar series 3·3 ; width outside molars 5·2.

The nasals are proportionately shorter than in *D. quadrimaculatus*, the maxillary portion of the zygomatic arches less developed, and the squamosal portion barely, if at all, wider than the auditory meatus ; the base of the skull is somewhat constricted.

This species was first discovered near Shendi by Messrs. Rothschild and Wollaston.

The nearest allies are probably *D. dasyurus*, Wagn., from Arabia, and *D. nanus*, Blanford, from Persia.—W. E. DE W.

DIPODILLUS CALURUS, Thomas.

Gerbillus calurus, Thomas, Ann. Mag. Nat. Hist. ser. 6, vol. ix. 1892, p. 76.

Resembling *G. pyramidum* in size, but distinguished from all other known gerbils by its tail, which is clothed with long hair almost to the base, as in the Myoxidæ. The ears are rather large. The hind feet have naked soles with six pads as in the more typical species of *Dipodillus*. The fur generally is very long and dense; on the back the coat is 20 mm. in length, and on the head 13 mm. General colour brown-fawn strongly washed with black, the base of the fur slate-coloured; the tail black-brown, with a tip of white hairs 20 mm. in length. The fore and hind feet whitish.

Approximate measurements:—Head and body 110 mm.; tail (without hair) 140; hind foot 30; ear 18.

The skull is about the same size as that of *G. pyramidum*, but is much fuller in the brain-case and the auditory bullæ are more inflated and project slightly beyond the bones of the occiput; the meatus projects beyond the zygomatic arch, thus the broadest part of the skull is found at this point. The palatal surface in the two skulls is very much alike, but in the true Gerbil the folds or indentations of enamel of the teeth are more varied.

The only specimen in the British Museum (No. 0.5.9.1) known with certainty to be Egyptian was collected by Mr. D. MacAlister at Wadi Sikait, south of Gebel Sebara, Eastern Egypt. The skull of this specimen is too imperfect to allow accurate measurements to be given.

The type of the species, badly preserved in alcohol, is of doubtful origin and may have come from either Sinai or Egypt. These two examples, with another specimen in poor condition from Sinai, likewise in spirit, are the only representatives of the species in the British Museum, and, I believe, the only three specimens known.—W. E. DE W.

TATERA.

Tatera, Lataste, Le Naturaliste, 1882, p. 126.

Form rather rat-like; ears moderate; hind legs not elongated; soles of feet naked. Incisors grooved; molars very persistently divided into transverse laminae, but when greatly worn the lateral infoldings of enamel are simple and V-shaped, in pairs.

TATERA ROBUSTUS, Cretzschm.

Meriones robustus, Cretschm. Rüpp. Atlas, 1828, p. 75, pl. 29. fig. *b*.

Meriones murinus, Sundev. K. Vet.-Ak. Handl. 1842, p. 231.

There is no specimen of this animal, either in the British Museum or in Dr. Anderson's collection, taken within the bounds more strictly treated of in this work, but the type of the species is stated to have come from Ambukol.

Messrs. Rothschild and Wollaston found it common at Shendi, and Mr. Witherby obtained specimens from near Khartum, the locality from which Hedenborg obtained the original specimens named *M. murinus* by Sundevall.

Dr. Anderson made the following note on the type specimen preserved in the Frankfort Museum:—

“*Meriones robustus*, Cretzschmar. *Type*.

Icon. Rüppell, Atlas, p. 75, pl. 29. fig. *b*. Geschenk von Rüppell, 1824, Ambukol in Nubia. Skull in specimen. A second ticket on the specimen marked VII.H.2*a*.

	mm.
Snout to vent	145
Vent to tip of tail	145
Hind foot without claws	35
„ with claws	38
Height of ear (more or less broken)	16

“Tarsus bare. Five metatarsal tubercles.

“The fur on the back is somewhat brownish yellow, as many of the hairs have a subapical yellow band and are tipped with brown. The sides are yellow, passing gradually into white on the under surface. The upper surfaces of the limbs are white. The area above, before, and between the eye and the ear more or less white, also the hairs behind the ear. The hairs on the tail are pale brown, with yellowish hairs intermixed.”—W. E. DE W.

MERIONES.

Meriones, Illiger, Prod. Syst. Mamm. 1811, p. 82.

Form robust, hind legs and feet not greatly elongated, metatarsal pads very small; skull angular and strong; incisors grooved; molars with simple V-shaped infoldings of the enamel of the outer and inner sides meeting in the middle line, forming three lozenge-shaped subequal divisions in the first molar and two in the second, the last molar simple and pillar-like.

MERIONES SHAWI, Duvern.

"Jird," Shaw, Travels, 1738, p. 248.

Meriones shawii, Rozet, Voy. Rég. Alger, 1833, i. p. 243 (sine descr.).

"Gerbillé indéterminée," F. Cuv. Trans. Zool. Soc. ii. 1838, p. 143 (nota), pl. xxvi. figs. 1-5.

Meriones shawi, Duvern. Leçons d'Anat. Comp. iv. 2^e part. p. 456; id. Mém. Soc. Strasb. 1842, iii. p. 22, pls. 1 et 2; Lataste, Le Natur. 1882, p. 107; id. Proc. Zool. Soc. 1884, p. 94, pl. vii.; id. Act. Soc. Linn. Bord. 1885, p. 266 (sep. p. 144); id. Expl. Tunis. 1887, p. 27.

Meriones robustus, A. Wagn., Mor. Wagner, Reisen Reg. Algier, iii. 1841, p. 61 (nec *M. robustus*, Cretzschm.).

Meriones melanurus, Rüpp. Mus. Senckenb. iii. 1845, p. 95, pl. 7. fig. 3.

Meriones crassus, Sundev. K. Vet.-Ak. Handl. (1842) 1843, p. 233, pl. ii. fig. 4 (cranium).

Meriones sellysii, Pomel, C. R. Ac. Sc. xlii. 1856, p. 654.

Gerbillus shawi, Anderson, Proc. Zool. Soc. 1892, p. 10; de Winton, Proc. Zool. Soc. 1897, p. 958.

In addition to the given synonymy there are a number of names which have been bestowed on slightly modified forms of this animal. In the first place, Levaillant gave five names to specimens from Tunisia collected by the French expedition commanded by Capt Loche. These specific names are *Gerbillus guyoni*, *richardi*, *savvii*, *schousbæii*, and *renaultii*. We are informed by Lataste that the last two forms are of the type with large auditory bullæ. In the second place, when attempting to classify the Gerbils, chiefly in 'Le Naturaliste' for the year 1882, and when writing a little later on the mammals of Barbary and Tunisia, Lataste gave several additional names to forms of this animal, entirely ignoring the names given by Levaillant. This was a very simple way out of a difficulty, for it is impossible to distinguish the various forms by means of Levaillant's descriptions; but there is no doubt that, in the interest of science, the existing names should have been employed and fixed with a more complete diagnosis on particular forms.

The names given by Lataste were *Meriones albipes*, *gætulus*, *ausiensis*, *trouessarti*, and *crassibulla*; the last two belong to the group with large bullæ.

MERIONES SHAWI subsp. MELANURUS.

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Specimens from Alexandria and the Sinaitic Peninsula are so much alike in external characters that Rüppell considered them identical, and founded his description of *M. melanurus* on specimens from both localities, but placing Alexandria first, so that the specific name may be assigned primarily to the form found in Lower Egypt. In the skull of this form the auditory bullæ do not project posteriorly beyond the occipitals. It thus agrees with the skulls of the typical race from Western Algeria.

In the same year, Sundevall described the form from Sinai as *M. crassus*, giving a figure of the skull, showing the auditory bullæ projecting beyond the occipital bones. Similarly coloured animals with skulls exactly agreeing with specimens from Sinai are found in Tripoli and Tunisia. Under these circumstances it seems advisable to treat all these forms as local races.

The final arrangement of these different races cannot as yet be settled, but the available material points to the possibility of recognizing the following forms:—

Auditory bullæ level with occiput: *M. shawi* (typical form), large, brown or grey; Morocco and North-western Algeria. *M. shawi* subsp. *melanurus*, smaller, fawn-coloured; Lower Egypt and ? Tunisia.

Auditory bullæ projecting behind occiput: *M. crassus*, Sinai; represented in Tripoli and Tunisia by *M. crassus* subsp. *sellysii*, if specimens from the latter localities are found to be distinct.

W. E. DE W.

MERIONES SHAWI, subsp. MELANURUS, Rüpp. (Plate XLIII.)

Meriones melanurus, Rüpp. Mus. Senck. iii. 1845, p. 95, pl. 7. fig. 3.

All specimens examined were obtained at Mex to the west and Ramleh to the east of Alexandria.

The ears are of moderate size and when laid forwards reach to the middle of the eye. They are moderately rounded and oval in form, and along the little folded anterior margin there is a fringe of rather stiff yellow hairs with black tips, about 5 mm. long below, and gradually decreasing in length to the upper fourth of the border. The ear externally and internally is partially covered with short yellowish or brown hairs. The skin of the ear, internally and externally, in the lower third of that organ is fleshy white, the remainder being nearly black. The general colour of the upper surface of the body is a sandy yellowish grey, darker along the back, owing to many of the hairs having black tips. There is a pale area above, below, and behind the eye, and some whitish hairs behind the ears. The under surface is whitish, with a tinge here and there of yellowish sandy colour on the sides. The fore and hind feet are covered with short whitish hairs. The tail on its upper surface is concolorous with the back, and the long hairs towards its end are rusty brown, or blackish in some specimens; it is shorter than the body and head.

Palm with five tubercles, two large ones immediately below the wrist at its middle, slightly above the level of the rudimentary thumb, and with three small tubercles anterior to them, one at the base of the second, another at the base of the fifth, and one common to the bases of the third and fourth fingers. The whole palm anterior to the wrist-tubercles and around the others is covered with minute granules. The skin beneath the digits strongly transversely ridged. There are five small tubercles on the sole of the hind foot surrounded by five granular tubercles, one lying at the bases of the first, second, and fifth, and one common to the third and fourth toes. The fingers and toes have much the same proportions to one another as in *Gerbillus*. The length from the elbow to the end of the middle finger (less claw) considerably exceeds the length from the heel to the tip (less claw) of the middle toe, which is exactly the reverse of what occurs in *Gerbillus gerbillus* and *G. pyramidum*, in which the fore limb is much shorter relatively to the foot. The moustachial hairs are moderately long, and are almost wholly either black or white. The wrist behind the tubercles is sparsely covered with hairs, as are also the under surfaces of the fingers, but the middle of the palm is naked. The sole generally, including its middle, is sparsely covered with hairs, and the toes also, on which, however, the hairs are longer, but the middle of the tarsus has generally a naked area, where the skin is of a livid hue. The claws are moderately well-developed. Tail ringed, clad sparsely all round with rather stiff semi-erect hairs, measuring 3 mm. in length on the dorsal surface, becoming towards the end about 17 mm. long. A long oval sebaceous gland on the middle of the abdomen.

The glans penis is more or less cylindrical and smooth.

Measurements taken from specimens preserved in alcohol.

	♂. mm.	♂. mm.	♀. mm.	♀. mm.
Head and body	140	124	138	139
Tail	134	(imp.)	128	132
Hind foot	35	34	33	33.5
Ear	18	19	(imp.)	18.5

Measurements of skull.

	♂. mm.	♂. mm.
Greatest length	41	39
„ breadth	24.5	23
Length of nasals	15	13.2
Basal length	36	34
Length of palate	18	17.5
„ incisive foramina	8.5	7.1
„ molar series	6	6

Notes on the type specimens preserved in the Frankfort Museum :—

Gerbillus melanurus, Rüpp.

(*Meriones melanurus*, Rüpp.) Co-type.

Alexandria. Rüppell, 1823.

= *M. shawi*.

Meriones melanurus, Rüppell.

Icon. Mus. Senckenberg. t. iii. pl. 7. fig. 3. Co-type.

Petras-Arabien. Geschenk von Dr. Rüppell, 1831. A second ticket on the specimen marked VII. H. 8. 6.

	mm.
Tip of snout to vent	125
Vent to tip of tail (imperfect)	125
Length of hind foot, without claw	31
„ „ with claw	33
Height of ear	15·2

The ear of course is contracted in drying.

This specimen is evidently much faded, but it still retains the trace of darker-coloured points to the hairs, although the general colour has become almost a uniform yellowish fawn. The area behind the moustache and below the eye, a spot above the eye, between the eye and the ear and behind the latter, and also a small area external to the base of the tail are nearly white. The under parts are pure white. The tail is brownish on its distal two-thirds and rufous brown towards the tip.

PSAMMOMYS.

Psammomys, Cretzschm. Rüpp. Atlas, 1828, p. 56.

Closely resembling *Meriones*, but with shorter ears. The skull and molar teeth also closely resemble those of *Meriones*, but the incisors are broader and flat, with no median groove.

PSAMMOMYS OBESUS, Cretzschm. (Plate XLIV.)

Psammomys obesus, Cretzschm. Rüpp. Atlas, 1828, p. 58, pl. 22 ; Lataste, Act. Soc. Linn. Bord. 1885, p. 269 (sep. p. 147) ; id. Expl. Tunis. 1887, p. 28.

Psammomys roudairei, Lataste, Le Nat. 1881, p. 492 (juv. fide auct.).

2 ♀. Mandara, Alexandria. Dr. Walter Innes, Bey.

5 ♀ & 4 juv. Mandara, 17.4.92.

1 juv. ♀, a litter of 5. Mandara.

This species, specimens of which occasionally much resemble examples of *Meriones melanurus*, is at once distinguished by its smooth incisors and short, thick, rounded ears. The length of the forearm from the elbow to the tip of the middle finger is considerably in excess of the length of the tarsus, and the hand, except in being stouter, is exactly like that of *Meriones*, with the tarsal tubercles the same, but more developed. The palm and the fingers are clad in much the same way as in *Meriones*, but there is generally a strong brush of hair, usually bright rusty brown, at the base of the toes, which not unfrequently becomes worn off with age.

The nose is rather prominent, and the muzzle somewhat broad, but contracting behind the moustachial area. The fore limbs are well developed, and the claws short and strong. The eye is of moderate size, smaller than in *Meriones shawi*. The ears are short, rounded, and thick, and when laid forwards do not reach beyond the posterior angle of the eye.

The tail is shorter than the body, round, rather thick, and scaly, but the rings are hidden, as it is well clad with shortish hairs, which increase in length on the dorsal surface and sides, while the terminal half, or nearly so, is clad with long dark brown hairs.

The moustachial hairs are moderately long, mixed white and black. The general colour of the animal is yellowish sandy, purest yellow on the under parts and on the sides and limbs, palest on the upper surface of the feet. On the head and back, the fur having black tips to the hair, and the subterminal yellow bands being richer

PSAMMOMYS OBESUS.

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coloured than the generality of the fur, this region, but especially the upper surface of the head, has a somewhat rufous tint speckled with the black tips. The upper surface of the tail is the same colour as the back, the under surface being paler, and the long hairs on the end russet-brown. All the under parts are strongly washed with yellow or pale cinnamon.

The ears are more thickly clad than in *Meriones*, the anterior fringe of stiff hairs being present, as in the last species. The nose, the bare area of the lips, the skin of the ears, and the skin of the feet are livid fleshy.

The pollex is very small, but the claw is well developed for the size of the digit. There is a small round tubercle at the base of the second, and another at the base of the fifth, with a similar tubercle common to the bases of the third and fourth fingers. Two large palmar tubercles are present immediately below the wrist, lying close to one another, but with their distal ends rounded and projecting. The whole under surface of the palm anterior to these tubercles is finely granular. The tubercles of the second, third and fourth, and fifth toes have the same form and arrangement as in the manus, but a fourth tubercle lies at the base of the hallux. Placed considerably more proximally than the last-mentioned tubercle is a small metatarsal tubercle, lying towards the inner border and slightly on the distal side of the middle of the tarso-metatarsus. On the distal side of it the plantar surface is covered with scales arranged transversely, and between the rows of scales arise numerous hairs, as in the scaly tail of a rat. The palmar surface anterior to the wrist-pads and as far as the base of the fingers has no hair, but the under surfaces of the digits of the manus and pes are haired, more especially the under surfaces of the latter.

There is no abdominal gland.

Three pairs of mammæ, two inguinal and one pectoral, are present.

Measurements taken from specimens preserved in alcohol.

	♀. mm.	♀. mm.	♀. mm.
Snout to vent	148	158	143
Vent to tip of tail, without hairs	130	135	123
Height of ear.	15	15	14
Length of head	50	51	48
„ hind foot, without claw	35	35	35

Measurements of skull:—Greatest length 43·5 mm.; greatest breadth 25; across auditory meatus 25; length of nasals 17; basal length 38·5; length of palate 21·5; incisive foramina 7·1; molar series 7.

The skull of this species is considerably larger than that of *M. shawi* subsp. *melanurus*; the interparietal is boldly irregularly convex in front, projecting well between the parietals, while in *M. shawi melanurus* this bone is feebly convex

anteriorly, barely encroaching on the parietals. The anterior palatine foramina are not so large as in *M. shawi melahurus*, and the dental area is longer. The tympanic bullæ are large, and the posterior ends of the zygomata impinge on them.

This species inhabits shallow burrows in low-lying sandy ground. It is very destructive to grain; from one burrow I removed 500 heads of barley which were stored in one chamber.

From three to five young ones are produced at a time in the month of April. The nest is made of grass finely cut up.

[Levaillant gives a description of a so-called *P. obesus* on p. 108 of his volume on the mammals collected by Capt. Loche in Algeria; but as the description in no way agrees with the animal under notice, mention is not made of this publication in the synonymy.—W. E. DE W.]

PSAMMOMYS ELEGANS, Heugl.

Psammomys elegans, Heuglin, Reise N.O.-Afr. ii. 1877, p. 80.

♂. Major Penton, R.A.M.C., D.S.O. Suakin.

2 ♂, 4 ♀. Suakin.

This species is very much more brilliantly coloured than the form found at Alexandria, being of a rich rufous brownish yellow, washed with black, many of the hairs being tipped with black. From the snout to the occiput the colour is a bright rufous brown and more intense than that of the rest of the dorsal surface; yellowish grey above the eye and on the sides of the head, but pale yellowish white on the chin and throat. The sides of the body are paler. The under surface of the body is coloured much as the back, but without any black-tipped hairs, and the outsides of the limbs are the same colour, but the inner and outer sides of the tarsus and the area behind the vent are deep blackish brown. The tail is concolorous with the back, but the long hairs on its posterior third are deep rufous brown. The ears, with the exception of their front borders which are margined with long hairs, are almost nude. The whiskers are numerous and rather long.

Measurements taken from specimens preserved in alcohol.

	♀.	♂.	♀.	♀.
	mm.	mm.	mm.	mm.
Snout to vent	133	136	136	135
Vent to tip of tail, without hairs	133	130	128	127
Height of ear	11	12	12	12
Length of head	45	45	47	47
„ hind foot, without claws	34	35.5	33	33

Measurements of skulls.

	Suakin.	
	mm.	mm.
Greatest length	40	41
„ breadth	24	...
„ „ across auditory meatus	23	24
Length of nasals	14·5	16
Basal length	31	34·5
Length of palate	20·5	20
„ incisive foramina	7·1	6
„ molar series	6·2	6·5

Common at Suakin and Durrur.

Subfamily *MURINÆ*.

Infraorbital foramina pear-shaped, with short lateral wings. Molars cuspidate, with laminate bars when worn; cusps arranged in three rows in the upper, two in the lower series of teeth. Number of teeth as in *Gerbillinæ*.

MUS.

Mus, Linn. Syst. Nat. x. 1758, p. 59.

Tail long, scaly. Pollex rudimentary, with a small flattened nail.

MUS RATTUS, Linn.

Mus rattus, Linn. Syst. Nat. x. 1758, p. 61.

Mus alexandrinus, Desmar. Nouv. Dict. Hist. Nat. xxix. 1819, p. 47; id. Ency. Méth., Mamm. 1822, p. 300; Geoffr. et Aud. Descr. Egypte, ii. 1829, p. 733; "*Rat d'Alexandrie*," Atlas, pl. v. fig. 1; ed. 8vo, Hist. Nat. v. p. 183.

Mus tectorum, Savi, Nov. Giorn. Pisa, Feb. 1825; Bonap. Fauna Ital. i. 1832-41, pl. 21.

Mus flavigaster, Heugl. Verhandl. K. Leop.-Carol. Ak. Naturf. 1861, p. 4, tab. ii. fig. 2.

♂ ♀. Fayum.

♀. Assuan.

♂. Minia. Major R. H. Brown, C.M.G.

♀. Haji Kendil. Prof. Flinders Petrie.

3 juv. Gizeh. Capt. S. S. Flower.

3 ♂. Old Cairo. Dr. C. W. Andrews.

♂, ♀, 6 juv. Qasr el Gebali, Fayum. Dr. C. W. Andrews.

Muzzle pointed; ears large; tail very long and tapering, scales coarse, set in distinct rings, 9 of which occupy about 10 mm.; feet well formed, the fifth toe long and somewhat thumb-like. Numerous long, straight, glossy black hairs projecting beyond the fur of the back, 60 mm. or more in length in some specimens.

There are two distinct varieties of the Black Rat found in Egypt—one being the town rat, a large grizzled brown form with grey belly, the *Mus alexandrinus*, Desm.; the other a smaller, yellowish-brown, white or lemon-white bellied form, *Mus tectorum*, Savi, which frequents groves and palm-trees.

This rat has become quite cosmopolitan, and very many of the names with which the genus *Mus* has been loaded are attributable to forms of this species.

Measurements taken from specimens of the smaller form preserved in alcohol.

	Fayum.		Minia.	Belim.
	♂.	♀.	♂.	♀.
	mm.	mm.	mm.	mm.
Head and body	180	165	152	152
Tail	183	200	197	195
Hind foot	33	30	32·5	35
Ear	24	22	22·5	22

Dr. Andrews gives the following measurements taken in the flesh of three large specimens from Cairo :—

	♂.	♂.	♂.
	mm.	mm.	mm.
Head and body	180	210	195
Tail	245	270	245
Hind foot	38	38	38
Ear	24	26	23
Long hair on back	43	58	55

Measurements of skulls.

	Cairo.		Fayum.	
	♂.	♂.	♂.	♂.
	mm.	mm.	mm.	mm.
Greatest length	48	45·5	39·5	39·5
„ breadth	23·5	22	19·5	20·5
Breadth of brain-case	18	17·5	16·5	16·5
Length of nasals	17·5	16·5	13·7	14
Basal length	43	40·5	35	35
Length of palate	22	22·5	18·5	18·5
Incisive foramina	8·5	8	7·3	7
Molar series	7·7	7	6·5	6·5
Breadth outside molars	9	9	7·7	8·1

The two Fayum skulls are from older animals than those of the larger Cairo specimens.

The brain-case of *Mus rattus* is much more rounded than that of the following, *M. norvegicus*. The parietal ridges for the attachment of the masseter muscles are somewhat bowed outwards; the angles formed by these ridges and the supraorbital ridges are on the fronto-parietal suture. The molars are narrower, the ear-conchs rounder. The incisive foramina slightly overlap the front molars; these foramina are alike in shape in both species, being about the same width in front and behind, and convexly expanding in the middle, with the median septum fairly strong throughout; the palate is slightly narrower in this species than in the following.—W. E. DE W.

MUS NORVEGICUS, Erxleb.

Mus noruegicus, Erxleben, Syst. Reg. Anim. 1777, p. 381.

Mus decumanus, Pallas, Nov. Sp. Glir. 1778, p. 91, pl. xxiii.; *et auct.*

Mus maniculatus, Wagn. Wiegmann. Arch. 1848, i. p. 186.

♂. Assuan.

This species is readily distinguished from *M. rattus* by its shorter and more hairy ears; by its shorter more thickly haired and more finely scaled tail (11 rings to 10 mm.); larger feet, with proportionately shorter first and fifth digits; softer fur, shorter whiskers, and shorter and less rigid longer hairs on the back. The fifth toe is less expansible than in the better climber *M. rattus*.

Specimen preserved in alcohol:—Head and body 180 mm.; tail 164; hind foot 41·5; ear 19; longer hairs of back 35.

Measurements of skull:—Greatest length 44·5 mm.; greatest breadth 21·5; breadth of brain-case 17; length of nasals 16; basal length 39; length of palate 21; incisive foramina 8; molar series 7; breadth outside molars 9·7.

The skull of *M. norvegicus* is distinguished from that of *M. rattus* by its flat and narrow brain-case; the parietal ridges formed for the attachment of the masseter muscles are almost straight; the angle formed by the meeting of these ridges and the supra-orbital ridges is found slightly in advance of the fronto-parietal suture. The molars are broad, the ear-conchs less rounded. The incisive foramina do not reach the plane of the front molars. The palate is broader.

This subadult male from Assuan is the first example of this species from the African continent which has come under my notice. Rüppell described a rat from Massowah as *M. leucosternum*; this name is very suggestive of *M. norvegicus*, since a patch of white is very frequently found on the breast of this species, and this is present in the Egyptian specimen. In the majority of specimens of this species a patch of hairs, white to the base, will be found on the chest; thus this seemingly slight and sportive character is of considerable systematic importance.

This species is not so widely spread as the last and does not vary in colour to the same extent under special conditions; but interesting local races are in process of formation in the British Islands (where it has established itself only within the last three centuries to the almost total exclusion of the Black Rat), notably the black form with white chest-spot of Ireland (*M. hibernicus*) and the red rat with pale buff under parts found in many localities in England.—W. E. DE W.

MUS MUSCULUS subsp. ORIENTALIS.

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MUS MUSCULUS, Linn. (Plate XLV.)

Mus musculus, Linn. Syst. Nat. x. 1758, p. 62.

Mus gentilis, Brants, Muizen, 1827, p. 126.

Mus orientalis, Cretzschm. Rüpp. Atlas, 1828, p. 76, t. 30.

Mus pallescens, Heuglin, Reise N.O.-Afr. ii. 1877, p. 72.

♀. Wadi Halfa. Major H. d'A. Harkness.

♂ ♀. Beltim, Delta. Sir J. Rogers, Pasha, K.C.M.G.

