In Capt. Salvin's letter to the 'Field' on this subject (vol. lix. p. 693, May 2, 1882) it was stated that the young were only fed in this manner by the male bird; but Mr. Bartlett had assured himself that both male and female parent had been seen to feed the young in the same way.

Mr. H. J. Elwes, F.Z.S., made some remarks on his recent expedition to the Aures Mountains of Algeria, and exhibited a specimen of a Stonechat (*Saxicola*) obtained there, which he believed to be new to science.

The Secretary placed upon the table a series of the Diurnal and Nocturnal Lepidoptera bred in the Insect-House during the past month, and called special attention to specimens of *Attacus roylei* and *Cricula trifenestrata*, both from India, as not having been reared in 1881.

The following papers were read :—

1. Notes on some Points in the Anatomy of the Æluroidea. By St.-George Mivart.

[Received May 9, 1882.]

In studying the Æluroidea for the purpose of trying to ascertain the number and nature of the groups into which that suborder might be best divided, I noted, as carefully as I could, such points in the anatomy of a number of species as I had an opportunity of examining. I now venture to lay before the Society some selections from these notes as a supplement to, and further justification of, the conclusions I lately had the honour of submitting to the judgment of the same Society[1].

It is only the osteology which I have had the opportunity of studying with any approach to completeness; but I have made such notes on the other systems of organs as I have been able to collect.

OSTEOLOGY.

The Axial Skeleton.

The Vertebral Column.

The greatest number of vertebræ of which I have found the spinal column to be composed is 60 (*Arctictis*) and 59 (*Cryptoprocta* and *Paradoxurus*). The smallest number is 33 (in a Manx Cat).

The general range is from 50 (*Suricata*) and 51 (*Cynogale*) to 56 and 57.

[1] P. Z. S. 1882, p. 135.

In absolute size the longest I have met with is that of a Lion, 174″·5. The smallest is that of *Helogale*, the skeleton of which I have not met with.

The Cervical Vertebræ.

The greatest absolute length of the cervical vertebræ which I met with was in the skeleton of a Tiger, where they measured 26″·0; but in *Crocuta* they attained 24·1.

The greatest proportion borne by the cervical region to the axial column from the atlas to the postaxial end of the sacrum—the latter being taken as 100—was 32·9 (*Proteles*). The next longest were 28·3 (*Hemigalea*), 27·9 (*Hyæna*), 27·4 (*Viverricula*), and 26·5 (*Genetta* and *Cynogale*). The smallest proportions were 19 (*Hemigalidia*) and 18·8 (*Arctictis*). In the *Felidæ* I found it to vary from 19·3 to 22·6.

The *atlas* in the *Felidæ* is provided with large transverse processes, each of which projects outwards almost, if not quite, as much towards its preaxial as towards its postaxial end; and the transverse processes project postaxiad but little beyond the postaxial margin of the central part of the atlas. In the *Hyænidæ*, on the other hand, the two transverse processes project considerably more backwards, while the postaxial end of each projects outwards equally beyond its preaxial end; so that the atlas has the appearance of being furnished with two obtusely pointed wings extending much outwards and considerably backwards.

In the *Viverridæ* various intermediate conditions occur, *Genetta* approaching the Cats most nearly, and *Suricata* having the transverse processes the most diverging, and *Viverra* the most postaxially projecting. Sometimes a small pointed spine projects postaxiad from the middle of the postaxial margin of the body, as in the *Galidictinæ* and *Herpestes*.

In a young *Hyæna*, in the Museum of the Royal College of Surgeons (no. 4474 c), the body of the atlas remains distinct.

The *axis* varies as to the shape of its spinous process, the degree of development of its ventral ridges, and the development of its hyperapophyses. The spinous process may have its dorsal margin nearly straight, as in the Cat, or strongly convex, as in *Viverra*. Its anterior margin may be strongly pointed, as in the Civets, or its hinder end, as in the Cat. The hinder part of the spinous process may be much produced upwards, as in *Suricata*, or may bifurcate, as in the *Hyænidæ*. The ventral, antero-posterior ridges of the axis are greatly developed in the *Galidictinæ*, *Herpestes*, and *Viverra*. They are but little marked in the *Hyænidæ* and *Suricata*, and still less in the Cat. The hyperapophyses[1] are very marked in *Suricata* and the *Hyænidæ*, where we have the pointed ends of the postaxial bifurcation of the spinous process, beneath these the hyperapophyses, and beneath these again the postzygapophyses.

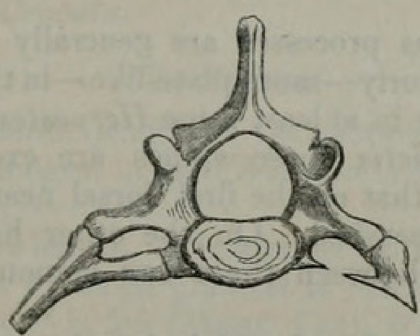
The remaining cervical vertebræ attain an exceptional size and strength, as well as length, in the *Hyænidæ*, and are generally more

[1] For these processes see P. Z. S. 1865, p. 576.

developed in the *Viverridæ* than in the *Felidæ*. Comparing the cervical vertebræ of the Civet with that of *Felis catus*, it may be remarked that while the plate-like transverse processes of the third vertebra are no larger (if not somewhat smaller) relatively in the Civet, those of the 4th, 5th, and 6th vertebræ are relatively larger; the neural laminæ are more concave dorsally, and the hypapophyses are much stronger, and the hyperapophyses more marked. The Genet is more cat-like; but, in the specimens examined, the distal ends of the plate-like transverse processes of the 4th, 5th, and 6th vertebræ project more preaxiad than in the Cat or Civet. *Paradoxurus* presents characters intermediate between those of the Cat and the Civet.

Arctictis is very exceptional as to its cervical vertebræ, their transverse processes being so little extended antero-posteriorly, the plate-like parapophysial parts of each transverse process of even the 5th and 6th cervical vertebræ being very little broader than the diapophysial part. The distal ends of the transverse process of the vertebræ posterior to the third are not all produced preaxiad distally; nevertheless the hypapophyses are more marked than in *Felis catus*. There is a distinct rib, with both capitulum and tuberculum, on the left side, and a less perfect rib on the other side, of the 7th cervical vertebra of the specimen of *Arctictis*, No. 1200 B, in the collection of the British Museum.

Fig. 1.



Seventh cervical vertebra of an *Arctictis binturong*, showing the perfect rib on the one side.

Cryptoprocta differs remarkably from *Arctictis* in the greater antero-posterior extent of its plate-like transverse processes and in the preaxiad extension of the distal ends of those of the 3rd, 4th, 5th, and 6th vertebræ. There are marked hyperapophyses to the first two or three vertebræ. These processes, as also the cervical metapophyses, are very distinct on the 2nd, 3rd, 4th, 5th, and 6th vertebræ of some *Herpestes*[1]. In *Felis catus* hyperapophyses are not only developed above each postzygapophysis of the axis, but these become more marked on the 3rd cervical vertebra, less on the 4th,

[1] *E.g.* in no. 1178 A in the British Museum.

vanishing at the 5th. Metapophyses are also developed beneath the præzygapophyses of the 3rd, 4th and 5th vertebræ, and may be traced in some of the larger Cats on the hinder part of the neural arch of the last four cervical vertebræ. The transverse processes form large osseous plates in *Proteles*, much as in *Viverra*; nevertheless in *Hyæna* they are relatively very small, smaller and less plate-like than even in the Cats.

The Dorsal Vertebræ.

The greatest length of the dorsal region which I have met with is 39″·4 (*Crocuta*) and 38″·0 (*Felis tigris*).

Its greatest relative lengths (the spine, from the preaxial margin of the atlas to the postaxial margin of the sacrum, being taken as 100) are 45·6 (*Hyæna*) and 45·4 (*Suricata*); the smallest are 34·4 (*Genetta*) and 34·8 (*Cynictis*). The *Felidæ* I find to vary from 36·1 to 39·2, the *Viverridæ* from 34·4 to 45·4, and the *Hyænidæ* from 40·4 (*Proteles*) to 45·6, as above given.

Compared with the cervical region, its greatest lengths are in *Arctictis* and in *Suricata*, viz. as 238·2 and 231·6 to 100 respectively. It is often nearly twice as long as the cervical region. It exceeds the cervical region least in *Proteles*, where it is but 122·7 to 100.

The greatest number of dorsal vertebræ is found in all *Hyænidæ*, viz. 15. I have found 14 in *Paradoxurus*, *Arctictis*, *Cynogale*, some *Herpestes*, *Bdeogale*, *Crossarchus*, and *Galidictis*, 13 in the other genera.

The dorsal spinous processes are generally more relatively extended antero-posteriorly—more plate-like—in the *Viverridæ* than in the *Felidæ*, especially in at least some *Herpestes* and in *Eupleres* and *Suricata*. In *Arctictis* these spines are exceptionally low and inclined postaxiad; that of the first dorsal nearly equals in length that of the seventh cervical. On the other hand, in *Hyæna* the difference in length between these two spinous processes is at its maximum.

Generally, as in the Cat, the 11th dorsal vertebra is the first the spinous process of which begins to incline preaxiad.

In *Galidictis* the spine of the 12th dorsal is vertical, while those of the 11th and 13th incline towards it.

In *Hemigalea* the spine of the 11th dorsal inclines forwards, meeting that of the 10th.

In *Cynictis* it is the 13th vertebra which first inclines preaxiad.

In *Eupleres* and *Suricata* it is the 12th which so inclines, and this is the first to have the anapophyses and metapophyses distinctly differentiated.

In *Felis catus* these latter processes are quite distinct on the 11th dorsal vertebra.

In *Hyæna* the change which takes place in the direction of the dorsal spinous processes is a gradual one between the 12th and 14th vertebræ, the 13th being nearly upright.

Proteles exhibits a very exceptional character: the spinous process of the first dorsal vertebra bifurcates more or less [1] laterally; and the spines of the next six show a tendency similarly to bifurcate; the spine of the 12th dorsal begins to curve over preaxially towards its tip; that of the 13th does so more decidedly, or may quite incline preaxiad, as the 14th always does.

The Lumbar Vertebræ.

The greatest absolute lengths of the lumbar region which I have met with are 40″·0 (Tiger) and 32″·5 (Lion). The longest in the *Viverridæ* is 17″·1 (*Cryptoprocta*); in *Crocuta* it is 15″·2.

Its greatest relative length, measured as before, is 37·4 (Wild Cat), 32·5 being the smallest I find amongst the *Felidæ*. In the *Viverridæ* 34·4 (*Nandinia*) is the highest, and 20·2 (*Proteles*) in the *Hyænidæ*. The smallest of the *Viverridæ* is 25·0 (*Cynogale*) aud 25·8 (*Suricata*). The smallest of all the Æluroids is 17·6 (*Crocuta*).

Compared with the dorsal region it may be as 103·6 to 100 (Wild Cat) or 93·1 (*Nandinia*), or only 38·5 (*Crocuta*). It never equals the dorsal region in length in the *Viverridæ* or *Hyænidæ*.

The number of lumbar vertebræ is constantly 7 in the *Felidæ*; 6 or 7 in the *Viverridæ*, except in *Arctictis*, where it is only 5 as in the *Hyænidæ*.

The transverse processes are exceptionally short in *Arctictis*. In *Proteles* the neural spines are more quadrate and upright than in the *Felidæ* or *Viverridæ*; and they are still more vertical and quadrate in *Hyæna* and *Crocuta*.

The Sacrum.

The greatest absolute length of the sacrum I have met with is 9″·5 (Tiger). The longest in the *Viverridæ* is 5″·1 (*Viverra civetta*). In *Crocuta* it is 7″·6.

Its greatest relative length, estimated as before, is 10·9 (*Crossarchus obscurus*), while 7·8 is its greatest in the *Felidæ*. The smallest of all I have measured [2] is 5·5 (Manx Cat), 6·3 (*Proteles*), and 6·9 (*Hemigalea*).

The number of sacral vertebræ is almost always 3; but there may be 4 in *Hyæna* and *Crocuta*.

The neural spines are more developed in the *Viverridæ* than in the *Felidæ*, and notably so in *Arctictis*.

The Caudal Vertebræ.

The absolutely greatest lengths I find to be 88″·0 (Tiger) and 81″·7 (*Arctictis*).

The greatest relative lengths are 153·9 (*Nandinia*), 151·0 (*Genetta*), 146·4 (*Arctictis*), and 122.5 (*Paradoxurus*). Its least dimensions are 8·5 (Manx Cat) and 8·7 (*Suricata*).

[1] It bifurcates very decidedly in the skeleton in the Museum of the Royal College of Surgeons. In that in the British Museum there is only a slight bifurcation towards its apex.

[2] *Cynogale*, according to De Blainville's figure, would give 5·1.

The number of caudal vertebræ varies from 29 (*Cryptoprocta* and *Paradoxurus*) to 3 (Manx Cat), 19 (*Crocuta*), and 20 (*Crossarchus* and *Suricata*). The neural arch ceases to be completely developed at from the 6th (*Hyæna*) to the 12th (*Arctictis*) vertebra.

The longest caudal vertebræ may be the 9th, 10th, and 11th (Cat), the 10th, 11th, and 12th (Civet), the 12th, 13th, and 14th (*Arctictis*), or the 13th, 14th, and 15th (*Proteles*).

Chevron bones may be developed beneath adjacent pairs of caudal vertebræ from the interval between the 1st and 2nd to between the 16th and 17th (*Arctictis*).

Transverse processes may cease to be distinct at the 6th caudal (sometimes in *Hyæna*), or may continue on to the 10th caudal (*Arctictis*).

The Sternum.

The sternum consists generally of seven sternebræ (including the manubrium) and a xiphoid cartilage. Sometimes in *Herpestes* and *Crossarchus* there are 8 sternebræ; and there are 8 in *Eupleres*. There may be but 6 sternebræ, as in *Proteles* and *Hemigalea*.

The manubrium is sometimes separate[1] from that sternebra which is placed between the attachments of the 1st and 2nd costal cartilages.

The manubrium is very pointed in *Hemigalea*. In *Arctictis* it is very exceptionally expanded transversely towards its middle, so that it has somewhat the appearance of the head of a lance. It has also a median ventral crest or keel—a condition I have found in no other Æluroid.

The last sternebra is broad and the xiphoid very broad in *Proteles*.

The Ribs.

The number of pairs of ribs has been already indicated in the notes given respecting the dorsal vertebræ. The number of true ribs may be 8, 9, or 10. 9 is the general number of true ribs, there being 5, 4, or 3 false ribs. In the *Hyænidæ*, however, there are 8 true ribs and 7 false ones.

The ribs are generally broader in proportion to their length in the *Viverridæ* than in the *Felidæ*. This is especially the case in *Eupleres* and the *Hyænidæ*.

The Skull.

The absolutely longest Æluroid skulls I have met with are 26″·8 and 26″·6 (Tiger and Lion). The longest non-feline skull (measured from the roots of the upper incisors in front to the "basion" or mid anterior margin of the foramen magnum) is 22″·5 (*Crocuta*); and the longest Viverrine skulls are 13″·9 (*Arctictis*) and 13″·4 (*Viverra civetta*).

[1] Sometimes, as in *Arctictis*, and as in the Paradoxure No. 4285 A in the Museum of the Royal College of Surgeons, two minute rounded ossicles are placed between the manubrium and the first sternebra behind it. I have found an indication of such distinctness in an adult *Eupleres*.

The length from the atlas to the end of the sacrum being taken as 100, the relatively longest skulls thus measured have the proportions of 29·5 (*Cynogale*) and 28·9 (*Genetta*). The shortest has 19·8 (Leopard). The shortest Viverrine are 21·4 (*Viverra civetta*) and 21·9 (*Cryptoprocta*).

The greatest width between the outsides of the zygomata is 22″·0 (Tiger). The broadest non-feline skull at the zygomata is 18″·3 (*Crocuta*); and the broadest Viverrine skulls are 7″·3 (*Viverra civetta*) and 7″·0 (*Cryptoprocta*).

The greatest widths of the zygomata in proportion to the spine at 100 are 24·4 (*Suricata*), 21·5 (Lion), and 21·2 (*Crocuta*). The shortest is 10·5 (*Eupleres*).

The length of the skull from basion to præmaxilla being taken as 100, the (relatively) broadest zygomatic arches measured across are 89·4 (*Suricata*) and 89·3 (*Felis*), the *Hyæna brunnea* being 83·4. The narrowest *Felis* is 80·4, the narrowest Viverrine (*Herpestes*) 44·4.

I have much desired to find a line to be measured externally as a basicranial axis. The received basicranial axis can only be measured in a vertical longitudinal section, and so can rarely be got at. I should have been well satisfied with a line from the basion to the front end of the præsphenoid or of the basisphenoid, if either of these two latter points were generally determinable externally; but, unfortunately, such is not the case. I have therefore been compelled to take as *a base* a line drawn from the basion to a point which may, for convenience, be distinguished as the "*ovalion*," and which is the middle point of a transverse line joining the hindmost point on the margin of one foramen ovale with that of the other.

This base, compared with that of the spine (from the atlas to the end of the sacrum) taken as 100, I never find to be more than 9·0 (*Hemigalidia*) or less than 4·5 (*Felis*).

Its greatest proportion in *Felis* is 6·2, its least proportion in the *Viverridæ* is 5·1 (*Viverra civetta*). In *Crocuta* it is 6·0, in *Proteles* 7·3.

The base, compared with the total cranial length at 100, has for its highest proportions 31·1 (*Galidia*), 28·7 (*Hemigalidia*), and 28·2 (*Felis*). Its smallest proportion in *Felis* is 20·5 ; and the smallest of all are *Hyæna brunnea* (21·1) and *Suricata* (19·3).

If this base be taken as 100, then the greatest relative expansions of the zygomata are 463·6 (*Suricata*), 400·0 (*Felis*), and 395·6 (*Hyæna brunnea*). The smallest are 194·4 (*Eupleres*) and 195·2 (*Genetta*).

The greatest relative breadths of the brain-case, compared with the spine at 100, are 13·8 (*Suricata*) and 13·3 (*Felis*), its least breadth 5·9 (*Viverra civetta*). Its greatest breadths compared with the length of the skull at 100 are 54·5 (*Felis*) and 50·8 (*Suricata*); its least proportion is 27·0 (*Hyæna brunnea*). Its greatest breadths compared with the base taken as 100 are 211·7 (*Felis*), 263 (*Suricata*), and 180·0 (*Crossarchus*); its least proportions thus estimated are 102·7 (*Proteles*) and 115·6 (*Viverra civetta*); the smallest I have found in *Felis* is 145·4.

The greatest total lengths of the palate bear proportions to the spine (atlas to sacrum as 100) of 17·9 (*Herpestes*) and 17·5 (*Crossarchus*). Its least proportion is 9·6 (*Felis*), the largest proportion I have found in *Felis* being 14·7. The shortest Viverrine palates, thus estimated, are 10·9 (*Viverricula*) and 11·5 (*Viverra, Galidia*, and *Cryptoprocta*).

Compared with the cranial length at 100, the greatest proportions the palate attains are 62·8 (*Bdeogale*) and 61·6 (*Herpestes*); its least is 43·4 (*Felis*). Compared with the base at 100, its greatest relative lengths are 290·9 (*Suricata*), 272·7 (*Felis*), and 268·2 (*Arctogale*); its smallest proportions in length are 153·8 (*Felis*) and 150·0 (*Galidia*).

The greatest breadths of the palate, compared with the spine at 100, are 12·8 (*Crocuta*), 11·4 (*Felis*), and 10·0 (*Suricata*). Its least relative dimensions are 3·9 (*Eupleres*), 5·4 (*Cynogale*), and 5·9 (*Viverra civetta*). Its smallest proportion in *Felis* is 7·8.

The greatest proportional breadths of the palate, compared with the total cranial length at 100, are 49·3 (*Crocuta*), 46·9 (*Felis*), and 36·8 (*Suricata*); its least proportions are 22·7 (*Arctogale*) and 16·8 (*Eupleres*). The greatest proportions of its breadth compared with the base at 100 are 213·4 (*Crocuta*) and 200·0 (*Felis*); its smallest is 100·0 (*Hemigalidia, Arctictis*, and *Poiana*).

The projection of the palate backwards behind the upper molars compared with the total cranial length at 100 is greatest in *Proteles* (20·8), *Arctictis* (18·7), and *Suricata* (16·9). I have found its maximum in the Cats to be 11·9, and its minimum 4·6. In *Genetta* it is 5·0. It is least in *Hyæna brunnea* (4·5) and *Nandinia* (2·6).

The interorbital breadth may be in a proportion as large as 7·3 (*Hemigalidia*), and as small as 2·5 (*Genetta*), compared with the spine at 100. Compared with the total cranial length at 100, it ranges from 27·5 (*Galidia*) down to 8·7 (*Genetta*).

The postorbital breadth similarly ranges from 10·0 (*Felis*) to 3·0 (*Viverra*), and from 45·0 (*Felis*) to 12·2 (*Cynogale*) respectively.

The orbits are rarely enclosed by bone, as sometimes in *Felis, Herpestes, Cynictis, Suricata*, and almost in *Rhinogale*. The postorbital processes, on the other hand, may be almost or quite obsolete, as in *Cynogale* and *Arctictis*.

Except in *Proteles* and the above mentioned Viverrine genera, in which the orbits may be enclosed by bone, the postorbital processes of the frontal are never so long in the *Viverridæ* as they generally are in the *Felidæ*.

The face is generally shorter as compared with the cranium in the *Felidæ* than in the *Viverridæ*.

The *auditory bulla* is always an ossified convex prominence except in *Nandinia*, where it is cartilaginous. It may be quite smooth and unconstricted, showing no external sign of internal division, as in the *Felidæ*. There may be no internal septum, as in *Crocuta*. There may nevertheless be an almost complete internal septum dividing each bulla into two chambers, with only a minute opening on the septum, as also in the *Felidæ* and *Viverrinæ*. The septum may have a somewhat larger aperture, as in the *Herpestinæ* and *Proteles*; or the septum may be represented only by two osseous ridges tending to divide off a small anterior chamber in each bulla, as in *Hyæna*.

The two chambers of the bulla may be placed, one rather internally and the other externally, as in the *Felidæ* and *Herpestinæ*; or one behind the other, as in the *Viverrinæ*. If placed one internally and one externally, the more posterior (which does not contain the auditory ossicles) may be placed the more internally, as in the *Felidæ*, or the more externally, as in the *Herpestinæ*. The external chamber may be not merely placed the more externally, but may be posteriorly and strikingly everted outwards, as in the *Herpestinæ*.

The bulla may narrow much anteriorly, as in *Paradoxurus*. Its anterior chamber may be hardly bullate, as in *Cynogale*, or very decidedly so, as in *Genetta* and *Herpestes*.

The *external auditory meatus* is generally very short, but may be prolonged, as in *Suricata* and *Hyæna*. Its posterior margin may project the more, as in most *Viverrinæ*, or its anterior margin, as in most *Herpestinæ*, or its inferior part, as in *Hemigalea*.

