TRANSACTIONS

OF

THE ZOOLOGICAL SOCIETY.

I. *On the Anatomy of the Lemuroidea.* *By* JAMES MURIE, *M.D., F.G.S., Prosector to the Zoological Society, and* ST. GEORGE MIVART, *F.L.S., F.Z.S., Lecturer on Comparative Anatomy at St. Mary's Hospital.*

Read March 27th, 1866.

[PLATES I. to VI.]

Introductory Remarks.

THE Lemuroidea[1] present many features of especial interest both to the zoologist and the comparative anatomist, because they may be considered, as it were, the transition between the higher Primates and ordinary Mammals, and because of the great varieties and striking peculiarities of form and structure which so many of them exhibit.

In addition to the notices regarding *Lemur* and *Loris* contained in Meckel's 'Comparative Anatomy'[2], several special memoirs have from time to time appeared of various genera of the suborder. Such are J. van der Hoeven's treatise on the Potto[3], and F. A. W. van Campen's admirable paper on the same animal[4]; also J. L. C. Schroeder van der Kolk and W. Vrolik's joint paper on *Stenops*[5] recently supplemented by us[6];

[1] Proc. Zool. Soc. 1864, p. 635.

[2] Traduit par MM. Riester et Alph. Sanson, 1830.

[3] Bijdrage tot de Kennis van den Potto. Van Bosman, Amsterdam, 1851.

[4] Verhandelingen der Koninklijke Akademie van Wetenschappen, Amsterdam, 1859.

[5] Bijdragen tot de Dierkunde, uitgegeven door het Koninklijk Zoologisch Genootshap Natura Artis Magistra. Erste Deel. Amsterdam, 1848–54.

[6] Proc. Zool. Soc. 1865, p. 240.

Burmeister's very complete monograph on *Tarsius*[1]; Kingma's[2] Graduation Thesis on *Otolicnus* (*Galago*) *peli*; Professors Owen[3] and Peters's[4] excellent memoirs on *Cheiromys*, and Professor Huxley's able paper on *Arctocebus*[5].

Notwithstanding, a careful comparison and view of the general internal anatomy of the *whole* of the Lemuroidea is still a desideratum. But this, unfortunately, is as yet impossible, if only for the reason that information regarding the internal organs of the *Indrisinæ*[6], *Hapalemur*, *Lepilemur* and others has been heretofore inaccessible to anatomists.

Besides the rare *Indrisinæ*, even the more common genera *Lemur* and *Galago* have received less attention from comparative anatomists than might have been anticipated, considering the peculiar structure of the latter and the fact that the former is the typical genus of the whole suborder.

Under these circumstances, and because specimens of both these genera have come into our possession, we think it advisable to attempt as general a review as the material at our disposal will permit.

For this purpose we have taken the two last mentioned as our basis, and availed ourselves of the several memoirs above referred to for comparison.

We have recently dissected eight species of those two genera, namely, *Lemur catta*, *L. varius*, *L. niger*, *L. xanthomystax*, *L. nigrifrons*, *Galago crassicaudatus*, *G. garnettii*, and *G. allenii*[7].

From this number we propose to select and describe the Ring-tailed Lemur, *L. catta*, in our text, as a type and standard of comparison for the entire suborder of Lemuroidea.

We choose this genus not only because we have been able to give the details of five specimens of it, but also on account of its being, as before said, the type of the suborder, because specimens of *Lemur* are pretty readily procurable, and, finally, on account of their large size enabling anatomical detail to be worked out with greater ease and more certainty.

When we commenced this paper we intended to take *L. catta* as our type, both for description and figures; but finding that the muscles of that animal have been delineated by Cuvier and Laurillard in their magnificent 'Planches de Myologie,' we have judged

[1] Beiträge zur näheren Kenntniss der Gattung *Tarsius*. Berlin, 1846.

[2] Eenige Vergelijkend-Ontleedkundige Aanteekeningen over den *Otolicnus peli*. Eene Academische Proeve door P. Hoekema Kingma. Leyden, 1855.

[3] Trans. Zool. Soc. vol. v. p. 33.

[4] "Ueber die Säugethiergattung *Chiromys*," Abhandlungen der Königl. Akad. der Wissenschaften zu Berlin, 1865.

[5] Proc. Zool. Soc. 1864, p. 314.

[6] Since this paper was read, M. Alfred Grandidier has brought to Paris from Madagascar a new species of the *Indrisinæ* preserved in spirits of wine. M. Alphonse Milne-Edwards is, we are glad to say, about to describe fully the anatomy of this animal; and thus a most important gap in our knowledge of the Lemuroidea will be filled up.

[7] For the opportunity of examining this specimen we are indebted to the kindness of Mr. W. H. Flower, F.R.S.

it better to figure *Galago crassicaudatus*. We have not, however, thought it necessary to rewrite the whole of the descriptions, and have therefore retained *L. catta* as our type in the text.

The skeleton, dentition, and brain of the animals composing this group having already been extensively investigated and compared the one with the other, we think it superfluous to retread the same ground. In the present memoir, therefore, omitting the consideration of those structures, we rather confine ourselves to a comparison of some external points, the muscles, the viscera, the generative organs, the blood-vessels, and the nerves of the several genera of the suborder. The present communication treats only of the external points and the myology.

Except where distinctly stated, it is to be understood that we have not been able to ascertain any divergence from the structure of *L. catta* in the other species or genera of Lemuroidea here referred to.

As regards the genera *Perodicticus* and *Tarsius*, however, we are unable to say as to some points whether there is an agreement or not, owing to the silence of the authors already mentioned respecting certain myological details.

The loss the Society sustained in the death of their fine specimen of Aye-Aye (*Cheiromys madagascariensis*) has been to us a gain, inasmuch as it has supplied us with the means of comparing Professor Owen's myological description with nature, and of adding details which he did not deem it necessary to state, but which are useful for our comparisons.

I. On some External Characters.

The object of the present memoir, as has been stated, is chiefly a comparison of the internal anatomy of the group; but, considering the correlation between external form and internal structure, we cannot altogether pass over the former in silence. This appears to us necessary, as the whole of the Lemuroidea, in spite of their seemingly great diversity of type, have strong external family resemblances accompanying those common characteristics of internal anatomy which separate them so sharply from the higher Primates.

The external characters differentiating the various groups of the suborder have already been sufficiently described by previous writers. We propose, then, simply by a few remarks to direct attention to:—1st, the general form of the body; 2nd, the head and ears; 3rd, the conditions presented by the extremities.

1. *General form of the Body and Limbs.*

Great as is the difference which seems at first sight to exist between such an animal as the Ring-tailed Lemur (*Lemur catta*), our type, on the one hand, and the Slow Loris (*Nycticebus tardigradus*) on the other, yet the whole of the Lemuroidea, from *Indris* to *Cheiromys*, agree together in the following points.

The trunk is relatively long, laterally compressed, and the abdomen slender[1]; and no deviation is presented in this respect even by that abnormal form *Cheiromys*[2]. That resemblance to the Rodentia which many have thought could be traced in the Aye-Aye is entirely fallacious, as has been recently demonstrated by Professors Owen[3] and Peters[4].

In the very great majority of cases this elongated body is terminated by an elongated tail, as in *Lemur catta* and its congeners; but, as is well known, this appendage is obsolete in *Loris* and *Nycticebus*, and is very short in *Arctocebus* and also short in *Perodicticus* and *Lepilemur*. In some Lemurs (e. g. *L. niger* and *L. varius*) the tail assumes more of a bushy character; this is carried to an extreme in *Cheiromys* and some Galagos (e. g. *G. crassicaudatus*; see the representation of this animal from a photograph, Pl. I. fig. 1).

In all cases the pelvic limb is longer than the pectoral one, and this whether their respective extremities (pes and manus) are or are not included[5].

As is well known, certain genera (e. g. *Galago* and *Tarsius*) present an elongation of the tarsal part of the leg which is altogether peculiar, and no approximation to which is possessed by any other order of the vertebrate subkingdom save the sufficiently remote Batrachia[6].

[1] In Dr. Peters's figure of *Galago crassicaudatus* (Reise nach Mossambique, Säugethiere, i. tab. ii.) the abdomen is represented so distended, and the apparent line of demarcation between it and the hind limb is so imperfect, that we suspect it must have been taken from a badly stuffed specimen.

[2] This slenderness of the abdomen is well shown in Owen's memoir referred to, Zool. Trans. vol. v. pls. 16 & 17.

[3] *Op. cit.* [4] *Chiromys*. Berlin, 1866.

[5] See St. G. Mivart, Phil. Trans. 1867, p. 382.

[6] What this elongated Lemurine tarsus denotes is one of those questions which might well provoke discussion. The singular fact of such a structural resemblance existing between creatures supposed almost as remote in habit as in zoological position and affinity, seems at first an inexplicable puzzle, whether on teleological or developmental hypotheses. Such, indeed, it did appear to us until, so to speak, our eyes were opened to habits in the Galagos which previously we were perfectly unacquainted with, and are not aware that any one hitherto has published an account of the same. To Mr. Bartlett, Superintendent of the Society's Gardens, is due the honour of this discovery, and we are indebted to him for permission to incorporate in our Memoir the subjoined letter. He also kindly allowed us ample opportunity of studying the movements of the live animal, enabling us to depict (see Pl. I. fig. 2) the peculiar attitudes which he himself so ably describes, and which we can unhesitatingly corroborate. On the 1st September, 1868, he writes:—

"My dear Murie,—You well know that I have long been much interested in the Lemuridæ, and have published several accounts of the habits of some of them in captivity. While you are at work on the group, therefore, I am sure you will be as pleased as I myself was to know what a wonderful and active little fellow Garnett's *Galago* is. The other night I took an opportunity of letting one of these interesting animals have his liberty in my room, and I assure you I was well repaid by his performance. Judge my utter astonishment to see him on the floor jumping about *upright* like a Kangaroo, only with much greater speed and intelligence. The little one sprung from the ground on to the legs of tables, arms of chairs, and, indeed, on to any piece of furniture in the room: in fact, he was more like a sprite than the best pantomimist I ever saw. What surprised me most was his entire want of fear of dogs and cats. These he boldly met and jumped on at once, and

It might be expected that the elongation of the pelvic limb, as compared with the pectoral one, would proceed *pari passu* with this tarsal extension. Such, however, is not the case; for though in *Galago* it is at its maximum, yet in *Indris* the proportion of the pelvic limb to the pectoral one very much exceeds that which exists in *Tarsius*, as well when the terminal segments of the limbs are included in the estimate as when they are not so.

On the other hand, if the pectoral limb with the manus be compared with the trunk, it is found to exceed the latter only in *Loris*, *Tarsius*, and *Cheiromys*; without the manus it does so only in *Tarsius*.

A similar maximum of development of the pelvic limb as compared with the body is presented by the same genus, and this even when the pes is excluded from the estimate.

2. *The Head and Ears.*

With regard to the form of the head the Lemuroidea present great variations; and this is the case even with forms very closely allied. Our type (*L. catta*), like all the species of the genus, has the well-known elongated, almost fox-like, muzzle (woodcut, fig. 1). In *Indris*, on the contrary, while the larger species (*I. diadema* and *I. brevicaudatus*) have a muzzle approaching in elongation that of Lemur, the smaller kinds (*I. laniger* and *I. verreauxii*) have the snout quite short and the head rounded, approximating in this respect to *Galago* (fig. 2) and *Microcebus*, which lead to the more square-visaged or short-snouted *Cheiromys* and *Nycticebus* (see fig. 3).

It might be expected *à priori* that in a group the species of which differ notably in size, a similar difference in the relative proportions of cranium and face would be found to coexist. This at least is the case in the *Cynopithecinæ*[1] amongst the higher Primates, where examples show such concomitant variations.