♀. Cairo. Mr. Jennings Bramly.

♂. Suakin.

♀. Island of Shadwan.

♂. Fergunt, Nubia (on Dahabiah). Mr. A. L. A. Loat.

Many specimens. Cultivation, Fayum. Dr. Andrews.

♂. Zool. Gardens, Gizeh. Mr. A. L. Butler.

The adults are distinguished by their decided pale brown colour, more or less speckled, owing to the black tips and yellowish-brown subterminal bands to the hairs. On the sides the colour passes into rather rich fawn, clearly defined from the pale yellowish white of the under parts. From the moustachial area to the shoulder the line of junction of the colour of the sides of the head has a decided yellowish-rufous tint. The skin of the conch is dusky leaden and the exterior half and the upper third of its inner surface are covered with pale brown hairs, the remainder being perfectly nude. The back of the conch is sparsely covered with short pale brown hairs. The anterior margin of the conch has a rather strong fringe of longish hairs. The margins of the eyelids are black and the feet are white. The tail is brown above, yellowish below, and is covered with fine stiff short pale brown hairs, which do not conceal the rings.

A male and female with their litter of six young ones, with eyes and ears still closed, were obtained in a Bishareen hut on the desert outside Assuan; two other specimens were taken in the same locality.

Note on specimen in Frankfort Museum.

Mus orientalis, Cretzschmar.

Icon. Rüppell, Atlas, pl. 30. fig. a. Massaua Geschenk von Rüppell, 1831. A second label marked VII. M. 15 a. This specimen has the skull in it.

	mm.
Snout to vent	64
Vent to tip of tail	54
Length of hind foot, without claw	13·5
„ „ with claw	15
Height of ear, external meatus	7

This is unquestionably *M. musculus*.

[Measurements taken from specimens preserved in alcohol.

	Beltim.		Fayum.		Cairo.	Wadi Halfa.
	♂.	♀.	♂.	♀.	♀.	♀.
Head and body.	74	74	75	72	80	77
Tail	64	60	71	69	81	69
Hind foot	16	15·5	18	17·5	16	17
Ear	11·5	12	12	12·5	12	11·5

The House-Mouse is subject to the same amount of environmental variation as the Black Rat (*M. rattus*), and is almost as widely distributed over the world.

As a rule, mice that live in towns have dark under sides, while those that live in the fields are pale orange or whitish beneath, the base of the fur being still grey. In Nubia, the Sudan, and in many parts of Asia a still further development takes place, the upper parts being nearly uniform brownish yellow, and the whole of the under parts pure white, with the fur white to the base.

Of the specimens enumerated above, the one from Cairo is a dark-bellied typical *M. musculus*, Linn.; those from Beltim, Gizeh, Fayum, and Suakin are of the yellowish- or whitish-bellied race, *M. orientalis*, Cretzschm.; while those from Wadi Halfa and Fergunt are the pure white-bellied race, *M. gentilis*, Brants, which is found throughout the Sudan (*Mus pallescens*, Heugl.). Some twenty or more names have been given to this mouse from different parts of the world, the most commonly used, and the only ones likely to have been applied in literature to examples from Egypt, are *Mus prætextus*, Brants, *Mus bactrianus*, Blyth, and *Mus spretus*, Lataste.—W. E. DE W.]

ARVICANTHIS.

Arvicanthis, Lesson, Nouv. Tab. Règ. Anim. 1842, p. 147.

These Field-Rats, of which there are many species, are found all over Africa: they are characterized by a speckled fur and are often longitudinally striped (as is the case with the Barbary Mouse); the ears are rounded and almost invariably of a brick-red colour. The first and fifth toes of the hind feet are very short, the three middle ones long and of almost equal length. The skull is strong, the palate narrow and not prolonged behind the molars; the lower jaw is very deep and massive. Teeth as in *Mus*.

ARVICANTHIS NILOTICUS, Desmar. (Plate XLVI.)

Lemmus niloticus, E. Geoffr. Cat. Mus. Paris (nom. nud.).

Arvicola niloticus, Desmarest, Ency. Méthod., Mamm. Suppl. 1822, p. 281.

Hypudæus variegatus, Licht. Verz. Doubl. Berlin, 1823, p. 2.

Hypudæus niloticus, Brants, Muizen, 1827, p. 87.

Mus variegatus, Brants, Muizen, 1827, p. 102.

Echimys niloticus, Geoffr. et Aud. Descr. Egypte, ii. 1829, p. 734 ("Echimys d'Egypte," Atlas, pl. v. fig. 2); id. ibid. 2^e éd. 8vo, Hist. Nat. v. p. 186.

Arvicanthis niloticus, Lesson, Nouv. Tab. Règ. Anim. 1842, p. 147.

Isomys variegatus, Sundev. K. Vet.-Ak. Handl. (1842) 1843, p. 220.

Isomys variegatus, var. *major* et var. *minor*, id. ibid.

♂. Minia. Major R. H. Brown, R.E., C.M.G.

♂. Fayum.

♂. Assuan.

♂ ♀. Gizeh. Capt. S. S. Flower.

3 ♂, 1 ♀. Plain of Tokar.

Head moderately pointed; distance between the inner canthus of the eye and the tip of the snout very slightly in excess of the interval between the external canthus and the base of the anterior margin of the conch. Ears broadly rounded, when laid forwards reaching to the posterior canthus or a little anterior to it, but never covering the eye. Tail invariably a little shorter than the length of the body and head. Hind feet large.

Hairs deep black, but with a broad subapical yellow band tipped with black, the yellow bands and black tips giving a speckled or variegated appearance to the fur;

mixed with the fur are many long black unbanded hairs, becoming more numerous on the hinder part of the body. In some specimens from Egypt there is a decided narrow black median dorsal line. The whole of the under surface is greyish white. The nose and ears and a small patch above the upper eyelid are covered with short reddish-brown hairs. The upper surface of the foot is concolorous with the body, and the bare under surface is livid. The skin and hairs on the upper surface of the tail are almost black ; the sides of the tail are brown, and below it is sparsely covered with brownish-yellow hairs.

[The specimens from Assuan are very much paler than the examples from Cairo and its neighbourhood, and are slightly more rufous posteriorly. This form may represent *A. variegatus*, var. *minor*, Sundevall (Vet.-Ak. Handl. 1842, p. 221), from Syrkut, Upper Nubia, described as being smaller and paler than the typical form.

Measurements taken from specimens preserved in alcohol.

	Cairo.		Minia.	Plain of Tokar.	
	♂.	♂.		♂.	♀.
	mm.	mm.		mm.	mm.
Head and body.	188	178	178	163	150
Tail	133	136	147	158	165
Hind foot	35	36	37	35	33
Ear	18	18	20	19	19

Measurements of skulls.

	Cairo.		Tokar.
	♂.	♂.	
	mm.	mm.	mm.
Greatest length	38·5	37·5	36·5
„ breadth	20	20	19·5
Length of nasals	15	14·2	13
Basal length	34·5	34	33
Length of palate	17	17	16
Incisive foramina	8	8·5	7·5
Molar series	8	8	7·1

The skull is shorter than that of *Mus rattus*, but while the zygomatic arches are broad in proportion, the cranium is narrow. The palate is very narrow; the posterior narial opening is narrow, commencing in a line with the posterior end of the molars ; there is no postdental shelf; the molars are very broad; the incisive foramina are narrow, especially posteriorly, the median septum in this portion being excessively

ARVICANTHIS NILOTICUS.

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narrow, hardly a hair's breadth ; the sphenoidal pits are very deep ; the auditory bullæ are small and slightly compressed laterally ; the lower jaw is very strong and deep.

This animal was badly figured in the Atlas of 'Descr. d'Egypte' under the name of "l'Echimys d'Egypte," but was re-named "l'Echimys du Nil" in the text, which was not published till many years after, with the assistance of Audouin. The *Lemmus niloticus* of the Catalogue of the Paris Museum also refers to this animal.

The specimens from Tokar agree with those obtained by Mr. Rothschild at Shendi and by Mr. Witherby to the south of Khartum in being very pale in colour and in having a proportionately longer tail than those of the typical species. This race represents the *A. testicularis*, Sundevall (Vet.-Ak. Handl. 1842, p. 221), which is also found in Arabia.

In the damper regions of both the Blue and White Niles a dark form is again found, *A. abyssinicus*, Rüpp.—W. E. DE W.]

ACOMYS.

Acomys, Is. Geoffr. Ann. Sci. Nat. 2^e sér. x. 1838, p. 126.

Hair generally coarse and flattened over the greater part of the body, and forming inflexible spines on the back. Dentition as in *Mus*. The palatal surface of the skull is considerably modified, the posterior narial opening being extremely narrow, the pterygoid fossæ very shallow, and the auditory bullæ very small. The pads of the feet each with an auxiliary smaller pad. Mammæ 6—one pair axillary, two inguinal.

Aristotle (Hist. Anim. vi. xxx. 3) says Egyptian mice have hair nearly resembling that of the hedgehog.

ACOMYS CAHIRINUS, Desmar. (Plate XLVII.)

Mus cahirinus, E. Geoffr. Cat. Mus. Paris (nom. nud.); Desmarest, Dict. Hist. Nat. xxix. 1819, p. 70 (partim); id. Ency. Méth., Mamm. 1822, p. 309 (partim); Licht. Verz. Doubl. Berlin, 1823, p. 2; Desm. Dict. Sci. Nat. xlix. 1826, p. 482 (partim); Brants, Muizen, 1827, p. 153; Licht. Darstellung, 1829, pl. 37. fig. i.; Cretzschm. Rüpp. Atlas, p. 38, pl. 13. fig. b; Is. Geoffr. Ann. Sci. Nat. 1838, p. 126; Wagner, Schreb. Säug. Supp. iii. 1843, p. 440 (partim).

Acomys cahirinus, Is. Geoffr. Ann. Sci. Nat. 2^e sér. x. 1838, p. 126; Sundev. K. Vet.-Ak. Handl. 1842 (1843), p. 222; Heuglin, Reise N.O.-Afr. ii. 1877, p. 69; Tristram, Faun. Palest. 1884, p. 10, fig. sup.

- ♀. Gizeh. Dr. J. Anderson. British Museum, No. 92.9.9.56.
- 2 ♂. Mahallet-el-Kebir. Mr. G. H. Kent. British Museum, No. 92.9.9.57-8.
- ♂. Minia. Major R. H. Brown, R.E., C.M.G.
- ♂. Houses of Suez.
- ♀. Wadi Halfa. Major H. d'A. Harkness.
- 2 ♂. Assuan. Dr. J. Anderson. British Museum, No. 92.9.9.59-60.
- ♂. Beni Hasan. Mr. M. W. Blackden. British Museum, No. 92.9.9.61.

Snout rather sharply pointed; ears large, rounded, and when laid forwards reaching to or a little beyond the inner canthus of the eye. General colour dark sooty fuscous or slate-grey, paler on the sides and under surface; the hand from the wrist and the toes of hind foot whitish; the ears, which are almost nude, and the tail dark sooty grey. The conch, externally at its base, the skin around the mouth, and the naked skin of the feet dusky fleshy white. From behind the shoulder to the tail the back is clad with stiff spines, increasing in length as they pass backwards. In outline they are concave anteriorly and convex posteriorly, a form which is even preserved in the softer hairs of

ACOMYS CAHIRINUS.

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the shoulders and occiput. The spines are generally almost pale grey at their bases, passing gradually into darker grey at their tips, the deep colour being chiefly confined to the sharp well-defined border and apices of the spines, so that when the animal is looked at from behind the spiny fur has a greyish-speckled appearance due to the paler bases of the spines becoming visible.

Measurements taken from specimens preserved in alcohol.

	Gizeh.	Minia.	Mahallet.	Halfa.	Suez.	Assuan.
	♀.	♂.	♂.	♀.	♂.	♂.
	mm.	mm.	mm.	mm.	mm.	mm.
Head and body . . .	84	96	91	87	98	92
Tail	100	107	94	98	104	116
Hind foot	17	18	18	18	19	19·5
Forearm and hand . .	23	23·7	23	23·5	26	26
Ear	20·5	19	17	18	20	20

One specimen from Assuan has a rufous tint on the sides, while two others from the same place differ but little from the Cairo specimens in the colour of their upper parts, but the whole of the throat is white and the under parts pale grey, the under surface of the tail being yellowish. In the specimen with a tendency to rufous sides (which colour also encroaches on the brownish mousy tint of the middle of the back) the whole of the under surface is white and the tail is yellow. A tuft of hairs behind the ears of this specimen is almost white. The latter specimen with another from Beni Hasan, for which I am indebted to Mr. Blackden, the Artist to the Egypt Exploration Fund, may be referable to the *Acomys nubicus*, Heuglin¹, which, besides the difference in colour, may be distinguished by its shorter ears and tail.

This species is very common throughout the Valley of the Nile in Lower Egypt, and is generally found in towns and villages and in the houses; I found it at Mena House, the hotel at the foot of the Pyramids.

[According to Mr. Sherborn (Proc. Zool. Soc. 1897, p. 287), the article on the Bats and that on the Ichneumon in the 'Descr. de l'Egypte,' written by Etienne Geoffroy Saint-Hilaire, were published in 1818, together with all the remaining plates of Mammals; the third and following articles to the eighth were written conjointly with Victor Audouin, and published, together with the Supplement (which was written by Audouin alone), in 1829.

Geoffroy was in the habit of setting up specimens in the Paris Museum, registered in his Manuscript Catalogue under a Latin name, without publishing any description of the species.

¹ Reise N.O.-Afr. ii. 1877, p. 70.

Desmarest, in describing the "Spiny Mouse" from Cairo, mistook the ill-drawn figure of "l'Echinys de l'Egypte" (plate v. fig. 2)—which was intended for the *Arvicanthis*, as already mentioned—for this animal; but his description was founded on the Museum specimen of the true *Mus cahirinus* of Geoffroy's MS. catalogue, as he remarks later on in the 'Encyclopédie.' *Mus cahirinus* was never mentioned in the work by Geoffroy and Audouin.—W. E. DE W.]

ACOMYS DIMIDIATUS, Cretzschm. (Plate XLVIII.)

Mus dimidiatus, Cretzschm. Rüpp. Atlas, 1826, p. 37, Taf. 13. fig. a.

Mus hispidus, Brants, Muizen, 1827, p. 154 (nec Geoffr. nec Licht.).

Mus megalotis, Licht. Darstellung, 1829, pl. 37. fig. 2.

Acomys dimidiatus, Tristram, Faun. Palest. 1884, p. 10, pl. iii. fig. 3.

♂. Wadi Sikait, S. of Gebel Zeban, E. Egypt. Mr. D. MacAlister. British Museum, No. 0.5.9.2.

Larger and more slender in form than *A. hunteri*; ears very large; tail about the length of the head and body, somewhat coarsely scaled; hind legs and feet rather long. The whole body covered with semicircular flattened spines. Colour brown-fawn, darker on the back, clearer fawn on the sides; all the under parts white.

Approximate measurements:—Head and body 110 mm.; tail 108; hind feet 20·5; ear 21.

The single Egyptian specimen available is a skin in poor condition; a specimen in alcohol from Sinai, also in the British Museum (No. 94.7.20.1), collected by Mr. E. N. Buxton, which may be taken as typical of the species, is apparently similar in form and colour.

The Plate was prepared from specimens obtained by Mr. Bent in the Hadramut, which seem to agree with the specimen from Egypt in all essential features, so far as can be judged from the poor condition of the latter.—W. E. DE W.

ACOMYS HUNTERI, de Winton. (Plate XLIX.)

Acomys hunteri (Anderson), List of Animals Zool. Soc. Lond. 1896, p. 123 (nom. nud.); Trouessart, Cat. Mamm. 1899, p. 496 (nom. nud.); de Winton, Novitates Zool. vol. viii. 1901, p. 401 (nota).

♀. Suakin. Major Penton, R.A.M.C., D.S.O.

♂ ♀ ♀. Plain of Tokar.

[Larger than *A. cahirinus*; form robust; ears moderate, rounded; tail rather shorter than head and body, somewhat finely ringed; feet very short and broad. The coat

ACOMYS DIMIDIATUS.

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ACOMYS HUNTERI.

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generally spiny ; no marked contrast in the spines of the back and those of the rest of the body. A few scattered very fine hairs projecting beyond the spines of the back.

General colour above bright chestnut-red, the spines of the back minutely tipped with brown ; the whole of the under parts, the feet, the inner sides of the legs, and a spot at the hinder base of the ear white.

Mammæ 1—2=6.

Measurements taken from specimens preserved in alcohol.

	Plain of Tokar.		
	♂.	♀.	♀.
	mm.	mm.	mm.
Head and body	105	96	98
Tail	102	93	93
Forearm and hand	26	22·5	23
Hind foot	17·5	17	16·5
Ear	16	15·5	15·5

This species is distinguished from *A. dimidiatus*, Cretzschm., by its shorter ears and feet and by the absence of the darker dorsal area.

Dr. Anderson presented some specimens of this Spiny Mouse to the Zoological Society's Gardens, where their descendants lived for several years. No description of the animal was at the time published, but the donor wished the species to be known as *A. hunteri*, in recognition of the great assistance rendered to him by Gen. Sir Archibald Hunter, then Commandant at Suakin.—W. E. DE W.]

Dr. Anderson had the following note on this species :—

“Native name among the Hadendowah Arabs, ‘Goup’ or ‘Shoeshabgoop.’

“Two specimens collected by Major Penton in 1893 at Suakin have lost their tails and their ears are injured. They are a uniform pale red above, white below, with the ears externally livid. The fore limb from the elbow and the hind limb from the tarsus are yellowish white. Many of the spiny hairs are more or less tipped with brownish.

	♂.	♀.
	mm.	mm.
Snout to vent	98	96
Length of ears	16·3	15·5
„ tarsus	17	17

“This Spiny Mouse is common at Tokar. Between the morning of the 18th and that of the 19th January, a Tokar female gave birth to two young ones, which, when discovered on the latter morning, had their eyes fully open and exhibited little of the helplessness generally characteristic of newly-born Rodents. This mouse seems chiefly to live on green food.”

NESOKIA.

Nesokia, Gray, Ann. Mag. Nat. Hist. x. 1842, p. 264.

Form stouter than that of *Mus norvegicus*, with much heavier deeper muzzle and shorter tail. Incisors flat and very broad. Molars divided by plain, almost straight, transverse bars of enamel. Skull approaching in shape to that of the more fossorial *Rhizomys*.

NESOKIA BACHERI, Nehring. (Plate L.)

Nesokia sp.?, Thomas, Proc. Zool. Soc. 1881, p. 524; Tristram, Fauna Palest. 1884, p. 12.

Nesokia bacheri, Nehring, Zool. Anz. 1897, p. 503.

♂ ♀. Shaluf, near Suez. Mr. W. H. Beyts.

3 ♂, 2 ♀. Shaluf. Rev. W. Statham.

The hands are white above and below, and the claws (which are strong) are brown towards their bases. The upper surface of the fore feet is sparsely clad with brownish hairs, and the fingers with white hairs; the palmar surface nude. Pollex reduced to a tubercle, but furnished with a well-defined but minute flat nail.

Three digital tubercles. A large tubercle, nearly equal in size to two of the digital tubercles, placed on the internal border of the metacarpus, and a still larger and more prominent tubercle on the palmar side of it. Immediately above the wrist there is a prominent rounded eminence, with a solitary bristle occurring among the hairs that are sparsely distributed over its surface.

Upper surface of the hind foot and bases of toes very sparsely clad with brownish hairs. Plantar surface nude and somewhat livid. Claws strong, brown at their bases. Four prominent digital tubercles on the hind foot. A metatarsal tubercle a little way above and slightly internal to the tubercle at the base of the fifth toe, and a much larger tubercle situated still more proximally and on the inner side of the metatarsus. This tubercle or pad is slightly inwardly curved and projecting at its free end.

Tail rather thick, short, ringed, but very sparsely clad with very short feeble hairs. The base nearly nude, flesh-coloured, the remainder brown. The transverse rings on the middle of the tail number 14 to each 10 mm. There are 131 rings in all, each ring being made up of separate scales. The ears are broad and rounded at their tips; they are very sparsely clad with short hairs, and there is a broad livid margin, the middle of the conch anteriorly being pale flesh-coloured.

The basal half of the fur is sooty grey, the terminal half being pale yellowish brown, feebly tipped with brown. Scattered among the fur are numerous long hairs, more

NESOKIA BACHERI.

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rigid than the general fur, and projecting out beyond it, and especially so on the rump. The sides of the face, the lower part of the limbs, and the under parts are a greyish yellow or yellowish white, passing gradually on the sides into the colour of the back. The skin of the feet above is yellowish, sparsely covered with short brownish hairs.

The specimen from the Dead Sea (British Museum No. 64.8.17.28), in alcohol, the measurements of which are given below, differs only from the Suez specimens in its greater size.

The clitoris of the female is of the same size and shape as the male organ. Mammæ, two pairs inguinal, two axillary.

Measurements taken from specimens preserved in alcohol.

	Shaluf.			Dead Sea.
	♂.	♂.	♀.	♂.
	mm.	mm.	mm.	mm.
Snout to vent	185	173	168	205
Vent to tip of tail	124	125	112	130
Breadth of head before ears	31	30	29	...
„ across snout	15	13	13.5	...
Base of upper margin of conch to eye.	20	18	18	23
Eye (ant. angle) to tip of snout . .	23	20	20	22.5
Height of ear, anterior border . . .	19	18	18.2	20
„ „ from notch	21	21	20	21.5
Breadth of ear	16	15	14.5	15.5
Length of hind foot without claw . .	36.5	37.3	33.5	38
Forearm and hand	54	53	46	53
Length of head	53.5	53	49	...
Breadth of upper incisors together .	...	5	5	5

Measurements of skulls.

	Shaluf.		Dead Sea.
	♂.	♂ imm.	♂.
	mm.	mm.	mm.
Greatest length	45	36	47
„ breadth	28	24	29.5
Breadth of brain-case	19	18	20.5
Temporal constriction	7	6.5	7.5
Length of nasals	15	12.5	15
Basal length	43	33.5	44
Length of palate	24	19.3	25.2
Incisive foramina	6.5	6	7
Molar series (alveolar)	9.3	9.3	10.5
„ „ (masticatory)	8	7.5	8

The Nesokia has apparently not yet been recorded from any other locality in Egypt than from the banks of the Sweet Water Canal, between Big and Little Shaluf, near Suez, where its numerous burrows and tortuous well-padded runs are concealed amongst long sedgy grass and stunted spiny shrubs. In this locality one of the animals was dug out under my directions.

It is well known to the natives, both Egyptians and Arabs, by the name 'Girdi.'

Every effort to obtain specimens, or to get information regarding it in any other quarter, proved unavailing.

Subfamily *LOPHIOMYINÆ*.

LOPHIOMYS.

Lophiomyys, Milne-Edwards, L'Inst. xxxv. 1867, p. 46.

Fur full and long; the dorsal area separated from the lateral by longitudinal spaces covered with short adpressed hair. Tail bushy, well developed. Hallux somewhat opposable. Skull rugose, the temporal fossæ roofed over by a plate of bone formed by processes thrown out from the malar, frontal, and parietal bones. Molars typically Cricetine, with persistent cusps set in two rows in both upper and lower jaws; incisors smooth, flat in front.

Dentition: i. $\frac{1}{1}$, m. $\frac{3}{3}$ = 16.

LOPHIOMYS IMHAUSI, M.-Edw. (Plate LI.)

Lophiomyys imhausii, Milne-Edwards, L'Inst. xxxv. 1867, p. 46; id. Ann. Sci. Nat. vii. 1867, p. 113; id. Nouv. Arch. Mus. iii. 1867, p. 81, pls. 6-10; Sclater, Proc. Zool. Soc. 1874, p. 497; Gestro, Ann. Mus. Civ. Gen. xv. 1880, p. 122.

Phractomys æthiopicus, Peters, Zeitschr. ges. Naturwiss. xxix. 1867, p. 195; Reichert, SB. Ges. naturf. Fr. Berl. 15 Jan. 1867, p. 1 (skull).

Lophiomyys imhausii, Giglioli, Zool. Anz. iv. 1881, p. 45.

Dr. Anderson left the following notes on this animal:—

“Specimen in the Florence Museum, from which the Plate was drawn by the kind permission of Prof. Giglioli, 30/1/97.

♀. Eskanid (Erkoweit?) (Suakin). Count L. Marrazzani, 12 April, 1880.

“In this specimen the denser fur generally is grey at the base, with a broad white band and wide brown tip; the long hairs, however, are broadly tipped with white. The upper surface of the head is covered anteriorly by a triangular white area, pointed over the forehead, and prolonged outwards and backwards below the ears to the side of the neck, where the adpressed lateral band of yellowish hairs commences. A white spot below the eye. The front of the head, a narrow area above the eye, the sides of the head, cheeks, throat, and sides of the neck to the shoulder blackish brown; under surface generally pale brown, with an admixture of white. Limbs also pale brown, with numerous white hairs; ears flesh-coloured, nearly nude; tip of tail white.

“Total length of the stuffed specimen from snout to tip of tail about 40 cm.

“Skull very imperfect: total length — ?; basilar length — ?; greatest breadth — ?;

interorbital constriction 13; length of nasals 22; basal breadth of nasals 7; length of upper molar series (alveolar) 11; length of mandible 37 mm.

“Professor Giglioli informs me that he was told by Count Marrazzani that Eskanid (which I think there can be no doubt is *Erkoweet*) is close to Suakin, and that this female was shot by a fellow companion of the Count's. The chief of this place was interviewed by me at Suakin, and on showing him a drawing of *Lophiomys* he said he recognized the animal and would try and get one for me. About fourteen days after this, news came to me, through the Mudir of Suakin, that the chief had caught one alive, but that at night it had eaten its way out of the bag in which it had been kept. He called it ‘Bamsuika.’

“Colonel Hunter also obtained one alive, which he took to Cairo, where it escaped.

“This animal is said to occur in the Khor Baraka and also at Tamai, and it is stated that it burrows under the roots of trees like a rat.”