The floor of the meatus may be imperfectly ossified, as in *Suricata* (where there is a longitudinal fissure) and in *Herpestes* (where there is a foramen). Instead of a fissure or foramen there may be a deep groove, as in the *Galidictinæ*.

The external aperture of the auditory meatus may be large and rounded, as in *Felis*; or oval, as in many *Viverrinæ*; or small and triangular, as in *Herpestes* and *Suricata*.

There may be a very deep pit (to receive the hyoidean cornu) on the outer side of the bulla, just below the external auditory opening, as in *Arctictis*.

The *mastoid* may be prominent, as in *Felis*, *Hyæna*, and *Suricata*; or not at all so, as in most *Viverrinæ*.

The *paroccipital process* may not depend below the bullæ or may be very slightly prominent, as in *Felis*. It may depend below the adjacent part of the bulla as a distinct process, as in *Viverra civetta* and most *Viverrinæ*; or it may not do so at all, as in the *Herpestinæ*.

Sagittal and *lambdoidal* ridges may be greatly developed, as in the large Cats, and especially in the Hyænas; or they may be almost evanescent, as in *Eupleres*, where also the zygomata are very slender. The occipital region may be very exceptionally prominent in the middle, as in *Eupleres*.

The *mesopterygoid fossa* may be to the cranial length at 100 as 23·9 (as sometimes in *Felis*), or only as 11·1 (as sometimes in *Herpestes*).

The average breadth of the palate compared with its length in the *Felidæ* is as 80·2 to 100. It may be only 32·5, as in *Eupleres*, or 33·8, as in *Cynogale*. It is 62·5 in *Genetta*, and 51·3 in *Viverra civetta*. It is 87·4 in *Crocuta*. In *Suricata* it is 65·6.

An *alisphenoid canal* may be present, as always in the *Viverrinæ* (except generally in *Viverricula*) and in the *Herpestinæ* (save in

Crossarchus, where it may be only imperfectly enclosed by bony processes). It may be entirely absent, as in the *Felidæ*, *Galidictinæ*, *Euplerinæ*, and *Hyænidæ*.

It may occasionally be present where it is normally absent, as in *Viverricula*.

There may be no *carotid canal* (for the internal carotid artery), as in the *Felidæ*; or there may be a distinct canal, as in all other Æluroids. The hinder aperture of this canal may be placed at about the middle of the internal margin of the auditory bulla, as in the *Viverrinæ*, or rather more forwards, as in the *Hyænidæ*. The artery may enter the cranial cavity through an aperture concealed, or almost concealed, beneath the anterior end of the auditory bulla, as generally in the *Viverrinæ*; or it may enter through a very conspicuous foramen anterior to and within the bulla, as in the *Herpestinæ* and *Galidictinæ*. This foramen notches the sphenoid very deeply, so much as to seem sometimes even to perforate it.

The *condyloid foramen* may be exposed or concealed; and there may be considerable variation in this respect in different individuals of the same species.

The *palatine foramina* may be in the posterior third, or well within the posterior half, of the palate, as always in the *Felidæ*; or they may be well within the anterior half of the palate, and often within its anterior third, as in all non-feline Æluroids. In *Cryptoprocta* they are very near the hinder end of the anterior half. In *Cynogale* they are very far forwards, only a little behind the incisive foramina.

The *upper alveolar border* may be notched to receive the apex of a lower premolar, as in *Hemigalea*.

The *mandible* may have its *angle* extending backwards almost or quite on a line with the inferior margin of the horizontal ramus, as in most *Felidæ*. It may, on the other hand, be very much bent up towards the condyle, as in *Hyæna*. It may be singularly flattened beneath, as in *Proteles*. It may be very small, as in *Arctictis*, or everted (or bent in the opposite way to that in which it is bent in Marsupials), as in *Suricata*.

The hinder portion of the inferior margin of the horizontal ramus may be very concave, as in many *Viverrinæ*.

The coronoid process may be greatly elevated, yet inclining backwards towards its apex, as in the *Felidæ*. It may be elevated vertically, and more or less truncated at its summit, as in *Prionodon*. It may be raised but little, relatively, above the condyle, as in many *Viverrinæ*.

The symphysis is generally moderate, but may be greatly prolonged, as in *Galidictis*, where its proportional length to that of the mandible, from the front of the canine to the hinder end of the last molar, is as 62·9 to 100.

The *alveolar border* may be singularly everted towards its hinder end, as in *Arctogale*.

The Appendicular Skeleton.

The Pectoral Limb.

The proportion borne by the entire pectoral limb (humerus, radius, and manus) to the spine—the length from the front of the atlas to the hinder end of the sacrum being taken as 100—is never more than 77·9 (as sometimes in *Felis*), or less than 42·3 (*Viverricula*).

The greatest proportion amongst the *Viverridæ* is 66·4 (*Suricata*); the shortest found by me in the *Felidæ* was 52·9 (*F. eyra*).

The Scapula.

The extreme length of the scapula compared with of the spine (estimated as before) is as 21·0 to 100, as sometimes in *Felis*. In that genus I have found 18·6 to be the minimum proportion. In the *Viverridæ* it varies from 11·9 (*Nandinia*) to 18·9 (*Cynictis*). In *Proteles* it is 19·7, and in *Crocuta* 20·6.

The Civets have the scapula much more in the shape of a parallelogram than have the Cats, the preaxial border not being so convex. The metacromion is not so much developed; and the proportion borne by the infraspinatus fossa to the supraspinatus fossa is greater, as also in the Genets, in which the scapula is otherwise more feline. *Fossa* and *Paradoxurus* are intermediate between *Genetta* and *Viverra* in the form of the scapula; but the convexity of the preaxial border is generally situate nearer to the glenoid surface than it is in the Genet.

In *Cynogale* the scapula is much like that of the Civet, but the prominence of its preaxial margin is more rectangular in outline and less rounded.

Arctictis resembles *Paradoxurus*; but its infraspinatus fossa is still larger relatively; the spine is but little prominent, and the metacromion quite rudimentary. In *Herpestes* the metacromion is well developed. There is sometimes a prominence for the teres major; and the proportional size of the infraspinatus fossa may not be greater than in the Cat. In *Crossarchus* there is sometimes so sharp a prominence from the glenoid end of the convexity of the preaxial border as to form a deep suprascapular notch. The metacromion is well developed, as also in *Suricata* (where its apex is sharply bent backwards); the outer surface of the scapula is in this genus singularly concave. In *Galidia*, the convexity of part of the preaxial margin may be very great; but here, as seems to be generally the case, there is much individual variation in the form of the scapula. In *Eupleres* the metacromion is well developed, but the acromion may be very short. In *Cryptoprocta* the scapula is very like that of some Cats; the infraspinatus fossa is not so large relatively as in *Genetta*; the metacromion is well developed. In *Hyæna* the preaxial margin is rounded; the metacromion is *very* minute and placed quite at the end of the spine; the supraspinatus fossa is smaller relatively than in the Cats, or than in the *Viverridæ* generally; both it and the infraspinatus fossa are very concave. In

Proteles the scapula is not unlike that of *Viverra*; the metacromion is rather larger and more pointed than in *Hyæna*. In *Proteles*, *Hyæna*, and *Crocuta* the acromion is shorter than in the *Felidæ* or *Viverridæ*, except sometimes in *Eupleres*.

The angle formed by the axillary margin with the spine of the scapula varies from about 20° (*Suricata*, *Galidictis*, *Proteles*) to 35° (Lion and Tiger). The average angle is a little above 25°.

The Clavicle.

The clavicle is always very rudimentary or absent; nevertheless in *Genetta* I found to be about 1″·6.

The Humerus.

The absolutely longest humerus is 31″·5 (Tiger), the largest Viverrine humerus is 14″·0 (*Arctictis*). The greatest proportion of the humerus to the spine at 100 is 28·5 (sometimes in *Felis*), the shortest is 18·1 (*Eupleres*). The shortest feline proportion is 23·4; the greatest Viverrine proportion is 25·0 (*Arctictis*). *Crocuta* is 22·0, and *Proteles* 24·8. The Civet's humerus, compared with that of the Cat, is stouter, with the great tuberosity relatively more prominent, and the fossa outside it much deeper and larger. The supinator ridge is also stronger, while the bony bridge enclosing the foramen for the median nerve is more slender. There is sometimes an olecranal foramen. The humerus of the Genet is more like that of the Cat. There is always a condyloid foramen, except in *Cynogale*, the *Galidictinæ*, and the *Hyænidæ*. In *Paradoxurus* the internal condyle may be much prolonged. In *Arctictis* the humerus is much broadened out distally, with a rather small condyloid canal and a strong supinator prominence; there is no marked pit outside the great tuberosity. In *Cryptoprocta* exactly reversed conditions obtain, as the condyloid canal is very large in that genus (at its maximum), and there is a very marked pit outside the great tuberosity, as also in *Herpestes*, *Crossarchus*, and *Hyæna*. In *Herpestes* the humerus is much curved. In *Crossarchus* the deltoid surface is very prominent, and the development of the supinator ridge and the projection of the internal condyle are at their maximum. The deltoid surface is even more prominent in *Suricata*. In *Hemigalea* the humerus is a good deal bowed, the great tuberosity and the supinator ridge are little developed, but the internal condyle is very prominent. In *Viverricula*, on the contrary, the internal condyle projects so slightly that it is almost effaced. In the *Hyænidæ* the internal condyle is also relatively little developed, the deltoid surface is prominent, there is an olecranal perforation, and the pit outside the great trochanter may be wide and shallow as in *Hyæna*, or wide and deep as in *Proteles*.

The Radius and Ulna.

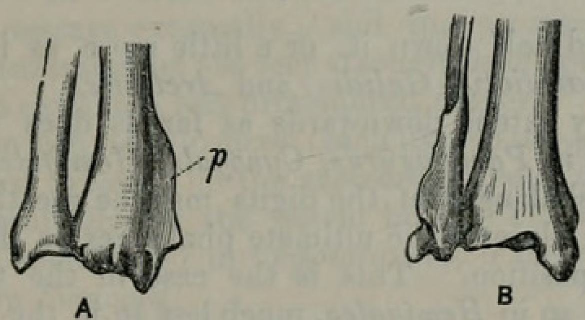
The absolutely longest radius is 26″·0 (Tiger); its greatest proportional lengths to the spine at 100 are 27·4 (sometimes in *Felis*) and

25·3 (*Proteles*). Its least proportion in *Felis* is 20·8. Its least proportion in the *Viverridæ* is 13·8 (*Viverricula*), and its greatest is 22·0 (*Suricata* and *Galidictis*). I have found it equal to the humerus in length in the Wild Cat and *Fossa*, and almost equal in *Hemigalidia*. I have only found it absolutely longer than the humerus in *Eupleres* and *Crocuta*.

The radius and ulna are long and slender in *Fossa, Galidictis,* and *Eupleres*. In *Hemigalea* the radius (which is a good deal bowed) is furnished with a singular plate-like expansion towards and at the ventral end of its outer or radial border. A more or less rudimentary development of the process may occur also in *Paradoxurus*, and a trace of it in *Cryptoprocta*.

The olecranon may, as in *Viverra civetta*, be more bent postaxiad than in most forms, and than even, relatively, in the Great Cats. A remarkable process may be also developed from the olecranon, extending mesiad. This is seen in *Civetta*, but attains its maximum in *Cryptoprocta*, where it reminds one of the inflected mandibular angle of a marsupial. This is little developed in *Hemigalea*,

Fig. 2.



A. Distal end of dorsal surface of right radius and ulna of *Hemigalea*: *p*, plate-like process. B. Distal end of tibia and fibula.

which, however, has a plate-like process, or ridge, developed from the middle of the distal fourth of the ventral surface of the ulna, extending down to the root of the styloid process; into this plate-like ridge the supinator longus, pronator teres, and the (large) pronator quadratus muscles are inserted. This ridge also exists in *Viverricula*.

The Manus.

The greatest length of the manus (measured from the junction of the radius and carpus to the end of the third digit), compared with that of the spine, is 23·9 (*Proteles*), the least is 11·5 (*Viverricula*). In *Felis* I have found it range from 17·0 to 22·0. The greatest relative length of the third metacarpal is 12·5 (*Proteles*), and the shortest is 4·2 (*Cynogale*). The greatest relative length of the third digit is 10·0 (*Felis*), and 9·5 (*Suricata*); the shortest is 5·2 (*Viverra*). The relatively longest third ungual phalanx is 4·5 (*Suricata*); the shortest is 1·3 (*Viverra*).

The metacarpus is thus proportionally most elongated in *Proteles* and *Felis*. It is shorter and stouter in the *Viverridæ*, especially in *Hemigalea* and *Cynogale*; and the length of M^3 and M^4 is less in excess of that of M^2 and M^5 than in the Cats.

There is no pollex, save a rudimentary metacarpal, in *Hyæna*, *Crocuta*, *Suricata*, and *Bdeogale*. Though present in all the other genera, its length, compared with that of the index, may vary considerably. Thus the whole pollex may not extend down the metacarpal of the index so far as one quarter of the length of the latter, as in *Felis*.

It may extend half down the metacarpal of the index or more, as in *Proteles*, *Cynictis*, *Viverricula*.

It may extend down to the distal end of the metacarpal of the index, as in *Viverra civetta*, *Genetta*, *Fossa*, *Galidictis*, *Galidia*, *Herpestes* (often), *Crossarchus*.

It may reach to the middle of the proximal phalanx of the index, or sometimes even to its distal end, as in *Paradoxurus*, *Arctictis*, *Eupleres*, *Hemigalea*.

The metacarpal of the pollex may not extend even one quarter down that of the index, as in *Felis*.

It may reach nearly half down, as in *Viverricula*, *Herpestes*, and *Proteles*.

It may extend half down it, or a little more, as in *Viverra*, *Genetta*, *Fossa*, *Galidictis*, *Galidia*, and *Arctictis*.

It may nearly extend downwards as far as does the metacarpal of the index, as in *Paradoxurus*, *Cynogale*, *Hemigalea*, *Eupleres*.

The middle phalanges of the digits may be greatly excavated on one side to give place to the ultimate phalanges in their rolled-back or contracted position. This is the case in the Cats; they are almost as much so in *Hemigalea*, much less so in the *Viverrinæ*, and not at all in the *Galidictinæ*, *Herpestinæ*, and *Hyænidæ*.

The ultimate phalanges may be very greatly arched and pointed, and with a deep lamina of bone round the proximal part, to shelter the root of the claw externally, as in the Cats generally; sometimes less so, as in *Cynælurus*; still less so, as in the *Viverrinæ*; or long, hardly arched, and with but a very small external lamina, as in the *Hyænidæ* and *Herpestinæ*, especially in *Suricata*.

The Pelvic Limb.

The proportion borne by the entire pelvic limb (femur, tibia, and pes) to the spine is never more than 93·8 (some *Felis*), or less than 55·6 (*Viverra*). The longest proportion amongst the *Viverridæ* is 79·9 (*Suricata*); the shortest found by me in the *Felidæ* was 75·6.

The greatest proportion borne by the entire pelvic limb to the entire pectoral limb at 100 is 139·8 (*Felis eyra*), the smallest is 94·4 (*Crocuta*). In none but *Crocuta* is the pelvic limb shorter than the pectoral one. The shortest proportion in the Cats is 113·1 (*Felis tigris*). In the *Viverridæ* the longest is 136·6 (*Nandinia*), and the shortest is 112·0 (*Arctictis*). In *Proteles* it is 104·8.

The Pelvis.

The absolutely longest pelvis (measured from the most preaxial part of the ilium to the tuberosity of the ischium) I found was 30″·4 (Lion). In *Crocuta* it was 12″·45. The greatest lengths I found in the *Viverridæ* were 12″·7 (*Arctictis*) and 11″·7 (*Viverra civetta*).

Compared with the length of the spinal column (atlas to sacrum), taken at 100, the greatest proportional length of the pelvis was 27·1 (*Hemigalidia*), and the smallest 14·4 (*Crocuta*). The smallest in the *Felidæ* was 20·9, and the smallest in the *Viverridæ* 17·4 (*Genetta*).

The greatest breadth of the ilium I found to be in *Viverra civetta* 3″·0, in *Genetta* 1″·3, *Paradoxurus* 1″·0, in *Galidictis* 0″·9, in *Galidia* 0″·9, in *Arctictis* 2″·4, in *Cryptoprocta* 2″·0, in *Herpestes* 0″·8, in *Eupleres* 1″·7, in *Crossarchus* 1″·3, in *Suricata* 1″·3, in *Proteles* 4″·2, in *Hyæna striata* 7″·9, in *Crocuta* 10″·4, and in *Felis catus* 1″·8.

The ilium has its ventral preaxial angle enormously produced in the *Hyæninæ*, its preaxial margin nearly straight, and its tuberosities greatly everted. In *Crocuta* these conditions especially obtain: the ilium is more concave externally; and the process for the rectus (preaxial to the acetabulum) is very strongly developed. In *Proteles* these characters exist in a less pronounced degree.

There may be two prominences (each like an ilio-pectineal prominence)—one just preaxiad to the acetabulum, and the other placed a little more ventrally on the pelvic brim. These may both be found (at least sometimes) in *Cryptoprocta*, *Viverra*, *Crossarchus*, and especially in *Suricata*.

The Femur.

The absolutely longest femora I found were 35″·5 (Tiger) and 31″·3 (Lion). The largest Viverrine femur was 14″·7 (*Arctictis*). It is 22″·8 in *Crocuta*.

Compared with the spine at 100, the longest femur is 31·3 (*Felis*), 27·9 being the minimum feline proportion. The longest Viverrine proportions are 28·2 (*Cryptoprocta*), 27·5 (*Genetta*), and 26·7 (*Suricata*). The shortest are 19·3 (*Viverra civetta*) and 20·1 (*Viverricula*). In *Proteles* and *Crocuta* it is 26·5 and 26·4.

The femur is always a little longer than the humerus.

In the Civet and Genet the bone is relatively shorter than in the Cat, and the lesser trochanter is relatively somewhat smaller.

In *Paradoxurus*, *Nandinia*, *Cynogale*, and *Hemigalea* it is much flattened behind between the trochanters; and thus the lesser trochanter is thrown almost under the head of the femur instead of being behind (postaxial to) it. In *Arctictis* this flattening is at its maximum, the lesser trochanter is very small, the trochanteric fossa is shallow, and the great trochanter is relatively smaller than in other species. In *Crossarchus* and *Suricata* the femur becomes thicker in proportion to its length than in most species. In *Hyæna* the small trochanter is largely developed, and there is a large process above the outer condyle. In *Crocuta* there is no marked process of the kind, and the lesser trochanter is but of moderate size. In *Proteles*, which has a long and slender femur, the small trochanter is little developed, but there is a process above the outer condyle.

The Tibia and Fibula.

The absolutely longest tibia is 30″·2 (Tiger). The greatest proportional lengths to the spine at 100 are 31·8 (*Felis*) and 29·1 (*Galidictis*). The least proportion in *Felis* is 24·7. Its least proportion in the *Viverridæ* is 19·3 (*Viverricula*); and its greatest after *Galidictis* is 28·6 and 28·4 (*Genetta* and *Hemigalidia*). I have found it equal to the femur in length in *Nandinia, Herpestes, Crossarchus,* and almost so in *Proteles*. I have found it longer than the femur in the Wild Cat and Domestic Cats (but not the large Cats), the Civet, Genet, *Bdeogale, Cynictis, Suricata, Galidictis, Galidia,* and *Eupleres*. I have found it shorter than the femur in the larger Cats and in *Viverricula, Paradoxurus, Hemigalea, Arctictis Cynogale, Cryptopacta,* and the *Hyæninæ*. The tibia is always longer than the radius, except in the *Hyæninæ*, where it is shorter.

The tibia of *Hemigalea* is remarkable for the very great projection mesiad of the internal malleolus, which allows the pes to be more obliquely articulated, so that the plantar surface may be directed more inwards than in most Æluroids. In *Paradoxurus* the same condition exists, though in a less marked degree.

In *Eupleres* the fibula is exceptionally strong amongst the *Viverridæ*, and the process at its distal end is very strongly developed outwards and postaxially.

The Pes.

The greatest length of the pes (measured from the front of the distal end of the tibia to the end of the fourth digit) is 30″·7 (*Felis*); the least is 16″·2 (*Crocuta*), In the *Viverridæ* I have found it range from 25″·3 (*Galidictis* and *Suricata*) to 16″·3 (*Viverra civetta*). The length of the pes is always greater than that of the manus, except in *Crocuta*. They are exceptionally equal in *Arctictis*, where, the manus being as 100, the pes is 119·7.

The greatest relative length of the fourth metatarsal is 15·1 (*Felis*), and the least is 8·0 (*Cynogale*). The length of the fourth metatarsal corresponds with the third metacarpal.

The metatarsus is proportionally most elongate in the *Felidæ*. It is shortest and stoutest in the *Viverridæ*, especially in such forms as *Arctictis, Cynogale,* and *Hemigalea*.

There is no hallux, save a rudimentary metatarsal, in the *Felidæ, Hyænidæ, Cynictis, Bdeogale,* and *Suricata*. Though present in all the other genera, its length, compared with that of the index of the pes, may vary considerably.

The hallux (when developed) always extends half down the metatarsal of the index. It may only extend about half down the metatarsal, as in *Viverricula* and sometimes in *Herpestes*, or two thirds down, as in *Fossa*. It may extend down to the distal end of the metatarsal of the pedal index, as in the Civet and Genet. It may reach further than to the middle of the proximal phalanx of the index (as in *Paradoxurus*, *Nandinia*, *Galidictis*, and *Galidia*), or to its distal end, as in *Arctictis*, *Cryptoprocta*, *Eupleres*, *Crossarchus*, and *Hemigalea*.

The metatarsal of the hallux (when not rudimentary) always extends more than half way down that of the index, but may hardly reach further, as sometimes in *Herpestes* and *Viverricula*. It may extend much more than half way down it, as in *Fossa* and *Viverra civetta*. It may extend two thirds down, as in *Crossarchus*. It may extend four fifths down it, as in *Galidia*, *Galidictis*, *Cryptoprocta*, *Hemigalea*, and *Eupleres*. It may extend downwards nearly to the end of the metatarsal of the index, as in *Arctictis* and *Paradoxurus*.

The middle phalanges of the digits of the pes vary in form harmoniously with those of the digits of the manus; and similarly the form of the ultimate phalanges of both limbs vary similarly in the various different groups of species.

Dimensions of the Skeleton in six specimens of the genus *Felis*. (In each there are 13 dorsal, 7 lumbar, and 3 sacral vertebræ.)