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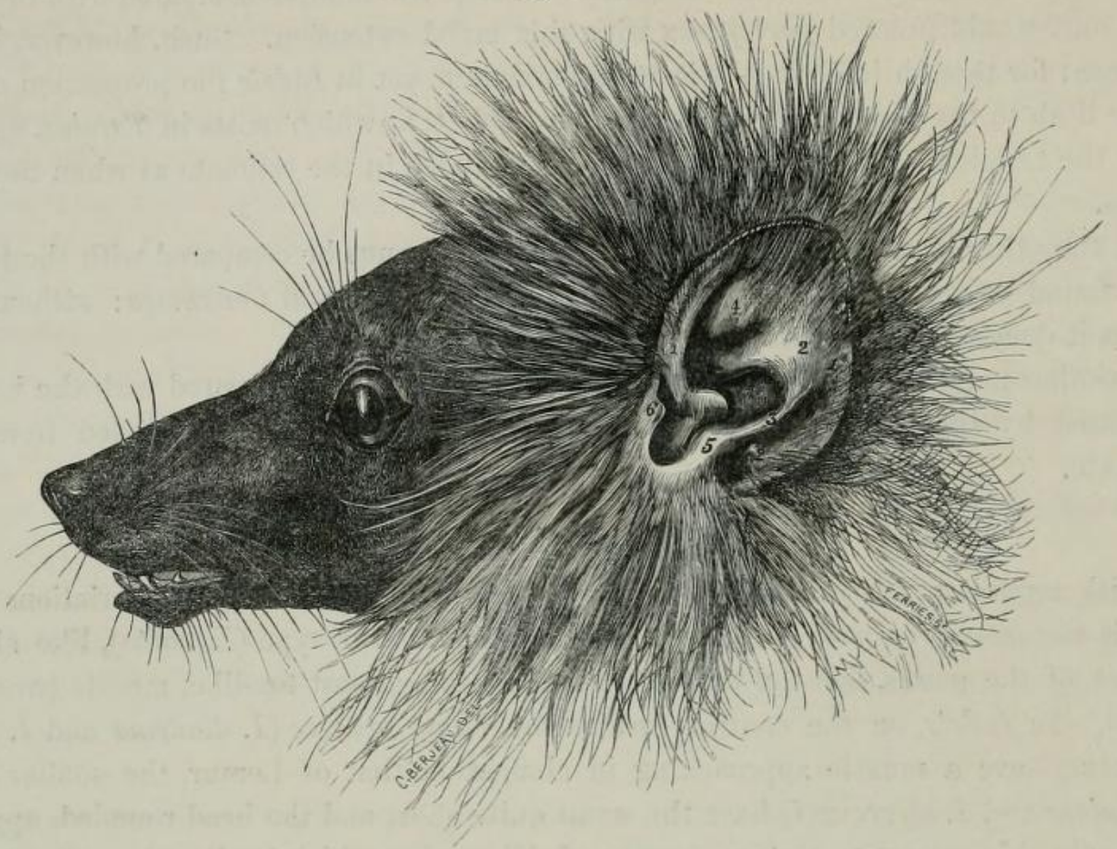
in the most playful manner hugged and tumbled about with them, rolling over and over, hanging on their tails, licking them on the head and face. I must add, however, that now and again he gave them a sharp bite, and then bounded off, full of fun at the noise they made in consequence of the sly nip he had inflicted. This active trickery he never appeared to tire of; and I was myself so pleased on witnessing the droll antics of the creature that the night passed and it was near daybreak before I put a stop to his frolics by catching and consigning him to his cage. In bounding about on the level ground, his jumps, *on the hind legs only*, are very astonishing, at least several feet at a spring, and with a rapidity that requires the utmost attention to follow. From the back of a chair he sprung, with the greatest ease, on to the table, four feet distance. He was delighted with a little wooden ball, which he rolled about and played with for a considerable time, carrying it on one hand while he hopped and skipped about in high glee.

"One more word, and that about food. It eats fruits, sweetmeats, bread, and any kind of animal substance, killing everything it can pounce upon and overpower. This strong and active little brute thus eats its prey at once, as I had proof in an unfortunate sparrow which it unmercifully devoured head first."

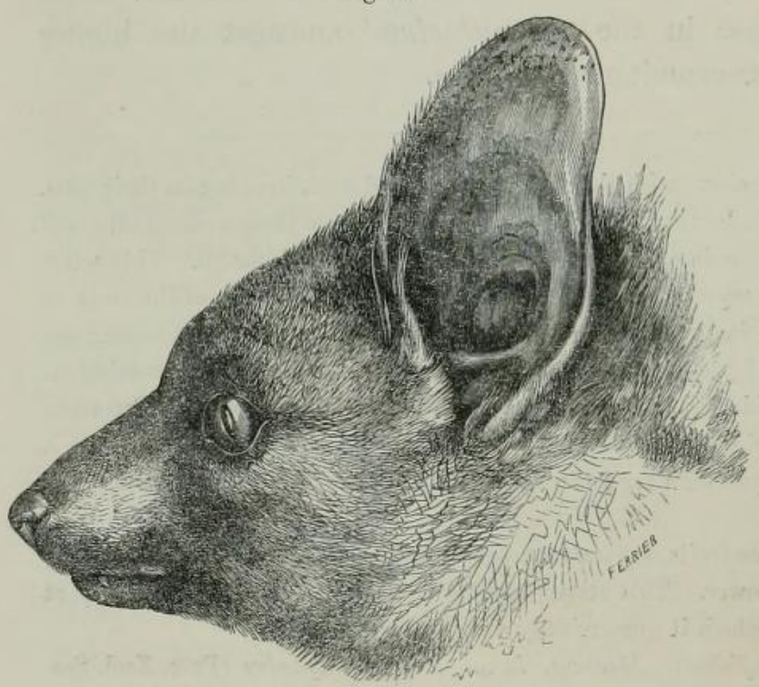
[1] This subfamily including the genera *Cercopithecus*, *Macacus*, *Inuus*, and *Cynocephalus* (Proc. Zool. Soc. 1865, p. 547).

Fig. 1.



Lemur niger, ♀, nat. size.

Fig. 2.



Galago crassicaudatus, nat. size.

Fig. 4.

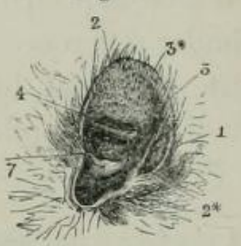


Fig. 3.

Nycticebus tardigradus, nat. size.

The ears are always fairly, often considerably, developed, and their relative size is a more constant character in certain groups than is the prolongation or shortness of the muzzle.

Their occasionally great mobility during life and flexibility after death, however, renders this character of little value as regards stuffed specimens; for, as Dr. Gray has remarked[1], they are apt to become so much distorted artificially in the drying.

The ears are smallest in the *Nycticebinæ* (woodcuts, figs. 3 & 4) and in *Lemur* (woodcut, fig. 1), where they are less than half the external length of the head.

On the other hand they attain their maximum of relative, and indeed of absolute, size in *Galago*, *Tarsius*, and *Cheiromys*. In the first-named genus of these three they exceed three quarters of the extreme length of the head (woodcut, fig. 2).

In *Galago*, also, their mobility during life is extreme. Attention was first called to this fact by Mr. A. D. Bartlett[2], who has figured his *G. monteiri* with one of its ears elevated, and the other depressed. We ourselves have repeatedly noticed and experimented on the ears of *G. maholi*. In this tiny animal the rapidity and great power of contraction of the pinna when the creature is alarmed or irritated, is something remarkable. This puckering of the ear is shown in *Galago garnettii*, Pl. II. fig. 4.

The hair about the ears or on them sometimes attains a noteworthy length[3]. Thus the ears are tufted in *L. varius*, while in *L. niger* (woodcut, fig. 1) the ear is surrounded by a circlet of very long hairs, which radiate round it in all directions, giving the animal quite a remarkable appearance.

The ears of the Lemuroidea are sensibly different in shape from those of Man and Monkeys.

As to the folds and prominences which compose the pinna of the external organ of hearing in the several genera of the Lemuroids, they are as follows:—

In *Lemur* (see woodcut, fig. 1, of *L. niger*) there is no distinct lobule. The helix is flattened out posteriorly, so that it forms the actual postero-external margin of the pinna (woodcut, fig. 1, no. 1*); but at the anterior margin of the pinna (no. 1) it forms a deep fold overhanging the fossæ of the antihelix and concha (nos. 4 and 7). The antihelix (no. 3) is a prominent though short fold; and there is a deepish pit existing (at no. 2*) between it and the adjacent part of the helix. This latter almost disappears towards the middle of the pinna, then suddenly reappears as a short but very prominent horizontal ridge, which dips beneath the recurved anterior bend of the helix before mentioned. This short horizontal fold appears to answer to the lower of the two prominences forming the anterior bifurcation of the human antihelix. Of the

[1] Proc. Zool. Soc. 1863, p. 144. [2] P. Z. S. 1863, p. 231, and pl. xxviii.

[3] Dr. Gray, *loc. cit.*, has made use of the presence or absence of a tuft on the ears and a ruff round the head as marks to distinguish his subdivisions of the genus *Lemur*,—subdivisions which we are unable to adopt, being convinced that all the species form but one natural genus.

upper part of that bifurcation there appears to be no trace. Both the tragus (woodcut, fig. 1, no. 6) and antitragus (no. 5) are fairly developed; of the two the antitragus is rather more developed. The fossæ of the helix and antihelix (woodcut, fig. 1, nos. 2 and 4) are broad and flat; the fossa of the concha (no. 7) is broad and deep.

The appearance of the ear in *Microcebus* as figured by Peters[1] is not unlike *Galago*'s; that author only says the helix widens tolerably opposite to the antihelix, so that the anterior part of the latter is hidden. The transversely wrinkled character of the pinna in his delineation seems to indicate mobility and power of folding it as in *Galago*.

In *Galago* (woodcut, fig. 2, Pl. II. fig. 3, and Pl. III. fig. 5) the conditions are essentially similar; but the anterior fold of the helix is much smaller and less marked, while the fossa between the helix and antihelix just above the antitragus assumes more the form of a pit (no. 2*).

The greater size of the ear is mainly produced by the much greater extension of the fossæ of the helix and antihelix, together forming a uniform concave expansion (nos. 2 and 4) traversed by faintly marked transverse lines, which become transverse grooves when the ear is contracted in the way before noticed.

In *Nycticebus tardigradus* (woodcuts 3 & 4) the general form of the ear, as before said, resembles more that of *Lemur* than that of *Galago*. But the anterior fold of the helix is less marked than in *Lemur*, and the fossa between the helix and antihelix, where they diverge, is more enclosed and pit-like (fig. 4, no. 2*).

A remarkable character by which it differs from these genera is the presence and large development of a horizontal fold (woodcut, fig. 4, no. 3*), which appears to answer to the upper part of the anterior bifurcation of the human antihelix; though this is not so largely developed as the horizontal fold (no. 3) corresponding to the lower branch of the same bifurcation in Man. This latter fold is present as in *Lemur* and *Galago*; and thus between the two prominent, though short, horizontal folds first mentioned there is enclosed a deep, but small, fossa of the antihelix (woodcut, fig. 4, no. 4), having quite a pouch-like appearance.

The tragus and antitragus are so small as to be almost obsolete.

In *Arctocebus* a similar condition obtains as to the fossa and fold of the antihelix[2].

Tarsius[3] approaches the form of ear possessed by *Galago* and *Microcebus*; the tragus appears, however, to be relatively more marked; but the pit (=2*) above the antitragus is wider and shallower than in *Galago*.

Burmeister acutely observes that the peculiarities of structure in the ear of *Tarsius* are not strictly confined to it, but partly exist in Bats and in Rodents.

[1] Reise nach Mossambique, 1852, Säugethiere, pl. iii. p. 15.