[The Plate will convey an idea of the form of this very curious rodent, which is of about the size of a guinea-pig. The fur is exceedingly dense and long, which gives it the appearance of having a proportionately very small head. The ears and eyes are rather small. The tail, which is rather more than half the length of the head and body, is densely clothed with somewhat harsh wool-like fur, with a moderate number of longer hairs; the under-fur upon the body is very soft.

The short ears are well clothed with hair, that on the inner surface being very thick and projecting well beyond the margin of the conch. In a line with the ears upon either side of the nape there commences a narrow area, which is covered with shorter, more adpressed, harsher fur of peculiar structure; these two depressed bands continue over the shoulders and along the sides to above the hips, thus dividing the coat on the upper side of the animal into three pretty equal divisions, a dorsal and two lateral. These lateral bands are no doubt of glandular formation.

The feet are short and broad. The fore feet have four well-developed digits, with moderate, slightly curved claws partially hidden by stiff hairs; the pollex is very short or vestigial, with a small flattened nail on its outer side; there are three pads at the base of the longer fingers, and two large rounded pads behind these on a level with the bones of the thumb.

The hind feet have five well-developed digits, with claws only slightly larger than those of the fore feet; the hallux, which is somewhat opposable, reaches to the base of the second toe and is similarly clawed. There are four pads at the bases of the toes, and two larger oval pads further back, the one on the inner side being very much the larger and also the more proximal.

The skull of this animal is totally unlike that of any other mammal, more resembling that of some reptiles. In all other rodents the zygomatic arch is entirely separated

LOPHIOMYS IMHAUSI. ♀.
(Florence Museum).

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from the frontals and parietals, the temporal fossa being uncovered, the masseter muscle thus having no bone between it and the skin. In *Lophiomy's* the malar is greatly expanded in its whole length, rising to meet a wing-like lateral expansion of the frontal and a similar process of the parietal, the three forming a pent-roof over the masseter muscle, completely covering the temporal fossa, and leaving only a roughly square-shaped orbital opening. The whole of the upper surface of the skull is rugose or covered with papilliform nodosities; this roughening extends on to the occipitals and paroccipitals, and somewhat resembles a structure found in certain fish. The squamosal is also flattened, and extends back to above the auditory meatus, forming a deep pit for the condyle. The sphenoidal fossæ are absent, there being no external lateral processes. The paroccipital processes are very long, free, and descend below the inferior plane of the bullæ. The skull in other respects much resembles that of *Cricetus*, as do the teeth, with the exception of the upper incisors, which are flat with square edges, and not rounded as in the Hamster.

The lower jaw is deep and strong. The coronoid process strong and upright. The condylar process strong, rising abruptly to the same level as the coronoid. The angle of the jaw is very short, broad, and flattened, evenly bowed inwards, forming a spoon-like structure.

The specimen described by Milne-Edwards was purchased alive in the streets of Aden by M. Imhaus; it was brought to Paris, where it lived for some years in the Jardin d'Acclimatation. About the same time that the description of this animal, which had died, was being published in Paris, a skull was received in Berlin from Maman, 70 miles N.E. of Kassala, and was exhibited to the German naturalists by Herr Reichert. Peters described this skull, forming a new genus for its reception, not having heard of the work of the Paris naturalists.

Only some half-dozen other specimens of this species are known. The British Museum possesses one from Fekkeri Ghesse Forest, near Het Marafia, the Shoa station of the Geographical Society of Italy. Dr. Sclater exhibited a specimen at a meeting of the Zoological Society of London, 3rd November, 1874, from Keren, in the Bogos Country. There is a mounted skin and skeleton in the Genoa Museum, mentioned by Gestro, also from Keren, where it is called 'Tzechira.' The specimen from Erkowet described above, and two females collected by Dr. Traversi in the forest of Tikem, Shoa, are all in the Florence Museum.

A nearly allied form occurs in Western Somaliland and British East Africa, *L. smithi*, Rhoads (Proc. Ac. Philad. 1896, p. 524). The type of the species was obtained by Dr. Donaldson Smith at Sheikh Husein, about lat. 80° N., long. 41° E.; a second specimen, collected by F. J. Jackson, C.B., at the Ravine Station, Mau Plateau, and presented to the British Museum, bears the note "Caught under fly of tent."—W. E. DE W.]

SPALACIDÆ.

SPALAX.

Spalax, Gldenstaedt, Nov. Comment. Petrop. xiv. i. 1770, p. 409.

This genus is distinguished from the other mole-like rodents included in the subdivision of this family characterized by the suppression of the premolars, by the total absence of an external eye, and by some peculiarities in the structure of the internal organs.

SPALAX ÆGYPTIACUS, Nehring. (Plate LII.)

Spalax typhlus, Anderson, Proc. Zool. Soc. 1892, p. 472.

Spalax ægyptiacus, Nehring, SB. Gesellsch. naturf. Fr. Berlin, 1897, p. 180 ; id. *ibid.* 1900, p. 210.

All the Egyptian specimens described were procured by the author, or the Bedouins in his service, at Maryut, in 1892 and 1893.

Native name ' Abu Amma ' (أبو أمم).

The head is broad and wedge-shaped, flattened above and below. The nose is broad and truncated, shelving over the nostrils in a sharp horny edge. Lateral ridges continue on the sides of the face, from the nose to the region of the orbits, and are clad with stiff hairs, those above and below growing towards one another. The front of the head is thus formed into a semicircular spade. Behind the nose there is a triangular space devoid of hair, the hinder portion of which is somewhat swollen.

There is no trace of an eye externally, nor any indication of it on the inner surface of the deflected skin of the head, but a black speck in the skin-muscle has been stated by M. Olivier¹ to show a perfectly organized eye. The ear is not provided with a conch, but the short tube, hidden in the fur, appears to have otherwise a very complete development, as the blind animal is most sensitive to sounds.

The thumb is rudimentary, but the remaining fingers are short and strong, ending in short claws, and the membrane at their bases has somewhat the form of a rudimentary web. There is one round pad at the base of the first digit, and a large palmar pad. The third, fourth, and fifth fingers in their natural position are bent slightly inwards.

¹ Voy. Emp. Oth. ii. (Syrie), 1804, p. 317, pl. 28. fig. 2.

SPALAX AEGYPTIACUS.

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The first toe is feeble, but relatively more developed than the pollex, and the claws on the second and third toes are stronger than those on the fingers. There is one pad at the base of the first toe, and external to it there is another irregularly shaped pad.

The fur on the body generally is 10 mm. in length, and is very fine, soft, and dense, and practically reversible. It is shorter and more sparse on the belly, the lower portion of which is nude in the adult male.

The fur on the upper surface of the broad, flat, and spatulate head is much shorter, and on the chin it is sparsely distributed. A ridge of strong, short, bristly hairs is prolonged backwards from the side of the nose above and behind the nostril, along the side of the head for nearly one-half of its length. On the areas above and below this ridge there are numerous scattered, long, anteriorly curved, tactile hairs.

The outside of the short tubular ear is nearly nude, but on its inner surface there are a few strong inwardly directed hairs. The hand is nude, with the exception of a few outwardly directed yellowish hairs on its upper surface, with still fewer on the fingers; the upper surface of the foot is sparsely covered all over with whitish hairs. The under surfaces of both hands and feet are nude. The rudimentary tail is perfectly devoid of hairs and is a mere nodule.

The basal half of the fur is black on the back generally, the terminal half being greyish fawn, so that the prevailing colour of the upper surface of the animal is of the latter tint, but in certain lights it assumes a bright silvery-grey sheen. On the under surface of the body the terminal fawn is reduced to a mere point, so that this surface is blackish, tinged with yellowish. On the head the yellowish fawn of the back passes into pale bluish grey a little way anterior to the ear, the position of the latter being usually indicated by a break in the continuity of the fur. The anterior half of the upper surface of the head is grey, which is also more or less the colour of the cheeks, while the chin and its sides are dark slate-grey. The nose above and below and the bare surfaces around the mouth are pale flesh-coloured, which is also the colouring of the hands and feet; but the skin of the belly is pinkish, and the tail is pure white.

Measurements of specimens of *Spalax* from Maryut.

Measured :	in life.	in life.	in life.	alcohol.	alcohol.	alcohol.	alcohol.
No. on specimens :	140, ♂.	141, ♂.	142, ♀.	139, ♂.	148 a, ♂.	148 b, ♀.	148, ♀ ¹ .
	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Tip of snout to vent	165	160	130	175.5	156	148	161
Anterior margin of tubular ear to snout	45	40	36	45	36.2	33	36.2
Length of fore foot (under surface from proximal end of bare surface (wrist) to 3rd finger without claw)	21	20.5	18.5	19.5	19	18.5	19
Length of hind foot to base of middle claw .	23	22	21	23.5	22.3	21.3	22.3

¹ Had been suckling her young. One pair of pectoral and one pair of inguinal mammæ. She was kept alive for a week in Alexandria, April 1892.

Measurements of the skulls of *Spalax*.

	Egypt. 139 a, ♂. mm.	Egypt. 140, ♂. mm.	Merom. Tristram. mm.	Erzerum. 1071 b. mm.	European. 3181. mm.	European. Brandt. mm.
Length from superior border of foramen magnum to anterior border of premaxillaries in front of incisors	43	37	39·5	47·5	49	55
From inferior border of foramen magnum to end of nasals	46	40·3	43	51	52·3	58
Greatest breadth across nasal portion of premaxillaries ¹	9·5	8·3	9·2	11	12	13
Anterior extremity (pre-incisorial) of premaxillaries to posterior border of palate ..	28	24	25·5	33	33	35

Now in measuring the tooth-row of these specimens we find that there is no perceptible difference in the size of the teeth judged by their length; but a comparison of the six skulls—two Egyptian, one Palestine, one Erzerum, and two European—brings out at once that the Asiatic and African skulls are distinguished by molars considerably narrower than those of the European form, although in the folds of enamel they are alike. This difference becomes important when we find that it is associated with some differences in the form of the skull, the Asiatic form having the nasal portion of the skull more elongated and narrower than in the European specimens, but at the same time the nasal portion of the skull of Tristram's skeleton of *Spalax* is relatively broader than the corresponding portion of my Egyptian skulls.

I observe also that the skulls undoubtedly of European origin have the nasals of equal breadth throughout the first (proximal) half of their length, beyond which they suddenly expand, their temporal suture being as broad as the first half of the conjoint bones; whereas in my Egyptian animals, and also in the skull of Canon Tristram's skeleton, the nasals contract gradually from before backwards, and the temporal suture is the narrowest portion of the conjoint bones. In the Erzerum specimen the condition of the nasals is intermediate between the European and the Syrian and Egyptian animals, their first half gradually expanding to about their middle and then rather suddenly so, as in the European skulls before me, but not to the same extent. The naso-intermaxillary portion of the skull, however, has in its narrowness all the characters of the Syrian and Egyptian rat-moles rather than those of the European ones.

Besides a stuffed specimen from "Europe," there is a skin from Volga, Russia, in the British Museum, very much paler than my specimens from Egypt, the upper surface

¹ In the Egyptian specimens the greatest breadth is situated at the fronto-maxillary angle of the premaxillaries, whereas the breadth in the Erzerum specimen, about the middle of the length of the nasals, is equal to the former, and this is the same in the European specimens, whilst in the Merom skull the breadth across the naso-maxillary region is greatest in the middle of its length. These last four specimens, which are in the British Museum Collection, are unfortunately not sexed.

being a uniform yellowish fawn, much paler on the sides and abdomen, dusky grey on the chest and throat, the anterior half of the upper surface of the head yellowish grey, the vibrissal ridge very strongly pronounced. It is larger than my Egyptian specimens and others from Palestine with which mine are identical. The fore foot of the skin of the Volga animal (much shrunk in its fleshy investment) measures $22\frac{1}{2}$ and the hind foot $25\frac{1}{2}$ mm.

Unfortunately I have not been able to obtain a European specimen of *Spalax* in spirit, which I had hoped to be able to do, in order to compare the character of the external nose with that of Egyptian and Palestine specimens, because it appears to me that the differences presented by the dried nose of the Volga skin and that of the skin of an Egyptian rat-mole are so great as to suggest the existence of a structural difference in the living animal, a supposition which is also supported by the condition of the nose in the stuffed specimen.

From this statement of facts it is evident that the materials in London at my disposal raise questions of possible racial distinctions between the animals under discussion. The Egyptian and Syrian rat-moles may therefore for the present be regarded as not more than a possible race of *Spalax typhlus*.

I am aware that the European representatives have been referred to two species, but, as Kessler¹ has pointed out, the alleged differences are purely due to age. However, among the specimens dealt with here the variations may be susceptible of quite another explanation.

The preceding table seems to establish the racial separation of the Egyptian and Palestine specimens on the one hand, and the European on the other, as the skulls are those of adults with well-worn teeth. The dissimilarity appears to be one of size only, if there prove to be no differences in the form of the nose.

[Prof. A. Nehring (SB. Gesellsch. naturf. Fr. Berl. 1897, p. 163) divides the genus into the following species:—

1. *Spalax microphthalmus*, Güldenst. The Steppes near Novo Choperskaja on the Choper (Güldenstaedt); the environs of Bachmuth and Tanganrog in the Government of Ekaterinoslaw (Nordmann, *S. pallasii*); the neighbourhood of Sarepta.
2. *S. giganteus*, Nehr. Petrowsk, on the west coast of the Caspian Sea; mouth of the Terek.
3. *S. typhlus*, Pall. Dondolia, Volhynia, Hungary, and Bessarabia.
4. *S. priscus*, Nehr. Found fossil in the Harsany Mountain near Villany, Southern Hungary.
5. *S. kirgisorum*, Nehr. Kirgis Steppe.
6. *S. ehrenbergi*, Nehr. The neighbourhood of Jaffa, Palestine.
7. *S. ægyptiacus*, Nehr. Ramleh, Lower Egypt.
8. *S. intermedius*, Nehr. Tschénkenkoi, in the interior of the country, some hours from Iskenderun (Alexandretta) in North Syria.

W. E. DE W.]

¹ Bull. Soc. Nat. Moscou, xxiv. 1851, pt. 2, p. 127.

On the Distribution of Spalax typhlus.

"This remarkable animal was known to Aristotle¹, and during the last two centuries it has been described and figured by many naturalists. It is the only representative of the genus *Spalax*, if these Egyptian individuals prove to be the same as the European animal which is found in Poland, Southern Hungary, and Eastern Russia, indeed over nearly the whole of South-eastern Europe, extending, as pointed out by Olivier² in the beginning of the present century, to Syria, Mesopotamia, and Persia, and of late years found by Canon Tristram in Palestine as far south as the neighbourhood of Jerusalem, and by Mr. H. C. Hart at Gaza." [Extract from the Author's communication on *Spalax typhlus* to the Meeting of the Zoological Society of London, June 14, 1892.]

As a statement followed, that probably *Spalax* was now recorded for the first time from the African continent, M. Lataste, to whom a copy of the paper had been sent, hastened to give me information correcting my conjecture that it had not been before observed in Egypt.

Dating from Santiago, 9th October, 1892, he writes:—"Je viens de lire, avec un vif intérêt, votre note sur le *Spalax typhlus* (P. Z. S. 1892, p. 472). Vous dites, p. 475: 'If I have not overlooked any of the literature of this subject, it is now recorded for the first time from the African continent.' Permettez-moi de vous dire à ce propos, que l'espèce a été déjà recueillie en Egypte par M. Letourneux, il y a un certain nombre d'années, et envoyée par lui au Muséum de Paris, où je l'ai vue. Le fait a-t-il été déjà publié, ou est-il resté inédit? C'est ce que je ne saurais dire. Mais M. le Prof. A. Milne-Edwards, du Muséum de Paris, pourrait vous renseigner à cet égard et vous faire connaître aussi l'époque précise de la capture." Acting on M. Lataste's suggestion, I addressed myself to Prof. A. Milne-Edwards for the desired information regarding the specimens of *Spalax* from Egypt in the Paris Museum. I received the following reply:—

"Muséum d'Histoire Naturelle.
22 février, 1893.

"CHER MONSIEUR,—Nous avons reçu en 1879 des *Spalax typhlus*, envoyés d'Egypte par M. Letourneux. Ils portent sur nos catalogues les numéros 1614 à 1618, année 1879. L'un d'eux a été empaillé, et figure aux galeries de zoologie. Ils ont été capturés à Mariout.

"Je n'ai rien publié relativement à ces animaux.

"Croyez, cher Monsieur, à l'expression de mes sentiments très distingués.

(Signed) "A. MILNE-EDWARDS."

¹ Genus *Aspalax* of Aristotle.—In the 4th century B.C. this distinguished Greek scholar observed and described this peculiar animal, remarkable, as he has recorded, by the "total absence of an external eye," and he gives otherwise a very accurate account of the animal.

² Olivier quotes Aristotle both in Bull. Soc. Phil. 1801, and in Voyage dans l'Empire Othoman, l'Egypte, &c. 1804, t. ii. pp. 317–323, pl. 28; and it was the object of Olivier's 'Memoir' to show that the *Mus typhlus*, Gùldenstaedt, described by Pallas, was identical with the *Aspalax* of Aristotle.

M. Letourneux occupied the position of a Judge of the Mixed Tribunal Courts in Alexandria for some years previous to 1880, and he took a great interest in natural history pursuits. He found the *Spalax* at Maryut in 1877 in much the same locality as I did in 1892. It is much to be regretted that a description of the animal was not given by M. A. Milne-Edwards.

The History of the finding of the Spalax.

On the dry, hilly, or rather low undulating land near Lake Maryut, seven or eight miles to the west of Alexandria, there is a group of humble dwellings, chiefly inhabited by Bedouins, who gain a precarious livelihood from the cultivation of barley and other crops wherever a level spot occurs. The land consists of an exceedingly sandy loam, but never having the pure sandy characteristics of the desert; and in similar soil between Ramleh¹ and Mandara we had noticed that vines were being cultivated to a considerable extent. The wine of Maryut or Lake Mariotis was famous in olden times.

We had expected at this season, the month of April, to have found fair crops of barley, and the district gay with the flowers of Asphodel and other liliaceous plants, but there were only stunted patches of barley and the withered stems of Asphodel amidst the burnt-up grass. The rainfall of winter and spring, scant and uncertain at all times, had completely failed, and the surface of the soil was perfectly hard. However, it was noticeable here and there that the soil was marked by numerous little heaps of earth thrown out by some burrowing animal, many of these being quite fresh. Enquiries being made on the spot elicited the fact that the Arabs knew of a rodent inhabiting these burrows which they asserted was perfectly blind². As their word required confirmation, a promise of good reward was given, with the result that a living specimen was brought to me in a couple of days to the hotel in Alexandria. A personal visit was next arranged, and men were engaged to open some of the burrows and find out whether they were tenanted before my wife and I should arrive. This was ascertained by their observing after a time whether any fresh earth was thrown out. On our arrival we found that the Arabs had marked four such runs, and they immediately set to work to dig them up, one after the other. The runs were found to extend over a wide area, and in some parts of their course they were most intricate. In two of those opened, as many as three passages were found, all going off close together from the same side of the run, and some of these branched off again, for

¹ [This is interesting in view of Dr. Nehring's mention of an old specimen of *Spalax* in the Berlin Museum, labelled "Ramleh, near Alexandria."—G. S. A.]

² The name given to the animal by the natives, 'Abu Amma,' is literally "Father of the blind," and may be translated as "truly or essentially blind."

there were many branches in one system. One passage measured over thirty metres in length, measurements being taken from what might be called the fortress of the animal, which was excavated a metre in depth beneath the surface, and consisted of three separate small chambers, two of which were filled with the bulbs of some species of lily stored as food. Sixty-eight bulbs were taken out of these two chambers; the smallest bulbs measured 2 cm. in their greatest diameter, whilst others were considerably larger. One of the three chambers was empty and was said by the Arabs to be the sleeping-quarters of this mole-rodent. Similar storehouses were found in every other burrow opened, and each was filled with the same species of bulb, the presence of no other kind of food being observed. As this blind rat is said never to appear on the surface, the long burrows are doubtless constructed by it in search of food, to which it is probably guided by its acute sense of smell, and when a bulb is met with it is dragged into the passage and then to the storehouse. As these animals were being dug out we noticed these bulbs *in situ*. However, it was impossible to determine the species in absence of leaf and flower.

Our excursion to Maryut resulted in the capture of three living animals. These were with the least possible delay forwarded to England from Alexandria; but they died on the voyage, owing to the sand in their cages being impregnated with salt, which began to deliquesce in the moist atmosphere of the Mediterranean. Fortunately they were preserved as museum specimens, and are described in the tables of measurements. Later on, a second venture was more successful and two arrived at my house in London, where one lived under observation over three months. Meanwhile the artist Mr. P. J. Smit made the coloured sketch which is represented on the accompanying Plate. Bulbs were supplied to the *Spalax* out of the ordinary garden after the supply from Maryut was exhausted. It took them one by one, partially eating some and hiding the others in the soil; it apparently thrived, but one morning the food was observed not to have been touched, and as another day similarly passed, a search beneath was made and the animal was found to be dead. This is the specimen which furnished my description and is No. 140 of the tables of measurements (pp. 293-4).

Rear-Admiral Blomfield, Port Commissioner at Alexandria, informed me that four different kinds of grape-hyacinth occur at Maryut, one flowering in August, the others in March and April. Next spring, when we were again in Egypt, at Cairo, Professor Sickenberger brought us a plant in flower direct from Maryut, which he had plucked in the end of March. He called it *Muscari holymanni*, Heldreich, which he observed was recently united to *Muscari comosum*, Miller, the musk or grape-hyacinth.

Of the bulbs we had taken to England with us in June 1892 we had distributed a few to various friends in hopes that plants might be reared to show the flower. The

first to succeed was Mrs. Harry Coghill, who sent a good flowering plant¹ in July 1893, grown at Coghurst Hall near Hastings.

[The preceding observations on *Spalax* are given in nearly the same form in which they were left by their lamented author, and were mostly completed in 1893, when the animal was described and figured from life, in London.

M. Letourneux was readily accepted as the discoverer of the blind rat in North Africa, but as no description of any of his specimens was extant, when it became known to some of Dr. Anderson's zoological friends that he had prepared a description, he was urged to publish his remarks and give the animal a specific name, in anticipation of the issue of his forthcoming volume on the Mammals of Egypt. A local term had been suggested, but he observed that a determinative local name oftentimes had proved embarrassing, if not misleading; and in this he was afterwards justified, as he leaned to the opinion that the North African form would prove to be identical with that from Palestine, obtained by Canon Tristram, with whose specimens in the British Museum he had become familiar and had carefully compared with his own. It is not improbable that if the species had then been given a name, that of the distinguished clerical naturalist would have been associated with it.

However, as the Dervish disturbances in Egypt interfered with the collecting of Mammals, the work on that section was laid aside and the volume on the Reptiles was completed. Meanwhile the subject of the Spalacidae came to be taken up and treated exhaustively by Dr. A. Nehring, in a publication in which he discriminated several new species; and to a stuffed *Spalax* from Ramleh, in Lower Egypt, without name of donor, but in the possession of the Nat. Hist. Museum, Berlin, since 1878, he gave the specific name of *ægyptiacus*.

Dr. Nehring's paper was placed, without any notes, beside Dr. Anderson's MS. relating to *Spalax*. Likewise, a paper by Professor F. Sordelli², of Milan, "Sulla esistenza del genere *Spalax*, nell' Africa settentrionale" (Seduta 26 Nov., 1899), was enclosed with the other materials bearing on the subject. This paper was of much interest, as it extended the area of distribution on the N. African coast to the westward of Egypt, into Cyrenaica. In 1893, Dr. Anderson wrote to H.B.M.'s Consul at Benghazi, Tripoli, to ask if he could allow a Collector to be sent to get all kinds of small mammals in that neighbourhood—the rat-mole being specially kept in view; but the reply was discouraging, "the country (the true Cyrenaica) being too unsettled for carrying out such an object."

¹ Length of flower-spike about 12 inches. Stem a delicate green, giving off the small flower-stalks almost alternately, with a tiny stiffish bract, terminating in a yellowish-green margin. The terminal fourth of the stem is covered with imperfect flowers of a delicate violet tint, which are asexual and do not open and are very small, and become smaller and rather crowded at the apex, being spirally arranged.

This grape-hyacinth probably extends all over North Africa. It is common in Southern Europe.

² Atti Soc. Ital. Mus. Civ. Milano, 1899, p. 357.

In response to my request Professor Giglioli, of Florence, has been good enough to summarize thus Prof. Sordelli's conclusions :—"One specimen of *Spalax*, studied and referred to *S. typhlus* by Professor Cornalia, and considered *S. ægyptiacus*, Nehring, by Prof. Sordelli, exists (preserved in alcohol) in the Museo Civico at Milan, and it is *the* specimen collected by Signor Haimann at Ras-el-Ferg, in Cyrenaica (Tripoli), in or about 1882. Haimann thought he had got a Mole! Prof. Cornalia, who gave a list of the animals collected (printed in Haimann's 'Cirenaica,' p. 138, Roma, 1882), found that the supposed Mole was a *Spalax*, and said so in that list."—G. S. A.]

JACULIDÆ.

JACULUS.

Jaculus, Erxleben, Syst. Reg. Anim. 1777, p. 404.

Dipus, Gmel. Linn. Syst. Nat. 1788, p. 157 (partim).

Hind legs greatly elongated, with only three toes.

Dentition: i. $\frac{1}{1}$, m. $\frac{3}{3}$ = 16.

Incisors grooved.

On the Egyptian Jerboas in general.

The young Swedish naturalist and traveller, Frederick Hasselquist, arrived in Egypt from Smyrna in May 1750, and two months later visited the Pyramids of Gizeh¹, and on that occasion observed a jerboa, of which he appears to have obtained specimens, as he, in the very same month, sent a description of it in Latin to Linnæus², who communicated it to the Academy of Science at Upsala. Hasselquist called this jerboa "*Mus ægyptius pedibus posticis longissimis*."