	Length of cervical vertebræ.	Length of dorsal vertebræ.	Length of lumbar vertebræ.	Length of sacrum.	Length from atlas to end of sacrum.	Length of tail.	Number of caudal vertebræ.
Wild Cat	″ 8·9	″ 16·5	″ 17·1	″ 3·2	″ 45·7	″ 32·4	20
Common Domestic Cat	8·0	12·0	13·0	2·4	35·4	26·1	20
Manx Cat	5·4	10·6	9·5	1·5	27·0	2·3	3
Leopard	16·0	31·0	29·0	6·5	82·5	78·0	23
Tiger	26·0	46·0	40·0	9·5	121·5	88·0	22
Lion	22·0	38·0	32·5	7·5	100·0	74·5	21
Average, excluding the caudal vertebræ of the Manx Cat	14·4	25·7	23·5	5·1	68·7	59·8	
Chetah	18·0	31·5	29·5	6·5	85·5		
Eyra	10·8	20·3	20·3	4·4	55·8		

	Wild Cat	Common Domestic Cat	Manx Cat	Leopard	Tiger	Lion	Average	Chetah	Eyra
Length of pelvic limb (femur, tibia, and pes).	39·0″	29·4	25·3	63·8	93·7	83·8	57·0	67·0	40·4
Length of 4th digit.	4·13″	2·9	2·7	8·0	10·5	9·5	6·29	7·0	...
Length of 4th metatarsal.	5·6″	4·5	4·1	8·0	12·0	11·0	7·5	9·75	5·7
Length of pes in front of tibia and fibula.	11·8″	9·4	8·3	20·0	28·0	25·5	17·3	20·0	12·6?
Length of os calcis.	3·2″	2·7	2·2	5·8	10·0	9·0	5·5	...	3·5
Tibia to root of malleolus.	13·8″	10·1	8·6	20·4	30·2	27·0	18·3	23·5	13·4
Femur from summit of head to condyloid surface.	13·4″	9·9	8·4	23·4	35·5	31·3	20·3	23·5	14·4
Length from summit of ilium to tuberosity of ischium.	9·6″	7·4	6·1	18·8	30·4	26·8	16·5	...	11·7
Length of pectoral limb (humerus, radius, and manus).	30·6″	24·0	20·8	53·9	82·8	73·8	47·3	58·5	29·6
Length of ungual phalanx.	0·9″	0·8	0·8	2·3	3·5	3·3	1·9	2·0	...
Length of 3rd digit.	3·5″	2·8	2·7	8·3	11·5	9·8	6·4	6·75	...
Length of 3rd metacarpal.	5·0″	2·7	2·6	6·6	10·8	9·0	6·1	7·75	...
Length of manus.	7·8″	6·2	5·7	16·7	25·3	22·0	13·9	15·5	8·5?
Radius from margin of its head to root of styloid process.	11·4″	8·8	7·4	17·2	26·0	25·0	15·7	22·0	9·7
Length from summit of head of humerus to surface of capitellum.	11·4″	9·0	7·7	20·0	31·5	26·8	17·7	21·0	11·4
Angle formed by scapular spine with axillary margin.	25°	27	30	27	35	35	28½	...	20
Greatest breadth of scapula.	4·55″	3·9	3·0	8·7	15·0	13·3	8·07	...	4·8
Length of scapula from margin of glenoid surface to vertebral end of scapular spine.	8·4″	6·2	4·9	14·5	23·0	21·0	13·0	...	7·8

	Wild Cat	Common Domestic Cat	Manx Cat	Leopard	Tiger	Lion	Average	Felis macroscelis	Felis planiceps
Breadth of narrowest part of skull behind postorbital processes.	3·4"	3·4	2·7	4·5	4·7	5·8	4·1	......	......
Interorbital breadth of skull-roof.	1·9"	1·8	1·3	3·4	5·5	5·9	3·3	......	......
Greatest breadth of brain-case.	4·5"	4·1	3·6	7·0	8·0	8·7	5·9	......	......
Length between roots of zygomatic arch inside the arch.	2·6"	2·9	1·7	4·6	8·4	7·5	4·6	......	......
Breadth of mesopterygoid fossa.	1·3"	1·2	1·0	2·4	3·8	4·4	2·3	......	......
Length of mesopterygoid fossa to end of hamular processes.	2·2"	1·6	1·5	3·1	5·6	4·5	3·1	......	......
Basion to ovalion.	2·6"	2·1	1·7	4·0	5·5	5·5	3·6	3·6	2·2
From front of præmaxilla to between palatine foramina.	2·9"	2·4	2·3	5·7	10·8	10·8	5·8	......	......
Greatest length of palate[1].	4·0"	3·5	3·1	8·6	15·0	14·7	8·1	......	......
Length of palate behind last molars.	0·5"	3·5	0·3	1·4	3·2	3·0	1·46	......	......
Greatest breadth of palate.	3·6"	3·5	3·1	7·4	10·6	11·0	6·5	......	......
Greatest width of zygomata.	7·4"	6·7	5·4	13·2	22·0	21·5	12·7	......	......
Basion to front of præmaxillæ.	9·2"	7·5	6·6	16·4	26·8	26·6	15·5	15·5	8·6

[1] Measured from front of præmaxilla to hinder border of palate, neglecting processes and notches there.

	Wild Cat	Common Domestic Cat	Manx Cat	Leopard	Tiger	Lion	Average	Felis macroscelis	Felis planiceps	Tiger
Length of median upper incisor I[1].	" 0·35	?	0·3	0·6	0·9	1·2	0·66			1·0
Length of outermost upper incisor I[3].	" 0·4	?	0·35	1·6	1·8	2·0	1·23			2·1
Vertical extent of P. 2.	" 0·3	0·2	0·25	0·7	0·8	0·8	0·51		0·5	......
Transverse extent of P. 2.	" 0·2	0·15	0·15	0·3	0·5	0·5	0·3		0·2	......
Antero-posterior extent of P. 2.	" 0·2	0·15	0·2	0·4	0·7	0·7	0·39		0·4	......
Vertical extent of P. 3.	" 0·5	0·55	0·55	0·9	1·8	1·8	1·1		......	......
Transverse extent of P. 3.	" 0·3	0·3	0·26	0·6	1·1	0·9	0·58		......	......
Antero posterior extent of P. 3.	" 0·7	0·55	0·5	1·4	2·1	2·2	1·24		......	......
Vertical extent of crown of P. 4.	" 0·6	0·5	0·6	1·3	2·0	2·0	1·2		......	......
Transverse extent of P. 4.	" 0·5	0·4	0·5	1·1	1·6	1·5	0·9		......	......
Antero-posterior extent of P. 4.	" 1·0	1·0	1·0	2·2	3·3	3·3	1·9	2·0	1·1	......
Transverse diameter of M. 1.	" 0·4	0·2	0·35	0·5	0·9	1·5	0·64	......	......	......
Antero-posterior dimension of M. 2.	" 0·3	0·15	0·2	0·35	0·5	0·8	0·35	......	......	......
Length of upper canine.	" 1·2	1·4	1·0	3·0	5·2	4·7	2·7	4·0	1·3	3·2

	Wild Cat	Tiger	Felis macroscelis	Felis planiceps
Length of lower molar series.	"	6·7		
Length from front of first lower molar to end of condyle.	"	16·0		
Length from front of upper canine to back of last upper molar.	"	12·4		
Length from the same point to hinder side of mandibular condyle.	" 6·7	21·5	12·5	6·3
Length from front of lower canine to back of last lower molar.	" 3·4	12·4	7·0	3·5
Length of upper molar series.	" 2·3	......	3·5	2·5

Proportions of Parts of Skeleton of Felidæ.

The spinal column from front of atlas to end of sacrum being taken as 100, length of :—

	Cervical region.	Dorsal region.	Lumbar region.	Sacrum.	Tail.	Scapula.	Humerus.	Radius.	Manus.	Third metacarpal.	Third digit.	Ungual phalanx.	Pelvis.	Femur.	Tibia.
Average	20·9	37·4	34·2	7·5	87·0	18·6	25·7	22·8	20·0	8·8	9·3	2·7	24·0	29·5	26·6
Maxima	22·6	39·2	37·4	7·8	94·5	21·0	28·5	27·4	22·0	10·9	10·0	3·3	26·8	31·3	31·8
Minima	19·3	36·1	32·5	5·5	8·5	17·5	23·4	20·8	17·0	7·6	7·6	1·9	20·9	27·9	24·7

	Pes.	Os calcis.	Fourth metatarsal.	Cranial length.	Length of palate.	Breadth of palate.	Basion to ovalion.	Breadth of zygomata.	Breadth of brain-case.	Interorbital breadth.	Postorbital breadth at the narrowest.	Length of upper canine.	Antero-posterior extent of P. 4.	Humerus + radius + manus.	Femur + tibia + pes.
Average	25·1	8·0	10·9	22·5	11·7	9·4	5·2	18·4	8·5	4·8	5·9	4·0	2·7	68·7	81·2
Maxima	30·7	9·0	15·1	26·6	14·7	11·4	6·2	21·5	13·3	5·9	10·0	4·7	3·7	77·9	93·8
Minima	23·0	7·0	9·6	19·8	9·6	7·8	4·5	16·0	6·5	4·1	3·8	2·6	2·1	61·2	75·6

Proportions of Parts of Skeleton of Felidæ (*continued*).

The length of the skull from the basion to front of præmaxillæ being taken as 100, extent of:—

	Breadth of zygomata.	Breadth of palate.	Length of palate behind last molars.	Length of palate.	Length of meso-pterygoid fossa.	Breadth of meso-pterygoid fossa.	Breadth of brain-case.	Interorbital breadth.	Narrowest post-orbital breadth.	Length of upper canine.
Average	82·0	42·0	9·4	52·2	20·0	14·8	38·0	21·2	28·6	17·4
Maxima	89·3	46·9	11·9	55·9	23·9	16·5	54·5	25·2	45·3	19·4
Minima	80·4	39·1	4·6	43·4	16·9	14·1	29·8	19·6	17·5	13·0
Felis macroscelis	......	......	......	......	......	......	......	......	......	25·8

	Length of outermost inisor.	Length of innermost incisor.	Antero-posterior extent of M. 1.	Transverse extent of M. 1.	Antero-posterior extent of P. 4.	Transverse extent of P. 4.	Antero-posterior extent of P. 3.	Transverse extent of P. 3.	Basion to ovalion.
Average	7·9	4·2	2·2	4·1	12·2	5·8	8·0	3·7	23·2
Maxima	9·7	4·5	3·2	5·6	19·4	7·5	8·5	4·0	28·2
Minima	4·3	3·3	1·8	2·6	10·8	5·3	7·3	3·2	20·5

Basion to ovalion being taken as 100, extent of:—	Length of palate.	Breadth of palate.	From front of præmaxillæ to palatine foramina.	Breath of zygomata.	Breadth of brain-case.	Antero-posterior extent of M. 1.	Transverse extent of M. 1.	Antero-posterior extent of P. 4.	Transverse extent of P. 4.	Antero-posterior extent of P. 3.	Transverse extent of P. 3.
Average	225·0	180·5	161·1	352·7	163·8	9·7	17·7	52·7	25·0	34·4	16·1
Maxima	272·7	200·0	196·3	400·0	211·7	14·5	27·1	60·0	29·4	36·2	20·0
Minima	153·8	138·4	111·5	284·6	145·4	7·1	9·5	38·4	15·3	26·2	11·5

Proportion borne by the pelvic limb (femur, tibia, and pes) to pectoral limb taken as 100.	
Average	119·4
Maxima	127·4
Minima	113·1
Felis eyra	139·8
Felis cynælurus	114·5

PROPORTIONS OF PARTS OF SKELETON OF FELIDÆ (*continued*).

Atlas to end of sacrum being taken as 100, length of:—

	Humerus.	Radius.	Femur.	Tibia.	Fourth metatarsal.	Manus.	Pes.	Humerus + radius + manus.	Femur + tibia + pes.
Felis eyra	20·4	17·3	25·8	24·0	10·2	15·2?	22·5?	52·9	72·3
Felis cynælurus	24·5	25·7	26·9	26·9	11·4	18·1	23·2	68·3	77·0

Length of palate being taken as 100, length from front of præmaxillæ to palatine foramina.	
Average	71·5
Maximum	74·2
Minimum	66·2

Extreme length of skull (basion to præmaxillæ) being taken as 100, length of:—

	Basion to ovalion.	Upper canine.	Upper molar series.	From lower canine to last molar.	From lower canine to condyle.	Antero-posterior extent of P. 2.	Transverse extent of P. 2.	Vertical extent of P. 2.	Antero-posterior extent of P. 4.
Felis macroscelis	23·2	25·8	22·5	45·1	80·6	......	......	......	12·2
Felis planiceps	25·5	15·1	29·0	40·6	73·2	4·6	2·3	5·8	12·7
Average, as before	23·2	17·4	......	42·5	75·4	2·5	1·2	3·2	12·2

	Number of dorsal vertebræ.	Number of lumbar vertebræ.	Number of sacral vertebræ.	Number of caudal vertebræ.	Number of sternebræ.	Number of pairs of true ribs.	Length of cervical vertebræ.	Length of dorsal vertebræ.	Length of lumbar vertebræ.	Length of sacrum.	Length from front of atlas to hinder end of sacrum.	Length of tail.
Viverra civetta	13	7	3	23	7	9	″ 16·1	″ 22·8	″ 18·4	″ 5·1	″ 62·4	″ 51·7
Viverricula	13	7	3	25	7	10	10·5	14·0	10·8	2·9	38·2	33·3
Genetta	13	7	3	27–29	7	10	7·0	9·8	8·5	2·3	27·6	41·7
Genetta felina	13	7	3	25	7	10	10·8	14·0	12·7	3·2	40·7	43·2
Paradoxurus	14	6	3	29	7	8 or 9	8·4	14·6	9·7	2·6	33·3	40·8
Hemigalea	13	7	3	24	7	9	10·15	12·7	10·5	2·5	35·8	33·0
Nandinia	13	7	3	26	7	9	5·4	10·2	9·5	2·5	27·6	42·5
Arctictis	14	5	3	31	7	9	10·5	25·0	15·2	5·1	55·8	81·7
Cynogale	14	6	3	21	......	......	10·3	16·65	9·65	2·0	38·6	20·3
Herpestes	{13 14	7 6}	3	26	7 or 8	9	4·4	7·6	6·3	1·9	20·2	
Herpestes vitticollis	13	7	3	23?	7	9	6·5	12·5	9·6	2·9	31·5	31·0
Bdeogale	14	6	3	25	8	9	...	...	...	...	29·0	26·0
Cynictis	13	7	3	25	7	9	6·0	8·3	7·6	1·9	23·8	22·2
Crossarchus obscurus	14	6	3	20	7 or 8	9	5·1	9·2	6·0	2·5	22·8	17·9
Crossarchus fasciatus	14	6	3	24	......	......	4·8	9·85	7·0	2·5	24·15	?
Suricata	14	6	3	20	7	9	4·1	9·5	5·4	1·9	20·9	18·2
Galidictes	14	6	3	27	......	9	4·9	9·5	6·3	1·8	22·5	
Galidia	13	{7 6}	3	25	7	9	4·8	8·8	7·8	2·0	23·4	?
Hemigalidia	13	7	3	26	7	9	4·4	8·9	7·6	2·3	23·2	20·8
Eupleres	13	7	3	22	8	......	7·6	11·8	10·8	2·9	33·1	22·5
Cryptoprocta	13	7	3	29	......	9	11·4	19·7	17·1	3·8	52·0	68·6
Proteles	15	5	3	22	6	8	16·5	20·3	10·15	3·2	50·15	27·3
Crocuta	15	5	4	19	7	8	24·1	39·4	15·2	7·6	86·3	31·0

	Length of scapula.	Breadth of scapula.	Angle of spine and axillary margin.	Length of humerus.	Length of radius.	Length of manus.	Length of 3rd metacarpal.	Length of 3rd digit.	Length of ungual phalanx.	Length of pelvis.	Length of femur.	Length of tibia.	Length of os calcis.	Length of pes (in front of tibia).	Length of 4th metatarsal.	Length of 4th digit.	Length of entire pectoral limb.	Length of entire pelvic limbs.
	"	"	°	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Viverra	9·4	5·3	25	10·2	9·4	7·6	3·3	3·15	0·85	11·7	12·1	12.5	3·0	10·2	5·1	5·0	27·2	34·8
Viverricula	5·2	......	......	6·5	5·3	4·4	2·5	......	......	6·9	7·7	7·4	2·0	7·0	3·4	......	16·2	22·1
Fossa	5·3	2·65	25	6·75	6·75	5·1	2·4	1·9	0·65	7·5	8·0	8·9	2·2	7·1	3·8	?	18·6	24·0
Genetta	4·0	2·5	25	6·6	5·4	4·6	1·8	2·0	0·5	5·2	7·6	7·9	1·9	6·5	3·0	2·3	16·6	22·0
Genetta felina	5·8	3·8	25	8·1	7·1	5·1	2·0	2·3	0·55	7·1	9·1	9·6	2·0	7·1	3·8	2·5	20·3	25·8
Paradoxurus	5·2	3·3	25	7·5	5·7	5·0	1·75	2·5	0·5	6·8	8·3	7·7	2·0	6·5	2·3	2·4	18·2	22·5
Hemigalea	5·45	3·1	25	7·6	6·5	4·8	1·8	2·3	0·65	6·6	8·9	8·3	1·8	6·1	2·8	2·3	18·9	23·3
Nandinia	3·3	2·3	26	5·8	4·7	4·55	1·5	2·3	0·5	5·6	7·1	7·1	2·0	6·3	2·5	2·5	15·0	20·5
Arctictis	7·85	5·6	25	14·0	11·7	9·1	3·0	......	......	12·7	14·7	13·45	4·0	10·9	4·3	......	34·8	39·0
Cynogale	6·3	3·65	25	8·5	6·65	6·30	1·65	3·3	0·55	8·0	10·0	8·8	2·8	7·65	3·1	2·8	21·3	26·4
Herpestes	2·5	1·5	20	3·5	3·0	3·9	1·5	1·9	0·65	4·0	4·5	4·7	1·5	4·5	2·3	1·8	10·4	13·7
Herpestes vitticollis	5·5	2·6	25	7·1	6·6	6·1	2·15	2·15	1·0	6·85	8·0	8·0	2·1	7·5	3·45	2·85	19·8	23·5
Bdeogale	......	......	......	6·0	5·45	......	......	......	......	......	6·8	7·2	......	......	......	......	......	......
Cynictis	4·5	1·9	20	5·2	4·8	4·2	1·9	2·15	0·9	4·7	5·8	6·2	1·5	5·8	2·8	2·0	14·2	17·8
Crossarchus obscurus	3·5	2·3	26	4·7	4·0	4·0	1·5	2·0	0·9	5·1	5·3	5·3	1·5	5·1	2·3	1·5	12·7	15·7
Crossarchus fasciatus	4·0	2·0	......	5·1	4·55	4·55	......	......	......	5·45	6·1	6·7	2·2	6·1	......	......	14·1	18·9
Suricata	3·8	2·0	20	5·0	4·6	4·3	1·65	2·0	1·0	5·1	5·6	5·85	1·5	5·3	2·4	1·8	13·9	16·7
Galidictis	3·7	1·9	20	5·3	4·95	3·0	1·7	1·8	0·65	5·1	5·8	6·55	1·5	5·7	2·7	2·4	13·2	18·0
Galidia	3·5	1·9	......	5·1	4·5	......	......	......	......	4·6	5·9	?	......	......	......	......	......	......
Hemigalidia	4·0	2·0	25	5·2	5·1	4·0	1·65	2·0	0·70	6·3	6·1	6·6	1·5	5·8	2·7	2·2	14·3	18·5
Eupleres	5·3	2·5	24	6·1	6·7	5·1	2·0	2·3	0·8	6·85	7·6	7·8	1·8	6·7	2·8	2·5	17·9	22·1
Cryptoprocta	8·4	4·8	25	11·9	9·2	8·6	3·0	4·0	1·25	10·1	14·7	12·95	3·5	10·4	4·3	4·3	29·7	38·0
Proteles	9·9	4·8	20	12·45	12·7	12·0	6·3	4·2	1·25	10·7	13·3	13·2	3·3	12·45	6·3	4·2	37·1	38·9
Crocuta	17·8	12·0	30	19·0	21·0	17·8	8·9	6·3	2·0	12·45	22·8	17·8	6·0	14·0	7·1	6·3	57·8	54·6

	Length from front of lower canine to back of mandibular condyle.	Length from front of lower canine to back of last lower molar.	Interorbital breadth at narrowest part.	Interorbital breadth.	Breadth of brain-case.	Length of each zygomatic arch in straight line.	Its breadth.	Length of meso-pterygoid fossa.	Basion to ovalion.	From præmaxillæ to palatine foramina.	Greatest length of palate.	Its length behind last molars.	Breadth of palate.	Width of zygomata.	Basion to præ-maxillæ.
Viverra civetta	9·5	6·2	1·9	2·4	3·7	3·7	1·5	2·4	3·2	2·8	7·2	0·7	3·7	7·3	13·4
Viverricula	5·7	3·6	1·2	1·3	2·7	2·2	0·6	1·45	2·3	1·8	4·2	0·45	2·4	4·55	8·3
Fossa	6·7	4·4	1·3	1·6	3·3	2·4	0·7	1·7	2·1	2·0	5·2	0·5	2·3	4·5	9·1
Genetta	5·5	3·5	1·5	0·7	2·7	2·2	0·8	1·5	2·1	1·8	4·0	0·4	2·5	4·1	8·0
Prionodon	4·9	2·9	1·2	1·4	2·3	1·9	0·5	1·3	1·6	1·35	3·6	0·7	1·8	3·8	7·2
Poiana	......	......	1·3	1·1	2·3	1·8	0·5	1·2	1·7	1·4	3·0	0·3	1·7	3·6	6·4
Paradoxurus	7·3	4·2	1·2	1·7	3·25	3·1	0·95	1·9	2·0	2 0	4·75	0·4	2·8	5·7	9·3
Arctogale	7·8	4·2	1·7	1·9	3·4	3·2	0·6	1·5	2·2	2·2	5·9	1·5	2·3	5·8	10·1
Hemigalea	......	......	1·5	1·7	3·1	2·5	0·8	1·6	2·0	1·4	4·9	0·4	2·5	4·7	8·8
Nandinia	5·6	3·2	1·4	1·5	2·9	2·3	0·7	1·6	2·0	1·7	3·7	0·2	2·1	4·4	7·5
Arctictis	10·1	5·1	3·8	3·3	4·5	4·4	1·8	2·2	3·5	2·9	7·8	2·6	3·5	8·2	13·9
Cynogale	8·5	5·8	1·4	1·6	3·7	3·2	0 8	1·6	2·7	1·5	6·2	0·6	2·1	6·2	11·4
Herpestes	......	......	1·1	1·5	2·8	2·0	0·7	1·1	2·1	1·2	4·5	1·2	2·2	4·3	7·8
Herpestes vitticollis	6·4	4·1	1·5	2·0	3·5	2·2	0·7	1·0	2·1	2·2	5·55	1·2	2·8	5·0	9·0
Bdeogale	......	......	......	......	......	......	......	......	......	......	4·9	......	......	......	7·8
Cynictis	4·3	3·0	1·6	1·6	2·8	1·6	0·7	1·0	1·6	1·1	3·5	0·8	2·1	4·0	6·3
Crossarchus obscurus	4·5	2·7	1·3	1·5	2·7	1·8	0·6	0·8	1·5	1·2	4·0	1·1	1·9	3·9	6·5
Rhinogale	......	......	2·2	1·8	3·1	2·1	1·0	1·5	1·9	1·5	4·5	0·6	2·3	4·7	8·0
Suricata	4·2	2·5	1·9	1·5	2·9	1·6	0·6	0·7	1·1	1·3	3·2	0·6	2·1	5·1	5·7
Galidictis	4·4	2·7	1·3	1·5	2·9	1·8	0·7	1·4	1·7	1·0	3·0	0·3	2·0	4·2	6·2
Galidia	4·0	2·5	1·4	1·6	2·8	1·5	0·7	1·0	1·8	1·1	2·7	0·4	2·1	4·1	5·8
Hemigalidia	4·4	2·8	1·5	1·7	2·7	1·9	0·7	1·2	1·9	1·4	3·3	0·4	1·9	3·9	6·6
Eupleres	5·6	3·4	1·4	1·4	3·1	2·0	0·5	1·5	1·8	1·9	4·0	0·4	1·3	3·5	7·7
Cryptoprocta	8·4	4·9	2·5	2·6	4·3	2·9	1·2	2·4	2·9	2·9	6·0	0·6	3·5	7·2	11·4
Proteles	8·9	3·3	1·8	2·3	3·8	3·8	0·9	2·3	3·7	2·5	7·0	2·8	3·8	8·6	13·4
Hyæna striata			3·8	4·9	5·8	5·0	2·0	4·0	4·5	5·1	11·4	1·1	7·0	15·0	20·1
Hyæna brunnea			4·4	5·6	5·9	5·5	2·6	4·8	4·6	5·4	12·3	1·0	8·3	18·2	21·8
Crocuta			4·0	5·6	8·1	5·4	3·0	4·4	5·2	4·5	12·7	1·4	11·1	18·3	22·5