[2] Huxley, P. Z. S. 1864, pp. 317, 318, fig. 1, *a*, *b*. He speaks of these branches of the antihelix as "the two singular transverse ridges," and quotes a previous description by Dr. John Alexander Smith, Roy. Phys. Soc. Edin. April 25, 1860.

[3] Burmeister, *op. cit.* p. 7, pl. i.

Cheiromys[1] differs little, if at all, from *Galago* in the configuration and development of the external ear; except, it may be, in the relatively diminished size of the expanded fossa of the antihelix, and in the shallower and broader condition of the pit (=2*) above the antitragus. In the general appearance and position of the ear-folds the Aye-Aye resembles *Lemur*; but size differentiates the one from the other.

3. *The Extremities* (*Manus and Pes*).

There is a striking diversity between the development of the various digits in Man and Apes and their condition in Lemuroids, *i. e.* the Anthropoidea and Lemuroidea.

While in the former group the four ulnar or peroneal digits are, without exception, well developed, the inner, *i. e.* radial or tibial digit, is subject to great variation, the pollex being quite rudimentary in *Colobus* and *Ateles*, while the hallux is diminutive in the *Simia* and *Hapale*.

In the second group, on the other hand, the innermost digit, whether of manus or pes, is invariably well developed; but some abnormality continually crops out in the index or third digit of one or other extremity,—for example, the claw-like nail so constant in the index of the pes, and in the index and third digit also in *Tarsius*, the extreme attenuation of the third digit of *Cheiromys*, the general shortness of the index of the manus and its rudimentary condition in *Arctocebus* and *Perodicticus*.

With regard to the fleshy pads of the palms of the hands we find the conditions to be as follows:—

In *Lemur* (woodcut, fig. 5) one very large pad, the largest of all (no. 1), occupies the position of the ball of the thumb in Man. In front of this a very considerable pad (no. 2) occupies the base of the root of the index. Another, much smaller, pad (no. 3) is placed behind the roots of the third and fourth fingers. Another pad, not quite so large (as that belonging to the index), (no. 4) is placed at the root of the fifth digit. Indistinctly below the last-mentioned pad, running along the ulnar border of the palm, are two others placed anteroposteriorly, one behind the other (nos. 5 and 5*). The anterior of these two (no. 5) is the smallest of all the pads. The posterior one (no. 5*) is of nearly the same size as that at the root of the index.

In *Galago* (woodcut, fig. 7), instead of one large pollicial pad there are two (nos. 1 and 1*) (separated by a deep furrow), placed one in front of the other. The anterior of these (no. 1*) is the larger, and projects freely forwards between the pollex and index.

The indicial pad of *Lemur* is represented by a very large one in *Galago* (no. 2), the anterior end of which projects between the second and third digits. The rest is as in *Lemur*, except that but one single pad (no. 5) appears to represent those two which in *Lemur* occupy the posterior part of the ulnar border of the palm. In *Microcebus myoxinus* Dr. Peters[2] says there are five palmar eminences, the three smaller at the

[1] Owen, Trans. Zool. Soc. vol. v. p. 43, and pls. iv.–xviii. Also Peters, 'Cheiromys,' Berlin, 1866, p. 82, and pl. i. fig. 1.

[2] Reise nach Mossambique, p. 15.

basis of the fingers, and two larger towards the root of the wrist. The last two we may suppose to correspond to nos. 1 and 5, 5* of *Lemur*.

Fig. 5.

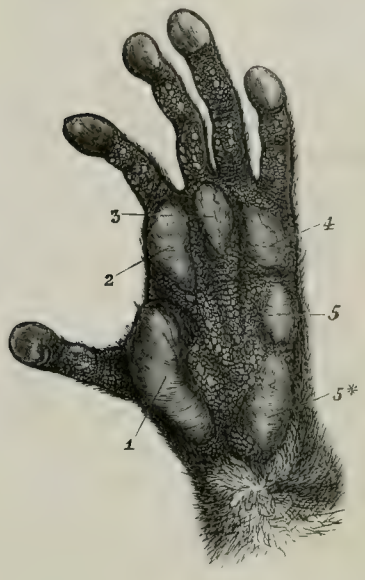


Fig. 6.

Fig. 5. Palmar surface of hand of *Lemur niger*: nat. size. Fig. 6. Plantar aspect of foot of the same.

In *Nycticebus tardigradus* (fig. 9, p. 11) the conditions presented are the same as those in *Galago*, except that two small pads placed side by side (nos. 3 and 3*) take the place of that single pad which in *Lemur* and *Galago* is located between the roots of the third and fourth digits.

In *Tarsius* there is a single large oval pollicial pad; and Burmeister[1] further mentions that between the roots of the middle and other digits there are two very high round ones; and opposite the ball of the thumb, towards the outer border of the palm, there is a long figure-of-eight-shaped palmar cushion.

Cheiromys[2] in some respects more nearly approaches *Lemur* than it does the other genera, inasmuch as the pad at the base of the thumb is broad, flat (or very gently rounded), and with no marked tendency to duplication. Of the three somewhat smaller pads at the proximal ends of the index, annulus, and fifth digits, the middle one (that which in *Lemur* is equidistant between the third and fourth digits) is here in *Cheiromys* almost entirely opposite the annulus, the attenuated middle finger in a measure being excluded from its proper share of the palmar cushion.

[1] *Op. cit.* p. 9.

[2] Owen, *loc. cit.* p. 44; and Peters, 'Cheiromys,' p. 83, tab. i. fig. 2.

The pads on the plantar surface of the foot (*pes*) are less numerous and less distinct than those on the palmar surface of the hand (*manus*) in all three forms.

Fig. 8.

Fig. 7.

Fig. 10.

Fig. 9.

Fig. 7. Palmar surface of fore foot, and Fig. 8. Plantar surface of hind foot of *Galago crassicaudatus*.
Fig. 9. Palm, and Fig. 10. Sole of *Nycticebus tardigradus*: all nat. size. The lettering corresponds to that in Figs. 5 & 6, and is referred to in the text.

In *Lemur* (fig. 6, p. 10) one large pad (no. 1), marked by so deep an antero-posterior furrow as almost to be divided into two, is placed between the first and second metatarsals. A considerable pad (no. 2) is placed beneath the root of the index, and

two smaller subequal ones (nos. 3 and 4) respectively between the roots of the third and fourth and the fourth and fifth pedal digits. Another, elongated but narrower, pad (no. 5) occupies the peroneal border of the sole.

In *Galago* (woodcut, fig. 8) the pad beneath the hallux is not marked by so deep a furrow (if by any) as in *Lemur*. The other pads are similar, except that a rather shorter one occupies the place of that elongated pad which is placed beneath the peroneal border of the sole in *Lemur*.

A marked difference, indeed, is presented between *Lemur* and *Galago*, in the large extent of hairy surface at the hinder part of the sole corresponding with the elongated naviculare and os calcis.

In *Microcebus myoxinus* Peters[1] mentions that the naked anterior sole of the foot has six pads, of which that between the first and second toes is found particularly large. He does not state, however, whether there is a tendency to division in the hallucial eminence.

In *Nycticebus tardigradus* (woodcut, fig. 10) the pad beneath the hallux is marked by a depression which seems to correspond to the antero-posterior groove of *Lemur* opened out (nos. 1 and 1*). The pad beneath the root of the index (no. 2) has another, smaller pad placed immediately behind it, while the third and fourth digits have each their own, very small pad placed at the root of each respectively (nos. 3 and 3*). The pad at the root of the fifth digit (no. 4) is very imperfectly divided from the one bounding the peroneal side of the sole behind it (no. 5).

In *Tarsius*, according to Burmeister's description[2], there are three, unequal, elliptical, transversely wrinkled pads, of which the largest corresponds to the ball of the great toe; the middle one occupies the base of the second and third digits; and the smallest but longest one, partly applied to the outer border of the foot, is placed opposite the fourth and fifth digits.

In *Cheiromys* the plantar surface of the foot and the pads thereon correspond almost identically with those of *Lemur*. The peculiar delicate tracery or papillary structure and the fine parallel lines upon the pads themselves, both of the hand and foot, have been beautifully illustrated in Peters's monograph (*op. cit.* tab. i. figs. 2 and 4).

II. Muscular System.

1. *Muscles of the Head and Neck.*

a. *Epicranial and Auricular Regions.*

Occipito-frontalis.—This muscle is well marked in *Lemur catta*, and covers each side of the skull, its fibres being far more strongly developed posteriorly. Its origin and insertion are as in Man.

In *L. varius* the muscular fibres are very sparse, the entire sheet of aponeurotic and fibrous material being exceedingly delicate.

[1] *Loc. cit.* p. 15.

[2] *Loc. cit.* p. 10.

In *Galago crassicaudatus* (see Pl. II. fig. 3, and Pl. III. fig. 6, *O.f*), although thin, it is a well-developed sheet, and nearly throughout muscular. Its continuation into the ear-muscles would seem to aid in producing the peculiar epicranial movements so characteristic of this species and its allies. In the specimen of *G. garnettii* dissected by us, it was remarkably thin, but otherwise similar to the above, as we observed also in *G. allenii*.

The Attollens aurem is represented by a broad and thin muscular layer, united above with the occipito-frontalis, and inserted into the upper part of the tragus.

In *G. crassicaudatus*, as in some degree also in *G. garnettii* and *G. allenii*, it is very strongly marked, being in fact a continuation of the broad occipito-frontalis. It seems to spread out as a thin and delicate sheet over the anterior part of the dorsum of the external ear for at least half its length.

Van Campen[1] mentions that in Potto its fibres mingle with the occipito-frontalis.

Our description of this muscle in *L. catta* seems to agree with Burmeister's account of the same muscle in *Tarsius*[2].

Attrahens aurem.—This is represented by some rather indistinctly separated fibres of the lower border of the occipito-frontalis muscle, which are inserted into the anterior part of the concha.

In *Galago crassicaudatus* (Pl. II. fig. 3, *At. a*) this (as well as the other auricular muscles) is well developed; and its fibres, imbedded in a thin sheet of fascia continuous above with the attollens and occipito-frontalis, arise from the posterior margin of the orbit, and are inserted as in *Lemur*. The fibres are most marked and numerous towards the helix. In some respects it may be said even to be stronger in *G. garnettii*.

In *Perodicticus*[3] it is short.

In *Tarsius*[4] it is less developed than in *G. crassicaudatus*, in this rather approaching to the *Lemurs*.

Retrahens aurem.—This is a narrow band of muscle arising from the superior curved line of the occiput as far forwards and inwards as its junction with the temporal ridge. It is inserted into the posterior part of the concha.

In *G. crassicaudatus* (Pl. III. fig. 6, *Re.a*^{1}, *Re.a*^{2}, *Re.a*^{3}) the retrahens aurem is represented by at least three separate slips, much in the manner described by Burmeister in *Tarsius* (see below). The anterior slip is the largest.

In *Perodicticus*[3] it appears to be represented by two thin slips of muscle, but with the same attachments as in *Lemur catta*.

In *Tarsius*, Burmeister[5] says, there are four muscular bundles which compose the retrahens aurem. The first and largest arises from the upper part of the ligamentum nuchæ, the middle line of the occiput, and posterior part of the sagittal suture, becoming narrower as it reaches the upper part of the ear. The three other smaller bundles lie

[1] *Loc. cit.* p. 24. [2] *Loc. cit.* p. 31, tab. 3. fig. 1, η. [3] *Loc. cit.* p. 24.
[4] *Loc. cit.* p. 32, tab. 3. fig. 1 (1). [5] *Loc. cit.* p. 32, tab. 4. fig. 1. K. 1, 2, 3, 4.

under the first; they spring from the lambdoidal suture close to each other, from above the middle of the insertion of the cleido-mastoid, and, running parallel, are inserted into the back of the ear. The longest is above, the shortest beneath.