In the following September he again visited the Pyramids and observed this animal for the second time. He left Egypt in the end of March 1751, but when in Smyrna in November of the same year he forwarded a paper in Swedish to the Stockholm Academy of Science³, describing it again under the popular name of the Egyptian Mountain Rat, and gave a figure of it. In the description of this jerboa in the Latin edition of his 'Travels'⁴, Hasselquist mentions that his "*Mus ægyptius* &c." was known to the French as the "Rat de montagne," and in his Swedish paper he says no Swedish name could be better than a translation of the French appellation. It is probable that the two papers refer to one and the same species, which in both descriptions he characterized as "*Mus pedibus posticis longissimis*."

The 'Iter Palæstinum' was not published until 1757, and Linnæus took a great deal of trouble with its publication. He says he digested the work in the best manner he could, ranged everything under its proper *tribe*, added *names* to plants and animals, altered the *technical terms* and manner of writing without changing in the least the author's meaning. He had the work corrected at the press and personally inspected its publication, all this being necessary as Dr. Hasselquist had died. Linnæus says:—

¹ 'Voyages and Travels in the Levant,' Engl. ed. 1766, p. 66.

² *Op. cit.* pp. 421, 427.

³ Acta Stockh. 1752, vol. xiii. pp. 123-4, fig. 1.

⁴ Iter Palæst. 1749-1752 (Stockh. 1757), p. 200.

"Our beloved Dr. Hasselquist wasted away daily like a lamp whose oil is spent, and departed this life at Smyrna, the 9th February, 1752, to the inexpressible grief of all who knew him." With this explanation of how the book came to be edited by Linnæus, we understand how Hasselquist is made to speak in his 'Iter Palæstinum,' p. 94, of his "*Mus ægyptius* &c." as *Mus jaculus*, a term for this Egyptian jerboa which he had never applied to it, since it was purely of Linnean origin, as Linnæus says in his preface that he had imagined it needless to add synonyms to the 'Iter Palæstinum,' as they might easily be found in the 10th edition of his 'Systema Naturæ,' in which he had introduced them, having described Hasselquist's specimens in that work.

The paper in Swedish, entitled "Die ægyptische Bergratte"¹, has priority given it by Linnæus over Hasselquist's first paper in the Upsala 'Acta,' doubtless because it was accompanied by a figure of the species.

In Hasselquist's original description the only information recorded regarding the size of the animal is "Magnitudo corporis media inter Spec. 6 et 8 Linn. Syst. Nat."; but in the 'Iter Palæstinum' it is stated "Magnitudo corporis ut in mure domestico majore," and the following dimensions are given:—"Mensuratio Cap. poll. 1; Corp. poll. $2\frac{1}{2}$; Caud. spith. $1\frac{1}{2}$; Post. ped., spith. $\frac{1}{2}$; Ped. anter. infra pollicem; Myst. longit. poll. 3." His second added nothing to his first paper.

In Lower Egypt I have met with two distinct species of jerboa, one larger than the other. The largest specimen of the smaller species that has passed under my observation was an old female with the teeth so worn that all the laminar cusps were obliterated, the crowns of the teeth being reduced by use to perfectly rounded surfaces. The head of this animal measured nearly 38 mm. in length, the body a very little over 63 mm. in length, the ears a little more than 13 mm. long, and the tail nearly 203 mm. long. This individual, with another of nearly similar dimensions, was captured for me alive at the Pyramids by some Bedouins, and I have observed many other specimens of this species from the same locality, where it is so common that I had only to signify my desire to be possessed, say, of twelve living examples, and they were brought to me in a couple of days by my Bedouin guide.

After a very careful consideration of Hasselquist's two descriptions of his specimens obtained at the Pyramids of Gizeh, and his measurements as quoted above, with the specimens obtained by me at the same locality, I think there can be no doubt that the latter are examples of *Mus jaculus*, Linn.

Hasselquist does not appear to have met with the larger Egyptian jerboa, as in his account of his visit to Alexandria and Rosetta he makes no mention of it; and I may state that during a residence at the Pyramids of Gizeh for a period of four weeks in December and three weeks in March and April, during which time I was constantly

¹ The Bedouins at the Pyramids of Gizeh call the small species of *Dipus* found there the rat of the *Gebel*, i. e. the rat of the desert or mountainous country, in contradistinction to the level valley of the Nile.

urging the Bedouins to bring to me all the mammals they knew to occur in the neighbourhood of the Pyramids, the only jerboa I obtained from them was the smaller species. It was not until I had commenced my observations on the fauna around Alexandria that I became acquainted with the larger species, which is there even more abundant than the smaller form is at Gizeh, but the latter I never observed at Alexandria. If the larger species does not occur at the Pyramids, then there can be no doubt whatever that *Mus jaculus*, Linn., is the smaller Egyptian jerboa.

Olivier¹, while in Egypt, directed his attention to the jerboa found in the environs of Alexandria, which he described under the name *Dipus gerboa*². Numerous examples of a large jerboa, common in the country surrounding Alexandria to the east and west, on high land beyond the direct action of the Nile inundations, were examined by me and were frequently dug out of their burrows on the stony low hills about Ramleh. This species is undoubtedly the *Dipus gerboa* of Olivier, and is the only species of the genus, as far as I could ascertain, that occurs in that part of the Delta of the Nile. It is very much larger than the smaller species of the outskirts of the Libyan Desert at the Pyramids of Gizeh; and when seen at rest, seated on the ground, with its body drawn together, it reminds one of a diminutive hare in its general colour, form, and large ears.

Olivier fortunately described some parts of the anatomy of this animal, and among the features which caught his attention as being remarkable, which it certainly is, was the formidable armature of the penis, the dorsum of the glans being provided with two remarkable curved horny spines, measuring 9 mm. in length, the rest of the glans being covered over with spines of varying sizes. In the smaller form from Gizeh the structure of the glans penis is entirely different, as it is destitute of spines, and, indeed, so far from being armed with such structures, it is covered with a multitude of minute pits, in each of which lies a small scale, adpressed to the bottom, but with a toothed free border. The glans itself also differs in the form of its lobes, and by this structural difference the two species are sharply defined one from the other.

The first figure of the large species was published a few years after Hasselquist's visit to Egypt. It is found in Edwards's 'Gleanings of Natural History'³, where we are told that it is a life-sized representation of the species. This figure, although very imperfect from an artistic point of view, is still undoubtedly intended for the larger species; it was drawn from a specimen living in London, and it was probably from this figure that Pennant⁴ derived his knowledge of the Egyptian jerboa, although in his synonymy he did not distinguish between it and the smaller species.

¹ Voyage dans l'Empire Othoman, t. ii. (1804) pp. 42, 43.

² Bull. de la Soc. Phil. t. ii. 1801, p. 121.

³ Vol. v. 1758, pp. 18-19, pl. 219.

⁴ Hist. of Quad. vol. ii. 1793, pp. 164-166.

Lichtenstein in 1823¹ gave a short description of two species of Egyptian jerboas, viz. *Dipus bipes* and *D. hirtipes*, the former said to inhabit Egypt, and the latter the Desert of Sakkarah; the first was the animal originally described by Olivier, and the second that first described by Hasselquist.

In 1828, in his Monograph of the *Springmäuse*², Lichtenstein indicated two species from Egypt—the one under the name *D. ægyptius*, Hempr. & Ehrenb. (which was most probably a manuscript name of these authors, as I have not been able to find in their writings any jerboa described by them under this term), and the other as *D. hirtipes*; the former being the larger and corresponding to his *D. bipes*, a term which does not occur in his Monograph, and the other the smaller species already indicated by him in 1823. It is evident from Lichtenstein's description of the feet of *D. ægyptius* that it is not the *Mus jaculus*, Linn., but the jerboa of Olivier, which this traveller says was regarded by the ancients and moderns as a biped animal. Olivier saw it frequently in the environs of Alexandria, just as I have observed it there a century later, and the description in the third volume of his 'Travels' leaves no doubt whatever of the identity of his *Dipus gerboa*.

Over the bare area of the nose of *Jaculus* there is a thickened fold of skin capable of being drawn forwards so as almost to cover the nostrils, this structure serving to protect them when the animal is using its broad snout to push out the earth when making its burrow.

One of the leading features of the skull of *Jaculus* is the great size of the infra-orbital foramen and the development of the preorbital wing-like processes of the malar surmounted by the expanded lachrymal. These modifications of the area in front of the orbital cavity have reference to the habits of the animal, and serve to protect the eye when the head is used to shovel out the soil from its burrows. The digging is done by its seemingly feeble anterior extremities, the loosened sand being swept back by the brushes of the hind feet.

The skulls of the two species manifest the same differences that are observable in the head of the living animal, namely, the greater breadth across the conjoint areas of the infraorbital foramina, and also the greater interorbital breadth in the larger as compared with the smaller species. The difference in the size of the two species is also well exemplified in the dimensions of their skulls in the adult state.

[Notices of the jerboa date from the earliest historic times, Herodotus, Theophrastus, and Aristotle being among the earliest writers. Bruce has an excellent chapter on the subject in his 'Travels.' Sonnini (Voy. Egypte, i. 1798, chap. xi. p. 156) gives a most complete anatomical description of the animal, and preceded Olivier in noticing the extraordinary armature of the glans penis of the large species.

¹ Verz. Doubl. p. 5.

² Abhandl. königl. Akad. Berl. 1828, pp. 151, 152.

The synonymy of the Jerboas is very complicated, for none of the earlier writers distinguished between the different species, and even embodied the five-toed *Alactaga* in their descriptions. The synonymy given below for the several species is confined to notices relating more particularly to specimens from Egypt. Lataste identifies certain Jerboas from Algeria and Tunisia with the Egyptian species, setting aside names which had been bestowed on these local forms, but the absolute identification should be received with caution. At the same time it may be remembered that *Jaculus mauritanicus*, Duvernoy (Mém. Soc. Hist. Nat. Strasb. iii. 1842, p. 30), from Oran, is allied to *Jaculus orientalis*, Erxl., and *Jaculus desertii*, Levallant (Loche, Explor. Algér. 1867, p. 100), to *J. jaculus*, Linn.—W. E. DE W.]

JACULUS JACULUS, Linn. (Plate LIII.)

“*Mus ægyptius*, &c.,” Hasselq. Act. Soc. R. Sc. Upsal. 1750, p. 17; id. Act. Stockh. 1752, p. 123, t. 4. fig. 1.

Mus jaculus, Linn. Syst. Nat. x. 1758, p. 63.

Dipus hirtipes, Licht. Verz. Doubl. 1823, p. 5; id. Abh. k. Akad. Wissensch. Berl. 1825 (1828), p. 152, tab. iv.; id. Darst. 1827, tab. xxiv. fig. sup.

Dipus (Haltomys) hirtipes, Brandt, Bull. Acad. St. Pétersb. 1844, p. 215.

The snout is not quite so truncated as in the large species and the cheeks are less prominent. The ears are proportionately much shorter, since when laid forwards they only pass beyond the anterior angle of the eye by 2 or 3 mm., or even less; they are also somewhat narrower, and the posterior border above is more rounded. The ears are finely clad with hairs internally, and along the anterior border there is a fringe of long hairs gradually becoming shorter towards the upper margin, where they are not more than 1 mm. long. The backs of the ears appear nude to the naked eye, but they are in reality very sparsely covered with minute hairs. The thumb is minute, but furnished with a flat nail. The claws of the other fingers are long, curved, and sharp. There is a large palmar tubercle immediately behind and external to the thumb, with another but smaller tubercle external to it, the portion of the palm immediately before them being swollen. There are long hairs immediately behind these tubercles, and the upper surfaces of the toes are finely clad with long, outwardly curved, white hairs. The palm itself is perfectly nude, but on the sides of the fingers there are a few white hairs curving inwards. The three toes of the hind foot are more laterally compressed than in the other species, and this is especially observable in the cushions below the nails. The claw of the middle toe is feebler, and only about half the length of that of the inner toe, which, with the outer, is broad, bare, flat externally, and

slightly concave internally; the inner toe is slightly shorter than the outer. At the base of the proximal phalanx of the middle toe there is a minute white tubercle. From the side of each toe to the base of each phalanx a brush of long white hairs is directed forwards, so that the foot is a regular brush, the only portion that is bare being the fronts of the toe-pads and the restricted area immediately around the minute tubercle in the centre of the hairy foot. The metatarsal area is moderately covered with white hairs, which come towards each other along the outer surface of the metatarsal bone. The lower half of the tibial joint is also very sparsely covered with short hairs.

The snout generally, with the exception of the limited bare surface of the nose and the narrow groove leading downwards to the cleft of the incisors, is densely covered with white hairs, shorter and directed forwards on the middle of the snout, much longer and directed outwards and forwards on the sides. Behind them are the moustachial hairs, generally all white, with the exception of a few black ones. The most posterior of the moustachial hairs is very thick at its base, a true bristle, and springs from a prominent papillary eminence; it is generally as long as the body of the animal and is pure white.

General colour of the dorsal surface pale sandy fawn, the hairs being finely tipped with black, more heavily towards the loins, while on the head the black tips are exceedingly minute. On this dorsal area, which stops short of the root of the tail, the base of the fur is bluish grey; on the sides, the rump, and all the lower parts of the head and body, with the exception of the outside of the thighs, the base of the fur is pure white. The fawn-colour does not extend on to the moustachial area, nor between it and the eye, nor above and below the eye, all of which are white; but behind the eye there is more or less fawn, and the hair is grey basally, but posterior to this on the sides of the body the extreme points of the fur only are washed with fawn, with almost microscopic black tips; on the outside of the thighs, where the fur is grey at the base, the fawn is stronger; the base of the tail and all the rump are pure white, and a white band is directed forwards across the thigh. The under parts, the fore limbs, and the feet are pure white. The outside of the ears is sparsely covered with short hairs. The anterior margin of the ear at the base of the conch is clad with moderately long hairs for the protection of the orifice. The skin of the upper half of the conch, externally, is pale brown, but the lower half is fleshy white, and there is a tuft of white hairs behind the ear. The tail is more or less quadrangular in transverse section, and is densely covered on the upper surface, for three-quarters of its length, with short yellowish-fawn hairs, the under surface being nearly white. The longer hair, sagittally arranged, is pure white for about 30 mm. at the extremity of the tail, the proximal portion of this feather-like tip being blackish brown for about 45 mm.

JACULUS JACULUS.

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	Beltim.		Pyramids. ♂ (figured).
	♀.	♀.	
	mm.	mm.	mm.
Snout to vent	105	105	111
Vent to tip of tail	156	175	180
Length of head	35	35	34
Height of ear	16·5	18	18
Breadth of ear	13	13	15
Length of hind foot, without claw . . .	59	55	59
Snout to eye	...	...	21
Eye to ear	...	...	11
Diameter of eye (longitudinal)	...	...	10
„ „ (vertical)	...	...	9
Posterior moustachial bristle	...	...	99
Weight	...	...	2 oz. 12 grs.

Measurements of skull:—Greatest length 34 mm.; greatest breadth of anteorbital malar processes 24·5; breadth outside auditory meatus 23; length of nasals 13; height of infraorbital foramen 7, breadth of infraorbital foramen 4·5; basal length 28; length of incisive foramina 4; length of molar series 5.

This species probably occurs in suitable localities in the Nile Valley as far south as Shendi. However, specimens from different districts are needed to work out the ranges of the several species satisfactorily.

JACULUS ORIENTALIS, Erxleb. (Plate LIV.)

Jaculus orientalis, Erxleben, Syst. Reg. Anim. 1777, p. 404.

Dipus jaculus, Gmel. Linn. Syst. Nat. 1788, p. 157 (partim, nec Schreb.).

“*Jerboa*,” Bruce, Travels, vol. v. App. 1790, p. 121, pl.

Dipus sagitta, Schreb. Säug. iv. 1792, p. 849 (partim, nec *Mus sagitta*, Pall.).

Dipus abyssinicus, Meyer, Syst. Zool. Entdeck. Neuholl. u. Afrika, 1793, p. 86.

Dipus gerboa, Olivier, Nouv. Bull. Soc. Philom. ii. 1801, p. 121; Desm. Encycl. Méth., Mamm. 1822, p. 316.

“*La Gerboise*,” Olivier, Voy. Emp. Oth. ii. 1804, p. 42.

Dipus bipes, Licht. Verz. Doubl. 1823, p. 5.

Dipus locusta, Illig. ap. Licht. Abh. k. Akad. Wissensch. Berl. 1825, p. 152.

Dipus ægyptius, Licht. Abh. k. Akad. Wissensch. Berl. 1825 (1828), p. 151, tab. i.; id. Darst. 1827, tab. xxii.

Dipus (Haltomys) ægyptius, Brandt, Bull. Acad. St. Pétersb. 1844, p. 215.

The snout is rather broad and short, rapidly increasing in breadth before the eyes.

The forehead is convex. The ears are large, broad, and placed relatively closer to the eye than in the other Egyptian species ; when laid forwards they reach to the middle of the moustachial area, and to the upper margin of the opposite eye when laid across the head, whereas in the other species they fall far short of that distance, just crossing the mesial line of the head. The anterior margin in its upper half is nearly straight, but directed obliquely backwards, while in the small species it is rounded. The anterior border of the ear nearly up to the rounded summit is fringed with rather long, dark brown hairs, curving inwards to the conch-cavity, the summit and rounded posterior border of the ear being fringed with minute hairs increasing in length towards the orifice of the conch, where they become long and silky, but erect. The inner surface of the ear is covered with fine, white, adpressed, silky hair, but not sufficiently dense to obscure the skin, and the outer surface is covered in a similar manner, but with yellowish hair, which is much more dense along a narrow band close to the anterior border. The skin of the ear on both surfaces, in its upper two-thirds, is clearly marked off by its colour from the lower third, which is white ; the upper two-thirds are black behind, but of a leaden colour in front. The thumb is small, but with a well-developed flat claw. The third finger is very slightly longer than the fourth, and the second than the fifth. The claws are rather long, curved, and sharp. Posterior to the thumb there is a very large tubercle, with a smaller one external and slightly anterior to it, the palm immediately in front being swollen, but concave further in advance. Behind these tubercles there are short white hairs partially curving over them. The palm itself is perfectly nude, but the dorsum of the hand and the sides of the fingers are more or less covered with downwardly curved white hairs. The toes of the hind foot are more or less laterally compressed. The middle toe is the longest, with a feeble claw ; the inner toe is somewhat longer than the outer ; the claws on both are short and stout, flat internally and convex externally. The sides of the toes, up to the distal end of the common metatarsal, but more especially their under surfaces, with the exception of the fronts of the subungual pads, are clad with strong, brush-like hairs, directed obliquely forwards, and curving inwards on the sole of the foot to the mesial line, where a prominent ridge is formed. The hairs from the sides of the toes and cushions are white ; those on the under surface of the phalanges dark brown. The upper surface of the foot from the heel downwards is covered, but not very thickly, with short white hairs. The under surface of the tarsus in the mesial line is semi-nude, but is more or less obscured by the hairs from its sides, which curve inwards and forwards. Immediately behind the base of the middle toe there is a small bare area on the sole hidden by the inwardly curving hairs of the foot-brushes, at the back part of which there is a somewhat sharply pointed, rather prominent tubercle. The lower third of the tibial portion of the leg is sparsely clad with reddish-yellow hairs. The tail is more or less quadrangular in transverse

JACULUS ORIENTALIS.

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section, and is covered, but not very thickly, with short greyish-yellow hairs above, and almost white hairs below. The long hairs on the terminal fourth of the tail are arranged sagittally, about 30 mm. of the tip being white, and 50 mm. in front of this brownish black.

The nose and the groove leading to the cleft of the incisors are nude. The moustachial hairs are well developed, and there is a strong and long bristle placed posteriorly as in the other species, but not quite so long.

The general colour of the upper surface is sandy fawn, mottled with black, somewhat similar to that of the European hare; the variegated appearance is due to the black tips and broad subapical yellow bands of the hairs amalgamating in patches. Along the sides of the body to the outside of the thigh the colour is reddish fawn, and although in this area the black tips to the hairs are extremely short, the fur is here and there streaked with irregular black lines where these minute black points come together. On the dorsal area and the outside of the thighs only the base of the fur is bluish grey, on all other parts it is white. On the upper portion of the tibial region the hairs are long, silky, and reddish-yellow fawn, the black tips being obsolete. The cheeks behind the moustaches, the whole of the under surface of the animal, the fore limbs from the elbows, the inner side of the thighs, the upper surface of the metatarsus, the hairs at the base of the tail, and a broad stripe from the latter on to the thighs below the distal end of the femur are white. The short hairs immediately above the bare area of the nose are black-tipped, while those from the moustachial area to the eye, those below the latter, a narrow area above it and also more or less behind, are paler than the rest of the head, being greyish white, but not clearly defined from the surrounding colour. The margin of the eyelids, the eyelashes, and long sensory hairs are black. The longest moustachial hairs are dusky at the base and silvery white distally.

In the young the areas of colour are well defined, so much so that they recall the particoloration of young birds. The area between the eyes is dark brown, due to the presence of very black hairs among the fawn-coloured ones, while anteriorly the muzzle is almost golden; the top of the head and the back of the neck to between the shoulders are also golden fawn; behind this, the back to the white root of the tail is brownish black, and this colour is clearly defined across the femur by the position of the white stripe, which, however, is not so well defined as in the adult. The hinder parts of the thighs and the outside of the upper part of the tibial portion of the legs are greyish brown, due to the presence of very short blackish hairs. The whole of the under surface of the tarsus and a small area at the base of each toe is clad with blackish-brown hairs, the hairs on the remainder of the toes being white. The quadrangular character of the tail is well seen in the young, and on the areas on which the blue-grey and white under-fur occurs the skin partakes of the same colours.

Measurements.

	♂. mm.	♂. mm.
Snout to vent	151	147
Vent to tip of tail, without hairs	226	235
Length of head	41	41·3
Height of ear from anterior border of meatus	28·2	27
Length of hind foot, without claws	77	76

Measurements of skull:—Greatest length 39 mm.; greatest breadth of ante-orbital malar processes 29; breadth outside auditory meatus 25·5; length of nasals 13·5; height of infraorbital foramen 11, breadth of infraorbital foramen 6; basal length 32; length of incisive foramina 5·5; length of molar series 6·5.

The neighbourhood of Alexandria is the only locality within our bounds from which this species has been recorded. The same or a nearly allied form occurs also in Tunis and Algiers. At Ramleh great numbers are to be seen in the evening and on moonlight nights.

[In the neighbourhood of Suez there is a third species of jerboa, probably *J. macro-tarsus*, Wagner (Abh. Ak. Wiss. München, iii. 1843, p. 214, pl. iv. fig. 2).

Dr. Anderson has the following note on specimens taken to the "N.E. of the Suez Canal":—"Ears larger and broader than in specimens of *J. jaculus* from the neighbourhood of the Pyramids. Measurements of female: snout to vent 113 mm.; vent to tip of tail, without hair, 185; length of head 35; height of ear 23, breadth of ear 16; hind foot without claws 64. A male was slightly larger."

Mr. Th. Meyer, German Consul at Suez, has kindly sent three specimens in alcohol—"Appelés par les Bedouins 'Gerbouh.'" The material at my disposal is, however, wholly insufficient to go further into the subject, as there are no specimens from other parts of Egypt with which to compare them, the numerous specimens mentioned by Dr. Anderson not having been preserved.

A jerboa, without the conspicuous white band on the feather-like portion of the tail, has been recorded from Sennaar by Reichenow, in the Zool. Anz. x. 1887, p. 369, under the name of *Dipus microtis*.—W. E. DE W.]

SCIRTOMYS.

Scirtomys, Brandt, Bull. Ac. St. Pétersb. ii. 1844, p. 220.

Four toes on the hind feet.

Dentition: i. $\frac{1}{1}$, pm. $\frac{1}{0}$, m. $\frac{3}{3} = 18$.

Incisors without grooves.

SCIRTOMYS TETRADACTYLUS, Licht.

Dipus tetradactylus, Licht. Verz. Doubl. Berlin, 1823, p. 2; id. Abh. k. Akad. Wissensch. Berl. 1825 (1828), p. 153, tab. iii.; id. Darst. 1827, tab. xxiii. fig. inf.

Scirtomys tetradactylus, Brandt, Bull. Acad. St. Pétersb. ii. 1844, p. 220.

Lichtenstein indicated a species of jumping desert-rat which he designated *Dipus tetradactylus*, "e deserto Libyco inter Sivam et Alexandriam."

The unique example of this species is preserved in the Berlin Museum, and I am indebted to Mr. Matschie for having been permitted to examine it.

This animal is intermediate in size between *Jaculus jaculus* and *J. orientalis*, with long pointed ears; they are longer, more pointed, and narrower even than in *J. orientalis*. It is coloured much the same as the latter. The tail seems to be relatively shorter than in either of these species, but is marked the same way at the extremity. The first or inner toe is entirely wanting, as in *Jaculus*, but in *Scirtomys* the outer or fifth toe is found, though quite functionless, on the outer side of the tarsus, considerably removed from the other toes.

	mm.
Snout to vent	118
Vent to tip of tail	150
Height of ear	32.5
Breadth of ear, approximate	15
Length of tarsus	57
Distance of origin of fifth toe above extremity of middle toe	31.8
Length of fifth toe, without claw	7

The upper incisors are perfectly smooth. In *Scirtomys*, besides three upper molars, there is a premolar, absent in *Dipus*: this tooth is very small, unicuspidate, and conical.

The preorbital prolongation of the malar is very feeble, as also is the process of the maxillary, so that the exterior boundary of the preorbital foramen is reduced to little more than a vertical rod, these parts in *Jaculus* forming a broad widely projecting plate. The interorbital region compared with that of *Jaculus* is somewhat narrow.

HYSTRICIDÆ.

HYSTRIX.

Hystrix, Linnæus, Syst. Nat. x. 1758, p. 56.

Form heavy, tail and legs short, plantigrade.

Muzzle very deep, ears short and rounded.

The fore parts, the under surface, and the legs are covered with short spines; the nape to the shoulder with long, tapering bristles. From the shoulders backwards the body is covered with strong rigid spines. At the end of the short tail there is a bunch formed of small, sharp, rigid spines, and hollow, inflated, open-ended quills with thin hair-like stalks.

In the skull the nasal cavity is greatly enlarged; the brain is of peculiar structure.

Dentition: i. $\frac{1}{1}$, pm. $\frac{1}{1}$, m. $\frac{3}{3} = 20$.