	Length of upper canine.	Length of M. 2.	Breadth of M. 2.	Length of M. 1.	Breadth of M. 1.	Length of P. 4.	Breadth of P. 4.	Vertical extent of P. 4.	Length of P. 3.	Breadth of P. 3.	Vertical extent of P. 3.	Length of P. 2.	Breadth of P. 2.	Vertical extent of P. 2.	Length of P. 1.	Breadth of P. 1.	Vertical extent of P. 1.	Length of outermost incisors.	Length of innermost incisors.	Length of upper molar series.
Viverra	1·7″	0·4″	0·8″	0·7″	1·3″	1·5″	0·9″	0·9″	0·8″	0·5″	0·7″	0·8″	0·4″	0·7″	0·3″	0·3″	0·4″	0·7″	0·5″	4·6″
Viverricula	1·0	0·2	0·3	0·4	0·65	0·7	0·55	0·5	0·5	0·25	0·4	0·5	0·2	0·4	0·2	0·1	0·3	0·4	0·3	2·6
Fossa	1·2	0·4	0·5	0·5	0·7	0·8	0·6	0·45	0·6	0·3	0·35	0·5	0·2	0·35	0·3	0·15	0·3	0·3	0·15	3·5
Genetta	0·9	0·1	0·3	0·3	0·7	0·8	0·5	0·5	0·5	0·2	0·4	0·5	0·2	0·4	0·2	0·1	0·2	0·3	0·2	2·7
Prionodon	0·8	0·0	0·0	0·2	0·4	0·6	0·3	0·5	0·45	0·2	0·3	0·35	0·15	0·3	0·25	0·15	0·25	0·3	0·2	2·2
Poiana	0·9	0·0	0·0	0·2	0·4	0·6	0·4	0·3	0·5	0·2	0·3	0·4	0·2	0·3	0·1	0·1	0·2	0·3	0·2	...
Paradoxurus	1·4	0·3	0·4	0·5	0·8	0·7	0·7	0·4	0·55	0·35	0·5	0·5	0·25	0·45	0·2	0·15	0·3	0·5	0·35	3·2
Arctogale	1·2	0·3	0·3	0·4	0·5	0·5	0·4	0·4	0·4	0·3	0·4	0·4	0·2	0·4	0·1	0·1	0·2	0·4	0·3	2·9
Hemigalea	1·1	0·4	0·4	0·5	0·7	0·6	0·6	0·3	0·6	0·4	0·4	0·5	0·2	0·5	0·3	0·2	0·4	0·4	0·3	...
Nandinia	?	0·1	0·2	0·3	0·4	0·7	0·45	0·4	0·5	0·3	0·4	0·4	0·2	0·4	0·2	0·1	0·3	?	?	2·6
Arctictis	1·7	0·0	0·0	0·6	0·7	0·7	0·7	0·5	0·6	0·6	0·5	0·5	0·3	0·5	0·2	0·2	0·5	0·5	0·4	3·0
Cynogale	1·5	0·6	0·7	0·6	0·8	0·9	0·8	0·5	0·9	0·4	0·6	0·9	0·3	0·6	0·4	0·3	0·6	0·5	0·3	4·5
Herpestes vitticollis	1·2	0·25	0·6	0·5	0·9	0·9	0·65	0·5	0·6	0·45	0·55	0·5	0·3	0·45	0·2	0·15	0·2	0·5	0·5	3·0
Cynictis	0·9	0·2	0·4	0·3	0·6	0·7	0·5	0·4	0·4	0·4	0·4	0·4	0·2	0·4	0·1	0·1	0·3	0·4	0·3	1·9
Crossarchus obscurus	0·7	0·2	0·5	0·3	0·5	0·4	0·4	0·3	0·3	0·3	0·3	0·3	0·2	0·3	0·0	0·0	0·0	0·3	0·2	1·8
Rhinogale	1·0	0·3	0·5	0·4	0·6	0·6	0·6	0·3	0·4	0·4	0·4	0·4	0·3	0·4	0·1	0·1	0·2	0·5	0.3	...
Suricata	0·9	0·2	0·4	0·3	0·6	0·5	0·6	0·3	0·3	0·3	0·5	0·3	0·2	0·5	0·0	0·0	0·0	0·4	0·3	1·7
Galidictis	1·1	0·2	0·3	0·3	0·6	0·7	0·5	0·4	0·5	0·3	0·4	0·3	0·2	0·3	0·0	0·0	0·0	0·6	0·4	1·7
Galidia	0·8	0·1	0·3	0·3	0·6	0·8	0·4	0·4	0·4	0·2	0·3	0·2	0·1	0·2	0·0	0·0	0·0	0·3	0·2	...
Hemigalidia	0·8	0·25	0·4	0·3	0·6	0·6	0·4	0·4	0·4	0·25	0·4	0·4	0·2	0·4	0·2	0·1	0·2	0·4	0·25	1·7
Eupleres	0·3	0·3	0·3	0·4	0·3	0·5	0·2	0·2	0·4	0·1	0·3	0·3	0·1	0·2	0·2	0·1	0·2	0·25	0·19	2·9
Cryptoprocta	1·7	0·0	0·0	0·3	0·8	1·5	0·7	0·9	0·8	0·5	0·7	0·6	0·3	0·5	?	?	?	0·9	0·5	3·6
Proteles	0·9	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·4	0·2	0·2	0·4	0·3	0·4	0·2	0·3	0·2	0·4	0·3	2·0
Hyæna striata	3·0	0·0	0·0	0·5	1·3	3·1	1·7	1·8	1·9	1·3	1·8	1·4	1·0	1·3	0·7	0·6	0·8	1·6	0·7	7·0
Hyæna brunnea	3·2	0·0	0·0	0·6	1·3	3·5	2·2	2·0	2·2	1·7	2·1	1·7	1·1	1·2	0·6	0·6	0·6	1·6	0·9	
Crocuta	3·2	0·0	0·0	0·3	0·4	3·7	2·0	2·2	2·4	...	2·6	1·5	1·0	1·2	0·7	0·7	0·8	2·1	1·0	

Proportion of parts of skeleton, the length from the atlas to the end of the sacrum being taken as 100.

	Cervical region.	Dorsal region.	Lumbar region.	Sacrum.	Tail.	Scapula.	Humerus.	Radius.	Manus.	3rd metacarpal.	3rd digit.	Ungual phalanx.	Humerus + radius + manus.	Femur + tibia + pes.
Viverra	25·8	36·5	29·4	8·1	82·8	15·0	16·3	15·0	12·0	5·2	5·0	1·3	43·3	55·6
Viverricula	27·4	36·6	28·2	7·5	87·1	13·6	17·0	13·8	11·5	6·5	......	......	42·3	57·7
Genetta	25·3	35·5	30·7	8·3	151·0	14·4	23·9	19·5	16·6	6·5	7·2	1·8	60·0	79·6
Genetta	26·5	34·4	31·2	7·8	106·1	14·2	19·9	17·4	12·5	4·9	5·6	1·3	49·8	63·2
Paradoxurus	25·2	43·8	29·1	7·8	122·5	15·6	22·5	17·1	15·0	5·2	7·5	1·5	54·6	67·5
Hemigalea	28·3	35·4	29·3	6·9	92·1	15·2	21·2	18·1	13·4	5·0	6·4	1·8	52·7	64·9
Nandinia	19·5	36·9	34·4	9·0	153·9	11·9	21·0	17·0	16·4	5·4	8·3	1·8	54·4	74·2
Arctictis	18·8	44·8	27·2	9·1	146·4	14·0	25·0	20·9	16·3	5·3	......	......	62·2	69·9
Cynogale	26·6	43·1	25·0	5·1	52·5	16·3	22·0	17·2	16·3	4·2	8·5	1·4	55·5	68·4
Herpestes vitticollis	20·6	39·7	30·4	9·2	98·4	17·7	22·5	20·9	19·3	7·1	7·1	3·1	62·7	75·9
Bdeogale	......	......	......	......	89·6	......	20·7	18·6	......	......	......	......	......	......
Cynictis	25·2	34·8	31·8	7·9	93·2	18·9	21·8	20·1	17·6	7·9	9·0	3·7	59·5	74·6
Crossarchus obscurus	22·3	40·3	26·3	10·9	78·5	15·3	20·6	17·5	17·5	6·5	8·7	3·9	55·6	68·7
Crossarchus fasciatus	19·8	40·7	28·9	10·3	......	16·5	21·1	18·8	18·8	......	......	......	58·7	78·1
Suricata	19·6	45·4	25·8	9·0	8·7	13·3	23·9	22·0	20·5	7·8	9·5	4·5	66·4	79·9
Galidictis	21·7	42·2	28·0	8·0	......	16·4	23·5	22·0	13·3	7·5	8·0	2·8	58·8	80·1
Galidia	20·5	37·6	33·3	8·5	......	14·9	21·7	19·2	......	......	......	......	......	......
Hemigalidia	19·0	38·3	32·7	9·9	89·6	17·2	22·4	21·9	17·2	7·1	8·6	3·0	61·5	79·6
Eupleres	22·9	35·6	32·6	8·7	67·9	16·0	18·1	20·2	15·4	6·0	6·9	2·4	53·7	66·6
Cryptoprocta	21·9	37·8	32·8	7·3	112·6	16·1	22·8	17·6	16·5	5·7	7·6	2·2	56·9	73·1
Proteles	32·9	40·4	20·2	6·3	54·4	19·7	24·8	25·3	23·9	12·5	8·3	2·4	74·0	77·6
Crocuta	27·9	45·6	17·6	8·8	35·9	20·6	22·0	24·3	20·6	10·3	7·3	2·3	66·9	63·2

Proportion of parts of skeleton, the length from the atlas to the end of the sacrum being taken as 100.

	Pelvis (length).	Femur.	Tibia.	Pes.	Os calcis.	Fourth metatarsal.	Cranial length.	Length of palate.	Breadth of palate.	Basion to ovalion.	Breadth of zygomata.	Breadth of brain-case.	Interorbital breadth.	Postorbital breadth.	Length of $\frac{\text{M. 1.}}{}$	Length of $\frac{\text{P. 4.}}{}$
Viverra	18·7	19·3	20·0	16·3	4·8	8·1	21·4	11·5	5·9	5·1	11·7	5·9	3·8	3·0	1·1	2·4
Viverricula	18·0	20·1	19·3	18·3	5·2	8·9	21·7	10·9	6·2	6·0	11·9	7·0	3·4	3·1	1·0	1·8
Genetta	18·8	27·5	28·6	23·5	6·8	10·8	28·9	14·4	9·0	7·6	14·8	9·7	2·5	5·4	1·0	2·8
Genetta	17·4	22·3	23·5	17·4	4·9	9·3										
Paradoxurus	20·4	24·9	23·1	19·5	6·0	6·9	27·9	14·2	8·4	6·0	17·1	9·7	5·1	3·6	1·5	2·1
Hemigalea	18·4	24·8	23·1	17·0	5·0	7·8	24·5	13·6	6·9	5·5	13·1	8·6	4·7	4·1	1·3	1·6
Nandinia	20·2	25·7	25·7	22·8	7·2	9·0	27·1	13·4	7·6	7·2	15·9	10·5	5·4	5·0	1·0	2·5
Arctictis	22·7	26·3	24·1	19·5	7·1	7·7	24·9	13·9	6·2	6·2	14·6	8·0	5·9	6·8	1·17	1·2
Cynogale	20·7	25·9	22·7	19·8	7·2	8·0	29·5	16·0	5·4	6·9	16·0	9·5	4·1	3·6	1·5	2·3
Herpestes	21·7	25·3	25·3	25·3	6·6	10·9	28·5	17·9	8·8	6·6	15·8	11·1	6·3	4·7	1·5	2·8
Bdeogale	......	23·4	24·8	......	......	......	26·9	16·9								
Cynictis	19·7	24·3	26·0	24·3	6·3	11·7	26·4	14·7	8·8	6·7	16·8	11·7	6·7	6·7	1·2	2·9
Crossarchus obscurus	22·3	23·2	23·2	22·3	6·5	10·0	28·5	17·5	8·3	6·5	17·1	11·8	6·5	5·7	1·3	1·7
Crossarchus fasciatus	22·5	25·2	27·7	25·2	9·1											
Suricata	24·4	26·7	27·9	25·3	7·1	11·4	27·2	15·3	10·0	5·2	24·4	13·8	7·1	9·0	1·4	2·3
Galidictis	22·6	25·7	29·1	25·3	6·6	12·0	27·5	13·3	8·8	7·5	18·6	12·8	6·6	5·7	1·3	3·1
Galidia	19·6	25·2	......	......	......	......	24·7	11·5	8·9	7·6	17·0	11·9	6·8	5·9	1·2	3·4
Hemigalidia	27·1	26·2	28·4	25·0	6·4	11·6	28·4	14·2	8·1	8·1	16·8	11·6	7·3	6·4	1·2	2·5
Eupleres	20·6	22·9	23·5	20·2	5·4	8·4	23·2	12·0	3·9	5·4	10·5	9·3	4·2	4·2	1·2	1·5
Cryptoprocta	19·4	28·2	24·9	20·0	6·7	8·2	21·9	11·5	6·7	5·5	13·8	8·2	5·0	4·8	0·5	2·8
Proteles	21·3	26·5	26·3	24·8	6·5	12·5	26·7	13·9	7·5	7·3	17·1	7·5	4·5	3·5		
Crocuta	14·4	26·4	20·6	16·2	6·9	8·2	26·0	14·7	12·8	6·0	21·2	9·3	6·4	4·6	0·3	4·2

Proportions of the skull and teeth, the length from basion to front of præmaxillæ being taken as 100.

	Breadth of zygomata.	Breadth of palate.	Length of palate behind molars.	Length of palate.	Length of mesopterygoid fossa.	Breadth of mesopterygoid fossa.	Breadth of brain-case.	Interorbital breadth.	Narrowest postorbital breadth.	Length of upper canine.	Length of outermost incisor.	Length of innermost incisor.	Length (antero-posterior) of M. 2.	Breadth of M. 2.	Length of M. 1.	Breadth of M. 1.	Length of P. 4.	Breadth of P. 4.	Length of P. 3.	Breadth of P. 3.	Basion to ovalion.
Viverra	54·4	27·6	5·2	53·7	17·9	11·1	27·6	17·9	14·1	12·6	5·2	3·7	2·9	5·9	5·2	9·7	11·1	6·7	5·9	3·7	23·8
Viverricula	54·8	23·9	5·4	50·6	17·4	7·2	33·4	15·6	14·4	12·0	4·8	3·6	2·4	3·6	4·8	7·8	8·4	6·6	6·0	3·0	27·7
Fossa	49·4	25·2	5·4	57·1	18·6	7·6	36·2	17·5	14·2	13·1	3·2	1·6	4·3	5·4	5·4	7·6	8·6	6·5	6·5	3·2	23·0
Genetta	51·6	31·2	5·0	50·0	18·7	9·9	33·7	8·7	18·7	11·2	3·7	2·5	1·2	3·7	3·7	8·7	9·9	6·2	6·2	2·5	26·2
Prionodon	52·7	25·0	9·7	50·8	18·0	6·9	31·9	19·4	16·6	11·1	4·1	2·7	......	......	2·7	5·5	8·3	4·1	6·2	2·7	22·2
Poiana	56·2	26·5	4·6	46·8	18·7	7·8	35·9	17·1	20·3	14·0	4·6	3·1	......	......	3·1	6·2	9·3	6·2	7·8	3·1	26·5
Paradoxurus	61·2	30·1	4·3	51·0	20·4	9·1	33·8	18·2	12·9	15·0	5·3	3·7	3·2	4·3	5·3	8·6	7·5	7·5	5·9	3·7	21·5
Arctogale	57·4	22·7	14·8	58·4	14·8	5·9	33·6	18·7	16·8	11·8	3·9	2·9	2·9	2·9	3·9	4·9	4·9	3·9	3·9	2·9	21·7
Hemigalea	53·4	28·4	4·5	55·6	18·1	9·1	35·2	19·3	17·0	12·5	4·5	3·2	4·5	4·5	5·6	7·9	6·8	6·8	6·8	4·5	22·7
Nandinia	58·6	28·0	2·6	49·3	21·3	9·3	38·6	20·0	18·6	?	......	......	1·3	2·6	4·0	5·3	9·3	6·0	6·6	4·0	26·0
Arctictis	58·9	25·1	18·7	56·1	15·8	12·9	32·3	23·7	27·3	12·2	3·5	2·8	......	......	4·3	5·0	5·0	5·0	4·3	4·3	25·1
Cynogale	54·3	18·4	5·2	54·3	14·0	7·0	32·4	14·0	12·2	13·1	4·3	2·6	5·2	......	5·2	7·0	7·8	7·0	7·8	3·5	23·6
Herpestes	52·8	28·2	15·3	56·4	14·1	21·7	35·7	19·2	14·1	......	......	......	......	......	......	......	......	......	......	......	26·9
Herpestes vitticollis	44·4	31·1	13·3	61·6	11·1	7·7	38·8	22·2	16·6	13·3	4·4	4·4	2·7	6·6	4·4	10·0	10·0	7·2	6·6	5·0	23·3
Bdeogale	......	......	......	62·8																	
Cynictis	63·4	33·3	12·7	55·5	15·8	11·1	44·4	25·3	25·3	14·2	6·3	4·7	3·1	6·3	4·7	9·5	11·1	7·9	6·3	6·3	25·3
Crossarchus obscurus	60·0	29·2	16·9	61·5	12·3	9·2	41·5	23·0	20·0	10·7	4·6	3·0	3·0	7·6	4·6	7·6	6·1	6·1	4·6	4·6	23·0
Rhinogale	58·7	28·7	7·5	56·2	18·7	12·5	38·7	22·5	27·5	12·5	6·2	3·7	3·7	6·2	5·0	7·5	7·5	7·5	5·0	5·0	23·7
Suricata	89·4	36·8	10·5	56·1	12·2	10·5	50·8	26·3	33·3	15·7	7·0	5·2	3·5	7·0	5·2	10·5	8·7	10·5	5·2	5·2	19·3
Galidictis	67·7	32·2	4·8	48·4	22·5	11·2	46·7	24·1	20·9	17·7	9·6	6·4	3·2	4·8	4·8	9·6	11·2	8·0	8·0	4·8	27·4
Galidia	70·6	36·2	6·8	46·5	17·2	12·0	48·2	27·5	24·1	13·7	5·1	3·4	1·7	5·1	5·1	10·3	13·7	6·8	6·8	3·4	31·1
Hemigalidia	59·0	28·7	5·0	50·0	18·4	10·6	40·9	25·7	22·7	12·1	5·0	3·7	3·7	5·0	4·5	9·0	9·0	5·0	5·0	5·0	28·7
Eupleres	45·4	16·8	5·1	51·9	19·4	6·4	40·2	18·1	18·1	3·8	3·2	2·4	3·8	3·8	5·1	3·8	6·4	2·5	5·1	1·3	23·3
Cryptoprocta	63·1	30·7	5·2	52·6	21·0	10·5	37·7	22·8	21·0	14·0	7·8	4·3	......	......	2·6	7·0	13·1	6·1	7·0	4·3	25·4
Proteles	64·1	28·3	20·8	52·2	17·1	6·7	28·3	17·1	13·4	6·7	2·9	2·2	......	......	......	......	......	......	2·9	1·4	27·6
Hyæna striata	74·1	34·8	5·4	56·7	19·9	9·9	28·8	24·3	18·9	14·9	7·9	3·4	......	......	2·4	6·4	15·4	8·4	9·4	6·4	22·3
Hyæna brunnea	83·4	38·0	4·5	56·4	22·0	11·9	27·0	25·6	20·1	14·6	7·3	4·1	......	......	2·7	5·9	16·0	10·0	10·0	7·7	21·1
Crocuta	81·3	49·3	6·2	56·4	19·1	13·3	36·0	24·3	17·7	14·2	9·3	4·4	......	......	1·3	1·7	16·4	8·8	10·6	......	23·1

Extreme length of skull being taken as 100, length:—	From front of lower canine to back of last lower molar.	From front of lower canine to back of condyle.	Upper molar series.	Proportion borne by the pelvic limb (femur, tibia, and pes) to the entire pectoral limb, taken as 100.
Viverra	46·2	70·8	34·3	127·9
Viverricula	43·3	68·6	31·3	136·4
Fossa	48·3	73·6	38·4	129·0
Genetta	43·7	68·7	33·7	132·5 or 127·0
Prionodon	40·2	68·0	30·5	......
Poiana	......	......	......	......
Paradoxurus	45·1	78·4	34·4	123·6
Arctogale	41·5	77·2	28·7	......
Hemigalea	......	......	......	123·2
Nandinia	53·6	74·6	34·6	136·6
Arctictis	36·6	72·6	22·2	112·0
Cynogale	50·8	74·5	39·4	123·9
Herpestes	......	......	......	131·6
Herpestes vitticollis	45·5	71·1	33·3	118·6
Bdeogale	......	......	......	......
Cynictis	47·6	68·2	30·1	125·3
Crossarchus obscurus	41·5	59·2	27·6	123·6
Rhinogale	......	......	......	......
Suricata	43·8	73·6	29·8	120·2
Galidictis	43·3	70·9	27·4	136·3
Galidia	46·5	68·9	......	......
Hemigalidia	42·4	66·6	25·7	129·3
Eupleres	44·1	72·7	37·6	123·4
Cryptoprocta	42·1	73·6	31·5	127·9
Proteles	24·6	66·4	14·9	104·8
Hyæna striata	......	......	34·8	......
Hyæna brunnea	......	......	......	......
Crocuta	......	......	......	94·4

Proportions of the skull and teeth, the line from the basion to the ovalion being taken as 100.