The muscles of the external ear in the genus *Galago* are peculiar in their complexity; and their action has, as before said, been noticed by Mr. A. D. Bartlett in the P. Z. S. 1863, p. 231. *G. monteiri*, he says, "has the power of turning its ears back and folding them up when at rest," which phenomenon is well displayed in the excellent plate, no. xxviii., in the same volume.

The action (produced by muscles, the fibres of which are of the striped variety, and mainly by the retrahens aurem) consists in a folding downwards of the summit of the ear behind its posterior margin, producing a wrinkling of the ear, which is thrown into numerous transverse folds, reminding us of a fan closed, or of the reefing of a ship's sail. This evidently is by the muscular contraction acting from behind, namely, the powerful retrahens aurem and mingled fibres of the attollens. The former of these, covering more or less the dorsum of the ear, seems to drag the point backwards and downwards, and while so doing creases the membrane of the ear itself (Pl. II. fig. 4).

b. *Facial and Mandibular Regions.*

The Orbicularis palpebrarum in *L. catta* surrounds the orbit as usual.

In *Lemur varius* it is figured by Cuvier, 'Planches de Myologie,' pl. 69. fig. i, *d*.

The circlet of muscular fibre representing this muscle in *Galago crassicaudatus* is broad, agreeing thus with the large orbit and eyelids which this animal possesses (Pl. II. fig. 3, *O.p*). In *G. allenii*, though a small animal, this muscle is very distinctly marked; and the fibres, firmly attached to the skin, as usual, form a subcircular band round the orbit.

In *Loris gracilis* it is, as might be expected, large, as represented by Cuvier[1].

It is very thin in *Tarsius*[2].

Temporalis.—This is strongly developed (as Meckel says[3], "*surtout les makis l'ont plus fort que l'homme*), and has the usual origin and insertion; but its anterior portion is continued along the outer margin of the coronoid process, and is inserted by a distinct narrow tendon with a pit at the junction of the ascending ramus with the horizontal one.

Its insertion is not shown in Cuvier's figure[4] of *Lemur varius*.

In *L. xanthomystax* and in *L. nigrifrons* we found this muscle equally large; and the part giving rise to the aforesaid tendon is easily resolvable into a separate superficial layer of muscles. In this latter respect there is an approach to the condition found in some of the *Rodents*[5].

In the *Galagos* this muscle answers to the description above given of it in *L. catta*. See that of *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. fig. 6, and Pl. IV. fig. 11, *Te*).

[1] *Loc. cit.* pl. 67. figs. 1 and 2, *d*. [2] *Loc. cit.* p. 30, tab. 3. fig. 1, *a*. [3] Anat. Comp. vol. viii. p. 751.
[4] *Loc. cit.* pl. 69. fig. 1, *b*. [5] See Meckel, vol. viii. p. 577, and P. Z. S. 1866, p. 389.

In *Loris gracilis* it is rather small[1].

In *Tarsius*, according to Burmeister[2], it is double. The outer or anterior portion springs from the anterior half of the linea semicircularis of the frontal and temporal fossa. The inner and hinder part springs from the entire length of the same linea semicircularis.

In *Cheiromys*, Owen[3] says it derives many fibres from the strong temporal fascia.

Masseter[4].—This muscle is rhomboidal in shape and arises from the whole length of the zygoma. It is inserted into the concavity outside the ascending ramus of the mandible and into its angle, pretty well shown in Cuvier's figure (pl. 69. fig. 1, *j*) of *Lemur varius*.

Substantially the same in the Galagos: that of *G. crassicaudatus* is shown in Pl. II. fig. 3, and Pl. III. figs. 5 & 6, *Ma*. In *Loris gracilis* it is of moderate size[5]. In *Tarsius*[6] it consists of two layers—an outer and anterior, and an inner or posterior one.

Owen[7] says that in the Aye-Aye the masseter consists of two portions, an external and an internal. "The external fibres pass downward almost parallel, to be inserted into the lower border of the posterior half of the mandible; they are separated by a thin glistening aponeurosis from the internal portion, the fibres of which pass a little forward as well as downward. These two portions blend together anteriorly, the inner portion is inserted into the outer surface of the broad ascending ramus. There is no trace of an accessory masseter such as exists in many Rodents."

Orbicularis oris.—In *Lemur catta* this is a very elongated narrow muscle, agreeing with the length of the jaws[8].

It is with some difficulty the fibres can be separated from those of the cheek and nasal muscles[9] in the Grand Galago (Pl. II. fig. 3, and Pl. III. fig. 5, *O.o*).

In *Loris gracilis* it is relatively larger than in *Lemur*, as shown by Cuvier in the sixty-seventh plate of his 'Planches,' fig. 1, *l*. In *Tarsius*[10] it is very weak.

Van der Hoeven speaks of its being much intermixed with the other lower facial muscles in the Potto[11].

Nasal muscles.—In the Lemuroids generally, the naso-labial region being more or less elongated and produced, the nasal muscles proper, with those of the upper lip, form a broad and very extensive sheet reaching from the orbits to the nostrils. This sheet appears to represent the conjoined *zygomatici*, *levator labii superioris alæque nasi*, &c. (Pl. II. fig. 3, *Na*.).

The buccinator in the genus *Lemur* is also somewhat elongated in shape[12].

[1] Cuvier, pl. 67. figs. 1 and 2, *b*. [2] *Loc. cit.* p. 33, tab. iv. figs. λ, λλ. [3] *Loc. cit.* p. 59.

[4] Meckel, *l. c.* p. 752, considers it relatively more developed in the Lemurs than in Man.

[5] Cuvier, *l. c.* pl. 67. figs. 1 and 2, *j*. [6] *Loc. cit.* p. 32, tab. 3. fig. ϑ, and tab. 4. fig. 9, ϑϑ.

[7] *Loc. cit.* p. 59. [8] Cuvier, *l. c.* pl. 69. fig. 1, *l*.

[9] Meckel, *op. cit.* vol. viii. p. 751, alludes to this circumstance in speaking of the muscles of the lips in Quadrumana generally, and further notices the intimate relation of the cutaneous fibres with them.

[10] *Loc. cit.* p. 31, tab. 3. fig. 1, ζ. [11] *Loc. cit.* p. 24. [12] Cuvier, *l. c.* pl. 69. fig. 1, *k*.

It is well marked though not readily distinguished from the posterior fibres of the orbicularis oris in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. III. fig. 5, *Bu*).

In *Perodicticus*[1] it is very thin, otherwise much as in Man. The duct of Stenon passes through it above.

In *Tarsius*[2] it springs from the under surface of the malar bone and masseter muscle, from the surface of the superior maxillary bone joining the orbicularis oris; and its fibres extend to the mandible and orbicularis oris.

The distorted condition of the incisors and jaws in the specimen of Aye-Aye dissected by us interfered with the natural condition of the parts in the neighbourhood of the mouth.

External Pterygoid.—This arises from the upper surface of the maxilla and the outer surface of the palatine bone beneath the orbit. It is inserted into the neck of the mandible beneath the condyle.

Identical in the *Galagos* (Pl. V. figs. 17 & 18, *E.pt*). In *Tarsius*[3] it is said to spring in the orbit from the *os ethmoideum* near the optic foramen.

Internal Pterygoid.—This springs from the pterygoid fossa and the outer surface of the external pterygoid process, and is inserted into the inner side of the angle of the mandible.

That of *Galago crassicaudatus* is figured by us in Pl. V. figs. 17 & 18, *I.pt*.

In *Tarsius*[4] this is larger than the external pterygoid; it arises from the space between the two ascending branches of the pterygoid, and contains a strong internal tendon.

c. *Hyoidean and Inframandibular Regions.*

Sterno-cleido-mastoid.—This muscle is largely developed, and arises by a strong tendon from the manubrium, and by muscle from the inner third of the clavicle. As it passes forwards and upwards, the clavicular portion becomes covered by the sternal part[5]. The two portions are inserted into the skull behind the meatus auditorius externus.

Cuvier, in his 'Planches de Myologie,' pl. 68. fig. 1, letters a and b, quite agrees with the appearances we found, except that the sterno-mastoid (*b*) seems to consist of two parts, *i. e.* to be longitudinally divided. In the list of muscles in the text, however, a and a^1 are described as indicating the trapezius (*dorso-sus-acromien*); and at pl. 69. fig. 1, a large broad muscle, marked a and a^1, is represented as passing downwards and backwards from the neck and occiput to the clavicle. We, however, have found no such muscle apart from cutaneous fibres, though several specimens were examined by us to ascertain the correctness of the delineation.

In *Galago crassicaudatus* (Pl. III. fig. 5, *St.m*, and *Cl.m*, and Pl. II. fig. 3, *St.m*) and in *G. garnettii* it is tolerably strong, and there is only a moderate division into two parts. In *G. allenii*, on the other hand, it is rather feebly developed. In *G. peli*[6] the

[1] Van Campen, *op. cit.* p. 23.
[2] *Loc. cit.* p. 32.
[3] *Loc. cit.* p. 33.
[4] *Loc. cit.* p. 33, tab. 5. fig. 14.
[5] Meckel, Anat. Comp. vol. vi. p. 169.
[6] Kingma, *l. c.* p. 21.

thoracic portions of this muscle are said to be quite divided and to be so broad at its insertion as to meet above its fellow of the opposite side.

In *Loris gracilis* both portions of this muscle are largely developed[1].

In *Nycticebus tardigradus* it is as in *Lemur catta*.

Burmeister describes this muscle as divided into two in *Tarsius*[2], viz. (*a*) the cleido-mastoideus or larger portion, and (*b*) the sterno-mastoideus the smaller part. The former (*a*) arises from the upper border of the clavicle and is inserted upon the curved line of the occiput. The latter (*b*), a rounder muscle, springs from the upper end of the sternum, and is inserted into the skull behind the ear, but before the first part of the muscle.

Owen says that in *Cheiromys*[3] it is as we have above stated it to be in *L. catta*, except that the cleidal portion arises from the middle third of the clavicle.

Sterno-hyoid.—This muscle arises deeply within the thorax from the upper or inner surface of the sternum between the cartilages of the second and third ribs. It is inserted into the os hyoides just within the insertion of the omo-hyoid. It is closely united with its fellow of the opposite side.

Cuvier represents in *Lemur varius* the two sterno-hyoids as fused into one single muscle (*l. c.* pl. 68. fig. 1, *x*). In his pl. 69. fig. 1 the same muscle is erroneously marked *y*.

In *Galago crassicaudatus* (Pl. III. fig. 5, *S.hy*, *S.hy**, and *S.hy***) it is much as in *Lemur*, as is also the case in *Loris gracilis*[4] and Potto[5].

Each muscle is broad, but presents no difference in its attachment in *Tarsius*[6].

In *Cheiromys* Owen[7] says merely "they gradually contract as they ascend," and are closely connected together in the middle line.

The Sterno-thyroid also has origin deeply within the thorax and in common with the sterno-hyoid. It is inserted into the outer side of the posterior (lower) border of the thyroid cartilage, partly figured by Cuvier in his 'Myologie,' pl. 68. fig. 1, x^1, and also in pl. 69. fig. 1, where it is wrongly marked y^1, which letter in the list of muscles is said to designate the *thyro-pharyngien*!

In *Galago crassicaudatus* (Pl. III. fig. 5, *S.th*) as in the genus *Lemur*.

At the sternum these muscles are hardly resolvable into two bellies in *Tarsius*[8].