HYSTRIX CRISTATA, Linn. (Plate LV.)

Hystrix cristata, Linnæus, Syst. Nat. x. 1758, p. 56; id. ibid. xii. 1766, p. 76; Erxleb. Syst. Reg. Anim. 1777, p. 340; Schreb. Säug. iv. 1792, pls. 166, 167; F. Cuv. Mém. Mus. ix. 1822, p. 430, pl. 20 *bis*, figs. 1, 2; id. Mamm. 1821, pl. 269; Waterh. Mamm. ii. 1848, p. 448; Sclater, Proc. Zool. Soc. 1871, p. 233; *et auct.*

Acanthion cuvieri, Gray, Proc. Zool. Soc. 1847, p. 102.

The head, legs, and all the under parts are black or brown-black, with the exception of a crescent-shaped band of white-pointed spines on the chest. From the crown of the head to behind the shoulders, where the long quills commence, there is a high crest of long, finely tapered, flexible bristles, dusky or black for a variable distance basally, with white tips. On the fore part of the back some of the large quills are very long and curved, reaching to beyond the tip of the tail; on the hind-quarters the spines or quills are very strong; they diminish in length towards the base of the tail, then again become longer and very strong; the short tail, which is hidden among these strong spines, has a bunch of stalked, hollow-ended quills, which cause a curious rustling noise when the animal moves, or which rattle among the clattering of the spines when the animal is excited. All the quills are black and white in broad rings, or white basally and black distally, but variable.

Measurements of an adult female from the hills behind Suakin:—Snout to vent 650 mm.; vent to tip of tail 100; length of tarsus 100; snout to eye 81; length of eye 11; eye to ear 40; height of ear 42.

HYSTRIX CRISTATA.

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Measurements of skulls of specimens from Suakin.

	mm.	mm.
Greatest length (pmx. to occiput)	140	130
„ breadth	77	72
Vertical depth (palate to highest point of nasals)	61	57·5
Length of nasals	81·5	75
„ frontals, middle line	22·5	24
Basal length	125·5	114
Palatal length	69·5	61·3
Molar series	34	30·5 ¹

Within our boundary, Suakin is the only locality from which Porcupines have been recorded.

Rüppell (Reise Nub., Kordof., &c. 1829, p. 123) mentions porcupines among the animals observed on the route from Debbeh by Simrie and Haraga to El Obeid; and Heuglin (SB. Ak. Wissensch. Wien, ix. 1852, p. 917) also mentions the animal in Bayuda Province. Specimens are necessary before the species can be determined.

The porcupines from Southern Europe, the whole of Africa, and Asia as far as the peninsula of India are almost indistinguishable outwardly; the species are separated with certainty only by the formation of the skull.

In 1894 Dr. Anderson presented a living specimen from Suakin to the Zoological Society of London, and from this specimen the Plate has been drawn. This animal is still living in the Gardens at Regent's Park, side by side with specimens of the distinct species—according to the skull—from South Africa, but it is quite beyond my power to find any character by which to separate these specimens outwardly. The amount of white on the crest is variable.

The Crested Porcupines are readily separable into well-marked races by their skulls. In Southern Europe, North Africa, probably Asia Minor, and the neighbourhood of Suakin they all agree in being of rather small size, with the nasals moderately arched and extending back to above the posterior half of the temporal fossæ, the ascending process of the premaxilla rather narrow, and the process of the maxilla forming the outer wall of the infraorbital foramen narrow and very slightly inflated. This form is known as *H. cristata*, Linn.; but if further evidence shows the North-African porcupine to be distinct from the Italian, it would have to take the name of *H. cuvieri*, Gray, Linnæus having based his description of *H. cristata* upon the porcupine of Southern Europe.

Hystrix senegalica, F. Cuv., is a larger form, confined to Western Africa. This species is distinguished by still greater developed nasals, both in length and breadth;

¹ Permanent pm. not yet up.

the process of the premaxilla narrows posteriorly before joining the frontal; the outer wall of the infraorbital foramen is broad and inflated.

In *H. africa-australis*, Peters, from South Africa, the nasals are shorter than in either of the foregoing forms; otherwise the skull nearly resembles that of *H. senegalica*.

H. galeata, Thomas, is by far the largest of all the Crested Porcupines. It was first described from British East Africa, but Mr. A. E. Pease has lately found it in the Hawash Valley in Abyssinia. It differs from all other species in having a longer palate, the posterior narial opening being level with the back of the last molars, whereas in all the others the palate ends on a level with the back of the second molars. The premaxilla sends up a broad process to meet the frontal, the suture is placed about equidistant from the anterior and posterior extremities of the huge, dome-like nasals. The maxilla is very broad and greatly inflated in the outer wall of the infraorbital foramen.

Hystrix indica, Gray, differs greatly in the form of its skull from any species found on the African continent. It ranges as far west as Aden, and is there very plentiful. The skull is narrow and flat, the nasals are truncated posteriorly and only extend slightly further back than the junction of the premaxillæ and frontals. The premaxillary process is extraordinarily broad and actually embraces the lachrymal. The maxilla in front of the orbit is narrow, thin, and solid.—W. E. DE W.

Suborder *DUPLICIDENTATA*.LEPORIDÆ¹.

LEPUS.

Lepus, Linn. Syst. Nat. x. 1758, p. 57.

This genus contains the Hares and the Rabbit, and, so far as existing forms are concerned, constitutes the family Leporidæ. This, with the Pikas (*Lagomyidæ*), forms the suborder, which is distinguished by having a second pair of small incisor teeth in the upper jaw placed behind the large cutting-teeth characteristic of the order. The members of this suborder also differ in many other respects from other rodents.

The clear definition of the different species of Hares is a matter of great difficulty. Proportions of ears and limbs change with age, the teeth are all of persistent growth, and the skulls give no reliable records, the sutures of the different bones being so variable in individuals belonging to the same species.

Dr. Forsyth Major has shown (Trans. Linn. Soc. 2nd ser. Zool. vii. p. 433, 1898) that the Hares may be classified to a certain extent by characters of the teeth; and, indeed, very valuable help in distinguishing and showing the affinities of the various species will be found in the character of the infolding of the enamel which forms the groove on the front of the upper incisors. This character is easily discerned by examining the cutting-face of the teeth with the aid of a lens, when the fold of enamel will be seen to penetrate in variable pattern according to species, and to be generally filled with cement. In the Hares with which we are now dealing these grooves are comparatively simple, but in some Indian species in particular the pattern of the fold is very complicated.

According to Champollion (Syst. Hierogl. 1826, p. 36) the hare was the symbol for the letter S in the ancient hieroglyphic writing. The Coptic name for this animal is 'Saragousch'; Arabic name 'Aerneb.'

Hares occur in various Hunting-Scenes on the Monuments, *e. g.* at Abusir and Sakkarah; they are also depicted in colours at Beni Hasan, and one very good Hare, coloured reddish-brown, is figured from Deir-el-Bahari by Mr. F. Ll. Griffith in his "Memoir on Hieroglyphs"². There is a fine Hunting-Scene at Thebes, probably of the XVIII. Dynasty, well portrayed in Prissé's 'Art Egyptien,' t. ii. pl. 24, in which a hare is being held by its ears.

¹ Except when otherwise stated, the chapter on the Hares is written by W. E. de Winton.

² Arch. Survey of Egypt, 6th Mem. pl. i. fig. 2.

LEPUS ÆGYPTIUS, Desmar.

“ Lièvre d’Egypte,” Geoffr. & Aud. Descr. Egypte, Atlas, 1818, pl. vi. fig. 2.

Lepus ægyptius, Desmar. Mamm. 1822, p. 350; Is. Geoffr. Dict. Class. ix. 1826, p. 381; E. Geoffr. & Aud. Descr. Egypte, Hist. Nat. ii. 1829, p. 739; ed. 8vo, 1829, Hist. Nat. vol. v. p. 196; Hemp. & Ehrenb. Symb. Phys. 1832, pl. xv. fig. 1; Wagner, Schreb. Säug. Suppl. iv. 1844, p. 90; Waterhouse, Mamm. ii. 1848, p. 85.

Sex? Province of Gizeh. Dr. Walter Innes, Bey.

♂. Eastern Desert, Assuan, „ „

♂. Western „ „ „ „

♀. Birket-el-Kerun, Fayum. Dr. C. W. Andrews.

Largest of the Egyptian hares. Ears enormous, measuring fully $1\frac{3}{4}$ times the length of the head. Legs very long and thin, feet long and narrow. Fur rather short, without conspicuous longer hairs. General colour rather greyish, the front of the head more rufous, the nape rufous fawn; the ears margined with yellowish-white hairs on both borders for two-thirds of their length, the apical third brightish yellow-fawn edged with black; a well-marked black tip on the hinder surface. The tail is rather long, the black on the upper side slightly mixed or bordered with brownish. The legs more fawn-coloured than the body, but slightly grizzled with darker tips to the fur.

The fold of enamel on the front of the upper incisors is rather deep, the sides slightly bowed out and the inner point inclined outwards, almost wholly filled with cementum showing a very shallow groove.

Measurements taken from specimens freshly preserved in alcohol.

	♂. Near Assuan, ♂. Near Assuan, Western Desert. Eastern Desert.	
	mm.	mm.
Head and body	400	430
Length of head	94	97
Breadth of head	43	45
Ear from notch	133	142
„ crown.	165	168
Breadth of ear	76	80
Tail.	103	104
„ with hair	125	135
Hind foot	107	111
„ with hair	114	116
Tibial joint	138	143
Forearm and hand	154	160

Measurements of skulls.

	♂. Assuan, W. Desert.	♂. Assuan, E. Desert.	♀. Birket-el- Kerun.
	mm.	mm.	mm.
Greatest length	85.5	90	85
„ breadth	40	40	41.5
Basal length	69	75	68
Front of incisors to back of palate	33.5	31.5	32
Length of molar series (alveolar)	14	15	16
Anterior point of zygoma to front of incisors .	31.5	33	32.5
Length of snout, middle line of nasals from central imaginary point	35	39.5	36
Breadth of face outside posterior processes of premaxillæ	22	23.5	24.5
Breadth of nasals anteriorly	11.5	13	13

Etienne Geoffroy St.-Hilaire first described the Egyptian hare as a distinct species from specimens obtained during the French Scientific Expedition 1798-1802, but unfortunately his work was not published for many years afterwards, so that Desmarest gets the credit of having named the species. From the description and measurements he gave, there can be no doubt that the very long-eared hare, light in form and greyish in colour, was the animal that Geoffroy had before him. Since that time very few hares from Lower Egypt have found their way into the Museums of Europe, and it was with very great surprise that I discovered that three quite distinct species are there represented. One would think that it would have been an easy matter to obtain such animals as hares from a country so easily accessible; but this was found to be far from the case, and although Capt. Flower made considerable efforts to procure material, other engagements prevented him from looking after the proper preservation of the specimens, so that when they reached this country they were in such poor condition that specific identification was impossible.

The Hon. N. Charles Rothschild offered to help, and with the aid of a native shikari specimens were obtained. These, however, were so unlike the description given by Geoffroy and Audouin that it was very evident that the true *L. ægyptius* had still to be sought for. Dr. Walter Innes, Bey, then very kindly made efforts to obtain material, and to my still greater surprise specimens of a distinct short-eared species arrived, and it is not till now (May 1902) that the problem has been solved by further specimens from the same contributor. These all arrived in the most perfect state of preservation and prove that there are three very distinct species of hares to be found living within a short distance of Cairo. It will be highly interesting to know the habits of these different species, and it is to be hoped that the publication of this work will encourage research and interest in the habits of the animals of the country.

LEPUS HABESSINICUS, Hemp. & Ehrenb. (Plate LVI.)

Lepus habessinicus, Hemp. & Ehrenb. Symb. Phys. 1832, pl. xv. fig. 2; Waterhouse, Mamm. ii. 1848, p. 87.

Lepus aegyptius, Cretzschm. Rüpp. Atlas, 1828, p. 53; Blanford, Geol. Zool. Abyss. 1870, p. 273.

— Suakin Plain. Head preserved in alcohol.

— Suakin Plain. Capt. Henderson, R.N. (Figured.)

♂. Suakin. Dr. Foot.

Size rather small, form slender. Ears moderate, measuring about $1\frac{1}{3}$ times the length of the head. Legs and feet moderate, rather slight. Fur rather short, without conspicuous outstanding hairs.

General colour dark grey, strongly washed with black all over the dorsal area and head. The nape rufous fawn. The ears almost naked over the general surface; the margins buff-white, except near the tips, where they are yellowish; black tips on the posterior sides. The tail with yellowish borders to the black on the upper side. The legs paler and more fawn-coloured than the body, but somewhat grizzled.

The specimen from which the Plate was drawn is in very worn coat, and the rich black-brown tips to the fur which are present in the normal condition have almost entirely disappeared; the whole of the under parts are also much damaged.

Dr. Anderson made the following note from specimens freshly obtained:—

	mm.	mm.
"Snout to vent	415	370
Vent to tip of tail	90	78
Height of ear, external meatus	100	102
Height of ear behind	135	124
Length of tarsus and digits	95	91
Snout to eye	40	37
Length of eye	18	17
Eye to external meatus	45	49

"In the young the ears are short and there is a small black spot on the hinder surface of the ear below the tip.

"Common on Suakin Plain."

In form and coloration this hare somewhat resembles *L. aegyptius*, but the ears are very much shorter and the colour very much darker. The pattern of the enamel fold in the incisors also is practically the same in the two species, and there is no doubt that they are nearly allied.

LEPUS HABESSINICUS.

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Measurements of skulls.

	♂. Suakin. Dr. Foot.	♀. Zoula. Brit. Mus. No. 69.10.24.14.
	mm.	mm.
Greatest length	83	86.5
„ breadth	...	39
Basal length	67	70
Front of incisors to back of palate	34	36.5
Length of molar series (alveolar)	14.5	15
Anterior point of zygoma to front of incisors	30.5	34
Length of snout, middle line of nasals from central imaginary point	33.5	35
Breadth of face outside posterior processes of premaxillæ	21.5	21
„ nasals anteriorly	11	12

Dr. Blanford collected specimens of this hare at Zoula, near Annesley Bay, and one of the specimens still in the British Museum agrees so closely with a specimen from the Suakin Plain that there can be no question as to their specific identity. The measurements of the skull of this specimen, No. 69.10.24.14, are given above.

Dr. Blanford questions the identity of this hare with *L. habessinicus*, Ehrenb.; but I cannot agree in this view, and have no hesitation in assigning the specimens before me to that species, which was founded on a hare from the same locality and the description of which agrees with the specimen in poor coat figured in the Plate.

Dr. Anderson made the following note on the type specimen in the Berlin Museum:—

“*Lepus habessinicus*, H. & Ehr. Type.

“Abyssinia, No. 900. Hemprich and Ehrenberg.

“The fur of this animal has the same character as that of *L. ægyptius*, but it is distinguished by its much shorter ears. Skull in specimen.”

LEPUS ROTHSCILDI, de Winton.

Lepus rothschildi, de Winton, Nov. Zool. vol. ix. 1902, p. 444.

Size intermediate between *L. ægyptius* and *L. innesi*, but form much more robust. Ears rather large and broad, measuring about $1\frac{1}{2}$ times the length of the head. Legs apparently rather short; feet large and broad, with very thick hairy cushions. Fur far denser and longer than in any other Egyptian species, with conspicuous long white hairs on the shoulders and sides. General colour pale isabelline-fawn, strongly

washed with black on the back and on the front of the head; nape very pale isabelline. Borders of the ears pale whitish buff, rather more fawn towards the tips; well-marked black tip behind. The tail is long and pure black and white. The legs only slightly more pure isabelline than the sides of the body; feet very pale coloured.

Measurements taken from specimens in skin:—Head and body (c.) 420 mm.; tail (c.) 73, with hair 95; hind foot (c.) 100; ear from crown (c.) 130, from notch (c.) 118.

Measurements of skulls.

	♂.	♀.	♀ (type).
	mm.	mm.	mm.
Greatest length	85·5	86	84
„ breadth	38·5	40	39
Basal length	69·5	69·5	69·5
Front of incisors to back of palate	34·5	34	34·5
Length of molar series (alveolar)	14·5	15	14·5
Anterior point of zygoma to front of incisors	34·5	33·5	33·5
Length of snout, middle line of nasals from central imaginary point	32·5	32	32·5
Breadth of face outside posterior processes of pre- maxillæ	20·5	20·5	20·5
Breadth of nasals anteriorly	12	11·5	12

For the object of this work, Mr. Rothschild has lent several specimens of this hare at various ages, obtained in the neighbourhood of Cairo, probably in the Province of Gizeh. Two specimens obtained by Capt. Flower, also in the Province of Gizeh, were made into mats by an officious taxidermist; other specimens were rolled up and completely destroyed by damp and beetles.

The grooves of the upper incisors are shallower than those of *L. ægyptius*, simple, V-shaped, straight, and filled with cement.

LEPUS INNESI, de Winton.

Lepus innesi, de Winton, Nov. Zool. vol. ix. 1902, p. 445.

♂ ♀. Gattah, Fâyum. Dr. Walter Innes, Bey.

Size smaller than *L. ægyptius*; ears short, measuring only $1\frac{1}{4}$ times the length of the head. Legs rather short; feet narrow, hair of the cushions short. Fur short, with but few conspicuous longer hairs about the shoulders and flanks. General colour paler and more sand-coloured than *L. ægyptius*, but with the nape of the neck of a very similar tint of rufous fawn. The ears margined throughout their length with whitish short hair on the outer border, and on the inner border with longer buff hairs; blackish

tips posteriorly. The tail is moderate, pure black on the upper side. The legs are clear pale fawn-coloured.

Measurements taken from a specimen freshly preserved in alcohol:—Head and body 397 mm.; length of head 95, breadth 42; ear from notch 98, from crown 118, breadth 42; tail 82, with hair 113; hind foot 101, with hair 107; tibial joint 123; forearm and hand 139.

The female has six mammæ, one pair preaxillary and two pairs abdominal, placed at about even distances from the fore and hind legs and from each other.

Measurements of skulls.

	♂. mm.	♀ (type). mm.
Greatest length	79	82
„ breadth	37·5	37
Basal length	64·5	64·5
Front of incisors to back of palate	30·5	32
Length of molar series (alveolar)	13·4	14
Anterior point of zygoma to front of incisors	28	28·5
Length of snout, middle line of nasals from central imaginary point	29·5	31·5
Breadth of face outside posterior point of premaxillæ	19·5	19·5
„ nasals anteriorly	11·5	10·5

Groove on the upper incisors open, the fold of enamel being rather shallow, with very little, if any, cement in it.

LEPUS ISABELLINUS, Cretzschm.

Lepus isabellinus, Cretzschm. Rüpp. Atlas, 1828, p. 52, pl. 20; Waterhouse, Mamm. ii. 1848, p. 88.

? *Lepus æthiopicus*, Hemp. & Ehrenb. Symb. Phys. dec. ii. 1832.

Cretzschmar described this species from specimens obtained by Rüppell to the south-west of Ambukol. Hemprich and Ehrenberg had sent home specimens obtained in the province of Meroë to the Berlin Museum under the manuscript name of *L. æthiopicus*; and in writing the 'Symbolæ Physicæ,' Dr. Ehrenberg adhered to that name, saying that probably the form described by Cretzschmar belonged to the same species. This question is not yet settled.

Messrs. Rothschild and Wollaston obtained specimens of hares at Shendi from both sides of the river, which agree with Ehrenberg's description and plate, but seem to differ from the diagnosis given by Cretzschmar. It is therefore desirable to have specimens of hares from the type locality before an opinion can be expressed.

Dr. Anderson made the following note on Cretzschmar's type of the species, preserved in the Frankfort Museum :—

“♂. Nubia. Rüppell, 1823. (Type.)

“This specimen is now pale yellowish fawn above, paling on the sides of the body and below into white, with a faint yellowish tinge. Limbs pale fawn in front, whitish behind; the feet-brushes rich rusty yellow. Sides of the head, before and below the eye, whitish, but in the latter situation marked with pale fawn; the sides of the neck behind the bases of the ears nearly white. Ears semi-nude behind, the apical margin densely clad with brownish-yellow soft hair, their inner margin fringed with a line of rather long, upwardly-directed white hairs; outer margin with soft, short, brownish-yellow hairs; whiskers dark brown, the longest with a subapical broad yellowish band. Tail marked on the upper surface with brownish.

“The hair generally is pale fawny white in the basal half, yellowish fawn in the terminal half, becoming paler at the extremities in the great mass of instances, but with an intermixture of hairs ending in black tips of varying extent and intensity, but never to such an extent as to interfere with the uniform yellow-fawn colour of the entire upper surface.”

Lepus, species ?

♀. Shot in desert hills east of Ain Musa. 20.3.93.

	mm.
Snout to vent	492
Height of ear from behind	145
„ „ lower margin of external meatus	110
Length of hind foot	113
„ tail, without hair	63

The skin of the specimen from which these measurements were taken is in a very bad state of preservation and the skull is wanting. It is a very pale-coloured animal, and may possibly be referable to *L. rothschildi*. It certainly does not belong to the species recorded from the Sinaitic Peninsula or from Syria by Hemprich and Ehrenberg, a description of the types of which Dr. Anderson gives as follows :—

“*Berlin Museum.*

“*Lepus sinaiticus*, Ehr. (Type.)

“Mount Sinai. No. 896. Skull in specimen.

	mm.
Snout to vent, approximately	410
Vent to tip of tail	90
Height of ear	120
Breadth of ear	75

"Base of fur pale blackish grey, passing into pale yellowish, followed by a brown band about half the length of the grey-yellowish basal portion of the hair, succeeded by a pale yellow band about the same length, the hairs terminating in broad apical dark brown tips. On the sides of the body the basal portion of the fur is more pronouncedly bluish than on the dorsal area, the annulation practically disappears, and the black tips to the hairs are only very feebly indicated. The intensity of the blackish-brown tips to the hairs on the vertex and on the back from behind the shoulder along with the subapical yellow bands produces a yellow and blackish-brown variation of those parts, which is most pronounced on the hinder part of the back and rump. The sides, owing to the pale colour of the individual hairs, are yellowish white; this is the colour also on the limbs, which, however, have a rather more pronounced yellowish tint. The brushes on the fore feet, and on the hind feet and tarsus, yellow sandy coloured. The area around the eye, and backwards towards the ear, whitish, and an area before the eye greyish white. Moustachial area and cheeks yellowish, the latter margined more or less below from the ear downwards with brownish black, due to a corresponding area of black-tipped hairs. Lower parts of cheek, chin, and throat pure white. Chest concolorous with the lower part of the shoulders and fore limb. Under parts white. Ears long and broad, broadly ciliated anteriorly by white erect hairs, but not to the tip; the terminal fifth of the inner border and the posterior border with soft adpressed hairs, pale on the posterior margin, more brownish on the apical fifth of the anterior border. An area on the outer posterior surface of the tip covered with short dark brown hairs. The parts nearest the borders of the back of the ear covered with very finely-speckled short hairs; the mesial area semi-nude. Base of the ear posteriorly with soft white hairs. Occiput and mesial line of neck rufous yellow. Many long hairs on the sides.

"*Lepus syriacus*, Ehr.

"No. 895. Hemprich & Ehrenb. Skull in specimen.

	mm.
Snout to vent, approximately	440
Vent to tip of tail	80
Height of ear	110
Breadth of ear	75

"This specimen (type) differs from the type of the previous species in being much more uniformly yellow throughout, due to the much greater development of the subapical yellow band and to the very feeble way in which the black apices of the hairs are developed. The white markings on the head are much more distinct than in the previous specimen. The brushes on the fore and hind feet are very rich orange or rusty yellow. The ears of both species are alike.

"Many long hairs on the sides."

UNGULATA.

Suborder HYRACOIDEA.

PROCAVIIDÆ.

PROCAVIA.

Procavia, Storr, Prodr. Syst. Mamm. 1780, p. 39.

It is still a debatable question what position the Hyrax should occupy in a systematic list of Mammalia. Most of the anatomical characters are peculiar, but the pattern of the molar teeth, resembling closely that of the Rhinoceroses, seems to point to kinship between the two groups. Up to the present time, however, palæontology has thrown no light on the affinities of these animals. The dentition generally accepted is : incisors $\frac{1}{2}$, canines $\frac{0}{0}$, premolars $\frac{4}{4}$, molars $\frac{3}{3} = 34$ teeth.

The upper incisors have persistent pulps, and are curved longitudinally, forming a semicircle as in Rodents, but their apices are sharp-pointed instead of chisel-shaped. There is a long diastema between the incisors and the molar series of both jaws.

There are five toes on the fore feet, but only three on the hind feet : they are shod with short broad nails, with the exception of the inner toe of the hind foot, which has a peculiar long curved claw.

The size is about that of the Hares, but the form is heavy and robust. The tail rudimentary. The hair short, thick, moderately harsh, with scattered, longer, bristle-like hairs over the greater part of the body. A glandular area, covered with adpressed modified hairs, on the middle of the back. The ears are very short.

PROCAVIA RUFICEPS, Ehrenb.

Hyrax ruficeps, Hemp. & Ehrenb. Symb. Phys. dec. i. 1828, pl. ii. fig. sup.

Hyrax burtonii, Gray, Ann. Mag. Nat. Hist. (4) i. 1868, p. 43.

Hyrax dongolanus, Blanford, Proc. Zool. Soc. 1869, p. 642.

Procavia ruficeps, Thomas, Proc. Zool. Soc. 1892, p. 63.

Dr. Anderson gives the following notes on specimens of *Procavia* preserved in the Continental Museums :—

PROCAVIA sp. ?
(Zoological Gardens, Berlin).

1/2

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Berlin Museum.

Hyrax ruficeps, Ehrenb. Dongola, Ehrenberg and Hemprich.

At present the general colour of this museum specimen, evidently much faded, is pale sandy brown, a brownish yellow above, on the trunk generally, and on the outsides of the limbs, but the upper surface of the head is reddish brown. The under parts are much paler than the upper parts, and nearly sandy yellowish white. The rufous tint of the upper surface of the head is continued on to the sides of the cheek below the eye, but anterior to the eye the face is sandy yellow. The dorsal glandular area is long and well defined, and the hairs covering it are orange-yellow, except at their tips which are concolorous with the rest of the back.