	Length of palate.	Breadth of palate.	From præmaxillæ to palatine foramina.	Breadth of zygomata.	Breadth of brain-case.	Length of M. 1.	Breadth of M. 1.	Length of P. 4.	Breadth of P. 4.	Length of P. 3.	Breadth of P. 3.
Viverra	225·0	115·6	87·5	228·1	115·6	21·8	40·5	43·4	28·1	25·0	15·6
Viverricula	182·6	104·3	78·2	197·8	117·3	17·3	28·2	30·4	23·9	21·7	10·8
Fossa	247·6	109·5	95·2	214·2	157·1	23·8	33·3	38·1	28·5	28·5	14·2
Genetta	190·4	119·0	85·7	195·2	128·5	14·2	33·3	38·1	23·8	23·8	9·5
Prionodon	225·0	112·5	84·3	237·5	143·7	12·5	25·0	37·5	18·7	28·1	12·5
Poiana	176·4	100·0	82·3	211·7	135·3	11·7	23·5	35·3	23·5	29·4	11·7
Paradoxurus	237·5	140·0	100·0	285·0	162·5	20·0	40·0	35·0	35·0	27·5	17·5
Arctogale	268·2	104·5	100·0	263·6	154·5	18·1	22·7	22·7	18·1	18·1	13·6
Hemigalea	245·0	125·0	70·0	235·0	155·0	25·0	35·0	30·0	30·0	30·0	20·0
Nandinia	175·0	105·0	85·0	220·0	145·0	15·0	20·0	35·0	22·5	25·0	15·0
Arctictis	222·8	100·0	82·8	234·2	128·5	17·1	20·0	20·0	20·0	17·1	17·1
Cynogale	229·6	77·7	55·5	229·6	137·0	22·2	29·6	33·3	29·6	33·3	14·8
Herpestes	214·2	104·7	57·1	204·7	133·3						
Herpestes vitticollis	264·2	133·3	104·7	238·1	166·6	23·8	42·8	42·8	30·9	28·5	21·4
Cynictis	218·7	131·4	68·7	249·9	175·5	18·7	37·5	43·7	31·2	24·9	24·9
Crossarchus obscurus	266·6	129·9	80·0	260·0	180·0	20·0	33·3	26·6	26·6	20·0	20·0
Rhinogale	236·8	121·0	78·9	247·3	163·1	21·0	31·5	31·5	31·5	21·0	21·0
Suricata	290·9	190·9	118·1	463·6	263·6	27·2	54·5	45·4	54·5	27·2	27·2
Galidictis	176·4	117·6	58·8	247·0	170·5	17·6	35·2	41·1	29·4	23·5	17·6
Galidia	150·0	116·6	61·1	227·7	155·5	16·6	33·3	44·4	22·2	22·2	11·1
Hemigalidia	173·6	100·0	73·6	205·2	142·1	15·6	31·5	31·5	21·0	21·0	13·1
Eupleres	222·2	72·2	105·5	194·4	172·2	22·2	16·6	27·7	11·1	22·2	5·5
Cryptoprocta	206·9	120·6	100·0	248·2	148·2	10·3	27·5	51·7	24·1	27·5	17·2
Proteles	189·1	102·7	67·5	232·4	102·7	......	......	......	......	10·8	5·4
Hyæna striata	253·3	155·5	113·3	333·3	128·8	11·1	28·8	68·8	37·7	42·2	29·8
Hyæna brunnea	267·3	180·4	117·3	395·6	128·2	13·0	28·2	76·0	47·8	47·8	36·9
Crocuta	242·2	213·4	86·5	351·9	155·7	5·7	7·6	71·1	38·4	46·1	

Myology.

The muscles of the *Felidæ* have, as every one knows, been most perfectly illustrated and described, with his peculiar nomenclature, by Straus-Dürckheim in his splendid work 'Le Chat.' The muscles of the Cat have also been shortly described under their commonly known names, and partly illustrated from fresh dissections, by me [1]. The muscles of various *Felidæ*, of the Genet, and of the Hyæna have been figured in Cuvier's magnificent 'Recueil des Planches.' The muscles of the Civet have been described by Prof. Macalister [2] and by Messrs. Young [3] and Davis [4], and those of *Crocuta* by Dr. Watson [5].

With these references, I shall content myself with shortly noticing the myological conditions which I have observed in the specimen of *Genetta tigrina* dissected by me, pointing out their resemblances and differences from those found by me in the Cat, by Prof. Macalister in the Civet, and by Dr. Watson in *Crocuta*.

Muscles of the Pectoral Limb.

Pectoralis.—I found this in the Genet to be as in the Cat, save that one muscular mass corresponds with what I have described [6] as the 1st, 2nd, and 5th parts of the Cat's *pectoralis*, while the part which seems to represent the Cat's 2nd portion extends three fourths down the humerus. What corresponds to the 4th part of the Cat's pectoral is here inserted into the head of the humerus around the tendon of the biceps, and (mainly) on the greater tuberosity.

In *Crocuta* the pectoral is inserted into the whole length of the humerus from the bicipital groove to the elbow, and is divisible into a superficial and a deep stratum.

The *rectus abdominis* extends the whole length of the sternum; and there are (as in the Civet) seven tendinous inscriptions.

The *scaleni* are as in the Cat, except that the longer one reaches from the 5th to the 8th rib: from the 3rd to the 6th in the Civet. There are but two scaleni in *Crocuta*, but there are three in *Hyæna brunnea* and the Civet.

The *subclavius* is represented by a small muscle which goes from the first rib to the rudimentary clavicle, as also in the Civet.

The *trapezius* has the same general conditions as it has in the Cat [7]. Its anterior part is very small in the Hyænas [8].

The *cephalo-humeral* is as in the Cat, as it is also probably in the Civets and Hyænas. In the latter it is of enormous strength [9].

[1] Journ. of Anat. and Phys. vol. xiv. (1879) p. 166.

[2] Ibid. vol. ii. p. 205.

[3] See 'The Cat' (John Murray, 1881), chap. v.

[4] Proc. Roy. Irish Acad. n. s. vol. i. 1869–74, p. 506.

[5] P. Z. S. 1879, p. 79, pls. v. & vi. Some myological notes as to *Hyæna brunnea* have also been published by Dr. Murie in Trans. Zool. Soc. vii. p. 509.

[6] 'The Cat,' p. 145.

[7] Prof. Macalister reckons as part of the trapezius what I and Dr. Watson consider to be the cephalo-humeral (or levator humeri).

[8] "Opposite the last two cervical spines."

[9] Trans. Zool. Soc. vol. vii. p. 510.

The *rhomboideus* arises (as in the Civet) from the 3rd cervical to the 4th dorsal vertebra; in *Crocuta* from the 5th cervical to the 4th dorsal. There is no *rhomboideus capitis*, thus differing from the Cat and agreeing with *Crocuta*, though, according to Meckel, there is one in *Hyæna striata*.

The *serratus magnus* arises in the Cat from the first ten ribs, in the Genet from the first nine, in *Crocuta* from the first eight, and in the Civet from the first seven or eight.

The *levator anguli scapulæ* arises in the Cat from the last five cervical vertebræ, in the Genet and Civet from the last four[1], in *Crocuta* from the last five cervical and first dorsal vertebræ. It is enormously thick in the Hyænas.

The *levator claviculæ* is as in the Cat; also in *Crocuta*[2].

The *latissimus dorsi* I found to arise as in the Cat; while in the Civet it extends from the 5th dorsal to the 3rd lumbar vertebra. In the Hyænas it arises from the posterior eleven dorsal spines and the lumbar aponeurosis.

There is but one *dorso-epitrochlear*, which corresponds to my internal dorso-epitrochlear of the Cat. There is but one in the Civet and Hyænas.

The *deltoid*, *infraspinatus*, and *teres minor* are as in the Cat.

The *subscapularis* and *infraspinatus* are as in the Cat. The *supraspinatus* only differs from that of the Cat in that, as in the Civet, it is obscurely separable into two portions, and in that it projects less beyond the margin of the bone of the scapula.

The *teres major* in the Genet, Civet, and Hyænas is inserted into the tendon of the latissimus dorsi, rather than into the humerus in common with it as in the Cat.

The *triceps* of the Genet is substantially like that of the Cat, except that its fifth head of origin extends higher up the humerus. In *Crocuta* and *Viverra civetta* there are but four heads.

The *anconeus* is like that of the Cat, except that it is not larger than is the fifth head of the triceps. There is a short flat anconeus in *Crocuta*.

The *biceps* in the Genet (as in the Civet, the Cat, and the Hyænas) arises by a single head from the margin of the glenoid surface, and is inserted into the tubercle of the radius.

The *coracobrachialis* is as in the Cat, save that it (as also in the Civet) partly unites with the tendon of the latissimus dorsi and adjacent part of the triceps. It is also single in the Hyænas.

The *brachialis anticus* is as in the Cat, Civet, and Hyænas.

The *supinator longus* arises much lower down the humerus than in the Cat. It is inserted into the radius, but sends (as also in the Civet) a slip to the dorsal carpal ligament. It is absent in the Hyænas, or only represented by a tendinous vestige[3]. In *Hemi-*

[1] Mr. Young says from the last six (Journ. of Anat. & Phys. vol. xiv. p. 169).

[2] Also in the Ichneumon, where it is said by Meckel (Anat. Comp. vol. vi. p. 238) to perforate the trapezius.

[3] P. Z. S. 1879, p. 98.

galea it is inserted into the large plate-like process of the radius, before described (fig. 2).

The *extensores carpi radiales longior et brevior* and the *supinator brevis* are as in the Cat and Civet.

The *extensor communis digitorum* supplies the four outer digits in the Hyænas and Civet, as in the Genet and Cat.

The *extensor minimi digiti* is substantially as in the Cat, and supplies the 3rd, 4th, and 5th digits in the Civet, but in the Hyænas it only goes to the 4th and 5th [1].

The *extensor longus ulnaris* is as in the Cat.

The *extensor ossis metacarpi pollicis* is as in the Cat, save that its origin extends up inside the olecranon. It is recorded as arising from the olecranon in the Civet (but not in the Hyænas), and as inserted into a sesamoid at the base of the first metacarpal according to Macalister [2], and exclusively into the metacarpal of the pollex according to Mr. Young.

The *extensores indicis et secundii internodii pollicis* are as in the Cat, save that their origin does not extend up to the olecranon. The *extensor s. i. pollicis* is wanting in the Hyænas, but present in the Civet, where it goes to the pollex and index.

The *pronator teres* is as in the Cat. In the Civet its insertion extends down to the lower end of the radius. It is shorter and more slender, relatively, in the Hyænas. In *Hemigalea* it is inserted into the singular plate-like process of the radius.

The *palmaris longus* is inserted into the palmar fascia, as in the Cat and Hyænas. In the Civet it is said to be large (more or less double) and inserted into the pisiforme. It is much united with the muscle next to be noticed in Hyænas and in the Cat.

The *flexor sublimis digitorum* is not blended with the palmaris longus, but is very small, and takes origin from part of the tendon of the *flexor profundus*, as also in the Civet. It goes to the four outer digits; and in *Crocuta* (where it seems yet more completely blended with the *flexor profundus*) it goes to the three middle digits [3], the fifth being supplied by a minute separate muscle [4]; as also in the Civet, which Mr. Young (*l.c.* p. 172) compares with my and Murie's "flexor brevis manus" of *Hyrax* [5].

The *flexor profundus digitorum* arises by five bellies, three from the condyle, one from the radius (as in the Cat), and one from the ulna. It has four origins in the Civet—1. condylo-ulnar, 2. condylo-radial, 3. radial, and 4. ulnar.

The *flexor carpi ulnaris* is as in the Cat, except that the two heads soon unite to form one belly. In the Civet the muscle is double, one part arising from the condyle and one from the olecra-

[1] Also in the Genet in Cuvier's Planches, pl. 126. fig. 1 ε′; and in the Hyæna, see pl. 129. fig. 1 ε′.

[2] Proc. Roy. Irish Acad. vol. i. 1869–74, p. 509.

[3] P. Z. S. 1879, p. 99.

[4] In *Hyæna striata* the accessory slips are altogether tendinous.

[5] It arises in the Civet from the annular ligament, pisiforme, and tendon of palmaris longus. See also Cuvier's 'Planches,' pl. 126. fig. 2, κ, σ.

non; both are inserted into the pisiforme. In *Hyæna striata* and *Crocuta* it only arises from the inner condyle of the humerus.

The *flexor carpi radialis* is as in the Cat.

The *pronator quadratus* extends for about the lowest third of the length of the bones of the forearm (instead of half their length, as in the Cat). It extends for about the lowest quarter in the Civet, or a little more [1]. In *Hyæna striata* it is large; and in *Crocuta* it extends up the whole length of the bones of the forearm. It is very large in *Hemigalea,* and is inserted into the plate-like process of the radius.

The *lumbricales* in the Genet are as in the Cat. In the Civet there are sometimes but three [2], though there are four in *Hyæna* and *Crocuta.*

The *flexor brevis pollicis* arises by two heads in the Civet, and there is an *opponens.* There are no muscles furnished to the rudimentary pollex of the *Hyæninæ.*

The *abductor pollicis* arises in the Civet from the ulnar ossicle, and has a long tendon.

The *abductor minimi digiti* arises from the annular ligament and pisiform bone in the Civet, and it exists also in *Crocuta.* A second abductor arises in the Civet from inside the fifth metacarpal, and is inserted into the ulnar sesamoid of the fifth digit. There is also a second *flexor brevis minimi digiti* arising from the unciforme, and inserted beside the muscle previously mentioned.

The *interossei* in the Civet are said to be [3] as follows:—First, a (carpally arising) adductor indicis; secondly, a metacarpal adductor indicis; then an adductor annularis; fourthly, an adductor minimi digiti: the foregoing are palmar interossei. The dorsal interossei are:—First, an abductor indicis; secondly, an abductor medii digiti; thirdly, an adductor medii digiti; fourthly an adductor annularis: these are all bicipital except the third.

In *Crocuta* Dr. Watson says [4]:—"A deep set of interossei comprises eight fleshy bundles arranged in pairs, two to each metacarpal." "In addition to these paired muscles are two single ones (palmar interossei). These arise together from the bases of the third and fourth metacarpals. They are distributed to the middle and outermost digits respectively."

Muscles of the Pelvic Limb.

The *gluteus maximus, gluteus medius, gluteus minimus, tensor vaginæ femoris,* and *biceps femoris* are as in the Cat.

The accessory biceps or *tenuissimus* is in the Genet as in the Cat [5], except that it is slightly connected with the semitendinosus. In the Civet also it receives a slip, at its insertion, from the semi-

[1] Mr. Young says "lower third" (*l. c.* p. 171).
[2] Mr. Young (*l. c.* p. 172) found four.
[3] Macalister, Proc. Roy. Irish Acad. vol. i. (1869–74) p. 510.
[4] P. Z. S. 1879, p. 100.
[5] Cuvier says it only goes to the femur (Leçons d'Anat. Comp. i. p. 520).

tendinosus. In the *Hyæna* it descends at least to the middle of the leg[1]; Dr. Watson says to the os calcis in *Crocuta.*

The *semitendinosus* of the Genet (as also the Civet) has a delicate head, which arises from the third caudal vertebra at the hinder end of the caudal origin of the gluteus maximus, with which it is conterminous. This head joins the other part of the semitendinosus about one third down the femur, and becomes slightly connected with the tenuissimus. It is inserted as in the Cat, but the upper tendon of its insertion is not so distinct. This muscle has no caudal origin in *Crocuta.*

The *semimembranosus* is in the Genet quite as in the Cat, save that its two parts are more separate—separate for nearly the whole length of the muscle. The part from the ramus of the ischium goes to the femur; that from its tuberosity to the tibia. In *Crocuta* it is quite inseparable from the adductor magnus.

Agitator caudæ.—This muscle, which I did not observe in the Cat, arises in the Civet from the first and second caudal vertebræ, and is inserted into the back of the femur. In the Genet its origin blends with the hinder end of the caudal origin of the gluteus maximus. It is crossed by the sciatic nerve and goes to the lower third of the femur (rather behind its outer margin), and extends down almost to the external condyle.

In the Genet and Civet there is a special *sphincter* of the scent-glands.

The *sartorius* is double in the Genet and, sometimes at least, in the Civet[2]. One part arises from above and behind the anterior superior spine of the ilium and goes to the patella; the other part springs from below the first part, and is lost in the fascia on the inner side of the knee. It is also double in *Crocuta.*

The *pectineus* in the Genet is as in the Cat. It is large and double at its insertion in the Civet[3]. In *Crocuta* it goes from the ilio-pectineal line to the middle of the linea aspera.

The *adductor* mass of the Genet is substantially similar to that of the Cat, though, as in the Civet, it may be divided into three parts. One of these, the *adductor primus,* is attached to the semimembranosus[4]. Another, the *adductor secundus,* is very wide and short and is separable into two layers. The third part, or *adductor longus,* is attached halfway down the femur. In *Crocuta* there are two adductor muscles, which both arise from the pubic arch, and which are inserted, respectively, one into the internal condyle and internal tuberosity of femur, and the other into the whole length of the linea aspera and into the internal branch of its lower bifurcation.

The *quadriceps extensor* of the Genet is as in the Cat, save that the *crureus* takes origin along the whole length of the femur, up to the neck of that bone. The crureus is not differentiated in *Crocuta,* and the *vasti* are hardly separable.

[1] Cuvier's 'Planches,' pl. 131.
[2] Mr. Young, *l. c.* p. 174, describes it as single.
[3] P. Z. S. 1879, p. 102.
[4] Not so in the Civet (Young, *l. c.* p. 174).

The *psoas magnus* and *iliacus* are as in the Cat.

The *psoas parvus* arises from the third, fourth, and fifth lumbar vertebræ, and (as in the Civet) is inserted into the pelvis by a very strong tendon.

The *pyriformis, gemelli, quadratus lumborum, quadratus femoris,* and the *obturators* are as in the Cat.

A muscle which I did not notice in the Cat exists in the Civet: it arises in front of and below a very distinct antero-posterior ridge on the dorsum of the ilium. It is called *gluteus quartus* by Professor Macalister.

Another muscle, which answers to my gluteus quartus in the Cat, is similarly conditioned to that of the Cat, both in *Genetta* and *Viverra.* It also exists in *Crocuta.* This muscle is called *gluteus quintus* by Professor Macalister.

The *plantaris* arises, in the Genet, only from the external condyle of the femur and the adjacent sesamoid bone, and is (as also in the Civet) only slightly united with the external head of the gastrocnemius. It is inserted as usual.

The *gastrocnemius* of the Genet has only three heads of origin—one from each femoral condyle and adjacent sesamoid, and one (mainly aponeurotic at its origin) from the fibula. There is no origin from the ligamentum patellæ. The insertion is as usual.

The *soleus* of the Civet is like that of the Cat. In the Genet it takes origin from the upper half of the fibula. Its insertion is as usual. It is wanting in *Hyæna striata* and in *Crocuta.*

The *popliteus* and *tibialis anticus* are both as in the Cat, and the same is the case with the Civet. In *Crocuta* it is double halfway down, the tendon of one part being inserted into the entocuneiforme, and that of the other into the rudimentary metatarsal of the hallux.

The *extensor longus digitorum* of the Genet is like that of the Cat. In the Civet it gives origin to two main tendons, which subdivide to supply the four outer digits, the details of the subdivision varying in different individuals. In *Hyæna striata* the muscle divides into two bellies and gives off five tendons. In *Crocuta* it seems to be single, and is said to give off no tendon to the digitus minimus.

The *extensor longus hallucis* is absent in *Crocuta* and in the Cat. In the Civet it is slender, arises from the upper half of the margin of the fibula, and goes to the hallux only. In the Genet it is also slender and has a similar origin, but appears to end distally in an aponeurotic expansion extending dorsally on the hallux and index.

The *peroneus longus* in the Civet and Genet is inserted into the fifth metatarsal as well as into the first metatarsal. In *Crocuta* and *Hyæna striata* it is inserted into the fifth metatarsal only.

The *peroneus brevis* and *peroneus quiniti digiti* are as in the Cat. The latter is wanting in *Crocuta,* but the former has two tendons.

The *extensor brevis digitorum* of the Genet and Civet is much as in the Cat, but ends distally in an aponeurotic expansion rather than in quite distinct tendons. It goes to the four outer or to the four inner digits. In *Hyæna* and *Crocuta* it only goes to the second, third, and fourth digits.

The *tibialis posticus* is as in the Cat.

The *flexor longus digitorum* and *flexor hallucis* of the Genet are like those of the Cat, save that a small tendon is sent to the hallux. There is no such tendon in the *Hyæninæ*.

The *flexor brevis digitorum* is in the Genet as in the Cat, save that it is not divided into four bellies side by side, but is in one mass [1]. In *Crocuta* [2] it is confined to the sole of the foot, and is represented solely by a tendon, there being no muscular belly. In *H. striata* (according to Meckel) it is a prolongation of the tendon of the plantaris with additional muscular fibres from the fourth metatarsal. In the Civet it seems to be similar, except that the additional muscular fibres are derived from the os calcis.

The *accessorius* of the Genet (and apparently of the Civet) is very unlike the muscle described by me under this name in the Cat [3]. It arises from the outer side of the os calcis, and ends in a strong tendon which joins obliquely the tendon of the deep flexors previously noticed. In *Crocuta* it is very small and slender, with a similar origin and insertion.

In the Genet, Civet, and *Crocuta* there are but three *lumbricales*, which take origin from the surface of the conjoined deep flexor tendons.

Dr. Watson and Mr. Young remark [4] of the *Hyæninæ* :—"The enormous development of the muscles of the neck and fore quarters, together with minor points already referred to, serve at once to associate" *Crocuta* with the other Hyænas, and to separate them "from the remaining groups of the Æluroidea." Doubtless also, as these authors remark, the external form and skeleton of *Proteles* indicate that its muscular system does not differ materially from that common to *Hyæna* and *Crocuta*.

Splanchnology.

Tongue.