Thyro-hyoid.—This is as usual a continuation of the last, going from the outer side of the thyroid cartilage to the posterior cornua of the os hyoides. It is indicated by Cuvier in his 'Planches de Myologie,' pl. 68. fig. 1, *y*. For this muscle in *Galago crassicaudatus* see Pl. III. fig. 5, *Th.h.*

The Omo-hyoid is a very long and slender muscle, broader, however, anteriorly (above) than at its scapular end. It arises from the most prominent point of the

[1] Cuvier, *l. c.* pls. 6 & 7. figs. 1 & 2, *a*, *b*, b^1.
[2] *Loc. cit.* p. 37, tab. 5. fig. 13, *a*, *b*.
[3] *Loc. cit.* p. 58, pl. 22. figs. 1, 9, 9^1.
[4] *Loc. cit.* pls. 6 & 7. fig. 2, *x*.
[5] *Loc. cit.* p. 25.
[6] *Loc. cit.* p. 34, tab. 5. fig. 13, *a*.
[7] *Loc. cit.* p. 58.
[8] *Loc. cit.* p. 34, pl. 5. fig. 12, σ.

convex anterior (upper) border of the scapula[1], and is inserted into the hyoid just external to the insertion of the sterno-hyoid. There is no median tendon; and the triangles of the neck are long, each with an acute angle.

In *Lemur varius* it has been figured by Cuvier, pls. 68 and 69, fig. 1, *e*.

In *Galago allenii* the omo-hyoid is fairly represented towards its attachment to the hyoid, but as it leaves the scapula it is very closely applied to the anterior (inferior) margin of the levator anguli scapulæ. It is a broad and distinct strip of muscle in *Galago garnettii* and in *G. crassicaudatus* (Pl. III. figs. 5 & 6, and Pl. IV. figs. 13 & 14, *O.h*).

It is strong and without median tendon in *Loris gracilis*[2] and also in *Nycticebus tardigradus*[3].

In *Tarsius*[4] it is double-bellied and round near the hyoid.

In *Cheiromys* it is as in *Lemur*, according to Owen[5].

The Digastric is formed of two thick fleshy bellies with a long and strong median tendon. It arises in common with the stylo-hyoid, and has a broad insertion into the middle third of the inner side of the inferior border of the horizontal ramus of the mandible.

Meckel[6] also says that in *Lemur mongos* and *L. albifrons* the fibres of the anterior belly are arrested about the middle of the horizontal branch of the lower jaw. Indicated in *L. varius* by Cuvier, pl. 68. fig. 1, *q*.

The conditions found in *Lemur* obtain in *Galago crassicaudatus* (Pl. IV. fig. 11, *Di*.) and in *G. allenii*, where its anterior belly is rather the stronger one (Pl. III. fig. 5, *Di* and *Di**, the latter having a portion of the anterior belly removed to show the genio-hyoid muscle).

In *Nycticebus tardigradus*[7] it is double and with a strong median tendon.

Figured by Cuvier in his sixty-seventh plate, fig. 2, *q* (*Loris gracilis*). In this species S. van der Kolk found a rudimentary tendon[8].

In *Perodicticus*[9] the posterior belly is short and thick, the anterior one thinner. Attachments the same as in *L. catta*. This is also the condition in *Tarsius*[10].

The anterior bellies of the digastric are closely blended together in *Cheiromys*[11], and the posterior belly of each muscle is composed of two fasciculi of fleshy fibres.

The Mylo-hyoid is flat and strong. Its origin is from the body of the hyoid bone, and insertion into the horizontal ramus and mylo-hyoid ridge of the mandible.

In *Lemur varius* it is obscurely traced in pl. 68. fig. 1, *r*, of Cuvier's 'Recueil.'

Shown on the left side in *Galago crassicaudatus* (Pl.III. fig. 5, *My.h*).

In *Loris gracilis*[8] the mylo-hyoid is found between the anterior fascicles of the digastric muscle.

[1] As Meckel observes (*op. cit.* vol. viii. p. 770). [2] Indicated by Cuvier in this species, *l. c.* pl. 67. fig. 2, *e*.
[3] P. Z. S. 1865, p. 243. [4] *Loc. cit.* p. 48, tab. 4. fig. 1. no. 7. [5] *Loc. cit.* p. 58.
[6] Anat. Comp. vol. viii. p. 752. [7] P. Z. S. 1865, p. 241. [8] *Loc. cit.* p. 44.
[9] *Loc. cit.* p. 25. [10] *Loc. cit.* p. 34, tab. 5. fig. 13, *π*. [11] *Loc. cit.* p. 58.

Van Campen[1] mentions its similar position in the Potto, and Burmeister[2] in *Tarsius*.

The Stylo-hyoid is a small but very distinct muscle in *Lemur catta*, arising in common with the posterior belly of the digastric, and being inserted as in Man.

In *L. varius* its insertion is shown by Cuvier, pl. 68. fig. 1, *s*.

It is of moderate size in *L. xanthomystax*, and is pierced by the tendon of the digastric muscle. This is contrary to what Meckel says occurs in the Lemurs; his words are[3], "dans les makis, où le muscle en question passe en dehors du digastrique, au bord postérieur du mylo-hyoïdien et au bout antérieur de l'abaisseur de l'hyoïde, sans s'implanter à l'os hyoïde."

The stylo-hyoid in the Grand Galago arises rather within and along with the stylo-glossus than in common with the digastric. See Pl. V. fig. 18, *Sy.h*, the digastric having been removed.

Burmeister[4] remarks that in *Tarsius* the digastric does not penetrate the stylo-hyoid muscle.

Besides the stylo-hyoid muscle, Meckel speaks[5] of another extra muscle as existing in the Lemurs but which is absent in Apes and in Man. This he terms the *masto-styloïdien*, in contradistinction to the true stylo-hyoid or elevator of the hyoid. This *masto-styloidien*, according to him, stretches from the tympanum to the styloid process, and differs from the stylo-hyoid and stylo-glossus, which come from the tympanic process.

The Stylo-glossus arises beneath the external meatus in front of the origins of the stylo-hyoid and digastric. It is inserted as usual into the outer side of the tongue.

In *Galago crassicaudatus* (Pl. V. fig. 18, *Sy.g*) it is similar.

This muscle presents no noteworthy difference in *Tarsius*[6] from what is said above of *Lemur catta*.

Stylo-pharyngeus.—This muscle arises (behind the stylo-glossus and within the origin of the stylo-hyoid and digastric) from the surface of the auditory bulla, and is connected with the anterior cornua of the os hyoides. It is inserted as usual.

In *Galago crassicaudatus* (Pl. V. fig. 18, *Sy.ph*) and in *Perodicticus* this muscle is essentially as in *L. catta*[7].

d. *Vertebral Region, anterior and lateral.*

Rectus capitis anticus major.—In *Lemur catta* this is a long and slender muscle which arises from the transverse processes of the cervical vertebræ from the second to the sixth, and is inserted into the basioccipital.

In *L. xanthomystax* tendons only go to the sixth, fifth, and fourth cervical vertebræ; but there is another layer beneath, which sends a slip to the third cervical.

In *Galago crassicaudatus* (Pl. V. fig. 16, *R.a.ma*) it would appear as if this muscle

[1] *Loc. cit.* p. 25.
[2] *Loc. cit.* p. 34, tab. v. fig. 13, *r*.
[3] Anat. Comp. vol. viii. p. 770; see also p. 753.
[4] *Loc. cit.* p. 35, tab. v. fig. 12, *φ*.
[5] *Loc. cit.* vol. viii. p. 770.
[6] *Loc. cit.* p. 35, tab. v. fig. 12, *r*.
[7] *Potto*, l. c. p. 26.

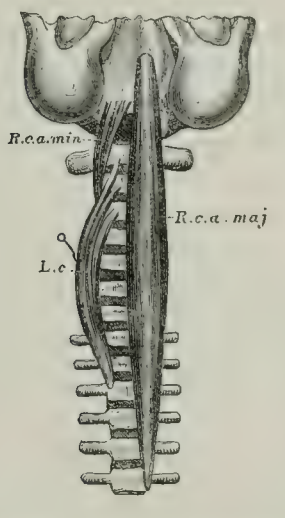
descended to the fourth dorsal vertebra, its fibres joining those of the first part of the longus colli. In another specimen this thoracic continuation was less distinct, the muscle, however, clearly went as far as the seventh cervical transverse process, there indefinitely merging into the said portion of the longus colli.

We noted in *Galago allenii* this muscle to be strongly developed. It arises by two tendons from the transverse processes of the seventh and sixth cervical vertebræ, and is inserted as in *Lemur catta*. A deeper portion, however, also exists, which comes from the upper cervical vertebræ (their transverse processes) to the atlas, and terminates with an insertion similar to that of the superficial portion. This may be the anterior division of the longus colli.

Special mention of this muscle is not made by S. van der Kolk and Vrolik, although they remark[1] that the long muscles of the neck give great power of flexion to this animal.

In our own recent examination of *Loris gracilis* we have found it to be like that of *Nycticebus tardigradus*. The latter animal, according to our observations[2], has the rectus capitis anticus major of great magnitude, and with an origin as far back (low down) as the body of the sixth dorsal vertebra. (See woodcut, fig. 11, *R.c.a.maj.*)

Fig. 11.



Deep muscles in front of the neck of the Slow Loris (*Nycticebus tardigradus*).

R. c. a. maj. Rectus capitis anticus major.
R. c. a. min. Rectus capitis minor.
L. c. Longus colli.

The skull is cut in such a transverse manner as to leave only the basioccipitals and tympanic bullæ present.—From P. Z. S. 1865, p. 242.

Van Campen[3] says it exists as usual in the Potto. *Tarsius*[4] has it arising from the five upper cervical vertebræ.

In *Cheiromys* this muscle is enormous, though not mentioned by Owen, who probably mistook it for the longus colli, which it in some respects resembles. It arises from the sides of the bodies of the first three dorsal vertebræ and transverse processes of all the cervical vertebræ except the first. It is inserted into the basioccipital and also into the inner side of the auditory bulla (Pl. VI. fig. 31, *R.a.ma*).

[1] *Stenops*, op. cit. p. 44. [2] P. Z. S. 1865, p. 241. [3] *Loc. cit.* p. 26. [4] *Loc. cit.* p. 39, tab. 5. fig. 14, *n*.

The Rectus capitis anticus minor arises from the under surface of the base of the transverse process of the atlas, and is inserted into the basioccipital beneath the last.

It is of small size in *L. varius* and in *L. xanthomystax*.

In *Galago crassicaudatus* (Pl. V. fig. 16, *R.a.mi*) it is as in *Lemur*.

In *Nycticebus*[1] we have found it arising from the transverse processes of both axis and atlas, and being inserted into the exoccipital just within the periotic (see woodcut, fig. 11, *R.c.a.min*).

In *Tarsius*[2] Burmeister states that its fibres extend to the transverse process of the second cervical vertebra or even further back.

It is not mentioned by Owen in *Cheiromys*; but we have found it the same as in *L. catta* (Pl. VI. fig. 31, *R.c.mi*).

The Longus colli arises from the bodies of the first five dorsal vertebræ and from the transverse processes of the third, fourth, fifth, and sixth cervical vertebræ. It is inserted by tendons into the hypapophysis of the atlas and into the corresponding parts of the bodies of the other cervical vertebræ.

Neither this muscle nor either of the two preceding is represented in those of Cuvier's plates which illustrate the myology of Lemuroids.

In *G. crassicaudatus* the longus colli *in situ* reaches from the basioccipital bone to the ventral surface of the first four dorsal vertebræ. On dissection it is found to consist of three portions as in Man. The first or inferior oblique portion of human anatomy arises by tendons from the transverse process of the sixth and seventh cervicals, and is inserted by several tendons into the sides of the bodies of the upper dorsal vertebræ (see Pl. V. fig. 16, *L.c*[1]). The second or superior oblique (*L.c*[2]) has a fleshy cranial attachment underneath and posterior to the rectus anticus major; it sends three tendons to the tips of the second, third, and fourth cervical transverse processes. The third vertical portion (*L.c*[3]) covers the ventral surfaces of the whole of the cervical and one or more of the dorsal vertebræ; short, indistinct tendons proceed outwards to the transverse cervical processes.

In *G. allenii* it arises by tendons from the tips of the transverse processes of the sixth to the third cervical vertebræ, and from their bodies on the ventral surfaces. What we have described as a deeper portion of the rectus anticus major may in fact be a part of this muscle.