The total length of the fur is about 25 mm., but a few hairs of the ordinary fur are longer; the isolated scattered black bristles measure about 45 mm. long. The ordinary fur is for about 8 mm. at its base dark brown, succeeded by an area of pale somewhat golden yellow for about 10 mm. or more, followed by a dark-brown area, then by a yellowish annulus and a blackish tip.

Snout to vent about 390 mm.

The total length of the skull from the upper border of the foramen magnum to the tip of the premaxillaries is 82 mm., and from the lower border to the same point 76 mm. The mesial line of the palate measures 41 mm. Anterior orbital angle of frontal to tip of premaxillaries 27 mm. Breadth of snout at its base 14 mm.

	mm.
Length of upper dental line	34
„ last upper molar	6·8
„ penultimate upper molar	7·5
„ dental line of lower jaw	35
„ last lower molar	6·6
„ penultimate lower molar	6·2

A half-grown young individual of this species, also from Dongola (305 mm. long), is uniformly pale brownish sandy-coloured, like *P. sinaitica*. The ears are pointed and measure about 19 mm. in height behind, 23·5 in front, and 21 in breadth.

P. ruficeps is distinguished from *P. habessinica*, Ehrenb., by the long linear shape of its dorsal gland, by the broad but feeble annulation of the fur in the adult, and by the gradual increase in size of the teeth from before backwards, without any sudden enlargement of the last three molars. The skull also is not so elongated as that of *P. habessinica*, and is marked by great occipital breadth. Compared with the skull of *P. habessinica* of the same age, it has a narrower muzzle, and the palatal border of the posterior nares is much broader and more open.

Hyrax habessinicus, Ehrenberg. Abyssinia, Ehrenberg and Hemprich. Marked *, meaning that it is the type. No. 1989.

The hair is speckled grey and brownish, and very markedly so, quite distinct from that of *P. ruficeps*. The general length of the fur in the type is about 24 mm., but some hairs are longer. The basal portion of the hair is very pale yellowish brown; the darkest portion of each hair is the dark brown band that succeeds the basal portion, which is the reverse of what obtains in *P. ruficeps*, where the basal portion of the hair is the darkest. This dark brown band is succeeded by a bright yellowish-grey narrow band, followed by a narrow dark brown tip. The dorsum of the head is somewhat darker than the rest of the body. The under parts are greyish yellow.

The dorsal glandular area is short and badly defined. The hairs covering it are very deep dark brown throughout the greater part of their extent, with a yellow subapical band and a black tip.

In a second and larger example from Abyssinia, total length 410 mm., the general tint is a dark brown, finely speckled with yellowish. The hairs generally in this specimen are coloured like those of the glandular area of the type, but the hairs of the dorsal glandular area are blackish brown.

In the same Museum there is a fine adult skull, ♂ (7079), from Sinai, referred to *P. syriaca*. Its teeth gradually increase in size from before backwards. The upper dental line measures 37 mm., the lower 38. In the skull of the type of *P. syriaca* the upper dental line, with the last molar not quite through, measures 37 mm.; the lower dental line, with the last molar quite through, measures 38 mm.

Adult Sinai skull.

	mm.
Length of last upper molar	8.5
„ penultimate upper molar	7
„ last lower molar	8
„ penultimate lower molar	7

Frankfort Museum.

Hyrax daman, G. Cuv.=*H. syriacus*, Schreb. “Der Klippschliefer.” Icon. Ehr. Symb. Mamm. t. 2. Sinai, Dr. Rüppell, 1822.

The skull is in this specimen.

The colour is uniform pale sandy, darker on the back, and paler on the under parts and sides of head. The long scattered bristle-like hairs are stronger and more numerous on the rump. The feet are greyish yellow, and the tarsus is about 65 mm. in length. It is distinguished from all the foregoing Hyraces by the smaller, rounded ears.

Another, but very young, animal from Sinai, with soft, fluffy hair, is coloured like the adult.

[The three specimens collected by James Burton in Egypt, probably in the Eastern Desert, although the exact locality is not known, are still preserved in the British Museum.

The above-given description of the type of *P. ruficeps* in the Berlin Museum might very well be applied to either of these faded specimens, which served Gray as types of *P. burtoni*. A specimen from Etbai, presented to the Museum by Capt. S. S. Flower, and another from Gebel Assab, 50 miles N.W. of Suakin, collected and presented by Mr. T. B. Hohler, of the British Embassy at Cairo, are in shorter coat and are darker and greyer in colour, and closely resemble the specimens figured; but in both these specimens the head is darker than the body and shows no light face-markings such as are represented in the Plate (Plate LVII.), which was drawn from animals living in the Zoological Gardens at Berlin. The exact locality from which these specimens were obtained is not known, but it was probably the neighbourhood of Kassala.

The three skulls of Burton's specimens are very unlike one another, and seem to prove the untrustworthiness of conclusions formed on comparisons of single specimens from different localities. Of two female skulls, one is long with the malars but little expanded, the other short with broad malars; the molar series seems to be the only point in which the two skulls agree.

	♀. 120 a.	♀. 120 c.
	mm.	mm.
Greatest length	94	86
„ breadth	54	53
Upper molar series	36.5	36.7

Two very young (not half-grown) specimens in the British Museum, collected by Mr. W. Jennings Bramly in the Shabluka Hills, 40 miles north of Omdurman, are very pale and grey in colouring, with distinctly brown, darker heads. These would seem to correspond with the typical *P. ruficeps*. Mr. Bramly says:—"It is called 'Kalidope' in the Sudan; the Arabs sometimes catch it and eat it when young; there are many colonies in the Shabluka Hills."

The two skulls from Wadi Ergayn, Sinai, collected by Dr. W. F. Hume and Mr. H. G. Skill, and forwarded by Mr. H. S. L. Beadnell, are of rather younger animals than those collected by Burton, so it is difficult to make a comparison; but in one, in which all the teeth are up, the measurement of the row of seven is practically the same. These two Sinai skulls agree in having shorter incisive foramina, with the premaxillæ showing further back on the palate, otherwise there seem to be no tangible differences between them and Burton's specimens.

Until more is known of the Hyraces of Egypt, nothing can be definitely said as to the number of species inhabiting the country. The synonymy quoted on p. 324 agrees with that given by Mr. Oldfield Thomas, who collected all the available material to be found in the museums of Europe, when writing his paper for the 'Proceedings of the Zoological Society' in 1892. Whether *P. burtoni* is distinct from *P. ruficeps* is still unsettled.

The Hyrax of Sinai (*P. sinaitica*, Ehrenb.) is supposed to have softer fur; unfortunately the skins which should have accompanied the skulls collected by Messrs. Hume and Skill have been lost, a most unfortunate circumstance, for the true relationship of the Egyptian and Sinaitic Hyraces is still uncertain; the latter animal is supposed to be specifically identical with *P. syriaca*, Schreb., but whether both *P. ruficeps* and *P. burtoni* are truly distinct from *P. syriaca* has not so far been clearly shown.

Mr. H. S. L. Beadnell writes on 12th July, 1899:—"I give the following information on the authority of Dr. Schweinfurth: 'Hyrax footprints were numerous in the upper part of Wadi Shietun (that is, above Ain Shietun), where there is a precipice dividing the valley and impassable to most animals.'¹ I did not myself find them in the lower part of this valley on my recent visit.

"Dr. Schweinfurth further informs me that the Hyrax lives on the bark, wood, branches, and sprigs of *Ochradenus baccatus*, DeC., the 'Gurdhi' of the Arabs. The native name for the animal is 'Wabber.'"—W. E. DE W.]

¹ Mention is made of this circumstance in the Introduction to the first volume of the 'Zoology of Egypt,' 1898, p. xxix. Dr. Schweinfurth named this valley "Valle di Hyrax." Mr. E. A. Floyer also observed a colony in Wadi Kittar.

Suborder *PERISSODACTYLA*.

EQUIDÆ.

EQUUS.

Equus, Linnæus, Syst. Nat. x. 1758, p. 73.

This genus consists of the Horses, Asses, and Zebras, in which there is but one toe shod with a hoof on each foot, nothing being left of the side toes but the so-called splint-bones, to be detected only in the macerated skeleton.

Dentition: i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{2}{2}$, m. $\frac{3}{3}$ = 36.

The canines are usually present only in males; occasionally small teeth appear in front of the molar series, representing, no doubt, the anterior premolars which are known to exist in some of the extinct forms. The molars are persistent in growth, not rooting until the animal has attained a very advanced age.

The Asses are often separated from the Horse under the subgeneric name of *Asinus*; likewise the Zebras as *Hippotigris*. Both the Asses and Zebras differ from the Horses in not having the bare patch of callous skin, often called "chestnut," on the inner side of the hind leg below the hock. It is very doubtful if there is any indigenous wild horse in any part of the world at the present day.

EQUUS ASINUS, Linn.

Equus asinus, Linnæus, Syst. Nat. x. 1758, p. 73.

Description of specimen in the British Museum, No. 1.7.1.1, collected and presented by Mr. H. W. Haig, from Yalalub, Eastern Sudan:—General colour greyish fawn. The nose, a circle round the eyes, and the belly are whitish; the legs also are of the same pale colour, with some greyish running down the front; there are dark spots on either side of the fetlocks. The mane commences between the ears and is dark brown or black. The black back-stripe is very narrow, from 8 to 12 mm. in width; it is continued in a very narrow stripe well down on to the tail; the arms of the cross-stripe on the withers are about 125 mm. long and of about the same width as the dorsal stripe. The long hairs on the end of the tail are about 130 mm. in length, and are mixed black and grey. The ears are about 140 mm. long, posteriorly black for about 60 mm. at the tips. The chestnut on the inner side of the forearm is 41 mm. in length.

Dr. Lyle Cummins has kindly lent the skin of a wild ass from near Kassala. This specimen agrees with the foregoing in every important detail. The colour at present is, however, yellower, but it is quite evident that this is the result of stain from the tanning used in preserving the skin.

In both of these specimens the back-stripe and cross-stripe on the withers are very narrow, and there are no dark bars on the legs whatever.

Baron Theodor von Heuglin has described the wild ass from the provinces of Taka and Berber under the name of *Equus tæniopus*. He says that this particular form was met with at the ruins of Wadi Safra, on the Atbara, and on the road from Taka to Suakin, and that it appears to extend northwards into the Desert of Korosko. A preliminary notice and description were given in the "Fauna of the Red Sea and Somali Coasts," published in Petermann's 'Mittheilungen,' 1861, p. 19; and in the 'Verh. Leopold.-Carol. Akad. Naturf.' 1861, a coloured plate of the animal was given in a paper entitled "Diagnosen neuer Säugeth. aus Afrika am Rothen Meere." In this latter animal, according to the description and the plate, the shoulder-stripe is broad, and the legs are heavily barred with irregular black bands.

Heuglin met with another form, which seems to resemble the Yalalub and Kassala specimens, but the locality for this is said to be the Somali Coast. To this form, with narrow shoulder-stripe and unbarred legs, Fitzinger applied the name *Asinus africanus* (SB. Wiss. Wien, liv. i. 1866, p. 588), a name which he had used a few years previously in 'Naturg. Säug.' iii. 1860, p. 434, without publishing any description of the species. It seems to me possible that Heuglin may have transposed the localities of the two forms, but nothing further can be said with our present knowledge.

The Arabic for the wild ass is 'Homar-' or 'Hamár el Wadi.'

Burekhardt and Rüppell mention a valley between Assuan and Berber known as "Wadi el Hamar," and a desert called "Homar Elwaheish," in which wild asses were to be found in the first quarter of the last century.

Dr. Anderson left the following note on the Wild Ass:—

"This animal is found at the foot of the Gebel Hennah, near Tokar. It is common in the Khor Sabbat parallel to the Khor Baraka. Captain O'Connor informs me that he has often seen them at the Khor Sabbat, on the plain of Tokar. A mountain near the Khor Baraka is called the mountain of the donkey = *Gebel O'meik* of the Hadendowahs."

In James Burton's MS. in the Brit. Mus. (add. MS. 25.666) is the following note:—
"Wild Asses are found in the neighbourhood of Gebel Kattar in the Arabian or Eastern desert of Egypt inland about opposite to the island of Shadwan. One was seen a little further south, at Ayd, in the neighbourhood of old Keneh; the animal was white, with a dark line down its back. The Ababdeh Arabs turn out the tame females into the mountains for the purpose of having them covered by the wild males,

and they always produce white donkeys. It is called 'Homar Wahsh' by the Ababdeh Arabs ; but the Arabs of the Eastern desert do not know the name."

G. A. Hoskins, 'Travels in Ethiopia,' 1835, p. 41, records that at Grananta, immediately above the 5th Cataract, he saw, for the first time on his journey southwards from Wadi Halfa *via* Abu Hamed to Berber, three wild asses which had been browsing among the acacias near the Nile.—W. E. DE W.

Suborder *ARTIODACTYLA*.Group I. *RUMINANTIA*.*BOVIDÆ*.Subfamily *CAPRINÆ*.*CAPRA*.

Capra, Linnæus, Syst. Nat. x. 1758, p. 68.

The Goats are closely allied to the Sheep (*Ovis*). Size medium and build rather stout. Tail short. No glands either on the face or in the groin, and foot-glands either wanting or confined to the fore feet. Muzzle hairy; a more or less distinct beard beneath the lower jaw of the males. Males with a strong, unpleasant odour. Horns present in both sexes.

Since no specimens from Egypt are available for examination, the general description of the Ibex is taken from 'Oxen, Sheep, and Goats of All Lands,' by the kind permission of the author.

CAPRA NUBIANA, F. Cuv. (Plate LVIII.)

Capra ibex, 'Beden,' Forskål, Deser. Anim. Ægypt. 1775, iv.

Capra nubiana, F. Cuvier, Hist. Nat. Mamm. fase. vii. 1825, pl. 397; Selater, Proc. Zool. Soc. 1885, p. 2; Ward, Records of Big Game, 1896, p. 230; Pousargues, Ann. Sei. Nat. ser. 8, vol. iv. 1897, p. 85; Lydekker, Oxen, Sheep, and Goats of All Lands, 1898, p. 266; Marriott, in Great and Small Game of Afr. 1899, p. 129.

Capra sinaitica, Hemp. & Ehrenb. Symb. Phys. i. 1828, pl. xviii.; Selater, Proc. Zool. Soc. 1886, p. 316, pl. xxxii., 1891, p. 464 (Suakin); Ward, Records of Big Game, 1896, p. 229.

Capra arabica, Rüpp. Neue Wirb. Abyss. 1835, p. 17; Fitz. SB. Wien, liv. i. 1866, p. 602.

Ægoceros beden, Wagn. Sehreb. Säug. Suppl. iv. 1844, p. 494; Heuglin, Reise N.O.-Afr. ii. 1877, p. 126.

Ibex nubianus, Gervais, Hist. Nat. Mamm. vol. ii. 1855, p. 189.

Ibex sinaiticus, Gervais, tom. eit. pl. 39; Hartmann, Zeitsch. Ges. Erdk. Berl. iii. 1868, p. 345.

Ibex beden, Heugl. Fauna Roth. Meer., Peterm. Mitth. 1861, p. 16.

Capra beden, Tristram, Proc. Zool. Soc. 1866, p. 85; id. Fauna Palestine, 1884, p. 6, pl. ii.

Build rather stout; height at shoulders about 33 inches. Horns scimitar-like, very long, slender, and highly curved; the outer front angle bevelled off, sloping from the

CAPRA NUBIANA.

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inner border, having no flat front surface, with numerous, somewhat irregular, rather large, knot-like ridges. The beard is long and full, as wide as the jaw. There is a nuchal tuft of longer hair just in front of the withers.

General colour brownish fawn or darker, somewhat grizzled with white, especially on the face, in winter coat. Muzzle, chin, beard, sides of belly, chest, dorsal line, sides of tail, and outer side and front of legs (except knees and pasterns) black. Inner sides of thighs and buttocks, the middle line of the abdomen, the inner sides and back of hind legs below the hocks, most of the corresponding surfaces of the fore legs, the knees, and a band above each hoof white or whitish; in winter longer hairs of greyish colour extend up each side of the face in continuation of the beard. Horns of rather light colour.

The head of a specimen obtained by Dr. Anderson from an hotel-keeper at Heluan gives the following measurements:—Right horn over curve 48 inches = 121 cm., left horn $47\frac{1}{2}$ inches = 120 cm., circumference at base $7\frac{3}{4}$ inches = 19.6 cm., from tip to tip 17 cm., from base to tip direct $12\frac{1}{2}$ inches = 31.5 cm.; beard 19 cm.; ear from notch 12 cm.

This species extends as far north in Palestine as the mountains of Lebanon; it is found throughout Arabia, is very plentiful on the Sinaitic Peninsula, and occurs in Egypt and Nubia in suitable localities to the east of the Nile, probably as far south as the latitude of Shendi.

Burckhardt ('Travels in Nubia,' 1819, p. 282) says:—"I frequently saw mountain-goats of the largest size brought to the market of Shendi; they have long horns bending to the middle of the back; their flesh is esteemed a great dainty. In Upper Egypt they are called 'Teytal' (تيتل)."

Heuglin gives the Egyptian name 'Tetel,' and that of Northern Nubia 'Kebseh el djebel' and 'Neger.'

The Plate was drawn from a specimen which has lived in the Zoological Gardens of London since April 1, 1889; it was presented to the Society by Commander Alfred Paget, R.N., the locality given being "Red Sea Coast."

Dr. Schweinfurth, writing to Dr. Anderson from Assiut, February 22, 1893, says:—"Mr. Allen Joseph, Chief Engineer of the Behéra Irrigation Works, mentions that he has shot Ibex just opposite Nagi Hamada, near Farchoût, on the eastern side of the Nile." Mr. Beadnell writes:—"I feel quite sure that the Ibex occurs in the eastern desert wadis between Assiut and Kenneh, and they are often shot in Wadi Shietun by the Bedouins, according to their own statements."

Dr. W. F. Hume, writing to Capt. Stanley Flower, says:—"I spent some days round Undisi. Ibex were evidently abundant, judging by the tracks near the water-pools."—W. E. DE W.

OVIS.

Ovis, Linnæus, Syst. Nat. x. 1758, p. 70.

The Sheep are distinguished from the Goats (*Capra*) in having glands between the hoofs of both fore and hind feet, and frequently also on the face below the eyes. The males have no distinct beard on the chin and are free from rank odour.

The description of the animal is taken almost entirely from 'Oxen, Sheep, and Goats of All Lands,' in which the specific features of a recent wild-killed specimen from Tunisia are given.

OVIS LERVIA, Pall.

"Fishtäll" or "Lervee," Shaw, Travels, 1738, p. 243.

Antilope lervia, Pallas, Spicil. Zool. 1777, fasc. xii. p. 12.

"Mouflon à Manchettes," Geoffr. Descr. Egypte, 1818, pl. vii. fig. 2.

Ovis tragelaphus, Desm. Mamm. 1822, p. 486; Rüpp. Neue Wirb. Abyss. 1835, pp. 17, 26; Lataste, Act. Soc. Linn. Bordeaux, xxxix. 1885, p. 288; Buxton, Proc. Zool. Soc. 1890, p. 361 (Algeria); Selater, Proc. Zool. Soc. 1895, p. 85 (Egypt); Ward, Records of Big Game, 1896, p. 257.

Ovis ornata, Audouin, E. Geoffr. Descr. Egypte, ii. 1829, p. 742; id. ibid. ed. 8vo, 1828, xxiii. p. 201.

Ægoceros tragelaphus, Heugl. Faun. Roth. Meer., Peterm. Mitth. 1861, p. 16.

Ammotragus tragelaphus, Fitz. SB. Wien, liv. i. 1866, p. 604; Hartmann, Zeitschr. Ges. Erdk. Berlin, iii. 1868, p. 346.

Ovis lervia, Lydekker, Oxen, Sheep, and Goats of All Lands, 1898, p. 226, pl. xviii.; Johnston, in Great and Small Game of Afr. 1899, p. 126.

Size comparatively large, the height at the shoulders being about 3 feet 3 inches. Withers relatively high, and hind-quarters low. Head rather long, without face-glands below the eyes, and no pits in the skull for their reception; ears relatively large. Hair of the chin quite short, a little longer hair on the sides of the jowl and angles of the lower jaw. A short upright mane extending from the nape of the neck to the middle of the back. In males a heavy fringe of very long and perfectly straight hair commencing on the throat and continued down the front of the neck to split on the chest and terminate on the front of the base of each fore leg; thence after a short interval it is continued on the front and outer surface of the leg to a short distance above the knees, below which the hairs depend. Tail long, tufted in its terminal half, and reaching to within about 5 inches of the hocks. In females the pendent hair is sparser and shorter.

Horns of adult males massive, pretty evenly bowed outwards and upwards, then downwards and inwards, with a distinct keel in the middle of the front surface at the base; in young specimens the whole horn is marked with prominent sinuous transverse

wrinkles, which are often retained at the tips of adult specimens. The horns of females are somewhat smaller, but of much the same form.

General colour of head, upper parts, outer surface of limbs, and tail uniform rufous tawny, becoming rather darker on the mane; ears, chin, middle of under parts, and inner surfaces of limbs dull whitish; a few dark bars on the long hair of the neck. Horns yellowish brown, becoming darker in old animals.

Menagerie specimens show a much greater profusion of long hair on the fore-quarters than is found in animals living in a wild state.

In the characters of the skull and horns the Arui, or Barbary Sheep, approaches the Goats, but the transverse wrinklins in the horns is an ovine character. The length of the tail is a feature unknown in the Goats, and at first sight might seem to affiliate this species with the domesticated breeds of sheep, from which the Arui is, however, widely separated by the absence of face-glands and the form and structure of the horns. In the large size of the horns in the female the species is unlike any other sheep or goat.

Mr. Rowland Ward gives the greatest size of the horns from a specimen from Algeria: length along outer curve $28\frac{1}{2}$ inches, basal circumference $11\frac{1}{2}$, tip to tip $18\frac{3}{8}$.

Distribution. Mountains of North Africa, southern arid slopes in sight of the desert, and in Egypt.

Mr. Beadnell writes about the Barbary Sheep:—"Dr. Schweinfurth says that the only locality for this animal he knows is in the country east of Minieh. When he was at the well of El Gos, in Wadi El Gos, he was given two perfect skulls of this wild sheep by the Arabs, which evidently belonged to animals killed only a few weeks before. These heads are now in the Berlin Museum."

Dr. Schweinfurth himself wrote to Dr. Anderson in 1893 to the same effect; the locality was then mentioned as "Wadi Gossal, south-east of Assiut."

Native name 'Kebsh.'

General Sir Archibald Hunter took much trouble to obtain a specimen of this wild sheep for Dr. Anderson, but was only successful in procuring a leg, which was picked up in the Dongola district. Specimens were also seen which had been shot at Sarras.

Mr. E. N. Buxton found a horn of this sheep at the rocky base of a mountain (1800 feet high) near the Wadi Medisa. This mountain is indicated in Mr. E. A. Floyer's map, published in the 'Proceedings of the Geographical Society' for 1887, a little to the south-east of Ain Yessar, and directly west of the Three Yessars (2520 feet). The specimen is the sheath of the right horn of a male, and is pale yellowish sandy in colour, and the side that lay uppermost is worn and cracked and in holes. It measures 59 cm. along the outer curve, and 43 cm. along the inner curve.

Mr. Buxton has published, in the 'Proceedings of the Zoological Society,' 1890, p. 361, some excellent notes on the habits of this animal as observed in the Atlas Mountains of Algeria.—W. E. DE W.

Subfamily *ANTILOPINÆ*

BUBALIS.

Bubalis, Licht. Mag. nat. Freund. Berl. vi. 1814, p. 154.

Size large; withers considerably higher than the rump. Horns present in both sexes, those of the female as long, but not so heavy, as those of the male. They are placed close together at the base, rising outwards and backwards, then curved forwards and upwards, and then bent more or less abruptly backwards and upwards at their tips. Colour uniform brown or rufous, with or without black markings on the face and legs. Longer hairs towards the end of the tail growing from upper side only, projecting at right angles to the vertebræ.

Having very little fresh local material at my disposal, in this and other definitions of genera and species of Antelopes I have depended largely upon Sclater and Thomas's 'Book of Antelopes,' both for the synonymy and specific characters of this group of Ungulata.

BUBALIS BUSELAPHUS, Pall.

"Bekker-el-Wash," Shaw, Travels, 1738, p. 242.

"Le Bubale," Buffon, Hist. Nat. xii. 1764, p. 294, pls. xxxvii., xxxviii.

Antilope buselaphus, Pallas, Misc. Zool. 1766, p. 7.

Antilope bubalis, Pall. Spic. Zool. fasc. i. 1767, p. 12, xii. 1777, p. 16; *et auct.*

Bubalus mauritanicus, Ogilb. Proc. Zool. Soc. 1836, p. 139.

Bubalis mauritanica, Sund. Pecora, K. Vet.-Ak. Handl. 1844, p. 208; Lydekker, Horns and Hoofs, 1893, p. 195.

Alcelaphus bubalis, Gray, Cat. Ung. Brit. Mus. 1852, p. 123; Tristram, Great Sahara, 1860, p. 387; id. Proc. Zool. Soc. 1866, p. 86; Brooke, Proc. Zool. Soc. 1872, p. 643.

Alcelaphus bubalinus, Flower & Lydekker, Mamm. 1891, p. 335.

Bubalis buselaphus, Sclater & Thomas, Book of Antelopes, i. 1894, p. 7, pl. i.

Bubalis boselaphus, Bryden, in Great and Small Game of Afr. 1899, p. 133, pl. iv. fig. 1.

Size, smallest of the Hartebeests; height at withers about 43 inches. Colour uniform pale rufous, entirely free from darker patches on head or limbs. Tail black on the terminal tuft only. Horns diverging from each other at an evenly rounded curve, so as to form a U when viewed from in front; length measured round the curves about 14 inches.

Hab. Northern Africa (interior of Morocco, Algeria, and Tunis) and Arabia.