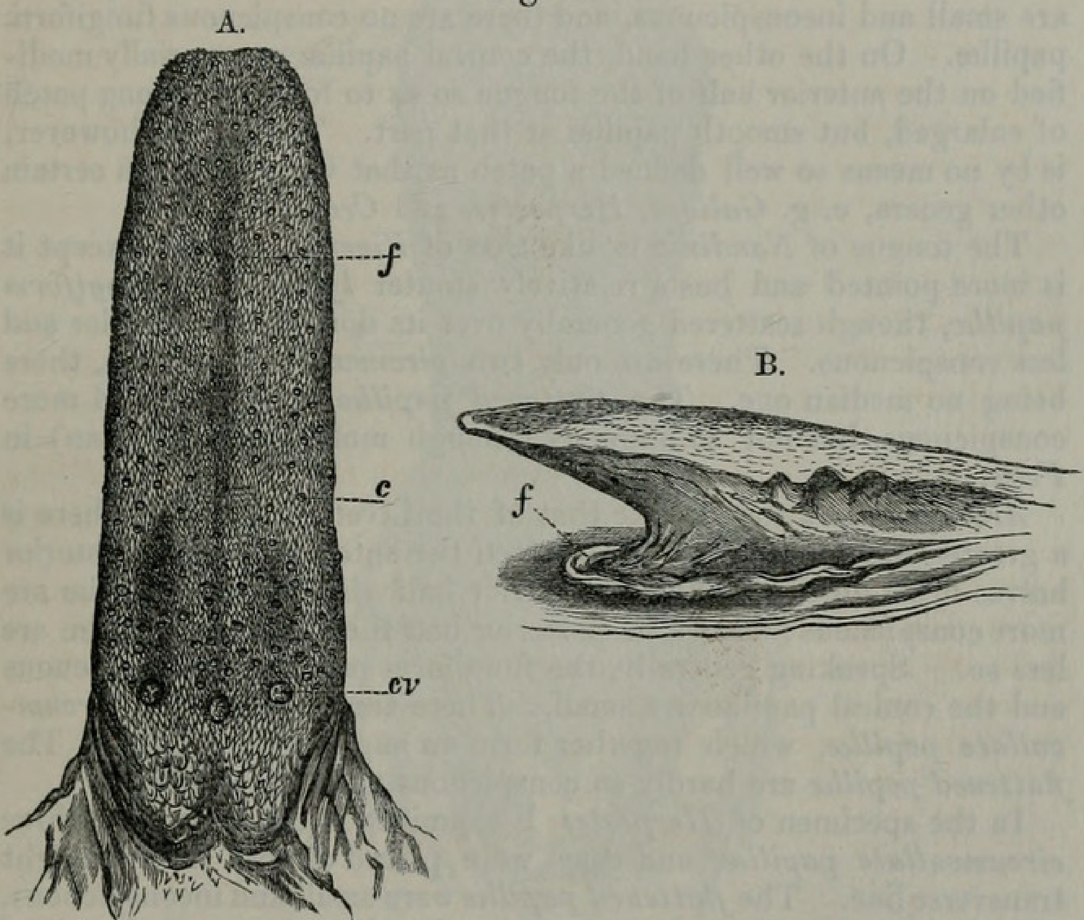
The tongue in the *Felidæ* is provided with *circumvallate papillæ* disposed in two rows converging posteriorly, there being sometimes as many as six in each row. Behind these is a group of very large, soft, and pointed *flattened papillæ*. *Fungiform papillæ* are little conspicuous, but are scattered over the organ, especially at the sides of the anterior part. The *conical papillæ* have, at the anterior fourth of the dorsal surface, that well-known hard and horny character which gives a rasp-like character to the tongue of even small Cats, while in the large species these papillæ are like claws and are veritable spines.

Comparing the tongue of the Civet [5] with that of a feline animal [6],

[1] See Cuvier's 'Planches,' pl. 128. fig. 4 γ.
[2] P. Z. S. 1879, p. 104.
[3] 'The Cat,' p. 161.
[4] P. Z. S. 1879, p. 106.
[5] *E. g.*, the specimen No. 1513 D, Coll. of Surgeons.
[6] *E. g.*, that of the Caracal, No. 1513 C, Coll. of Surgeons.

we find the tongue of the former to be relatively longer, more slender, and more pointed anteriorly. The frænum is attached for nearly two thirds the tongue's length instead of only for about half. The *lytta* is about as much developed, relatively, as in the Cat. The *fungiform papillæ* are scattered pretty equally over the greater part of the dorsum of the tongue, but are absent from a narrow elongated tract in the middle of its dorsum. There are only three *circumvallate papillæ*, one in the middle, and one on each side of it, a very little in advance, so that they form together an extremely obtuse angle open forwards.

Fig. 3.



A. Tongue of the Civet: *c*, conical papillæ; *f*, fungiform papillæ; *c.v*, circumvallate papillæ.
B. Tongue of the Genet: *f*, free fold of mucous membrane.

Each circumvallate papilla is large, with from 9 to 12 small papillæ on its surface. The *conical papillæ* are not horny [1], but are simply short conical processes scattered over the dorsum of the tongue, being longest on its middle towards the apex and also at its sides. There is no conspicuous patch of specially modified papillæ towards the anterior part of the dorsum. The *flattened papillæ* are very small, close-set, and inconspicuous compared with those of *Felis*; they are scarcely larger than the conical papillæ.

[1] They are said by Daubenton (Buffon, Hist. Nat. tome ix. pp. 322 & 337) to be much more conspicuous in the Zibet than in the Civet.

In the Genet the flattened papillæ are larger, relatively, than in the Civet. There is no median circumvallate papilla, but either one elongate one, or two small ones on either side. There is no patch of enlarged papillæ on the dorsum, but those on the anterior half of the part in front of the circumvallate papillæ are generally larger. A large free fold of mucous membrane projects horizontally from the anterior part of the frænum on either side of it.

In *Hemigalea* there is a marked free fold of membrane, similar to that of *Genetta*. There are three circumvallate papillæ, one of which is median in position, and they form together an angle open forwards, not quite so obtuse as in the Civet. The flattened papillæ are small and inconspicuous, and there are no conspicuous fungiform papillæ. On the other hand, the conical papillæ are specially modified on the anterior half of the tongue so as to form an oblong patch of enlarged, but smooth papillæ at that part. This patch, however, is by no means so well defined a patch as that which exists in certain other genera, e. g. *Galidia*, *Herpestes*, and *Crossarchus*.

The tongue of *Nandinia* is like that of *Viverra civetta*, except it is more pointed and has a relatively stouter *lytta*. The *fungiform papillæ*, though scattered generally over its dorsum, are smaller and less conspicuous. There are only two *circumvallate papillæ*, there being no median one. The *flattened papillæ* are larger and more conspicuous, but not so large as (though more close set than) in *Felis*.

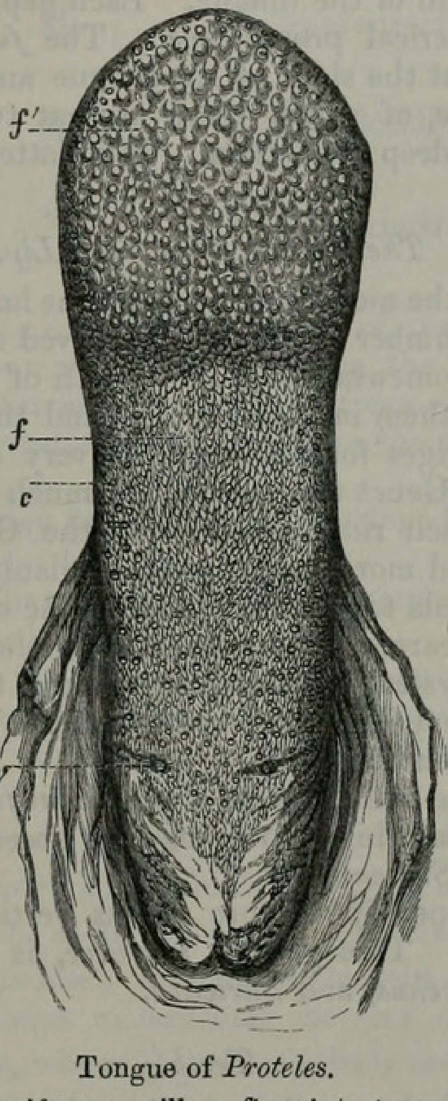
Arctictis has a tongue like that of the Civet, except that there is a greater difference of aspect between the anterior and the posterior halves of its dorsum. On its anterior half the conical papillæ are more conspicuous; and on its posterior half the fungiform papillæ are less so. Speaking generally, the fungiform papillæ are conspicuous and the conical papillæ are small. There are seven or eight *circumvallate papillæ*, which together form an angle of about 75°. The *flattened papillæ* are hardly so conspicuous as in *Nandinia*.

In the specimen of *Herpestes* I examined there were only three *circumvallate papillæ*, and they were placed almost in a straight transverse line. The *flattened papillæ* were small and inconspicuous. There was a very distinct patch of much enlarged so-called *conical papillæ* on the dorsum of the tongue, each of these papillæ being really flattened and having the appearance of having had its apex cut off. Fungiform papillæ were conspicuous, and scattered over the dorsum between the patch of enlarged papillæ and the circumvallate ones.

In *Cynictis* I found three very conspicuous *circumvallate papillæ*, which together form a right angle. Behind these are elongated *flattened papillæ*, but hardly so conspicuous as in *Nandinia*. There is, on the anterior half of the dorsum, a wide, rounded patch of much enlarged *conical papillæ*, which are really flattened in form, and so disposed as to cause the patch to have the appearance of being marked with a series of lines of the shape called "embattled" in heraldry. Around this patch, and on the middle of the tongue behind it, the papillæ are very small, and amongst them certain *fungiform papillæ* are moderately conspicuous. Conical papillæ of intermediate size are placed at the sides of the hinder half of the tongue.

In *Crossarchus*[1] we have similar characters carried to a more exaggerated degree, the *conical papillæ* of the dorsal patch being larger and the *fungiform papillæ* being more conspicuous. The

Fig. 4.



Tongue of *Proteles.*

c, conical papillæ; *f*, fungiform papillæ; *f'*, points towards the much enlarged papillæ; *c.v*, one of the two depressions in which lie the two circumvallate papillæ.

three *circumvallate papillæ* form an angle of about 105°. The flattened papillæ are very little conspicuous. *Galidia* has a tongue like that of *Crossarchus*, except that the papillæ of the dorsal patch are still more enlarged.

Hyæna has for the most part a tongue like that of *Cynictis* and *Galidia* magnified; but the *flattened papillæ* are much larger relatively as well as absolutely, and are much more conspicuous.

[1] Cuvier says (Leçons d'Anat. Comp. 2nd edit. vol. iv. 1e partie, p. 553) that he did not find a lytta in the Mangoustes.

The papillæ generally, other than those of the dorsal patch, are relatively small, and the *fungiform papillæ* are but little conspicuous. Even those of the patch are relatively smaller than in the previously noticed genera. The lytta is small. There are only two *circumvallate papillæ*, and they are very small.

In *Proteles* the tongue is very exceptional indeed. It is spatulate in form, and the dorsal patch attains here its maximum of distinctness. The patch extends quite to the apex and side of the anterior third of the dorsum of the tongue. Each papilla of the patch is an enlarged hemispherical prominence. The *fungiform papillæ* are only conspicuous at the sides of the tongue and in front of the *circumvallate papillæ*, of which there are but two, each of which is situated in a very deep depression. The flattened papillæ are very inconspicuous.

The Palate, Nose, and Lips.

In all Æluroids the membrane covering the hard palate is raised into a greater or less number of transverse curved ridges, the number of which may vary somewhat with the length of the muzzle, though there are eight of them in both the Cat and the Genet. But while in the Cat the ridges form a series of very open curves (convex forwards), in the Genet the curves are much sharper. Moreover, while in the Cat each ridge is entire, in the Genet the four hinder ridges are more and more interrupted medianly, and each of these ridges, as it proceeds towards the middle line of the palate, bifurcates nearer and nearer to its origin, *i. e.* to the outer margin of the palate. By this system of bifurcations there tend to be produced eight incomplete and four complete transverse ridges, instead of, as in the Cat, eight complete ones.

The nose in the Æluroids is almost always medianly and vertically grooved; but this groove may be absent, as in *Rhinogale, Crossarchus,* and *Suricata.*

Similarly the upper lip is more or less vertically cleft or deeply grooved medianly. This groove, however, is absent in *Cynogale, Rhinogale, Crossarchus,* and *Suricata.*

Teeth.

The *Felidæ* have the smallest number of teeth except the dentally degraded form *Proteles,* which has but three molars above and two below on either side.

All Æluroids have I. $\frac{3}{3}$, C. $\frac{1}{1}$.

The premolars and molars may be

$$\left.\text{Pm. } \frac{1+2+3+4}{1+2+3+4}, \text{ M. } \frac{1+2}{1+2}\right\}$$ *Viverra, Genetta, Arctogale, Cynogale,* &c.

$$\left.\text{Pm. } \frac{1+2+3+4}{1+2+3+4}, \text{ M. } \frac{1}{1+2}\right\}$$ *Prionodon.*

$$\left.\text{Pm. } \frac{1+2+3+4}{1+2+3+4}, \text{ M. } \frac{1}{1}\right\}$$ Some *Paradoxuri.*

Pm. $\frac{1+2+3+4}{2+3+4}$,	M. $\frac{1+2}{2}$	*Hemigalidia.*
Pm. $\frac{2+3+4}{2+3+4}$,	M. $\frac{1+2}{1+2}$	*Herpestes, Crossarchus, Suricata, Galidictis, Galidia.*
Pm. $\frac{1+2+3+4}{2+3+4}$,	M. $\frac{1}{1}$	*Hyæna.*
Pm. $\frac{2+3+4}{2+3+4}$,	M. $\frac{1}{1}$	*Cryptoprocta.*
Pm. $\frac{2+3+4}{3+4}$,	M. $\frac{1}{1}$	Some kinds of *Felis.*
Pm. $\frac{3+4}{3+4}$,	M. $\frac{1}{1}$	Other kinds of *Felis.*

The outer canine may be greatly in excess of the median ones, as in the *Hyæninæ,* or but very little so, as in the *Felidæ.* It may be of nearly the same size as a small adjacent canine, as in *Eupleres.* The canines may be greatly prolonged, as in the *Felidæ,* especially *Felis macroscelis.*

The lower canines may be excessively developed relatively, as in *Galidictis.*

The premolars may have greatly and nearly equally elongated and sharp curves, as in *Cynogale.*

The premolars and molars may be much developed antero-posteriorly into long diastemata, as in *Eupleres*; or they may be narrow antero-posteriorly, and much drawn out from within outwards, as in *Suricata.*

The teeth $\frac{\text{P. }4}{\text{P. }4}$ may be extremely sectorial, as in the *Felidæ, Cryptoprocta,* and *Hyæninæ,* or considerably so, as in most *Viverridæ,* or very slightly so, as in *Arctictis.* $\frac{\text{M. }2}{\text{M. }2}$ may be present and very small, as in *Nandinia,* or may be largely developed, as in *Cynogale.* The deciduous molars may be very exceptionally developed, as in *Cynogale,* where $\frac{\text{D. }4}{\text{D. }4}$ are relatively enormous.

The Salivary Glands.

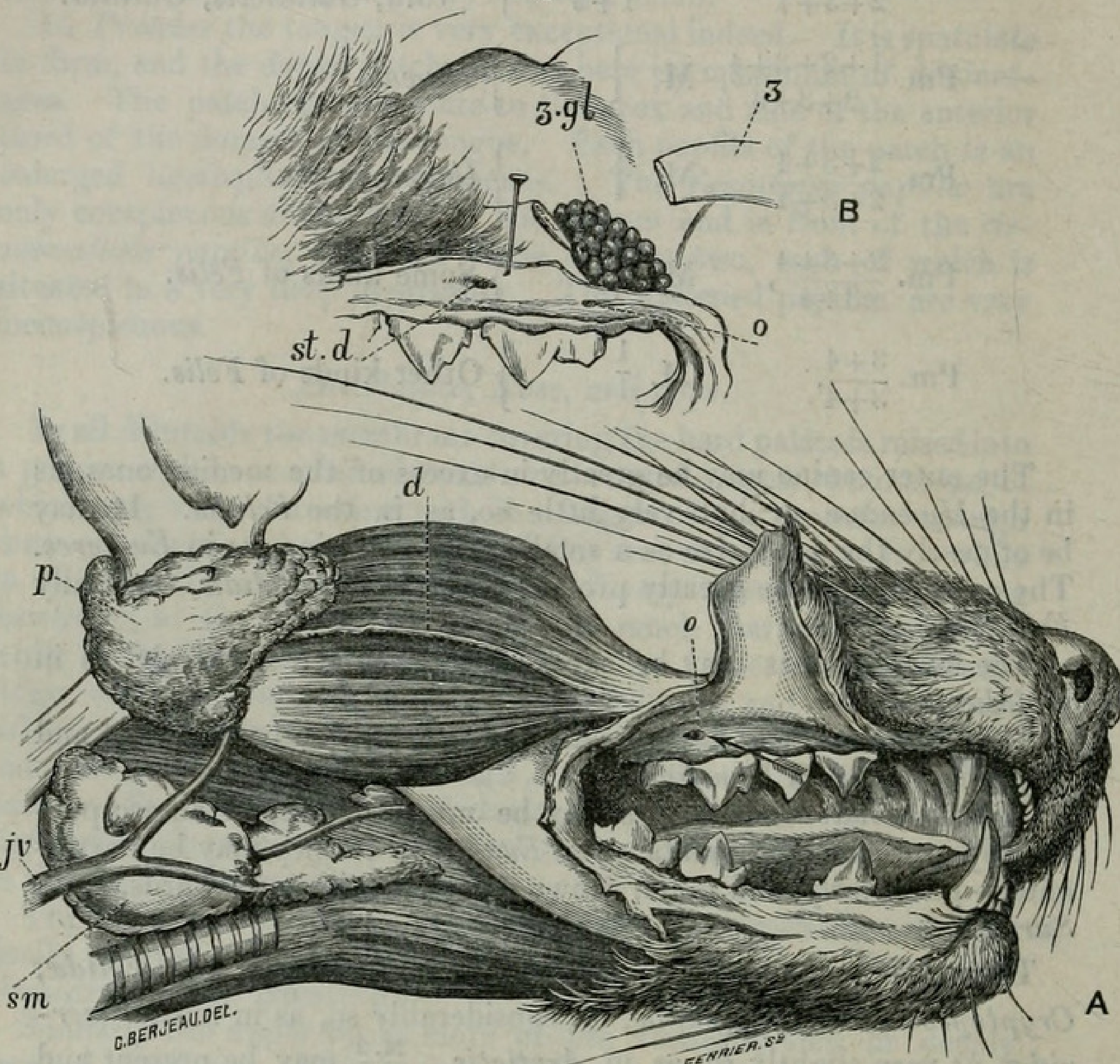
These, in such forms as I have examined, seem to be formed on one type. In *Genetta* and *Herpestes* (and probably in all the genera) there is a distinct zygomatic gland. There is a well-developed *parotid gland* with its Steno's duct, and a small *submaxillary gland* (over which the jugular vein passes), to which small accessory submaxillary glands may be annexed.

Cuvier says[1] :—" Les Mangoustes ont des parotides minces ; des maxillaires plus épaisses, nudes ; de petites sublinguales allongées, en avant des maxillaires ; des buccales à l'angle des lèvres ; et des

[1] Leçons d'Anat. Comp. 2nd edit. vol. iv. 1re partie, p. 425.

labiales à la lèvre inférieure." Meckel says[1] that in the Ichneumon the parotid and submaxillary glands are about equal in volume.

Fig. 5.



A. Salivary glands of Genet. *p*, parotid gland; *d*, Steno's duct; *s m*, submaxillary gland, traversed by *j v*, jugular vein; *o*, opening of Steno's duct.

B. Part of the skull of the Genet, showing the zygomatic gland, the lip being drawn up to show:—*st. d*, orifice of Steno's duct; *z. gl*, zygomatic gland; *o*, orifice of zygomatic gland; *z*, zygoma.

The Stomach.

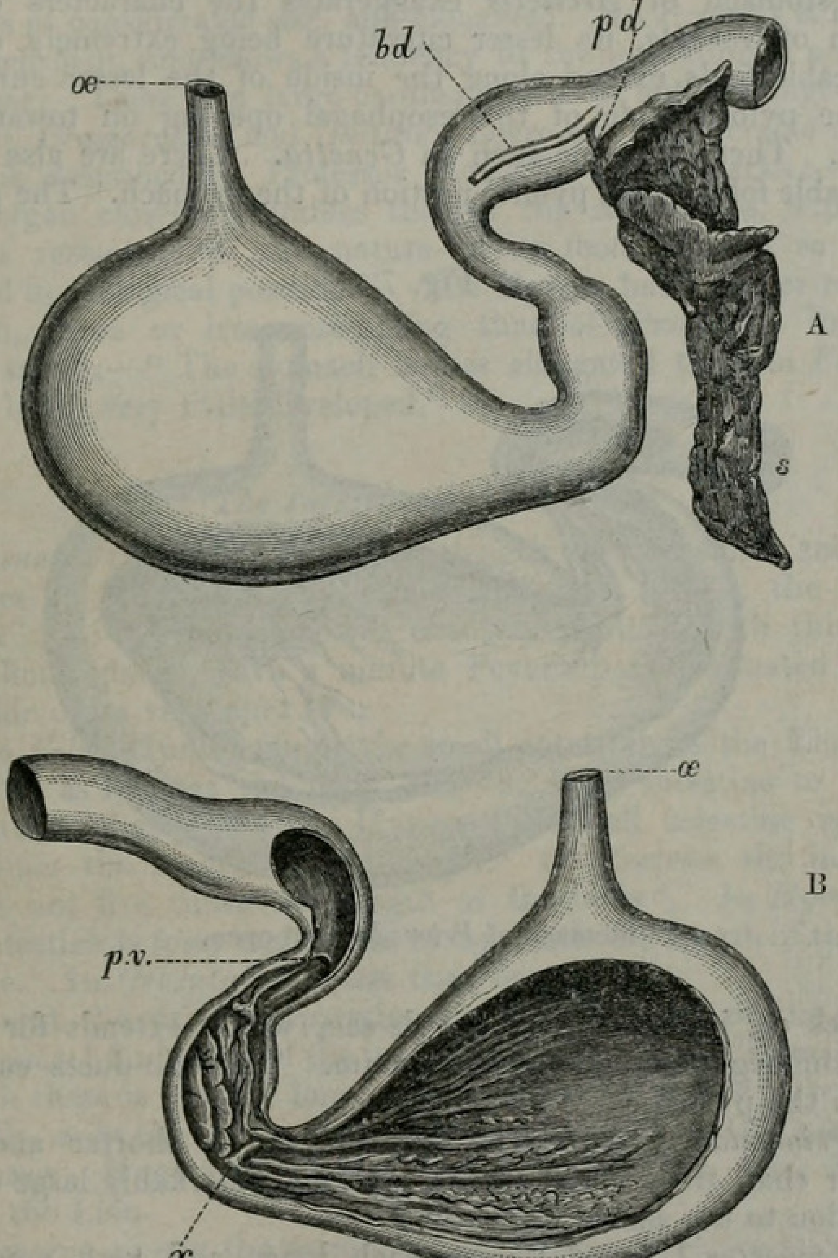
In *Genetta tigrina* the stomach is much longer in proportion to its breadth than in the Cat[2]. Its length, measured along its middle, is

[1] Anat. Comp. vol. viii. p. 681.