In *Loris* and *Nycticebus* it "arises from the fronts of the bodies of the four anterior dorsal vertebræ, and is attached to the bodies and transverse processes of all the cervical vertebræ, three distinct tendons going to the bodies of the atlas, axis, and third cervical vertebræ"[3]. That of *Nycticebus tardigradus* is delineated in woodcut, fig. 11, *L.c*, a hook dragging the muscle aside, the rectus capitis anticus major having been removed on that side.

[1] P. Z. S. 1865, p. 242. [2] *Loc. cit.* p. 39, t. 5. fig. 14, *o*. [3] Mivart & Murie, *l. c.* p. 242.

Van Campen divides this muscle in *Perodicticus*[1] into three parts. The lowermost stretches from the bodies of the first four dorsal to the transverse processes of the three lowest cervical vertebræ. The uppermost part springs from the transverse processes of the middle cervicals reaching to the ring of the atlas. The middle part has origin from the bodies of the three lowest cervical, and attaches itself to the bodies of the second and third cervical vertebræ.

In *Tarsius* Burmeister[2] observed two distinct portions,—the upper longish one springing from the transverse processes and bodies of the third, fourth, and fifth cervicals, and inserted into the anterior tubercles of the atlas; the lower portion, broader, comes from the bodies of the upper dorsal vertebræ, and is inserted into the bodies of the lowest cervical vertebræ from which the upper springs, reaching as far as the axis.

Owen says the longus colli in *Cheiromys*[3] is a powerful muscle, but does not give its entire attachments; he has probably mistaken for it the remarkably extended rectus capitis anticus major. It appears to consist of three portions. The first or lowest part arises from the sides of the bodies of the first three dorsal vertebræ (covered beneath by the rectus capitis anticus major) by two slips, and is inserted into the transverse process of the sixth cervical vertebra (Pl. VI. fig. 31, $L.c^1$). The second portion (superficial) arises from the transverse processes of the cervical vertebræ from the sixth to the third inclusive, and is inserted into the body of the atlas and axis; it is tendinous at its origin (Pl. VI. fig. 31, $L.c^2$). The third, or deepest, layer arises from the bodies of the cervical vertebræ from the seventh to the third inclusive; and its insertion is tendinous, and into the lower surface of the body of the axis (Pl. VI. fig. 31, $L.c^3$).

Scaleni.—These muscles[4] appear to consist of two distinct masses, both of which are situated entirely behind the axillary vessels and nerves, and the posterior one of which is perforated by the external respiratory nerve of Bell. It is the anterior of these two masses[5] which descends the further, and is inserted into the second and third ribs (the fourth rib, according to Meckel), in contact with part of the origin of the serratus magnus (Pl. IV. fig. 12, *Sca*).

They exist in very nearly the same condition in *L. varius*, only the long anterior portion descends to the fourth rib.

In *L. xanthomystax* the scaleni muscles are three or four in number. The longest slip springs from the fourth rib close to the cartilage; it proceeds forwards (upwards), and about the posterior (lower) third of the neck is joined by another slip which comes from the second and third ribs, in proximity and partial union with the serratus magnus. These two portions of scaleni are inserted by two tendons into the transverse processes of the second and fourth cervical vertebræ. A third portion of the scaleni

[1] *Loc. cit.* p. 26. [2] *Op. cit.* p. 39, tab. 5. fig. 14, *p*, *q*. [3] *Loc. cit.* p. 58.

[4] Figured by Cuvier in his 'Recueil,' pl. 69. fig. 2, 6^a & 6^b, and pl. 68. fig. 1, 6^1 (*Lemur varius*).

[5] The "scalenus posterior" of Meckel, *loc. cit.* p. 159.

comes from the anterior (upper) border of the first rib, and is inserted by two tendons into the transverse processes of the sixth and fifth cervical vertebræ. All these portions are placed outside the brachial plexus.

Galago crassicaudatus (Pl. IV. fig. 9, *Sca.*[1], and Pl. V. fig. 16, *Sca.*[1] & *Sca.*[2]) agrees with *L. varius*.

In *G. allenii* the scalenus medius arises as high as the transverse process of the fourth cervical vertebra. The scalenus posticus does not seem to reach higher than the sixth. The scalenus anticus is a small bundle of fibres which pass to the first rib in front of the lowest nerve of the brachial plexus.

In *Tarsius* there are three fasciculi (muscles according to Burmeister[1]) arising from the first three ribs, and going to the cervical vertebræ from the sixth to the first.

In *Cheiromys* this muscle is just as above described in *L. catta*, except that the anterior portion extends back to the fourth rib. Owen does not mention this muscle.

e. *Vertebral Region (Posterior and Superior).*

Splenius.—This muscle is very intimately connected with the transversalis cervicis, and arises from the spines of the first three dorsal vertebræ, the last cervical vertebræ, and ligamentum nuchæ. The larger and anterior (superior) portion of the muscle (the splenius capitis) is inserted into the occiput; the smaller and posterior (inferior) part (the splenius colli) into the transverse processes of the first three cervical vertebræ, as Cuvier has shown (pl. 71. figs. 1 and 2, I and I[1]).

In *L. varius* the splenius colli is inserted into the transverse processes of the first four cervical vertebræ, in *L. xanthomystax* only to the first three cervical vertebræ; but there is also a little separate slip carried onwards to behind the ear.

No line of demarcation exists in *Galago crassicaudatus* by which splenius capitis and splenius colli can be differentiated. The muscle representing the splenius capitis, or, it may be, both divisions (Pl. III. fig. 6, *Sp. cp*), arises from the uppermost second dorsal and spines of all the cervical vertebræ, and is inserted into the outer three-fourths of the superior curved line of the occiput.

In *G. allenii* the splenius capitis is as in *L. catta*; but we found a small slip between the splenius and longissimus, which may represent the splenius colli[2].

In *Nycticebus tardigradus* the splenius is exceedingly large; and our observation confirms Meckel's[3], that there is no splenius colli.

In *Tarsius*[4] it arises from the spinous process of the first dorsal vertebra. It goes mainly to the occiput; and a part (representing the splenius colli) is inserted into the transverse process of the atlas.

In *Cheiromys* it arises from the first five dorsal vertebræ.

Complexus.—This is large, and has origin from the transverse processes of the first

[1] *Loc. cit.* p. 37. tab. 4. fig. 9, *c.c.c.*

[2] P. Z. S. 1865, p. 243.

[3] *Op. cit.* p. 141.

[4] *Loc. cit.* p. 37, tab. 4. fig. 9, *d.*

four or five dorsal vertebræ, and all the cervical vertebræ. It is inserted into the occiput as usual, and internally to the splenius. Shown by Cuvier, pl. 71. figs. 2 & 3, L.

In *Galago crassicaudatus* (Pls. III. & IV. figs. 6, 9 & 10, *Co*) it only passes to the second dorsal.

In *G. allenii* it arises from the zygapophyses of the first eight dorsal vertebræ, and from the zygapophyses and transverse processes of the seventh, sixth, and fifth cervical vertebræ, the slips from each being somewhat separated. Insertion as in *L. catta*.

According to Meckel[1] there is an accessory slip in *Loris*.

In *Nycticebus tardigradus*[2] it arises from the dorsal spines as low as the third.

In *Tarsius*[3] the complexus is described as united with a biventer cervicis. The former of these is the broader, and springs from the transverse processes of the most anterior dorsal and most posterior cervical vertebræ, and goes to the occiput.

There is no Biventer cervicis in *Lemur catta*, according to our dissection; but Cuvier appears to have recognized a portion of the complexus as *digastrique du cou*, as it is represented in his 71st plate of his 'Recueil,' figs. 2 & 3, K.

This muscular division is demonstrated in *Galago crassicaudatus* (Pl. III. fig. 6, and Pl. IV. figs. 9, 10 & 11, *Bi.c*), its hindermost tendon reaching the sixth dorsal vertebra.

In *Tarsius*[4] this muscle is described (as already said) as united more or less with the complexus. It is the smaller and longer of the two, arises from the transverse processes of the six most anterior dorsal vertebræ, and is inserted into the occipital protuberance. It has no median tendon.

Trachelo-mastoid.—This is represented by a flat muscular band, which arises from the transverse processes of the first dorsal and last two cervical vertebræ; the insertion of this is into the outer region of the occiput.

Cuvier's figure represents this as having an origin somewhat more forwards, pl. 71. fig. 2, L^1.

In *Galago crassicaudatus* (Pl. IV. figs. 9 & 10, *T.ms*) its tendons attach themselves from the sixth dorsal vertebra forwards to the skull; fibres communicate also with the heads of the ribs. In *G. allenii* this arises from a few of the cervical vertebræ, and is inserted into the mastoidal region of the periotic.

It is said to be present in *Tarsius*, Burmeister remarking[5] that what must be taken as this muscle arises from the transverse processes of the second, third, and fourth cervical vertebræ, and goes to the transverse process of the atlas, and thence to the occiput.

Rectus capitis posticus major.—This is thick, and extends from the spine of the axis to the occiput. It is covered at its insertion by the obliquus superior, but at the same time diverges from its fellow of the opposite side. Figured by Cuvier in *L. catta*, pl. 71. fig. 3, M^2. In the representation it would appear to be double, the indicating letter being so placed as to cover each portion.

[1] *Op. cit.* vol. vi. p. 146.
[2] P. Z. S. 1865, p. 243.
[3] *Loc. cit.* p. 37, tab. 4. fig. 4, *e*.
[4] *Loc. cit.* p. 37, tab. 4. fig. 4, *e*.
[5] *Loc. cit.* p. 38, tab. 4. fig. 8, *m*.

In *Galago crassicaudatus* (Pl. IV. fig. 11, *R.p.ma.*) an additional outer portion is manifest; this is noted in the same figure by an asterisk (*).

In *Tarsius* it is similar (Burmeister, tab. 4. fig. 4, *i*) in condition to that of *Lemur*; also in *Cheiromys*.

Rectus capitis posticus minor.—This extends from the anterior border of the atlas to the occiput, and is situated more in the middle line than the preceding.

This is said to be represented in *L. catta*, in Cuvier's 71st plate, fig. 3, M³; but the small portion of shading which that latter refers to is very indefinite, and not in the true situation of this muscle.

Depicted in the thick-tailed Galago, Pl. IV. fig. 11, *R.p.mi.*

In *Tarsius* it is similar (Burmeister, tab. 4. fig. 8, *k*); also in *Cheiromys*.

The Rectus lateralis is rather posterior in position, and resembles a deeper obliquus superior. It springs from the anterior surface of the transverse processes of the atlas, within its outer end, and is inserted into the cranium immediately beneath the outer end of the insertion of the obliquus superior.

It is clearly represented in *L. catta* by Cuvier, pl. 71. fig. 3, M⁴.

In *Tarsius* it is not mentioned. That of *Galago* is represented in Pls. IV. and V. figs. 11 & 16, *R.l.*

Obliquus superior.—This arises from the end of the transverse processes of the atlas, and passes inwards and forwards to the occiput, covering the insertion of the rectus capitis anticus major. Well shown by Cuvier in *L. catta*, pl. 71. fig. 3, N.

Figured by us in *Galago crassicaudatus*, Pl. IV. fig. 11, *O.s.*

In *Tarsius*[1] it is similar; also in *Cheiromys*.

The Obliquus inferior is the largest of these small muscles of the head and neck. It has origin from the spine of the axis, and is inserted into the transverse process of the atlas. Also well shown in pl. 71. fig. 3, N¹, of Cuvier.

Figured in *Galago crassicaudatus* (Pl. IV. fig. 11, *O.i*). In *Tarsius*[2] it is similar.