Dr. J. C. Mitchell writes in 1895 :—"Two years ago I visited Lake Kurun, in the Fayum, and the Bedouins there informed me that the 'Baggara-el-Wahsh' was to be found two days' journey off due west into the Desert."

In 1900 Dr. Flinders Petrie, on behalf of the Egypt Exploration Fund, presented to the Natural History Department of the British Museum a skull and horns of a Hartebeest taken from a tomb at Abadiyeh, of about the date 300 B.C. This specimen has been identified as *B. lelwel*, Heuglin, a species which at the present time is not known to occur north of Khartum.—W. E. DE W.

OREOTRAGUS.

Oreotragus, A. Smith, S. Afr. Quart. Journ. ii. 1834, p. 212.

Size small. Horns directed nearly vertically, slightly curved forwards, their basal third ringed. Hoofs cylindrical, blunt; the animal walks upon what is normally the pointed tip of the hoofs in all other antelopes, so that the hoof stands up vertically and the pastern-joints are modified accordingly. Accessory hoofs present. Tail a mere stump, scarcely projecting beyond the fur. Skull peculiarly short and broad. Anteorbital fossæ large.

Range. Eastern and Southern Africa, from Northern Abyssinian Hills to the Cape.

OREOTRAGUS OREOTRAGUS, Zimm. (Plate LIX.)

Antilope oreotragus, Zimm. Geogr. Gesch. iii. 1783, p. 269; Schreb. Säug. 1785, pl. cclix.; Rüpp. Neue Wirb. Abyss., Mamm. 1835, p. 25; *et auct.*

Nanotragus oreotragus, Brooke, Proc. Zool. Soc. 1872, p. 642; Flower & Lydekker, Mamm. 1891, p. 339; Lydekker, Horns and Hoofs, 1893, p. 219.

Antilope saltatrix, Boddacrt, Elench. 1785, p. 141.

Oreotragus saltatrix, Jard. Nat. Libr. (1) Mamm. iii. 1835, p. 221, pl. xxx.; Heugl. Ant. u. Büff. N.O.-Afr. (N. Act. Leop. xxx. pt. 2) 1863, p. 9; Blanf. Gcol. Zool. Abyss. 1870, p. 265; Heugl. Reise N.O.-Afr. ii. 1877, p. 104; Brehm, Thierl. iii. 1877, p. 262.

Oreotragus saltator, Kirk, Proc. Zool. Soc. 1864, p. 657 (Shiré R.); Crawshay, loc. cit. 1890, p. 653 (Nyasa); Thomas, loc. cit. 1891, p. 211 (Somali); Jackson, Badm. Big-Game Shooting, i. 1894, pp. 285, 309; Rendall, Proc. Zool. Soc. 1895, p. 361; Selater, Proc. Zool. Soc. 1896, p. 303 (Suakin); Selater & Thomas, Book of Antelopes, ii. 1896, p. 5, pl. xxv.; Kirby, in Great and Small Game of Afr. 1899, p. 235, pl. vi. fig. 8.

Oreotragus oreotragus, Jentink, Cat. Mamm. Leyd. Mus. (Mus. Pays-Bas, xi.) 1892, p. 160; Matschie, Thierw. Ost-Afr., Säug. 1895, p. 122.

Height about 20–22 inches. Fur long and of very peculiar texture, each hair being thick, flattened, wavy, and, in fact, quite unlike the hair of any other antelope, but more similar to that of the Musk-Deer. The general colour is a mixture of brown and greenish yellow, each hair being whitish for three-quarters of its length, then brown, and tipped with greenish yellow. Specimens vary very much in the vividness and tone of the yellow, which, especially in old males, is often exceedingly bright, even verging on orange, particularly along the flanks. Chin white; throat grizzled brownish yellow; belly whitish. Back of ears grey, their edges black. Front and outer sides of limbs coloured like the back, inner sides white. Feet just above hoofs black. False hoofs large. Tail short and stumpy, coloured like the back. Horns wide apart,

OREOTRAGUS OREOTRAGUS

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practically straight, roughly ringed at the base ; length $3\frac{1}{2}$ to 4 inches. Females without horns.

The Klipspringer occurs within our boundary only on the rocky hills around Suakin, but it is found in Abyssinia, East Africa, and all suitable rocky districts down to the extreme south of the continent. In this vast range the variation in form of specimens from the different localities is very slight.

The Plate was drawn from a specimen living in the Gardens of the Zoological Society of London, and presented by Commander Alfred Paget, R.N., H.M.S. 'Dolphin,' February 3rd, 1896 ; it was captured in the Khor Abent, halfway between Suakin and Kassala. This specimen lived in the Gardens in Regent's Park for six years.—W. E. DE W.

GAZELLA.

Gazella, Licht. Mag. nat. Freund. Berl. vi. 1814, pp. 152, 171.

Size medium, but with a considerable range of variation. Horns usually present in both sexes; those of the male strong, prominently ribbed, and generally of medium size, about the length of the head, but sometimes considerably longer; those of the female more slender, straighter, and shorter than in the male. Coloration ordinarily sandy, with a white belly, the face generally marked with dark and light streaks; streaks also usually present on the flanks.

Mr. R. H. Porter, the publisher of the 'Book of Antelopes,' has very kindly lent woodcuts of heads of three of the smaller gazelles for the illustration of this work. These text-figures clearly show the form of the horns in the different species.

GAZELLA DORCAS, Linn. (Plate LX.)

Gazella africana cornibus brevibus, Ray, Quadr. 1693, p. 80.

Capra dorcas, Linnæus, Syst. Nat. x. i. 1758, p. 69.

Antilope dorcas, Pallas, Spic. Zool. i. 1767, p. 11; Licht. Darst. Säug. 1827, pl. v. (partim); Heugl. Ant. u. Büff. N.O.-Afr. (N. Act. Leop. xxx. pt. 2) 1863, p. 5 (partim); id. Reise N.O.-Afr. ii. 1877, p. 99; Brehm, Thierl. iii. 1877, p. 205; *et auct.*

Gazella dorcas, Ogilby, Proc. Zool. Soc. 1836, p. 137; Loche, Cat. Mamm. Algérie, 1858, p. 13; Tristram, Great Sahara, 1860, p. 337; Fitz. SB. Ak. Wien, lix. pt. i. 1869, p. 159; Brooke, Proc. Zool. Soc. 1873, p. 537; Danf. & Alst. *ibid.* 1877, p. 276 (Asia Minor); Lataste, Mamm. Barb. (Act. Soc. Linn. Bord. xxxix.) 1885, p. 293, sep. p. 171; id. Mamm. Tunisie, 1887, p. 36; Rowland Ward, Horn Meas. (2) 1896, p. 157; Lydekker, Horns and Hoofs, 1893, p. 180; Thomas, Proc. Zool. Soc. 1894, p. 467; Selater, *ibid.* 1895, p. 523 (Egypt); Pease, *ibid.* 1896, p. 812 (Algeria); Whitaker, *ibid.* 1896, p. 815 (Tunis); Selater & Thomas, Book of Antelopes, iii. 1897, p. 99, pl. lvii.; Johnston, in Great and Small Game of Afr. 1899, p. 344, pl. ix. figs. 2, 3; *et auct.*

Size small; height at withers 21-22 inches. General colour pale fawn, rather variable in tone. Facial markings distinct; central band rufous fawn, no dark nose-spot; streaks from eye to mouth brownish fawn, contrasting with the white bands between them. Ears long, whitish fawn behind. Light lateral band present, but not strongly marked; dark lateral band brown, considerably darker than the back. Pygal band indistinct. Knee-tufts present, reddish fawn.

Horns of the male flattened laterally, evenly divergent as they curve backwards in the basal half of their length, and as evenly convergent in the terminal half, with the tips bent upwards in a well-marked curve. Thus, viewed from in front, the widest expanse of the horns is in the middle, the tips being rather wider apart, but bearing the same relative positions one to the other as the bases of the horns have to each other.

GAZELLA DORCAS.

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The horns of the female are slender, only slightly curved, and little more than half the length of those of the male.

Hab. Morocco and Algeria, and extending through Egypt into Palestine and Syria.

Fig. 2.

Head of the Dorcas Gazelle (*Gazella dorcas*), ♂.
(‘Book of Antelopes,’ vol. iii. p. 108.)

Capt. Flower informs me that he believes this Gazelle is found in the Nile Valley as far south as Wadi Halfa.

The horns of a male obtained by Dr. Anderson from “the desert to the west of Cairo” measure $12\frac{3}{4}$ inches = 32 cm. and $12\frac{1}{2}$ inches = 31.4 cm. over the front curve; they are only 15 mm. apart at the base and 92 mm. apart at the tips. Those of a female from Moses’ Well, to the east of Suez, measure $7\frac{1}{2}$ inches or 195 mm. in length and are very wide apart at the tips.

Mr. H. S. L. Beadnell, of the Survey Department, writes :—" I have seen specimens of *Gazella dorcas* all over Egypt on both sides of the Nile Valley, and in the very centre of the western desert between the valley and oases. They are also common in the desert surrounding the Fayum, in the oases of Baharieh, Farafreh, Dakhel, and Khargeh. They are, however, very difficult to approach, so are seldom obtained. In the summer they become comparatively tame in the oases, as they come down to drink at the springs in the very hot weather. As the inhabitants do not, as a rule, have guns, and there are practically no Arabs in the oases at this time of the year, they have nothing to fear. The oases also abound in green scrub and juicy plants, on which Gazelles feed, and they also occasionally feed on the cultivated crops at night."

Mr. Beadnell has also sent two snares, similar to those described by Mr. Jennings Bramly under *G. leptoceros* (p. 345). The rings bearing the thorns are rather over four inches in circumference; the description of their use tallies entirely with that given by Mr. Bramly.—W. E. DE W.

GAZELLA ARABICA, Licht.

Antilope arabica, Licht. Darst. Säug. 1827, pl. vi.; Ehrenb. Symb. Phys. dec. i. pl. v. (1828); Heugl. Faun. Roth. Meer., Peterm. Mitth. 1861, p. 16; id. Ant. u. Büff. N.O.-Afr. (N. Aet. Leop. xxx. pt. 2) 1863, p. 5; *et auct.*

Gazella arabica, Tristram, Proc. Zool. Soc. 1866, p. 86; id. Faun. & Flor. Pal. 1884, p. 6 (? Palestine); Fitz. SB. Ak. Wien, lix. pt. i. 1869, p. 159; Blauf. Zool. Abyss. 1870, p. 261, pl. i. fig. 3 (horns); Brooke, Proc. Zool. Soc. 1873, p. 544; id. *ibid.* 1874, p. 141 (fig. head); Ward, Horn. Meas. (1) 1892, p. 114, (2) 1896, p. 156; Lydekker, Horns and Hoofs, 1893, p. 179; Selater, Proc. Zool. Soc. 1897, p. 812 (Hodeidah); Selater & Thomas, Book of Antelopes, iii. 1898, p. 115, pl. lix.

Size medium; height at withers about 24 or 25 inches. General colour dark smoky fawn; facial markings distinct, central facial band dark rufous fawn, with a black spot on the nose. Ears of medium length, brownish fawn behind. Dark lateral and pygal bands smoky brown; light lateral band very slightly lighter than the back. Limbs more rufous than the body; knee-brushes brown or black. Horns thick and rather short, almost straight, and parallel to each other, a little curved backwards below and forwards above.

Hemprich and Ehrenberg were the discoverers of this Gazelle; specimens were sent home to Berlin, and Lichtenstein described the species in his 'Darstellung der Säugethiere,' under the travellers' MS. name *Antilope arabica*. It was first found in the valleys of the Sinaitic Peninsula between Suez and Tor, and afterwards met with at many places in Arabia near the Red Sea coast, and also on the island of Farsan.

Hemprich and Ehrenberg were under the impression that they saw the same Gazelle near Baalbec, in Syria, and Canon Tristram records it from "desert-country east of the Jordan"; but both of these localities require confirmation, as the animals seen may possibly have belonged to *G. dorcas*.

Fig. 3.

Head of Arabian Gazelle (*Gazella arabica*), ♂.
(Proc. Zool. Soc. 1874, p. 141.)

The above woodcut was first published in illustration of a paper by the late Sir Victor Brooke, and has since appeared in the 'Book of Antelopes.' It is reproduced here by the kind permission of the Zoological Society.—W. E. DE W.

GAZELLA LEPTOCEROS, F. Cuv. (Plate LXI.)

- Antilope leptoceros*, Geoffr. & Cuv. Hist. Nat. Mamm. (fol.) pls. 373, 374, livr. 72 (1842); Wagn. Schreb. Säug., Suppl. iv. 1844, p. 422, v. 1855, p. 407; Sund. Pecora, K. Vet.-Akad. Handl. 1845, p. 269; Heugl. Reise N.O.-Afr. ii. 1877, p. 100, tab.
- Gazella leptoceros*, Brooke, Proc. Zool. Soc. 1873, p. 543; Lydekker, Horns and Hoofs, 1893, p. 234; Selater & Thomas, Book of Antelopes, iii. 1898, p. 137, pl. lxiii.; Johnston, in Great and Small Game of Africa, 1899, p. 349, pl. ix. fig. 8.
- Leptoceros abuharab* et *L. cuvieri*, Fitz. SB. Ak. Wien, lix. pt. i. 1869, p. 160.
- Gazella loderi*, Thos. Ann. Mag. N. H. (6) xiii. 1894, p. 452 (Algeria); id. Proc. Zool. Soc. 1894, p. 470, pl. xxxii.; Loder, ibid. 1894, p. 473 (habits); Selater, ibid. 1895, p. 522 (Egypt);

Bramly, *ibid.* 1895, p. 863 (Egypt); Sclater, *ibid.* 1896, p. 780 (Viv. Soc. Zool.); Pease, *ibid.* 1896, p. 813 (Algeria); Whitaker, *ibid.* 1896, p. 816 (Tunis); Ward, *Horn Meas.* (2) 1896, p. 169.

Height of male at withers about 25 inches. General colour very pale sandy fawn, the Gazelline markings little defined. Central facial band and darker cheek-bands sandy, not rufous, and but little contrasting with the light ground-colour. Light lateral bands scarcely perceptible, and the darker ones below them only pale sandy, with a tinge of brownish, as are the pygal bands, neither being much darker than the general dorsal colour. Ears long, narrow, pointed, pale whitish buff externally. Tail sandy at base, darkening terminally to brownish black. Front of fore limbs sandy, of hind limbs whitish; knee-brushes distinct, but little darker than the general colour; a circle of black stiff hairs round the base of the hoofs. Horns of male long, about twice the length of the head, slender, closely and heavily ringed nearly to the tip; somewhat variable as to their exact curvature, but usually less curved than in most species; they are placed near together basally, diverging above, sometimes very widely.

The horns of the female, though sometimes nearly equal to those of the male in length, are far more slender, and even less curved.

Hab. The interior of Algeria and the Libyan Desert.

In the Plate, the male represented in the foreground was obtained by Mr. Jennings Bramly at Wadi Natrun. The horns of this specimen measure as follows:—Right horn over curve 1 foot 3 inches=380 mm., left horn 1 foot $2\frac{1}{2}$ inches=368 mm., circumference $3\frac{3}{4}$ inches=95 mm., tip to tip $10\frac{5}{8}$ inches=270 mm. This was an old animal; the horns show considerable wear, and the point of the left one is slightly broken. These are believed to be the second longest, and have by far the widest spread, of any known specimen.

The female represented in the background was drawn from a photograph of the specimen presented to the Zoological Society of London by Mr. A. R. Birdwood, August 6, 1896, from the Western Desert of Egypt, and, notwithstanding that one of its legs was badly wrenched in the Arab trap, it has thriven and lived for six and a half years in captivity. (Fig. head, *Proc. Zool. Soc.* 1896, p. 781.)

Mr. Jennings Bramly, in the ‘Proceedings of the Zoological Society of London,’ 1895, p. 863, gives an interesting account of the mode of capture of this Gazelle, which has already been republished in ‘The Book of Antelopes’; but as it is an entirely local field-note, it is again given here *in extenso*:—

“On the 27th of June I started from the Pyramids in order, if possible, to catch some living specimens of Loder’s Gazelle, known to the Arabs as ‘Ghasal Abiad’ (the White Gazelle), which the shikaris whom I took with me reported to be found in the desert at some thirty or forty miles distant from Cairo.

“Leaving at 4 P.M. on the 27th, we started, taking a south-easterly direction. We

GAZELLA LEPTOCEROS.

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travelled till 12 that night, and at 4 next morning resumed our march. Soon after the sun had risen, one of the shikaris, pointing to the ground, showed what he made out to be the spoor, evidently but lately made, of a male Loder's Gazelle. This, being larger than that of the Dorcas Gazelle, is very easily recognizable; the bluntness of the hoof in the case of Loder's Gazelle shows a marked difference. About 12 o'clock one of the camel-men called out that a Gazelle could be seen ahead, but the many heaps of white stones, scattered all over the desert, are so deceiving at a little distance that both shikaris shook their heads.

"The habit that all Gazelles have, when first viewing an approaching danger, of standing motionless for some time, is carried to such an excess in this particular species that it is often possible to get within easy rifle-range by quietly walking up, without taking any particular care to hide the approach. On the other hand, the animal is often missed entirely, and passed by at some little distance as a heap of bones or white stones.

"The camel-man, however, in this case proved to be correct, as we soon noticed the Gazelle walking leisurely away. It disappeared behind a mound of sand, where it must have remained, for, on reaching the place about half an hour later, we were surprised to come suddenly on the Gazelle, now only some 200 yards off. It was a fine female, very white in colour. Not wishing to disturb any others that might be near, I did not fire. We found, however, that it was alone. At 12 o'clock or thereabouts we came upon the skirt of the plateau, from which the Fayoum can be seen, and here the shikaris decided to turn back, as they said we had passed the 'White Gazelle ground'; so, after returning about two miles, we set up the tents and waited for the evening, the sun being so hot that it was impossible to continue our search. Two Arabian greyhounds I had with me felt the heat especially. No sooner were the camels on the ground than, going to the shady side, they began to dig in the sand under the beasts in order to bury themselves away from the heat.

"During the afternoon the two shikaris constructed traps, which we set in the evening.

"The Gazelle trap, except the small hemp-platted rope, is made entirely from the date-palm. Taking the long leaves, the shikari first constructs by plating them together a deep ring, about 3 inches in diameter and about 4 inches deep: it should, in fact, fit well into a golf-hole and make its walls secure. He now takes an old stalk from which the dates have been picked, and separating about twenty of the fibres which compose it, and run its whole length, he twists them into a rude bracelet about three inches in diameter. Then taking three more fibres, in place of twine, he binds the ring securely; the ring or bracelet has then a form much resembling a diminutive 'Ringold' ring. The shikari now breaks off the points of the date-thorns until he has about twenty-five of them 2 inches in length; these he pushes through the

fibrous sides of the ring until all the points meet in the centre, so that when finished this ring has much the appearance of a small sieve. All the thorn-points overlap slightly in the centre of the ring. This ring, holding all the thorns, the deep ring of platted leaves, and a soft thick hemp rope, made by the Arab himself, by the ordinary three-plat from raw hemp (this rope, being soft, not only binds itself more securely to the Gazelle, but does not cut the skin when drawn tight), attached to a date-stick about a yard in length, are all the implements that an Arab requires to catch a Gazelle.

“Starting in the evening for the lower ground, which is studded with small bushes (for when pitching the tents we purposely kept at a good distance from the feeding-ground), we soon found spoor, but none very promising; a buck and two does had been there two nights before. A small desert plant, much resembling our English Red Cranesbill (*Geranium sanguineum*), was pointed out to me by the Arabs as a favourite food of the Gazelles. Finding a spot where the spoor led to one of these plants, and the plant evidently having been nibbled, we decided to put a trap near it. The Arab sat down and made a hole, using his deep ring to keep its sandy walls intact, so that he now had a hole resembling exactly in size and depth a golf-hole with basket-work sides, within four or five inches of the plant.

“Taking now the thorny ring he places it on the hole, which it should exactly cap. He now powders up some camel-dung and drops it carefully over the thorns in the ring, which being close together hold it up, so that soon nothing can be seen of the thorns. The use of the dried dung is to hold up the sand which hides the trap. The hemp rope, now made into a slip-noose, is put round the top ring, and the stick to which it is attached buried in the sand. The whole is now carefully covered with sand. One of the shikaris laid his traps so successfully that it was almost impossible to find one again unless a Gazelle was caught in it. The marks like those of a Gazelle made by the fingers over the trap add to the deception. It is curious to remark that a Gazelle will rarely walk over an impression left by either beast or man in the sand.

“When the Gazelle comes in the evening to feed, its foot slips through the top ring in the centre where the thorns meet, and so to the bottom of the hole. The top ring is now fixed round the Gazelle’s leg, at the height of the depth of the hole, the spiky thorns entering the skin. This ring also holds up the hemp rope, which the Gazelle, in endeavouring to kick off the thorny ring that pricks it, draws tight, generally over the knee.

“The Gazelle starts off, dragging after it the date-stick attached to the rope. The swinging stick makes it impossible for the animal to get away at any pace, as, twisting round one leg or the other, it throws the Gazelle to the ground continually.

"The spoor of the trapped Gazelle with the marks of the swinging stick are easily found, and the animal tracked down until in sight, when a trained greyhound will soon catch and hold it until its master comes up.

"During November and December the Gazelles are caught when fawns by trained hounds, and this is the simplest method ; but it can only be practised during two months, as it takes a very good dog to catch a Gazelle when more than this age.

"During the eight days I was in the desert, though unsuccessful in trapping any, I saw several very fine specimens of Loder's Gazelle."—W. E. DE W.

GAZELLA ISABELLA, Gray.

Antilope dorcas, Licht. Darst. Säug. pl. v. 1827 (partim).

Gazella dorcas, Blanf. Zool. Abyss. 1870, p. 261, pl. i. fig. 1.

Gazella isabella, Gray, Ann. Mag. N. H. (1) xviii. 1846, pp. 214, 231 ; id. Knowsl. Menag. 1850, p. 4 ; id. Proc. Zool. Soc. 1850, p. 113 ; Fitz. & Heugl. SB. Ak. Wien, liv. pt. i. 1866, p. 591 ; Fitz. SB. Ak. Wien, lix. pt. i. 1869, p. 158 ; Brooke, Proc. Zool. Soc. 1873, p. 539 ; Ward, Horn Meas. (1) 1892, p. 116, (2) 1896, p. 158 ; Sclater & Thomas, Book of Antelopes, iii. 1898, p. 151, pl. lxiv.

Antilope isidis, Sund. Pecora, K. Vet.-Ak. Handl. 1845, p. 267.

Height at withers about 25 inches. General colour pale fawn, rather variable in tone, sometimes tending towards brownish. Light lateral band very indistinct ; dark band generally fawn like the back, occasionally darker, almost smoky brown. Central dark facial band deep rufous, a darker nasal patch often developing in old individuals. Light facial streaks well defined, white. Pygal bands almost obsolete, little or not darker than the back.

Horns of the male nearly straight and parallel for a short distance, then evenly diverging and curving backwards for four-fifths of their length, the tips strongly bent inwards nearly or quite at a right angle ; length about 10 inches. The female is similar to the male, but the horns are slender, scarcely ridged, their tips curved inwards rather than upwards, and nearly equal to those of the male in length.

Hab. Coast-lands of the Red Sea from Suakin to Massowah, and over the interior to Bogos, Barca, and Taka.

Capt. Stanley Flower writes:—" *G. isabella* appears to be the common Gazelle from No. 6 Station (between Wadi Halfa and Abu Hamed) right away to Khartum. I have seen no *G. dorcas* south of Wadi Halfa, but the Gazelles from that place I believe to be *G. dorcas*."

Dr. Anderson had a note relating to this species, saying that behind Suakin the Gazelles were not to be seen far out on the open plain, as they usually kept close to the base of the hills.

The very beautiful plate of *G. dorcas* given by Lichtenstein in his 'Darstellung' undoubtedly represents the Gazelle under notice, but it is quite evident that he did not recognize the distinction between *G. dorcas* and *G. isabella*; and although the

Fig. 4.

Fig. 5.

Heads of Isabella Gazelle (*Gazella isabella*), ♂ & ♀.
(‘Book of Antelopes,’ vol. iii. p. 154.)

plate of the living animal depicts the latter form, drawn from specimens sent home by Hemprich and Ehrenberg from their travels in Nubia, the text treats of the Gazelle of Egypt proper, and the papyrus drawings represent animals being brought to sacrifice which are probably intended also for *G. dorcas*.

Sclater and Thomas say, in the ‘Book of Antelopes,’ that, notwithstanding much kind assistance from several officers serving in Egypt, there is still much to be learnt about this somewhat variable species.—W. E. DE W.

GAZELLA SOEMMERRINGI.

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GAZELLA SOEMMERRINGI, Cretzschm. (Plate LXII.)

Antelope soemmerringii, Cretzschmar, Atlas Rüpp. Reise, 1826, p. 49, pl. xix.; Rüpp. N. Wirb. Abyss. 1835, p. 25; Sund. K. Vet.-Ak. Handl. 1842, p. 201; Heugl. Faun. Roth. Meer., Peterm. Mitth. 1861, p. 16; id. Ant. u. Büff. N.O.-Afr. (N. Act. Leop. xxx. pt. 2) 1863, p. 7; id. Reise N.O.-Afr. ii. 1877, p. 102; Hartm. Zeitsch. Ges. Erdk. Berl. iii. 1868, p. 254; *et auct.*

Gazella soemmerringii, Jard. Nat. Libr. (1) iii. 1835, p. 215, pl. xxviii.; Selater, Proc. Zool. Soc. 1867, p. 817, pl. xxxvii. (yg.); Fitz. SB. Ak. Wien, lix. pt. i. 1869, p. 158; Blanford, Geol. Zool. Abyss. 1870, p. 260; Selater, Proc. Zool. Soc. 1871, p. 701 (Suez?); Ward, Horn Meas. (1) p. 108, (2) 1896, p. 150; Lydekker, Horns and Hoofs, 1893, p. 236 (fig. head); Selater & Thomas, Book of Antelopes, iii. 1898, p. 195, pl. lxx. (typical subspecies); Elliot, in Great and Small Game of Afr. 1899, p. 361, pl. x. fig. 4; Sitwell, *ibid.* p. 364 (Suakin).