[2] The dimensions of the stomach have been taken in as natural a condition as possible, the stomach not being inflated or greatly distended. Cuvier says (Leçons d'Anat. Comp. vol. iv. 1re partie, p. 38) the cardia is more approximated to the pylorus than in the Cat. Meckel says (Anat. Comp. vol. viii. pp. 694, 695) that in the Puma the stomach is much more elongated and less spheroidal than in the Cat, the Leopard being intermediate in these respects.

about 8″·8. Its breadth at its broadest part, *i. e.* at the entrance of the œsophagus, is 2″·75. About 1″ of œsophagus extends behind the diaphragm. Inside the stomach were elongated and very prominent ineffaceable folds, placed towards the pyloric end and along the greater curvature; and there were three shorter and less strongly

Fig. 6.



A. Stomach and pancreas of *Genetta tigrina*. *œ*, œsophagus; *s*, pancreas; *b d*, duct from the liver; *p d*, pancreatic duct.

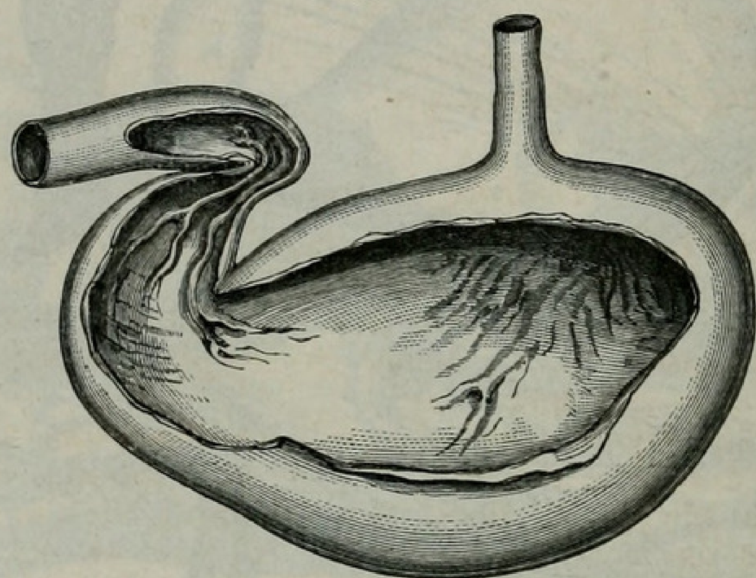
B. Stomach of Genet, cut open, showing internal folds. *x*, point where the folds are interrupted and the stomach makes a sudden bend; *p v*, pyloric valve.

marked folds along the lesser curvature. All these folds come to an end simultaneously at a point where the stomach, contracting its diameter, makes a sudden bend. Beyond this point three fresh longitudinal folds appear, which extend along the rest of the greater curvature. The pyloric valve was very little marked.

In *Hemigalea* I found the stomach to be very like that of the Genet, with quite similar internal folds. That of *Viverra civetta* is relatively shorter and more uniformly capacious than that of the Genet; and the pylorus exhibits a small prolongation, extending as a cul-de-sac beside the duodenum.

The stomach of *Arctictis* exaggerates the characters of the stomach of *Genetta*, its lesser curvature being extremely curved. Ineffaceable folds extend along the inside of the lesser curvature, from the pyloric side of the œsophagal opening on towards the pylorus. There are none such in *Genetta*. There are also strong ineffaceable folds in the pyloric portion of the stomach. The pylorus

Fig. 7.



Stomach of *Prionodon*, cut open.

continues on into a sort of cul-de-sac, which extends for a little beside the beginning of the duodenum. The bile-ducts enter full 4″ from the pylorus.

In *Prionodon* I found the stomach to be shorter and more globular than that of the Genet, and of remarkably large size in proportion to the size of the body.

In *Herpestes* I found the stomach long, and very much constricted towards its middle. This constriction does not appear in two dried specimens of stomach of *Herpestes* in the Museum of the College of Surgeons. *Herpestes*, however, is a very large and varied genus [1].

In *Crossarchus* the stomach is short and globular, but the cardia is considerably prolonged.

[1] Hunter says (‘Essays and Observations,’ vol. ii. p. 66) of the Ichneumon:—“The stomach is almost a round cavity, the small end as thick and short as the large.”

In *Suricata* the stomach is very short and round, while the cardia is extremely short[1].

Cynictis has a stomach more like that of the Genet, but not quite so elongated. There are folds inside the middle part of the greater curvature, but not towards the pylorus, which has a cul-de-sac extending beside the beginning of the duodenum. The cardia is very elongated.

The stomach of *Galidia* is very like that of *Crossarchus*. Its cardia is of considerable size, and elongated. In *Proteles* it is short and much bent, and shows a tendency to the formation of a pyloric cul-de-sac. There is a large cardia; but it is not prolonged as in *Cynictis*, *Crossarchus*, and *Galidia*. There are considerable internal folds, as described by Professor Flower[2], who remarks:—"The whole organ closely resembles that of the Armadillos, which the *Proteles* resembles in the nature of its food, though so widely removed in zoological position." The Hyæna has a rather rounded stomach, more or less resembling that of *Proteles*. Professor Flower says[3]:—"The stomach is less elongated than in *Felis*, its fundus being very little developed."

The Intestine and Cæcum.

In *Genetta tigrina* I found the length of the small and large intestines to be respectively about 120″ and 14″·25, the cæcum being 2″·75. The cæcum was obtusely pointed, with thin walls and without glands, save a minute Peyer's patch, situated on the inner side of its very apex.

As to *Felis*, Hunter found the small intestine in the Lion to be four times as long as the body, and the large intestine to be two thirds that length. In the Hyæna the small intestine is about eight times the length of the larger. In *Proteles* the intestinal canal is not five times the length of the body[4]. In *Hyæna* the large intestine is from one eighth to one sixth the length of the small intestine. In *Crocuta*[5] it is less than one twelfth.

Amongst the dried preparations in the Museum of the College of Surgeons I find parts of the intestine of a Lion and a Tiger, in both of which there is a rather long, simple cæcum, which is in both (but especially so in the Lion) relatively longer than in the cæcum of *Felis catus*. Hunter found the cæcum to be from 2 to 3 inches long in the Lion.

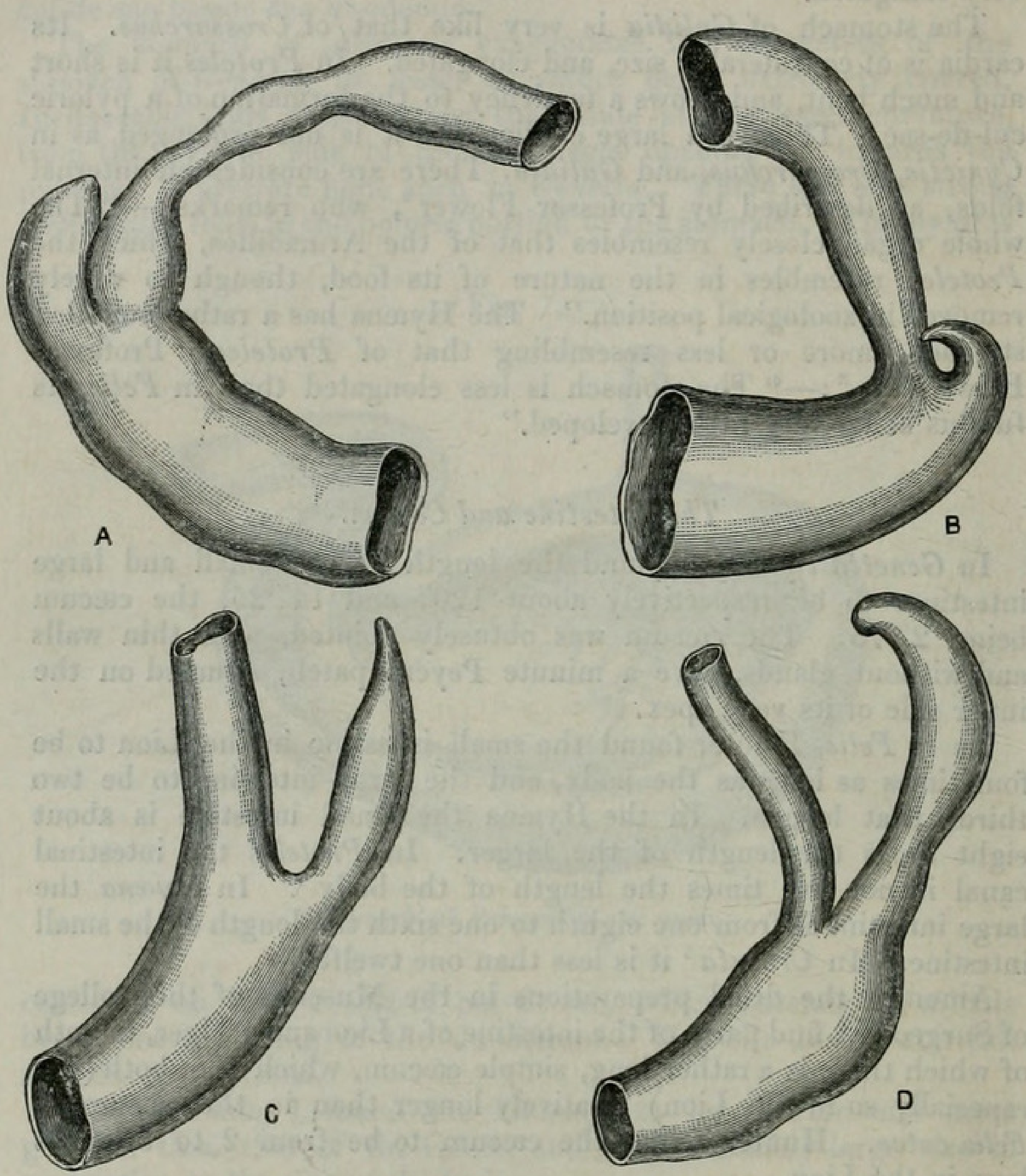
In *Viverra civetta* the cæcum is relatively a little longer than in *Genetta*; but a dried specimen of *Viverra tangalunga* exhibits a short and rounded cæcum, while one of *Viverricula* is also rounded, but longer.

[1] For figures of the Suricate's stomach and cæcum see Owen's 'Anatomy of Vertebrates,' vol. iii. pp. 444, 445.
[2] P. Z. S. 1869, p. 474.
[3] 'Medical Times and Gazette,' Jan. 15, 1872, p. 679.
[4] Ibid.
[5] P. Z. S. 1879, p. 84.

In *Prionodon* I found the cæcum to be very small and short, but strongly curved and acutely pointed.

Hunter says ('Essays and Observations,' vol. ii. p. 66) that in the Ichneumon there is no cæcum. It is therefore perhaps occasionally

Fig. 8.



A. Cæcum of *Genetta*. B. Cæcum of *Prionodon*. C. Cæcum of *Galidia*. D. Cæcum of *Cynictis*.

absent in that large genus. In a spirit-specimen of *Herpestes*, however, I found a long, slender and pointed cæcum; while in the series of dried cæca of *Herpestes* in the College of Surgeons some cæca are rather long, while others are short. Specimens of *Paradoxurus* exhibit a similar range of variation from moderately long to short and rounded.

In *Suricata* the cæcum is short, and shaped much as in the Cat.

A large Peyer's patch extends down to the ilio-cæcal valve; and there are glands at the cæcum's apex. In a dried specimen I find the cæcum with a rounded dilatation at its end; but this is probably an artificial distortion.

In *Hemigalea* I found the cæcum to be of about the same size as in the Genet, but with strong ineffaceable internal folds, which meet at the apex around a small glandular rosette of about six glands, each gland being about the size of a pin's head.

In *Galidia* the cæcum is long, rather slender, and exceedingly pointed towards its apex. In *Cynictis* it is very long (compared with the other Æluroids), rather slender, and a little curved.

In *Arctictis* the cæcum all but or quite aborts [1]. The large and small intestines run on as one longitudinal tube, of equal calibre, independently of it, with long and strong internal longitudinal folds, which are not interrupted at the place where the minute, quite rudimentary cæcum is given off. There is no trace of a transverse constriction or valvular structure between the small and the large intestine. In *Nandinia*, on the contrary, though there is no external indication of a cæcum, or change in the gut's diameter, there is a distinct interruption in the internal structure of the alimentary tube at the junction of the small and large intestines. There is, in the first place, a transverse valvular fold. On the small-intestine side of this fold there is a large continuous Peyer's patch, while on the other side of it longitudinal ridges begin to appear. These ridges, however, are not nearly so strongly marked as they are in *Arctictis*.

In *Proteles* the cæcum is short, thick, and rounded [2].

In *Hyæna* the cæcum is long, simple, and rather pointed. It is about 8 inches long. In *Crocuta* [3] it is 6 inches long.

Cuvier [4] gives the proportion in the Hyænas of the circumference of the small intestine to its length as 1 to 110, and of the large as 1 to 6. He also says [5] that the small intestine increases in diameter from the pylorus to the cæcum, and that its walls are so thin as to be almost transparent, though those of the Carnivora are generally more or less thick.

Meckel [6] says that the proportions borne by the small intestine to the large intestine, are in the Cat from 5 to 1 to 6 to 1, in the Genet as 8 to 1, in the Civet as 10 to 1, in the Zibeth as 15 to 1, and in the Hyæna as 5 (or 7) to 1.

According to Hunter ('Essays and Observations,' vol. ii. p. 56), the small intestine in the Suricate is "something more than the whole length of the body of the animal," while the large intestine "is more than half that length."

[1] P. Z. S. 1878, p. 142. On the other hand, the cæcum may be half an inch long: see Journal of Asiatic Soc. of Bengal, vol. xv. p. 193.

[2] P. Z. S. 1869, p. 474.

[3] P. Z. S. 1879, p. 84, fig. 2.

[4] Leçons d'Anat. Comp. vol. iv. 1e partie, p. 211.

[5] *L. c.* p. 236.

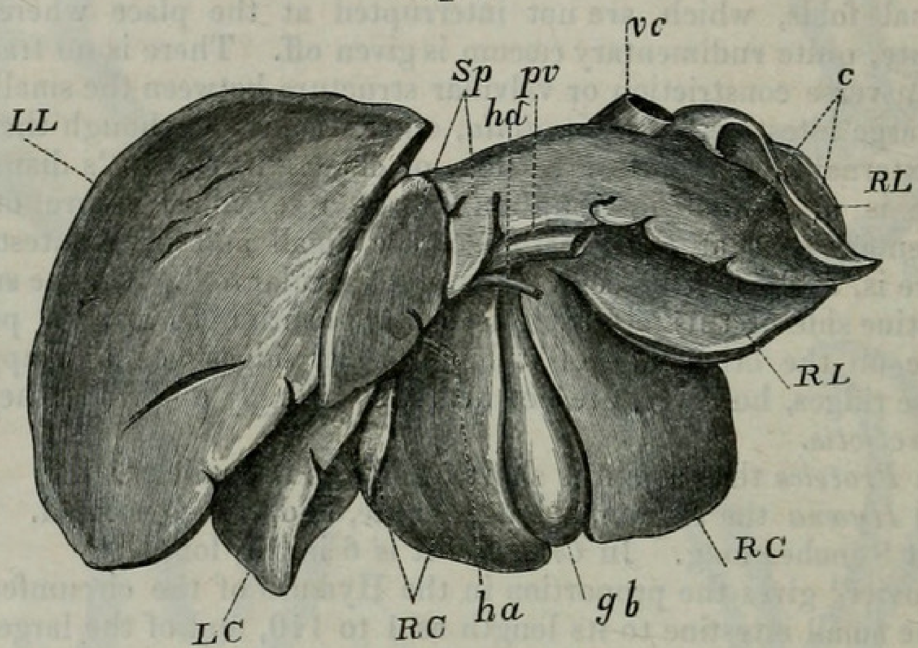
[6] Anat. Comp. vol. viii. p. 703.

The Liver.

The liver in *Felis* has the left lateral and right central lobes very large, the latter being divided by a deep cystic fissure, in which lies the gall-bladder, and the former being also somewhat divided by a fissure. The right lateral and left central lobes are each undivided and very small. The caudate lobe is of moderate size, about as large as the left central lobe. The Spigelian lobe is small (the smallest lobe), and is not divided by any fissure.

The liver of *Genetta tigrina* is very like that of the Cat; but the left lateral lobe is quite undivided, save by a small shallow groove on its posterior (gastric) surface. The cystic fissure is less deep

Fig. 9.



Liver of *Genetta tigrina*, its posterior (gastric) surface.
c, caudal lobe; *g b*, gall-bladder; *h a*, hepatic artery; *h d*, hepatic duct; *L C*, left central lobe; *L L*, left lateral lobe; *p v*, portal vein; *R C*, right central lobe; *R L*, right lateral lobe; *Sp*, Spigelian lobe; *v c*, vena cava.

than in the Cat, and is situated more to the right, so that the portion of the right central lobe which is to the right of the gall-bladder is much less in excess of that part of the right central lobe which is to the left of the gall-bladder. The caudate lobe has a very deep concavity, and is larger in proportion to its breadth. It runs uninterruptedly into the Spigelian lobe, which latter is a little larger relatively than in the Cat, and has a very deep groove (or fissure) running dorsad from its ventral margin, and dividing its proximal third from its distal two thirds. The diaphragmatic surface of the liver exhibits but a short cystic fissure.

In *Viverra civetta* the right lateral and right central lobes appear nearly of equal size, as seen on the diaphragmatic aspect of the liver.

The right central lobe has a short and wide cystic fissure, through which the gall-bladder appears. That portion of the right central lobe which is on the right of the gall-bladder also appears to be more in excess of the portion which is on the left of the gall-bladder than it is in *Genetta tigrina*, and thus more to resemble its condition in the Cat. This appearance is caused by the circumstance that, in the Civet, the large right lateral lobe comes down and excludes from view (on the abdominal surface) all that part of the right central lobe which lies to the right of the gall-bladder. The left central lobe is quite hidden from view when the abdominal aspect of the liver is seen. The Spigelian lobe is much stouter than in the Genet, and is not grooved.

In *Paradoxurus larvatus* the liver is like that of the Genet, except that the caudate lobe has become very large at the expense of the right lateral; so that, on the diaphragmatic surface, the right lateral lobe appears as a triangle between the caudate and the large right central lobes. There is no gall-bladder; nevertheless the right central lobe is notched as in the Genet. The left lateral and left central lobes present, on their diaphragmatic surface, an appearance similar to that which they present in *Genetta*. The posterior (gastric) aspect of the liver is also much as in the Genet, save that the caudate lobe is very large and the Spigelian lobe smaller, not grooved and slightly bifurcated at its apex.

In *Nandinia* the diaphragmatic aspect of the liver is much as in *Viverra*, but the right lateral lobe is smaller in proportion to the right central, though not so much smaller in relation to it as in *Genetta*. The right central is deeply notched at its ventral margin, but does not show any gall-bladder. The left central lobe is rather smaller in proportion to the left lateral than in *Viverra*, and is larger in proportion to its breadth. The left lateral lobe is nearly bisected by a transverse fissure which runs inwards from its lateral margin. The abdominal (gastric) aspect of the liver shows a caudate and a Spigelian lobe nearly as in *Genetta*. The left central is quite excluded from view. That part of the right central lobe which is on the right of the gall-bladder is more in excess of the part on the left, and is much as it is in the Cat.

In *Arctictis*, on the diaphragmatic aspect of the liver, the right and left segments appear nearly equal; the right lateral and right central lobes are also nearly equal. The latter has two ventral notches, the one more to the right being the cystic notch. No gall-bladder, however, appears. The proportions of the left lateral and left central lobes are much as in *Nandinia*; but the apex of the left central is separated off by an oblique transverse groove.

The posterior aspect of the liver is very like that of the liver of *Nandinia*; but there is no transverse groove on the left lateral lobe. That portion of the right central lobe which is on the right of the cystic notch is smaller than the portion which is on the left of that notch. The latter portion has four or five superficial fissures. In this condition of excess in the left portion of the right central lobe *Arctictis* differs from *Felis, Genetta, Viverra, Paradoxurus*, and *Nandinia*.

The liver of *Prionodon* differs remarkably from that of every other form I have examined in the much smaller relative size of the left central lobe compared with that of the left lateral; so that the latter rises (the apex of the gall-bladder being downwards) above the former, and forms nearly half of the posterior surface of the liver's left segment. These two lobes (the left lateral and the left central) are not separated, but are continuous towards their inferior margins. It is as if the left segment of the liver consisted only of one great lobe, the right portion of which was bent over so as to end in a free margin, to the right (on the abdominal surface) of the great bulk of such one lobe.

The gall-bladder lies in a fossa, placed very much towards the left margin of the right central lobe. The proportion borne by the right lateral lobe to the right central seems to be much as in the Genet[1]. The Spigelian lobe is small and simple; the caudate lobe is moderate. On the diaphragmatic aspect of the liver, the small left central lobe only shows a little towards the ventral margin. There is a deep cystic notch.

The liver of *Hemigalea* is almost like that of *Genetta*; but its Spigelian lobe has no notch, its caudate lobe is smaller, and its right lateral lobe is rather large compared with its right central. There is a gall-bladder, which is placed in nearly the same position in the right central lobe as it is in *Genetta*. This liver also resembles that of *Genetta* as to its diaphragmatic aspect, save that its right lateral lobe is rather larger and more pointed.

In *Herpestes* the liver is very much like that of *Genetta*, save that in it the right lateral lobe is smaller compared with its right central lobe, and that its gall-bladder lies much more close to the left margin of the right central lobe.