2. *Muscles of the Pectoral Limb.*

a. *Thoracic Region (anterior and lateral).*

Pectoral muscles.—As described by Meckel[3], these do not completely agree with the conditions exhibited in *Lemur catta*.

In the latter the Pectoralis major is very much extended antero-posteriorly, and consists of three more or less distinct portions. See Pl. IV. fig. 12, *P.ma*¹, *P.ma*², *P.ma*³.

The most anterior or clavicular portion (which is the smallest, *P.ma*¹) arises from the sterno-clavicular articulation, and from the innermost fourth of the clavicle; it is inserted into the ulnar side of the deltoid ridge. It is closely connected, except at its origin and insertion, with the second portion of the pectoralis major on one side, and dips a little beneath the deltoid on the other, especially towards its insertion.

[1] *Loc. cit.* tab. 4. fig. 4, *g*. [2] *Loc. cit.* tab. 4. fig. 4, *h*. [3] *Loc. cit.* p. 276.

The second or sternal portion (which is the largest, *P.ma*[2]) arises from the whole length of the sternum, and from the sternal ends of the cartilages of the sixth, seventh, and eighth ribs. It has a broad tendinous insertion (about three quarters of an inch wide) into the margin of the bicipital groove in close juxtaposition to the insertion of the first portion.

The third or abdominal portion (*P. ma*[3]) is very much longer, in proportion to its breadth, than are the preceding parts. It arises from the sheath of the rectus muscle, its origin extending as far forwards as the posterior end of the origin of the second portion, and as far backwards as the cartilage of the tenth rib. Thin and delicate, it narrows as it proceeds forwards, and has an aponeurotic insertion beneath and in close union with the insertion of the second portion.

In *L. varius* the pectoralis major is very nearly the same as in *L. catta*. It, however, differs in having no portion arising from the clavicle, and in the one portion of the muscle being as tendinous as the other. Cuvier has represented (pl. 68) the pectoral muscles in this species; and they well agree with the conditions we have found to exist in *L. catta*, there appearing in his plates to be a distinct clavicular portion, not, however, represented by a distinct letter, the part answering to our first and second portions being marked *j*, and our third portion *j*[1]. Towards its insertion the last-named part is represented as uniting with a slip of cutaneous muscle marked 5[c].

In *Galago crassicaudatus* one portion only is clearly distinct (Pls. II., III., and IV. figs. 3, 5, 13, & 14, *P. ma*); for, as in *G. allenii*, it does not seem to be separable in the way described in our type. Only a few fibres arise from the clavicle; nor has it such an extensive posterior (inferior) origin as in *L. catta*. Its insertion, however, agrees with the Ringtailed Lemur.

In *G. peli*[1] it is said to consist of two layers, one from the clavicle and sterno-costal articulations, both inserted into the great tuberosity of the humerus.

In *Loris gracilis* the deep portion of the pectoralis major (our third part in *L. catta*) is relatively larger, and extends up beneath the superficial portion higher than in *Lemur*, as shown by Cuvier, pl. 67. fig. 2, *j* & *j*[1]. It does not appear to have a clavicular origin.

In *Nycticebus* also there is no clavicular portion.

In the memoir on the Potto (*Perodicticus*), Van Campen[2] regards the pectoralis major as composed of two bundles. His figure of the same, though, leads one to believe that it is quite a single muscle.

Burmeister[3] says that in *Tarsius* this muscle is composed of but two portions—one, the smaller, coming from the clavicle and sternum, the other, larger portion from the sternum and cartilages of the ribs to the ninth. The insertions of these two portions are much as in the *Lemurs*.

[1] Kingma, *l. c.* p. 21. [2] *Loc. cit.* p. 27, pl. 2. fig. 10, 1. [3] *Loc. cit.* p. 50, tab. 4. figs. 2, 17, & 15.

In *Cheiromys* Professor Owen[1] describes only two portions; and such we found to be the case: but in our specimen the clavicular portion arose by a tendon from the sternal end of the clavicle.

The PECTORALIS MINOR, which is a strong, thick muscle, arises from the sternum beneath the pectoralis major, its origin extending from the second to the sixth rib inclusive. Its insertion is into the capsular ligament of the humerus.

In *L. varius* Cuvier has figured it, pl. 68. fig. 1, *j*[2].

It is of large size in *Galago crassicaudatus* (Pl. III. fig. 5, *P. mi*, and Pl. IV. figs. 13 & 14, *P. mi*), and agrees with that of *Lemur catta*.

We failed to detect any trace of a pectoralis minor in *Galago allenii*.

Schroeder van der Kolk and Vrolik[2] state that in the *Loris* this muscle is present, its fibres intermingling with those of the pectoralis major. Its point of insertion is the internal tubercle of the humerus, previously passing before the coracoid process. This description agrees with Cuvier's figure, where it is represented as very small[3]. It exists distinctly in *Nycticebus tardigradus*.

In *Perodicticus* Van Campen[4] forcibly points out that this muscle is broad, and has not the same insertion as in Man, the Chimpanzee, and the Orang (*i. e.* the coracoid process), but goes to the greater tubercle of the humerus.

In *Tarsius*[5], where also it is strongly developed, its origin is from the second to the seventh rib, and its fibres, taking the same direction as the greater portion of the pectoralis major, are inserted close to each other into the sharp outer edge of the bicipital groove and ridge.

In *Cheiromys* it, according to Professor Owen[6], "arises from the side of the manubrium, and from the sternal ends of the first to the fifth ribs." "It is inserted by a broad tendon, spreading over the head of the humerus, to be attached to the great tuberosity." In our specimen it arose from the cartilages of the fourth, fifth, sixth, and seventh ribs.

SUBCLAVIUS.—This is thick and strong, and arises from the cartilage of the first rib. It is inserted into the outer two-thirds of the clavicle, and especially into the concavity on the hinder (under) surface of the bone towards its distal or outer end.

In *L. varius* Cuvier represents its insertion as extending outwards but little beyond the middle of the clavicle, pl. 68. fig. 1, *h*.

In *Galago crassicaudatus* (Pl. III. fig. 5, *Sb*) and in *G. allenii* it is relatively stronger, and is only inserted into the middle third of the clavicle.

Van Campen[7] says this muscle is small in the *Potto*.

In *Tarsius*[8] its insertion occupies the whole under surface of the clavicle.

[1] *Loc. cit.* p. 60, pls. xxii. & xxiii. figs. 1, 17. [2] *Loc. cit.* p. 44. [3] *Loc. cit.* pl. 67. fig. 2, *j*[2].
[4] *Loc. cit.* p. 27, pl. 2. fig. 10. 2. [5] *Loc. cit.* p. 51, tab. 4. figs. 2, 18. [6] *Loc. cit.* p. 60.
[7] *Loc. cit.* p. 28, pl. 2. fig. 10. 3. [8] *Loc. cit.* p. 51, tab. 4. figs. 2, 19.

Professor Owen does not make mention of the subclavius in *Cheiromys*; but in our specimen it was well developed, and quite like that of *L. catta*.

b. *Shoulder and Scapular Regions.*

Deltoid.—As Meckel[1] observes, this muscle consists of three distinct portions.

The *first* of these arises from the middle third of the clavicle, and, descending obliquely somewhat outwards, closely joins the first part of the pectoralis major on the one side, and the second part of the deltoid on the other. (Pl. IV. fig. 12, D^1.)

The *second* and largest part of the deltoid arises from the acromion process only, and, descending vertically, is inserted into the deltoid crest on the outer surface of the humerus, extending considerably below the insertion of the first part of the pectoralis major.

The *third* and slenderest part arises at the posterior surface of the spine of the scapula, from a quarter of an inch distant from the vertebral margin to the posterior end of the metacromion process. It passes very obliquely downwards and forwards, and, joining the second portion of the muscle, is inserted into the outer margin of the deltoid crest of the humerus, the fibres passing beneath those of the second portion of the muscle.

In the other specimens of the genus *Lemur* we found this muscle existing in nearly a similar condition. In *L. varius* Cuvier represents it in three distinct portions in pl. 69. fig. 1, the clavicular portion being marked *k*, the two scapular portions k^1.

In *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 5, 6, 7, and Pl. IV. figs. 13, 14, D^1, D^2, and D^3) the three divisions of the deltoid, with their scapular, clavicular, and humeral attachments, are displayed.

We could not distinctly trace lines of separation in the deltoid of *Galago allenii*, although we remarked that the portion of the muscle between the attachments of the clavicle and coracoid process of the scapula seemed more fibrous than muscular. The third portion in *L. catta* was relatively smaller in *G. allenii*.

In *G. peli* this muscle is said to consist of two parts united by tendinous joints[2].

The deltoid is said by Meckel[3] to be simple in *Loris*. We found it single in *Nycticebus tardigradus*. In Cuvier's 'Recueil,' pl. 67. figs. 1 & 2, *k* and k^1 (*Loris*), there is but a faint indication of division between the parts answering to the two scapular portions of *Lemur*, and no indication of any separation between the clavicular and scapular portions.

In the anatomy of the Potto[4] (*Perodicticus*) no special mention is made of this muscle, and the figure of the shoulder-muscles displays but a slight tendency to division of the deltoid.

[1] *Op. cit.* vol. vi. p. 258.
[2] Kingma, *loc. cit.* p. 23.
[3] *Op. cit.* vol. vi. p. 258.
[4] *Loc. cit.* pl. 2. fig. 11.

This muscle Burmeister[1] described in *Tarsius* as composed of two parts; but that portion which springs from the middle of the clavicle he considers the broad part.

In *Cheiromys* Owen[2] remarks that the deltoid has the usual extensive origin and insertion, but speaks of no division. The scapular portion is shown by us (Pl. III. fig. 8, D^3); the two others also exist.

Supraspinatus.—This arises not only from the supraspinous fossa, but also slightly from the posterior (inferior) side of the spine of the scapula towards its acromial end. The fibres converge to a very strong tendon, which is inserted into the radial or greater tuberosity of the humerus.

It is but very imperfectly represented in *L. varius* by Cuvier, pl. 68. fig. 2, *l*.

Figured in *Galago crassicaudatus* (Pl. III. figs. 5 & 6, and Pl. IV. figs. 13 & 14, *S.sp*).

In *Tarsius*[3] it occupies the supraspinous fossa only; and in *Cheiromys* no fibres spring from the infraspinous fossa, but they take origin as far as the very edge of the spine beneath the acromion process.

Infraspinatus[4].—This muscle arises from the infraspinous fossa, except the axillary border and the spine towards its acromial end. The fibres converge to a central tendon, which is inserted into a deep pit in the middle of the radial side of the radial tuberosity.

It reaches the ridge-like portion of the axillary border in *L. nigrifrons*.

Shown in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 6 & 7, and Pl. IV. figs. 13 & 14, *I.sp*).

In *Loris gracilis* Cuvier represents it as large (pl. 67. fig. 1, *m*).

In *Tarsius*[5] it is as in *L. catta*.

In *Cheiromys* it arises from the whole infraspinous fossa (Pl. III. fig. 8, *I.sp*).

The Subscapularis[6] arises from the subscapular fossa as usual, and is very broadly inserted into the ulnar or lesser tuberosity of the humerus.

Figured in *Galago crassicaudatus* (Pl. III. fig. 5, and Pl. IV. figs. 13 & 14, *S*).

In *Tarsius*[7] it is strong and partially divided into three by tendinous intersections.

The usual origin of the subscapularis in *Cheiromys*, Owen remarks[8], is by three principal fasciculi, and its tendon of insertion is closely attached to the portion of the capsular ligament which it passes over. In our muscular individual this subdivision was indistinct.

Teres major.—A very large and powerful muscle, which arises from the superior (posterior) half of the axillary border of the scapula and from the flat surface at the posterior end of that border. It broadens out greatly as it descends, and has a glistening tendinous outer surface. Its insertion, which is almost an inch wide, is into the inner margin of the bicipital groove separating the two portions of the coraco-brachialis.