Size large; height at withers $35\frac{1}{2}$ inches in an old male of the Somali subspecies; animals from the Red Sea littoral measure somewhat less. General colour very pale fawn and very uniform everywhere, as there are neither light nor dark lateral bands nor any pygal bands. Central facial band black or blackish fulvous, contrasting markedly with the white lateral facial streaks. Dark facial streaks also black but narrow. Sides of muzzle black, continuous with the central facial band. Back of ears whitish, margined and tipped with black. White of rump very broad and extended, projecting far into the body-colour which is broadly cut off from the tail. Tail white basally, with a black terminal tuft. Knee-brushes present, whitish or fawn.

Horns long, nearly circular in section, heavily ringed. In the typical subspecies they are but little divergent for their basal half, but then curve widely outwards above, their tips being again abruptly hooked inwards so as to point almost directly towards each other.

The horns of a male obtained by Dr. Anderson near Suakin measure $14\frac{1}{2}$ inches or 36 cm. in length, $10\frac{1}{2}$ inches or 26·5 cm. in their widest spread, and 14·5 cm. from tip to tip. The horns of a female measure 30·5 cm. in length.

In a MS. note Dr. Anderson says:—"In December the plain behind Suakin is quite green and covered with shrubs, very few of which exceed 4 feet in height; a few isolated ones rising to 9 feet. Ariel Antelope abound at this season. I saw one herd of 50 close at hand and many others."

The typical form is found along the coast-lands of the Red Sea from Suakin to Tajurah, and inland to the Nile Valley from Berber district to the Atbara. It is commonly known as 'Ariel.'

A rather larger form with narrower horns is very plentiful in Somaliland, where it is known as 'Aoul.'—W. E. DE W.

GAZELLA TILONURA, Heugl.

Antilope melanura, Heuglin, Ant. u. Büff. N.O.-Afr. (N. Act. Leop. xxx. pt. 2) 1863, p. 6 (nec Bechstein, 1799).

Gazella melanura, Fitz. SB. Ak. Wien, lix. pt. i. 1869, p. 159.

Antilope tilonura, Heugl. Reise Weiss. Nil, 1869, p. 315; id. Reise N.O.-Afr. ii. 1877, p. 101.

Gazella tilonura, Ward, Horn Meas. (1) 1892, p. 126, (2) 1896, p. 170; Lydekker, Horns and Hoofs, 1893, p. 233; Sel. & Thom. Book of Antelopes, iii. 1898, p. 159, pl. lxvi.; Bryden, in Great and Small Game of Afr. 1899, p. 351, pl. ix. fig. 9.

Gazella lævipes, Brooke, Proc. Zool. Soc. 1873, p. 541 (nec Sund.).

Height at withers about 27 inches. General colour deep sandy. Central facial band but little more rufous than the back; no black patch on muzzle. Light facial streak absent or scarcely perceptible on sides of muzzle; the area round the eye dull whitish, not sharply defined. Back of ears scarcely lighter than nape. Light lateral band present, not strongly defined. Dark lateral band black, strongly marked, though narrower than in *G. thomsoni* from British East Africa; a sandy line present between it and the white of the belly. No dark pygal band. Tail sandy at base, the remainder black. Knee-brushes present, dark sandy.

Horns little or no longer than the head, lyrate, parallel at base, curving outwards above, and then abruptly twisted inwards towards each other at the tip, the ends each forming a sharp hook, similar to that found in *G. soemmerringi*, but even more strongly bent inwards.

Dr. S. Lyle Cummins has kindly placed at my disposal a book of water-colour sketches, with field-notes on animals and birds of the Kassala district. In the notes relating to the Gazelles, *G. isabella* is called *G. dorcas*, but there is no doubt that this latter name is applicable only to the Gazelle of Egypt proper. In the following quotation this error is corrected.

Dr. Cummins, in comparing *G. isabella* with this species, says:—" *G. isabella* has a much more pointed snout, the lips projecting well in front of the nostrils, whereas in *G. tilonura* the muzzle is very blunt; the horns of the former *bend back before turning in*, but in the latter they are hardly at all bent back, but hooked sharply inwards and backwards. [The sketch which accompanies the MS. shows a young male; the horns are not sufficiently developed to show the true backward sweep of the adult condition.] *G. isabella* has the typical gazelline markings on flanks, without dark band; in *G. tilonura* this band is black. In *G. isabella* there is a black line behind the fetlock-joint both on fore and hind legs, and a little tuft of black hair just above the hoof in front; these are absent in *G. tilonura*.

“Travelling up from Berber to Kassala, *viâ* Atbara, the Isabella Gazelle alone is seen until within a half-day's march of Adurrama. From this point this species and Ariels (*G. soemmerringi*) are both seen in great numbers. *G. tilonura* may be found south of Gog-regeb, but only very few, while *G. isabella* becomes less numerous, and the Ariels perhaps more so. From Asobri southwards on the Atbara, Heuglin's Gazelle becomes much more common than *G. isabella*, the latter being distinctly rare south of Kashm-el-Girba. At Kassala and up the Gash River, Heuglin's is much more common than the Isabella Gazelle, though both are found. There was a herd of *G. isabella* that lived near the Jebel at Kassala, and was to be found any day by riding close in round the base of the mountain, but Heuglin's were much more common.

“Heuglin's Gazelles are also found from Gedaref up to Gallabat, but no Isabellas (at least I have never seen any of the latter). There is another, larger, black-striped Gazelle at Gelet Arang Hills.”

Fig. 6.

Fig. 7.

Heads of Heuglin's Gazelle (*Gazella tilonura*), ♂ & ♀.
(‘Book of Antelopes,’ vol. iii. p. 160.)

Very little is known about the animals of this district, and specimens with accurate locality are much needed in the British Museum. It appears from the above note that

there is possibly an unrecorded species with a black lateral stripe, as in Heuglin's Gazelle; but again, this larger black-striped species may turn out to be *Gazella lævipes*, Sundevall (K. Vet.-Ak. Handl. 1845, p. 266, form *a*), the eastern representative of *G. rufifrons* found in Senegal, and possibly identical with *G. rufina*, Thomas (Proc. Zool. Soc. 1894, p. 467, fig., skull).—W. E. DE W.

In the country between Berber, Suakin, and Kassala there are several other antelopes which cannot be dealt with at length in this book. Among others, a Duiker, probably *Cephalophus abyssinicus*, a Dik-dik (*Madoqua saltiana*), and others.

There are several fine species of antelopes which come very near our south-western boundary. Of Gazelles there is the very beautiful red-necked *G. ruficollis*, which has recently been obtained in Northern Kordofan. Schweinfurth (Bull. Soc. Géogr. Paris, 1874, 6 sér. vii. p. 627) mentions *G. dama*, a name which properly belongs to a closely allied species from Senegal, as occurring in the oasis of Khargeh; but such a very casual reference requires confirmation. The White Oryx (*Oryx leucoryx*), with long sweeping horns, and the Addax (*Addax nasomaculatus*) are also found in the country between Kordofan and the great bend of the Nile. Very beautiful plates of these antelopes are given by Rüppell, Lichtenstein, and Hemprich and Ehrenberg in their chief works so often quoted.

Of the last-mentioned species, Major H. Hodgson writes on June 12, 1901, from Dongola:—"Two days ago I was able to buy from some desert Arabs a head and horns of what I believe to be the 'Addax,' and a young one of the same species alive. The horns have a curve resembling those of a Kudoo, and the pair measure 38 and 35 inches taken on the outside of the curves, circumference at base 5 inches. The Arabs say they got these specimens at what I reckon to be a point about 130 to 150 miles away, a point or two of the compass south of due west from here."

Very good photographs accompanied this note; the head was no doubt that of the Addax, and the young living animal showed a very strong likeness to an example of *Leucoryx* of a similar age figured in the 'Book of Antelopes,' vol. iv. p. 47.—W. E. DE W.

Mention may perhaps be made of the Giraffe (*Giraffa camelopardalis*, Linn.).

Burckhardt, 'Travels in Nubia,' 1819, p. 282, says:—"In the mountains of Dendor, a district towards the Atbara, and six or eight journeys south-east of Shendi, the Giraffe is found (Arabic, 'Zarafa,' *i.e.* the elegant). It is hunted by the Arabs, Shukorein and Kowahel, and is highly prized for its skin, of which the strongest buckles are made."

Rüppell, 'Reisen Nub., Kordof., &c.' 1829, p. 123, mentions the Giraffe as one of the animals observed on the route from Debbeh by Simrie and Hazara to El Obeid.

In the same work (pp. 63-71) Rüppell also mentions the Giraffe as one of the animals hunted in the Western deserts of Dongola in the months of May and June.

Cretzschmar, in Rüppell's *Atlas Reise nördl. Afr.*, Säugeth. 1826, p. 25, says that Rüppell brought back five specimens, two males and three females, from his journey in Nubia and Kordofan. He states that Giraffes were found to the south of Simrie in small companies, and were common in the desert of Dar-Fur.

Hoskins, 'Travels in Ethiopia,' 1835, says, p. 187, that "the Giraffe is found in great numbers on the road from El Debbah (on the Nile) to Kordofan, between Sabrian and Jebel el Arazi, and behind Kordofan, on the Bahr el Abiad, in the territory of the Baggara."

Holroyd (A. T.), *Journ. Roy. Geogr. Soc.* 1839, who visited Kordofan in 1836-37, says that the Camelopard is found within a few days of El Obeid.—W. E. DE W.

Group II. SUINA.

SUIDÆ.

SUS.

Sus, Linnæus, Syst. Nat. x. 1758, p. 49.

The Wild Boar of Europe is the type of this genus. The hairy covering of the body is well developed, consisting of long stiff bristles, most abundant on the back and sides, and of close, softer, curling under-coat.

Dentition: i. $\frac{3}{3}$, c. $\frac{1}{1}$, pm. $\frac{4}{4}$, m. $\frac{3}{3} = 44$.

The canines strongly developed, with persistent roots; those of the upper jaw without the usual downward curvature, but directed strongly outwards, upwards, and finally inwards. The molar series increases in size from the front backwards, the third molar of both jaws being very long and complex.

SUS SCROFA, Linn. (Plate LXIII.)

Sus scrofa, Linn. Syst. Nat. x. 1758, p. 49.

The Plate of the Wild Boar was drawn from photographs of a specimen living in the Zoological Gardens at Gizeh, and was coloured from a sketch of the same animal made by Mr. Ogilvy, through the kindness of Dr. J. C. Mitchell. In the original photographs this pig appears to have a far thicker and rougher coat than is shown in the Plate; but this may be the result of seasonal change, the photograph and sketch being taken at different times. So far as is known, the Wild Pig of Egypt does not differ from the typical form of Europe.

Mr. Ogilvy, brother of the artist, who was chief engineer of the Salt Works at Wadi Natrun in 1895, informed Dr. Mitchell that there were then only two pigs left in that district, one having been shot the summer before.

For some time after this it was supposed that these animals became extinct in the Wadi, but Capt. Flower has quite recently informed me that a few still remain, which are being strictly preserved.

Mr. J. Dewitz, of Zurich, Switzerland, who has taken much trouble in his endeavours to obtain specimens and information concerning Egyptian animals for Dr. Anderson, writes, November 1899:—"About the wild pig, Mr. Prochaska, late chief of the Chemical Survey of the Natrun Valley Company, tells me that some thirty years ago these animals abounded in the Wadi, but they became exterminated by injudicious hunting.

1/6

SUS SCROFA.

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Those who hunted them burned down the 'Bourdi' shrubs, in which the pigs lived, killed nearly all, only a few specimens escaping; these, or their offspring, are still living round the Lake Gar, at the extremity of the Wadi."

Dr. J. C. Mitchell writes from Damietta, February 20, 1897:—"I have made enquiries about the occurrence of *Wild Pig* in this neighbourhood, and I have no doubt that they exist. A few years ago, I am told, natives used to shoot them and bring them into Damietta, slung across a donkey's back. They were obtained from the waste marshy ground to the W. of Farascon, not many miles from this place.

"In 1892, on the estate of Ressendila, a man having fired a shot at one, missed or only wounded it. It charged him and ripped open his abdomen. This incident I have on good authority from a person who saw the man's body. I also heard of it in Cairo. Between Ressendila and Lake Burlos it is said that many are to be found. I shall make an excursion there soon and find out. A son of Prince Hussein Pasha, who is a sportsman, tells me that with a large party of beaters he traversed all the marshes between Rosetta and Damietta, and never saw a trace of pig. Still there is the 1892 incident."—W. E. DE W.

HIPPOPOTAMIDÆ.

HIPPOPOTAMUS.

Hippopotamus, Linnæus, Syst. Nat. x. 1758, p. 74.

Form very massive and unwieldy. Skin practically hairless. Muzzle very broad and rounded. Feet short and broad, with four subequal toes, with short, rounded hoofs, all reaching the ground when walking. Ears small; tail short. The legs also are so short that the belly is raised but a little distance above the ground.

Dentition: i. $\frac{2 \text{ or } 3}{1 \text{ or } 2}$, c. $\frac{1}{1}$, pm. $\frac{4}{4}$, m. $\frac{3}{3} = 38$ or 42.

Incisors and canines not rooted, but continuously growing. The crowns of the molars, when worn, showing trefoil-shaped pattern of dentine.

The dental formula i. $\frac{2}{1}$ belongs to the Pigmy Hippopotamus (*H. liberiensis*) only.

HIPPOPOTAMUS AMPHIBIUS, Linn.

Hippopotamus amphibius, Linn. Syst. Nat. x. 1758, p. 74.

At the present day the Hippopotamus is not found within the area treated of in this book, but it has disappeared only since firearms have become plentiful.

The hippopotamus of the Nile has been mentioned by most of the old writers. Diodorus Siculus (liv. i. p. 42, Wesseling Amstel. 1745) gives a very fairly accurate description of the animal.

This animal is supposed to be the "Behemoth" of Job, and it goes by this name at the present day in the Hebrew language.

Dr. Anderson had the following note on a specimen preserved in the Frankfort Museum:—

"♂. Nubia, Rüppell, 1825.

"This is probably the specimen, the killing of which Rüppell describes in his 'Reisen in Nubien, &c.'

"Total length of skeleton, premaxillaries to end of pelvis, 3 m. 305 mm. Height from apex of spinous process of 1st dorsal, 2 m. 400 mm."

In Buffon's Hist. Nat. vol. xii. 1764, p. 24, will be found an account of the capture of two of these animals in the Delta near Damietta, by Federico Zerenghi, Surgeon,

of Narni, in Italy, which was published at Naples in 1603. The story is told as follows :—

“With the object of obtaining a hippopotamus, I posted men on the Nile, who, having seen two animals leave the river, made a large trench across the track and covered it over with light wood, earth, and grass. During the night, in returning to the river, both of the hippopotami fell into the trap. My men came and told me of their success, and I ran down with my soldier guard. We killed the two animals by giving each one three shots in the head from a gun of greater calibre than the ordinary musket. They died almost at once, giving out a cry which more resembled the lowing of a buffalo than the neighing of a horse. This happened on the 20th July, 1600; the next day I had them taken out of the trench and skinned with care; the one was a male, and the other a female. I had the skins salted; they were filled with leaves of sugar-cane to take them to Cairo, where they were salted a second time with more care and convenience; it required 400 lbs. of salt for each skin.

“On my return from Egypt in 1601 I took the skins to Venice, and from thence to Rome. I allowed several learned doctors to see them.

“The doctor Jerome Aquapendente and the celebrated Androvandus were the only ones who recognized the hippopotamus from these remains, and as Androvandus’ work was then in the press, by my permission he had the figure which appears in his book drawn from the female specimen. . . . The inhabitants of this part of Egypt call the hippopotamus ‘Foras l’bar,’ meaning ‘sea-horse.’”

Dr. Burckhardt, in his ‘Travels in Nubia,’ 1819, p. 67, observes :—“The hippopotamus is very common in the river at Dongola. Its Arabic name is ‘Barnik’ or ‘Farass-el-Bahr’; the Nubians call it ‘Ird.’ It is a dreadful plague on account of its voracity, and the want of means in the inhabitants to destroy it. It often descends the Nile as far as Sukkot; the peasants, as I passed, told me there were three of them in the river between Mahass and Sukkot. Last year several of them passed the Batn el Hadjar, and made their appearance at Wady Halfa and Derr, an occurrence unknown to the oldest inhabitant. One was killed by an Arab by a shot over its right eye; the peasants ate the flesh, and the skin and teeth were sold to a merchant at Siout. Another continued its course northward, and was seen beyond the cataract at Assouan, at Derau, one day’s march north of that place.”

Writing from the island of Argo, in their ‘Journal of a Visit to some parts of Ethiopia,’ 1822, p. 247, Waddington and Hanbury say :—“Jan. 10, 1821. The silence of the last two or three evenings had been disturbed only by one sound, the voice of the hippopotamus, extremely near to us; it is a harsh and heavy sound, and like the creaking or groaning of a large wooden door; it is made when he raises his huge head

out of the water, and when he retires into it again. He sleeps on shore, eats greens, but not flesh, and passes his days under water. He is here caught in pits and snares, and furnishes food for the table of Malek Tombol."

Mariette Bey's 'Monuments of Upper Egypt,' 1877:—

P. 98. "In the tomb of Tih, a servant of the household of the deceased is hooking a *hippopotamus* with a sort of harpoon."

P. 118. "The hippopotamus formerly existed close to Memphis, *i. e.* almost as low down as Cairo. Moreover, let it be borne in mind that in the days of Abd-el-Latyf (1190 of the present era) *hippopotami* were still to be found in the Damietta branch of the Nile."—W. E. DE W.

SIRENIA.

HALICORIDÆ.

HALICORE.

Halicore, Illiger, Prod. Syst. Mamm. 1811, p. 140.

HALICORE HEMPRICHI, Ehrenb.

Halicora hemprichii, Ehrenb. Symb. Phys. dec. ii. 1832, k.

Halicora lottum, Ehrenb. Symb. Phys. dec. ii. 1832, k.

Halicore tabernaculi, Rüpp. & Sömm. Mus. Senck. i. 1834, pp. 99–113, pl. 6 ; Gray, Cat. Cet. Brit. Mus. 1866, p. 364.

Halicore dugong, Heuglin, Peterm. Mitth. 1861, p. 17 ; Fitz. & Heugl. SB. Akad. Wien, liv. i. 1866, p. 609.

Halicore —, Krauss, Archiv Anat. Phys. Leipzig, 1870, p. 525.

Halicore cetacea, Heugl. Reise N.O.-Afr. ii. 1877, p. 135.

This animal is supposed to be the origin of the legendary Mermaid, probably from its habit of carrying its young clasped to the breast.

The Dugong inhabiting the Red Sea has generally been considered specifically distinct from the earliest described species, *H. dugong*, Erxleb., inhabiting the shores and islands of the Indian Ocean, and from that of the coast of Northern Australia and New Guinea, *H. australis*, Owen. The differences between the three forms, however, appear to be very slight.

Ehrenberg was of opinion that there were two species inhabiting the Red Sea. The species found on the northern shores he named after his travelling companion. The Arabic name given is 'Nake.' The form found further southward he named *H. lottum*, saying at the same time that it was only known to him from some teeth purchased in the island of Hanakel, which seemed "*scarcely to agree with the Indian H. dugong*," and differed from those of *H. hemprichii*.

Rüppell gives a very full description of this animal, which he named *H. tabernaculi*, from observations taken on the spot and communicated through Dr. Sömmerring, of Frankfort. It is said to be known among the Arabs as the "Sea Camel." He considered that the "Tachash" of Moses in the Pentateuch, translated in the English Bible (Exodus, xxv. 5) "*Badger skins*," used by the Israelites in the construction of the Tabernacle, was really the skin of the Dugong.

Dr. F. Krauss, of Stuttgart, has published a lengthy anatomical paper on seven specimens from the Red Sea, collected by Dr. Klunzinger at Kosseir. Without expressing any opinion as to specific characters, Dr. Krauss certainly seems to consider that the specimens from the Red Sea, when compared with those from the Indian Archipelago, show considerable modification. In this paper will also be found some interesting field-notes, obtained by Dr. Klunzinger, chiefly from the Bedouin hunters, of which the following is an abstract:—

“In Arabic this animal is called ‘Gild,’ *i. e.* ‘Skin.’ They live socially 2–10 together, are apparently plentiful, and appear annually on the Nubian coast, especially near Aesa. In winter (December and January) they come northward to the island of Safadje, or further, and even to the mainland.

“They feed on the Phanerogamic [Cryptogamic] plants growing on the sea-bottom. They are very shy and cautious, therefore are very little seen by day; at night they betray their whereabouts by the glimmer of the sea, caused by their swimming. They keep in the upper stratum of the sea, but sometimes descend into the depths. About every ten minutes they rise to the surface to take breath, taking about four heavy respirations, but without uttering any sound.

“The males get their front teeth at the age of four years.

“The rut is in winter, like the camel. The female brings forth during the following winter, at which time she keeps to the surface-waters, and descends after two days with the young one into the deeps. The young are nursed for one year, and during the suckling are clasped by the mother in her arms, and likewise when danger threatens.”—W. E. DE W.

CETACEA.

BALÆNIDÆ.

BALÆNOPTERA.

Balænoptera, Lacépède, Hist. Nat. Cétacées, 1804, p. 114.

Dr. Anderson obtained one specimen of Fin-Whale from the Red Sea, which was cast ashore in April 1893 near Tor, on the Sinaitic Peninsula. With the kind assistance of Mr. A. R. Weston, Head of the Post-Office at Suez, and of Mr. N. Beyts, the entire skeleton was collected and preserved.

This is probably a specimen of *B. edeni*, Anderson, the Lesser Indian Fin-Whale, described in Zool. Res. W. Yunnan, 1878, p. 551, and, judging from the size of the bones, which are now in the British Museum, the animal would have been somewhat over forty feet in length.

Ehrenberg mentions having seen large mandibles of whales thrown up by the sea on the shore of Arabia, for which he suggests the name *Balæna bitan* (? *australis*), but gives no description. It is most unlikely that Ehrenberg saw the mandibles of a Right Whale (*Balæna*), and these bones probably belonged to *Balænoptera edeni*.

Capt. J. F. M. Prinsep, R.N., writing to Dr. Anderson, says:—"When at Akik, about 80 miles south of Suakin, the ship was surrounded one day by a school of whales."—W. E. DE W.

DELPHINIDÆ.

DELPHINUS.

Delphinus, Linnæus, Syst. Nat. x. 1758, p. 77.

So little is known of the Porpoises and Dolphins inhabiting the Egyptian waters that brief mention only is made of occurrences; at the same time it is hoped that the published announcement of lack of material may stimulate those who have opportunities for collecting to send specimens to the British Museum.

Dr. J. C. Mitchell, late of the Agricultural College, Cairo, writes in April 1897:—
“Dolphins are found in the lake, but only a short distance inside the sea-entrance, at Fort Gemeel, about nine miles from Port Said. The sea-entrance, supposed to be one of the ancient mouths of the Nile, has, with the channels, an average depth of about 5 metres. At about one and a half miles inward the channels, which converge at the entrance, lose themselves in the lake called Bahr-el-Gemeel, the depth of which is about 2 metres.

“I have counted between 30 and 40 dolphins in the channels in the neighbourhood of the fort, and occasionally I have seen stragglers in Bahr-el-Gemeel, about five miles from the sea-entrance; but the channels are their chief hunting-grounds, for it is by these that the fish leave and re-enter the lake. In summer and autumn the dolphins are particularly abundant, as at this time a species of grey mullet leaves the lake in shoals to spawn in the open sea.

“The dolphins are protected by Government, as by their help the spawning fish are driven into the shallow water at the margin of the channels, where they are within reach of the fishermen. These dolphins seem to be about 10 feet in length; the colour of the back is rarely black, it is often greyish. They bring forth about this time of the year [April], according to the fishermen, and I have just seen several pairs, parent and young one, swimming together. Formerly the fishermen used to catch them and eat portions of them, the black skin and fat beneath it.

“I send you a mutilated skull which was cast ashore inside the sea-entrance.

“Dolphins (a few) are found at the Damietta mouth of the Nile, but I have neither seen nor heard of their ascending the river.”

The skull proves to be that of *D. delphis*, the widely-distributed Common Dolphin.

Ehrenberg (Symb. Phys. ii. k) described a dolphin from the Red Sea as follows:—
“*Delphinus aduncus*, H. & E. *Expansus sexpedalis*. Pinna dorsi 1? Capite 17-pollicari. Rostro depresso elongato, utrinque utrinquesecus 25 dentibus conicis validis armato, ad postremos dentes 2" $6\frac{1}{2}$ " lato ad medios 1" 9", mandibulæ longioris

apice $8\frac{1}{2}'''$ lato sursum adunco. In insula Belhosse, Hemprichianarum una, a mari projectum, corruptum vidi."

Ehrenberg says that he also saw a young specimen of another species, recently captured by Arabs, with an obtuse snout and a single dorsal fin, but that he tried in vain to obtain it.

Rüppell (Abhandl. Mus. Senckenb. iii. 1845, p. 140, pl. xii.) gives a detailed description of a dolphin which he says is found all over the Red Sea in small parties; it is known by the Arab boatmen as 'Abu Salam.' The diagnosis is as follows:— "*Delphinus abusalam*, Rüpp. Delphinus rostro conico, mandibula paullulum prominente, in utraque maxilla supra et subtus 25–27 dentibus conicis subrobustis, fronte globosa, oculis non in linea prolongata anguli oris, sed supra illam positus; dorsi colore viridifusco, margine labiali, gula et ventre carneo-albicante, nonnullis maculis minutis nigris variegato."

Rüppell also briefly mentions that there is another dolphin which occurs in the Red Sea, with a very long, narrow beak, with about fifty teeth on each side of the jaw, "which may very likely be *Delphinus longirostris*, Dussumier." He also mentions an animal about fifteen feet long, with a short rounded head, light green in colour, which probably belongs to the genus PHOCÆNA, or True Porpoises.—W. E. DE W.

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