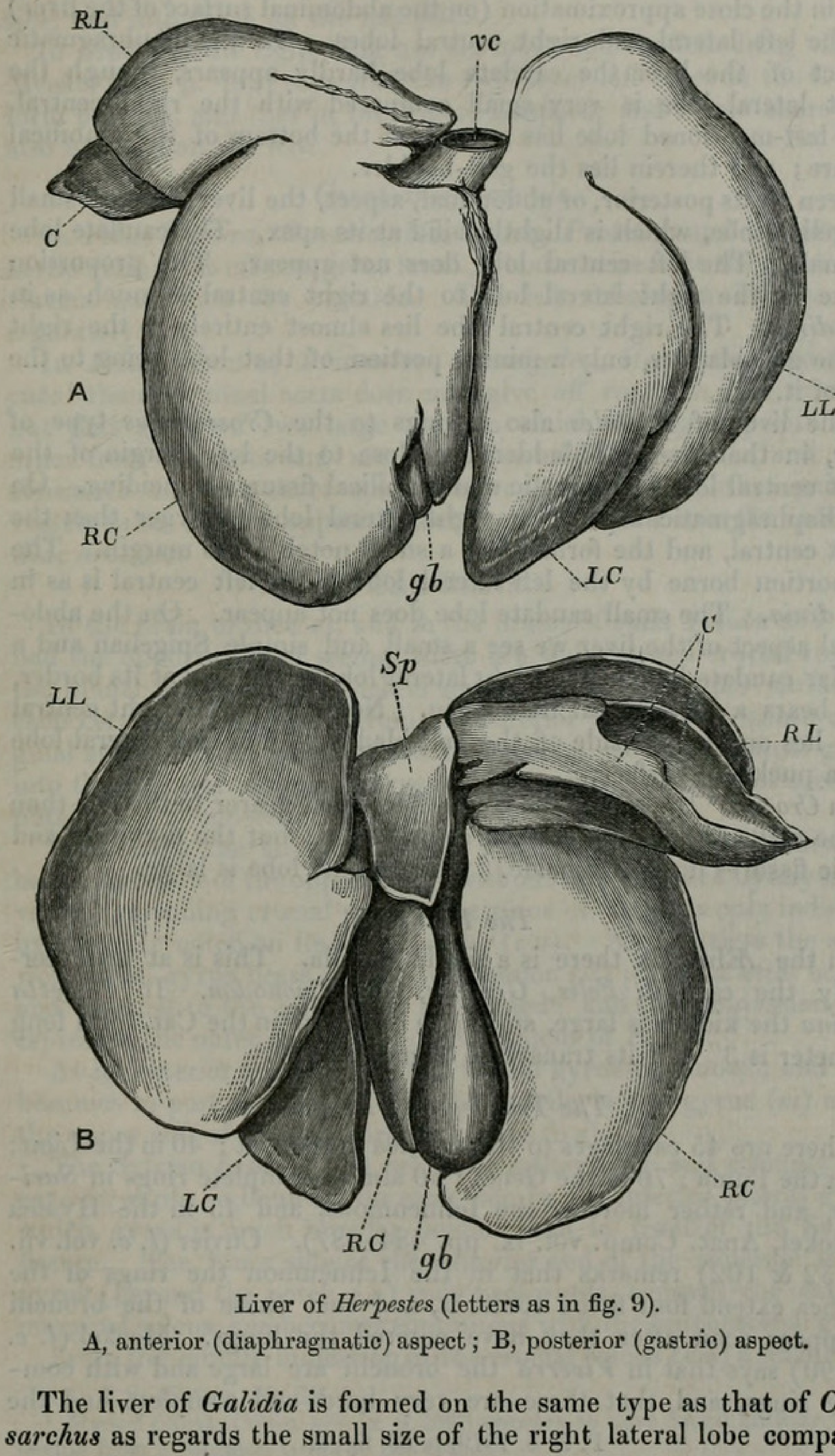
In *Crossarchus* the preponderance of the right segment of the liver over its left segment is greater than in any other form yet described; it is nearly as two to one. The diaphragmatic aspect of the liver presents the following characters:—The right lateral lobe is very small compared with the right central; this proportion is much as in *Paradoxurus*; but the shape is very different, broadening instead of narrowing to its outer margin. The right lateral lobe is not broad enough to hide the very large caudate lobe. The right central lobe has a notch, not at its ventral margin, but at its left end: it is a short side notch, wherein the gall-bladder appears. The proportion of the left lateral lobe to the left central is much as in *Nandinia*; but they are not quite so unequal.

On the abdominal aspect, the very large caudate lobe (larger relatively than in any form yet here noticed) is seen with a small, simple Spigelian lobe. The left central lobe does not appear. The left lateral lobe is entire, but hidden by the caudate lobe. The right central lobe is very large; but the excess of that part of it which is on the right of the gall-bladder over the minute portion on the left of the gall-bladder is greater than in any other form yet here described. Thus the bladder makes its appearance between the right

[1] The liver of the specimen examined was injured in this region.

part of the right central lobe and the left lateral lobe, both the right lateral and the left face of the right central lobe being hidden.

Fig. 10.



Liver of *Herpestes* (letters as in fig. 9).

A, anterior (diaphragmatic) aspect; B, posterior (gastric) aspect.

The liver of *Galidia* is formed on the same type as that of *Crossarchus* as regards the small size of the right lateral lobe compared with the right central, and in the proportion of the left lateral to the left central lobe, in the cystic notch and gall-bladder being quite close to the left margin of the right central lobe, in the proportion borne to the left lateral lobe by the left central, and in the great size and in the close approximation (on the abdominal surface of the liver) of the left lateral and right central lobes. On the diaphragmatic aspect of the liver the caudate lobe hardly appears, though the right lateral lobe is very small compared with the right central. The last-mentioned lobe has a notch at the bottom of the umbilical fissure; and therein lies the gall-bladder.

Seen on its posterior, or abdominal, aspect, the liver shows a small Spigelian lobe, which is slightly bifid at its apex. The caudate lobe is small. The left central lobe does not appear. The proportion borne by the right lateral lobe to the right central is much as in *Nandinia*. The right central lobe lies almost entirely to the right of the gall-bladder, only a minute portion of that lobe being to the left of it.

The liver of *Proteles* also belongs to the *Crossarchus* type of liver, in that the gall-bladder lies close to the left margin of the right central lobe—the cystic and umbilical fissures coinciding. On its diaphragmatic aspect the right lateral lobe is larger than the right central, and the former has a small notch at its margin. The proportion borne by the left lateral lobe to the left central is as in *Nandinia*. The small caudate lobe does not appear. On the abdominal aspect of the liver we see a small and simple Spigelian and a similar caudate lobe. The right lateral lobe is notched at its border, and bears a lobelet near its margin. No part of the right central lobe lies on the left side of the gall-bladder. The left lateral lobe has a puckered surface.

In *Crocuta*[1] the gall-bladder also lies much nearer to the left than to the right margin of the right central lobe; but the umbilical and cystic fissures do not coincide. The caudate lobe is large.

The Kidney.

In the Æluroids there is a single papilla. This is at least certainly the case in *Felis, Genetta,* and *Prionodon.* In *Genetta tigrina* the kidney is large, and more oval than in the Cat. Its long diameter is 3″ 4‴; its transverse diameter is 2″.

The Trachea and Lungs.

There are 45 cartilages to the trachea in the Cat; 40 in the Lion; 47 in the Puma; 70 in the Genet; 50 almost complete rings in *Suricata,* and rather more in the Ichneumons; and 45 in the Hyæna (Meckel, Anat. Comp. vol. ix. pp. 484–487). Cuvier (*l. c.* vol. vii. pp. 52 & 102) remarks that in the Ichneumon the rings of the trachea extend four fifths round it, and that those of the bronchi disappear soon after they have entered the lungs. Meckel (*l. c.* p. 490) says that in *Viverra* the bronchi are large and with complete rings, and that these are very hard and complete and the

[1] P. Z. S. 1879, p. 85, fig. 3.

bronchi long and narrow in *Hyæna*; while in *Suricata* the bronchi are very large, and almost without rings.

In *Felis, Viverra, Genetta, Hemigalea, Herpestes, Suricata, Proteles,* and *Hyæna* the lungs are divided into four lobes on the right side, and into three on the left side.

In *Crocuta*[1] the right lung has six lobes and the left lung three. Meckel (*l. c.* p. 492) says that the two lower left lobes in the Genet form but one, and that in the Tiger, Leopard, and Puma there are also but two on the left.

Great Blood-vessels.

In *Felis, Viverra, Genetta, Hemigalea, Proteles,* and *Crocuta* the aortic arch gives off one great trunk, whence arise first the right subclavian and then the carotids. The left subclavian is given off separately[2].

In *Felis, Genetta, Prionodon, Hemigalea, Herpestes,* and *Crocuta*[3] the abdominal aorta does not give off common iliac arteries, but first gives off two large arteries which spring opposite each other from the aorta and are the *external iliac arteries,* and then continues on for a short space before giving off another pair of vessels (also arising opposite each other), which are the *internal iliac arteries.*

The Brain.

In the brain of the Cat, and in the brains of such *Felidæ* as I have had the opportunity of seeing, there is a well-marked crucial sulcus, the hinder inner end of which is separated (on the inner surface of each cerebral hemisphere) from the anterior end of the calloso-marginal sulcus by the continuation forwards of the hippocampal gyrus into the superior external gyrus. This condition does not seem to obtain in any non-feline Æluroid.

In *Genetta* the superior lateral gyrus (*s*) runs simply forwards beside its fellow of the opposite side without being divided by any transversely extending crucial sulcus, the place of which is only indicated by a minute notch on its inner border (*c n*). Nevertheless the superior lateral gyrus bears a small depression (*d*) placed a little behind and external to the notch just mentioned; and this depression may represent the outer end of the crucial sulcus of *Felis.*

At its anterior end the superior lateral gyrus dips down, and then becomes in part continuous with the middle lateral gyrus (*m*) above the upper end of the supraorbital sulcus (*o s*).

The Sylvian fissure (*S f*), which is rather long and strongly concave forwards, is bounded on each side by the inferior lateral gyrus, which gyrus is much broader behind than in front of the Sylvian fissure. The inner side of the anterior end of the superior lateral gyrus (beyond the notch *c n*) runs backwards, beneath the calloso-marginal sulcus, and becomes continuous with the hippocampal gyrus.

From the minute indication of the crucial sulcus (*c n*) a sulcus runs

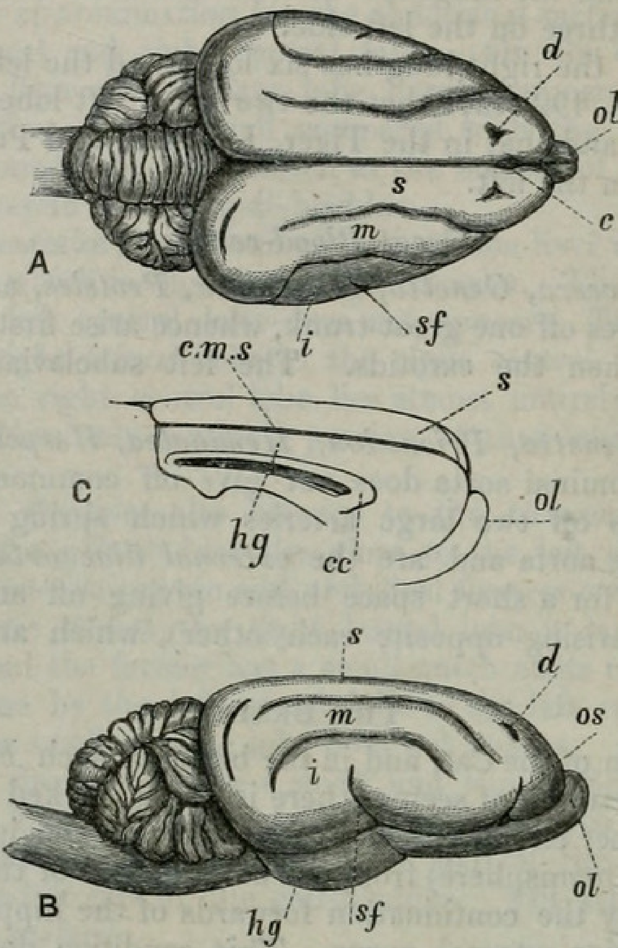
[1] P. Z. S. 1879, p. 88, fig. 4.

[2] Meckel (Anat. Comp. vol. ix. p. 396) appears to have found all four vessels spring from a common trunk in the Genet.

[3] P. Z. S. 1878, p. 89.

backwards, which may be considered as representing the crucial sulcus and the calloso-marginal sulcus united.

Fig. 11.



Brain of *Genetta tigrina*, natural size.

A, dorsal surface. B, lateral external surface. C, median or inner surface of right hemisphere.

c c, corpus callosum; *cm s*, calloso-marginal sulcus; *c*, notch representing crucial sulcus; *d*, depression on superior lateral gyrus; *h g*, hippocampal gyrus; *i*, inferior lateral gyrus; *m*, middle lateral gyrus; *ol*, olfactory lobe; *o s*, supraorbital sulcus; *s*, superior lateral gyrus; *S f*, Sylvian fissure.

In *Viverra civetta* the crucial sulcus is slightly more marked, and the supraorbital sulcus rises higher, than in the Genet. The calloso-marginal sulcus runs forward and joins the rudimentary crucial sulcus. That part of the inferior lateral gyrus which lies in front of the Sylvian fissure is as large as, or larger than, the part behind the Sylvian fissure, and may be subdivided by a sulcus.

In *Paradoxurus* that part of the inferior lateral gyrus which is behind the Sylvian fissure is wide, and bears a V-shaped sulcus. There is hardly even a rudiment of the crucial sulcus.

In *Nandinia* the brain is as in *Genetta*, save as regards that part of the inferior lateral gyrus in front of the Sylvian fissure, which part is as in *Civetta*.

In *Arctictis* that part of the inferior lateral gyrus which is behind the Sylvian fissure is wide, and bears a V-shaped sulcus; and the superior lateral gyrus has additional depressions. The crucial sulcus is distinct, but small; and the calloso-marginal sulcus joins it and goes on forwards beyond it. The sulcus between the superior lateral gyrus and the middle lateral gyrus extends so as almost to join the supraorbital sulcus.

In *Proteles* the crucial sulcus is well developed, much as in the Cats; and the same is the case in *Hyæna* and *Crocuta*[1], which have additional sulci on the inside of the superior lateral gyrus, and generally on that part of the inferior lateral gyrus which is posterior to the Sylvian fissure. The large forms of *Herpestes* show a tendency to the same development; and in *Herpestes* and *Crossarchus* there is a small crucial sulcus.

The Eye.

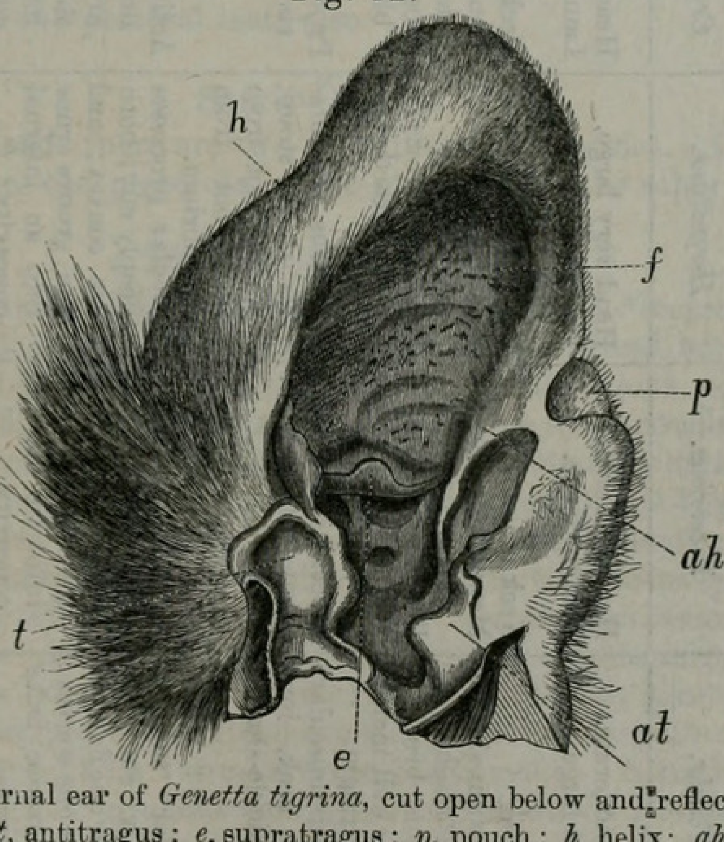
The tapetum in *Genetta tigrina* and in *Hemigalea* closely resembles that of *Felis catus*.

The pupil may contract so as to leave a vertical slit, as in most Cats and in *Paradoxurus*; or an oblong erect aperture, as in *Felis chaus*; or a horizontally extended aperture, as in, at least some, *Herpestes* and *Bdeogale*; or in a circular aperture, as in the Lion and larger Cats.

The Ear.

The external ear in *Genetta tigrina* has a reduplication, forming

Fig. 12.



External ear of *Genetta tigrina*, cut open below and reflected.
t, tragus; *at*, antitragus; *e*, supratragus; *p*, pouch; *h*, helix; *ah*, antihelix; *f*, fossa of helix.

a pouch at the lower part of the hind margin of the concha, much as in the Cat; but the pouch is not so deep.

There is a tragus which fits into a concavity of the double antitragus; and there is a supratragus; but the latter is not so elongate and pedunculate as in the Cat.

[1] P. Z. S. 1879, p. 90, figs. 5 & 6.

The Auditory Ossicles.

The malleus is the only ossicle which presents readily available classificatory characters. These have been examined and described by Mr. Alban Doran[1]. From an examination of the collection of ossicles in the Royal College of Surgeons, with the use of Mr. Doran's paper, I have noted the following characters in the following groups :—

	Felidæ.	*Viverrinæ.*	*Herpestinæ.*	*Cryptoproctinæ.*	*Hyænidæ.*
(1) …	Head moderate.	Head moderate.	Head very large.	Head moderate.	Head large.
(2) …	Lamina large.	Lamina large.	Lamina rudimentary.	Lamina large.	
(3) …	Neck long.	Neck long.	Neck short and stout.	Neck long.	Neck long and stout.
(4) …	Manubrium slender and straight.	Manubrium slender and straight.	Manubrium broad and curved.	Manubrium very slender.	Manubrium thick and curved.
(5) …	Processus brevis rather well marked and straight.	Processus brevis blunt.	Processus brevis well marked.	Processus brevis blunt.	Processus brevis well marked.
(6) …	Processus muscularis from neck, long and sickle-shaped.	Processus muscularis small, from neck.	Processus muscularis short, stout; springs not from neck, but from manubrium.	Processus muscularis rudimentary.	Processus muscularis very short, rather lower down.
(7) …	Articular surfaces deeply cut; the upper one flat, the lower one convex; the groove fades outwards.	Articular surfaces deeply cut; both are convex; and the groove runs into an internal concavity.	Articular processes deeply cut; both are convex; and the groove runs into an internal concavity.	Articular surfaces deeply cut; both are convex; and the groove runs into an internal concavity.	Articular surfaces may or may not have a groove running into a concavity.

[1] Trans. Linn. Soc. new series, (Zoology) vol. i. p. 371.

Sexual Organs.

The penis presents every variety as to its internal osseous support. It is entirely boneless in the *Hyænidæ*; and the bone is rudimentary or absent in the *Viverrinæ*. It is tolerably developed in the *Herpestinæ*, and very large indeed in *Cryptoprocta*.

Cuvier says [1] of the Ichneumon:—"Le gland est comprimé sur les côtés, arqué en dessus à son extrémité, et composé, en très grande partie, de l'os qu'il contient. Son bord inférieur présent une fente qui ne s'étend pas jusqu'à l'extrémité. Elle aboutit à une sorte de cul-de-sac très profond, qui remplit l'échancrure de l'os, et au fond duquel viennent s'ouvrir, par deux orifices séparés, l'urètre et le canal excréteur commun des glandes de Cowper."

Crocuta differs from all other Æluroids in that the clitoris is enormous and traversed by the urogenital canal [2].

In *Arctictis* the Cowper's glands are each less than half the size of the bilobed prostate. In *Prionodon*, on the contrary, each Cowper's gland is about as large as is the whole of the bilobed prostate.

According to Professor Owen (Anat. of Vertebrates, vol. iii. p. 780), Felines have usually six nipples, four ventral and two pectoral; but there are eight in the Domestic Cat. There are four ventral teats in *Paradoxurus*, *Herpestes*, and *Hyæna*; but in *Viverra* there may be two pectoral teats also.

Scent-Glands.

Of these glands there are two very distinct categories. One category comprises the prescrotal scent-glands, and the other the anal glands.

The Prescrotal Glands [3].

These are met with in their most complete form in *Viverra civetta*, where there is a pair of medianly adjoined glands placed between the penis and the scrotum in the male, and in an analogous position in the female. Their secretion escapes into a large scent-pouch, the external aperture of which appears as an antero-posteriorly extended slit simulating a large vaginal aperture. This aperture is larger than either the vulva or the anus. Each scent-gland is about twice the size of one of the animal's anal glands; and in each scent-gland is a central cavity which communicates with the median scent-pouch, into which the glands also open by a number of minute orifices.

In *Viverra zibetha* [4] the scrotum is similar. In *Arctictis* the secretion of the prescrotal gland exudes into a naked cutaneous invagination placed, like a vulva, in front of the anus. A similar invagination exists in *Paradoxurus*, and a naked space in *Nandinia*.

In *Genetta* and *Hemigalea* the conditions are those already described and figured by me [5]. The scent-glands contain numerous

[1] Leçons d'Anat. Comp. vol. viii. p. 222.

[2] P. Z. S. 1877, p. 369, fig. 41.

[3] Chatin, Ann. des Sci. Nat. (5th series) vol. xix. (1874).

[4] There is an old but an excellent preparation of these glands in the Museum of the Royal College of Surgeons, Physiological Series, No. 2514.

[5] P. Z. S. 1882, p. 156.

small cavities which rather increase in size towards the surface of each gland.

Anal Glands.

There are constantly two anal glands, one on each side of the anus, in all Æluroids. The glandular structure may be a transverse band of follicles extending between the two anal glands, as in (at least some) *Herpestes*, *Crocuta*, and *Proteles*. The anal glands may be augmented to three pairs, as in *Hyæna brunnea*[1], or even to five pairs, as in *Crossarchus*. These glands, together with the anus, may open into a deep anal pouch, as in the *Hyænidæ*, *Crossarchus*, *Suricata*, and *Cryptoprocta*; or the anus may open on the surface of the body, as in the *Felidæ* and almost all, if not all, the *Viverrinæ*.

2. On some *Laridæ* from the Coasts of Peru and Chili, collected by Capt. Albert H. Markham, R.N., with Remarks on the Geographical Distribution of the Group in the Pacific. By Howard Saunders, F.L.S., F.Z.S.

[Received May 16, 1882.]

(Plate XXXIV.)

Capt. A. H. Markham, already well known for his circumpolar explorations, has availed himself of the opportunities afforded by his appointment to the command of H.M.S. 'Triumph,' on the South-Pacific station, and has sent home from there an interesting collection of birds. The specimens belonging to the *Procellariidæ* have been placed in the hands of Mr. Osbert Salvin, who has made that family his special study; and the present paper is limited to the *Laridæ*, of which the collection contains examples referable to 15 species. Amongst these is a specimen of that rarest of Gulls, and one of the rarest of all birds, *Xema furcatum* (the large forked-tailed congener of the circumpolar *Xema sabinii*), a species of which only two examples were previously known, and the rediscovery of which, after forty years' fruitless search, is due to the energy of Captain Markham.

The following *Laridæ* were obtained between Payta, in 5° 11′, and Coquimbo, in 30° S. lat. In addition to the original name of each genus and species, only those references are given which bear upon geographical distribution in the Neotropical Region.

Nænia inca (Lesson).

Sterna inca, Lesson, Voy. 'Coquille,' ii. p. 731, Atlas, pl. 47 (1826).

Nænia inca, Boie, Isis, 1849, p. 189; Scl. & Salv. P. Z. S. 1871, p. 567; Saunders, *op. cit.* 1876, p. 667.

[No. 28 (♂ adult), no. 29 (♂ immature), Callao Bay, August 1881.]

In the latter the general hue of the upper parts is of a smoke-

[1] Trans. Zool. Soc. vol. vii. p. 506.