[1] *Loc. cit.* p. 49, tab. 3. fig. 1. no. 15.
[2] *Loc. cit.* p. 60, pls. 22 & 23. figs. 1 & 2. no. 15.
[3] *Loc. cit.* p. 48, tab. 3 & 4. figs. 1 & 9.
[4] Cuvier, *loc. cit.* pl. 69. fig. 1, *m* (*L. varius*).
[5] *Loc. cit.* p. 48, tab. 4. fig. 1. 11.
[6] Cuvier, *loc. cit.* pl. 68. fig. 2, *n* (*L. varius*).
[7] *Loc. cit.* p. 49, tab. 3. figs. 2–13.
[8] *Loc. cit.* p. 59.

Meckel observes that it is large in the Makis (Lemurs), and is inserted into the second fifth of the humerus[1].

It is represented by Cuvier in *Lemur varius* (pl. 68. fig. 2, and pl. 69. fig. 1, *o*) and in *Loris gracilis* (pl. 67. fig. 1, *o*).

Shown in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 5, 6, 7, and Pl. IV. figs. 13 & 14, *T. ma.*), but the surface is not so highly tendinous in this species as in *L. catta*.

In *Tarsius*[2] it is as in *L. catta*, except, of course, proportionally smaller.

Teres minor.—This is a very small and inconspicuous muscle; and there is therefore the less wonder that it should have escaped Meckel's[3] and Cuvier's[4] observation. It arises from the lower (anterior) half of the axillary border of the scapula, its origin extending rather further up (back) than, but not quite so far downwards (forwards) as, that of the long head of the triceps. It is inserted into the lower part of the radial tuberosity.

In *Galago crassicaudatus* this muscle (Pl. III. fig. 6, and Pl. IV. fig. 13, *T. mi.*) is of moderate size, and is attached quite to the neck of the scapula, and slightly covered by the infraspinatus.

We found in *Galago allenii* the teres minor to be comparatively larger than in *Lemur catta*; its fibres also arose more superficially upon the dorsum of the infraspinatus, being partly attached to the lower border of the spine of the scapula, chiefly about its middle; but it had a similar insertion.

Nycticebus tardigradus, like *Lemur catta*, has it small.

Burmeister[5] says that in *Tarsius* it is present, but weak.

In *Cheiromys*, Owen[6] mentions that it is not much inferior in size to the teres major; but in our dissection we have found it very much smaller than the teres major, yet very distinct and quite in the condition it presents in *Lemur catta*. As Professor Owen takes no notice of the infraspinatus, and as the teres minor is pretty closely connected with the latter muscle, he has probably mistaken the teres minor for it.

c. *Humeral Region (posterior and anterior).*

Triceps.—This muscle is very large and complex in *L. catta*, not only consisting of all the parts found in Man, but one of the heads described as single in him being here differentiated into four more or less distinct parts.

1. The long head is very tendinous at its origin, which occupies about half an inch at the lower (anterior) part of the axillary margin of the scapula.

2. The outer head arises from the postero-outer portion of the head of the humerus, beside the insertion of the teres minor.

[1] *Op. cit.* vol. vi. p. 262. [2] *Loc. cit.* p. 48, tab. 3. fig. 2. 12. [3] *Loc. cit.* p. 278.

[4] It is not figured in the Lemuroids of his 'Planches de Myologie.'

[5] *Loc. cit.* p. 48, tab. 3. fig. 1. no. 10. [6] *Loc. cit.* p. 59, pl. 23. fig. 2. 10.

The inner head is more or less divisible into two muscles, and is described as such by Burmeister.

3. The first or upper part of the inner head arises from the postero-inner side of the head of the humerus, as high as just beneath the insertion of the subscapularis, and considerably above the insertions of both the teres major and the short part of the coraco-brachialis.

4. The second or lower part of the inner head, which is spoken of by Burmeister as a distinct muscle, the "Anconeus sextus," is separated from the last-described part by a more or less marked interval, where the muscular spiral nerve passes. It arises from the inner side of the lower half of the shaft of the femur, the supinator ridge, and internal condyle, and occupies part of the intercondyloid space at the back of the humerus.

All these portions unite together and are inserted into the olecranon process of the ulna; but the second and third portions unite together very high up indeed. The long head joins at about the middle of the arm; the anconeus sextus of Burmeister joins the common mass at the olecranon, but is more or less connected with the rest of the muscle for the lower half of its extent.

Cuvier, in his posthumous 'Planches de Myologie,' distinguishes the usual three parts of the triceps and the dorso-epitrochlear, marked respectively in pl. 68. fig. 2, and pl. 69, fig. 1, of *Lemur varius*, by t, t^1, t^2, and t^3. The lower division of the internal head of the triceps is distinguished as the "ancone interne," and marked u^1. No external anconeus is separately indicated.

We ourselves have found it in *Lemur varius*, *L. niger*, and *L. nigrifrons* as in *L. catta*; also in the Galagos. Slight individual variations exist as to how far the anconeus sextus goes up—one being like what is mentioned in *Nycticebus*. The several portions of the triceps are figured in *G. crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 5, 6, & 7, and Pl. IV. figs. 13 & 14, T^1, T^2, T^3, T^4).

In *G. peli*[1] it is described as consisting of six parts, namely, the three ordinary heads, together with an anconeus quartus (the ordinary anconeus of Man), the dorso-epitrochlear, and a distinct lower separation of the internal head.

In *Nycticebus* we did not find an anconeus sextus distinctly differentiated; for the musculo-spiral nerve pierces what is evidently the ordinary internal head.

In the *Potto* the anconeus sextus is not mentioned by Van Campen.

In *Tarsius* Burmeister[2] describes what answers to the lower part of the internal head of Man, as quite distinct, under the name of anconeus sextus. His arrangement of the great extensor of the forearm is as follows:—

A. Anconeus primus[3], or longus (the scapular head of Man).

B. Anconeus secundus[4] (the external head of Man).

C. Anconeus tertius[5] (the upper part of the internal head of Man).

[1] Kingma, *loc. cit.* pp. 25 and 26.

[2] *Loc. cit.* p. 53.

[3] Tab. 3. fig. 1. 22 *a*.

[4] Tab. 3. fig. 1. 22 *b*.

[5] Tab. 3. fig. 2. 22 *c*.

D. Anconeus quartus (the anconeus proper of Man).

E. Anconeus quintus[1] (the dorso-epitrochlear).

F. Anconeus sextus[2] (the lower part of the internal head of Man).

In *Cheiromys* Professor Owen[3] found the lower portion of the inner head of this muscle almost as distinct as it is asserted to be by Burmeister in *Tarsius*. In our dissection we can confirm this statement; but we found the origin of the upper part of the internal head (which is not distinctly mentioned by Professor Owen) to extend up as high as in *Lemur* and in the other forms already noticed. Thus the so-called triceps may here, as also in *Hyrax* (and, no doubt, in many other forms), be more correctly spoken of as the quadriceps extensor; and we remark that the aspect of the part called "sextus" by Burmeister, lying as it does beneath the others in the intercondyloid space, may perhaps be compared to the crureus of the thigh, so distinct in the Lemuroids.

Anconeus.—Evidently but the continuation of the triceps. It may be said to arise from the posterior aspect of the external condyle, and to be inserted into the radial border of the olecranon.

In Cuvier's 'Recueil,' pl. 69. fig. 1, no separate letter indicates the anconeus, but a darker shade seems nevertheless to point to its existence in *L. varius*.

The three species *L. varius*, *L. xanthomystax*, and *L. nigrifrons* do not entirely agree with the above description, inasmuch as the anconeus muscle crosses over much of the intercondyloid space.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and more distinctly in Pl. IV. fig. 13, *Anc*).

It is present in *G. peli*[4], and named anconeus quartus.

Van Campen says it is wanting in the Potto (*Perodicticus*[5]).

In *Tarsius* this is described as the anconeus quartus[6].

Very large and distinct in *Cheiromys*.

Dorso-epitrochlear.—This takes origin from the outer margin of the latissimus dorsi, near its insertion (*i. e.* just before it becomes tendinous); it broadens out into a thin muscular sheet, and becomes continuous with the fascia of the forearm[7] between its two insertions, which are into the inner condyle of the humerus and the olecranon.

It arises over the tendinous part of the latissimus dorsi and goes to the shaft of the ulna in *L. varius*, as Cuvier already has shown, pl. 69. fig. 1, t^3.

See *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 5, 6, & 7, and Pl. IV. figs. 13 & 14, *D.ep*).

In *G. allenii* this muscle does not so broaden out as in *Lemur catta*, but it is also inserted into the inner side of the olecranon process.

In *Tarsius* Burmeister[8] notices this offshoot from the latissimus dorsi under anconeus quintus, as before mentioned by us in describing the triceps.

[1] Tab. 3. fig. 2. 22 *d*. [2] Tab. 3. fig. 2. 22 *e*. [3] *Loc. cit.* p. 61. [4] Kingma, *loc. cit.* p. 25. [5] *Loc. cit.* p. 34.
[6] *Loc. cit.* p. 54. [7] Mentioned by Meckel, *loc. cit.* p. 267. [8] *Loc. cit.* p. 50, tab. 3. fig. 22, *d*.

It has been twice referred to by Owen in *Cheiromys*, pp. 59 and 61.

Biceps[1].—With two distinct heads; the short head arises from the coracoid process, the long head from the superior margin of the glenoid cavity. The two heads unite a little below the middle of the arm and are inserted by a strong tendon into the posterior part of the tubercle of the radius.

In *L. niger* we found a slight approximation to the structure (next to be described) in *Galago*.

In all the Galagos we examined, the long head springing from the upper margin of the glenoid cavity is as in *Lemur*; but the coracoid head remains almost distinct from the former down to its insertion, receiving, however, a few fibres from the glenoidal portion about the bend of the elbow.

The coracoid portion is very remarkable, as it remains broad, flat, and muscular down to its insertion, which is into the superficial fascia covering the forearm. Its free margin projects forwards inside the arm at the end of the elbow more than does the supinator longus at the outside of the limb. This condition must powerfully assist the flexing action of the muscle. (Figured in *Galago crassicaudatus*, Pl. II. fig. 3, Pl. III. figs. 5 & 7, and Pl. IV. figs. 13 & 14, B^1, B^2.)

In *G. peli* it was found to have two heads by Kingma[2].

In a recent dissection of *Loris gracilis* made by us, the biceps sent but a single head to the scapula. Meckel[3] says the *Loris* has only a long head. Cuvier represents two heads, pl. 67. fig. 2, r, and r^1.

In *Nycticebus tardigradus*[4] we found but one head of origin, which agrees with W. Vrolik's earlier observation[5], although in the later conjoined memoir with S. van der Kolk[6] they speak of two heads.

Perodicticus[7], *Tarsius*[8], and *Cheiromys*[9] each possess double tendinous heads of origin to the biceps muscle. In *Cheiromys* the expansion mentioned as existing at the insertion of the muscle in *Galago* does not exist. We carefully looked for it.

Coraco-brachialis.—Double[10]; the long part arises exclusively from the inner side and deep surface of the strong tendon of the short head of the biceps, no muscular fibres arising from the coracoid process itself. Narrowing rapidly downwards, it is inserted into the inner border of the humerus as far down as the upper border of the perforation in the inner condyle.

The short part, which is very small, arises from the end and deep surface of the coracoid process, and is inserted on the posterior side of the inner margin of the

[1] Cuvier, *loc. cit.* pl. 68. fig. 2, pl. 69. fig. 1, r and r^1 (*L. varius*).
[2] *Op. cit.* p. 24.
[3] *Op. cit.* vol. vi. p. 291.
[4] P. Z. S. 1865, p. 244.
[5] Todd's Cyclop. of Anat. and Physiol. vol. iv. p. 218.
[6] *Op. cit.*, Rech. d'Anat. comp., le Genre *Stenops*, p. 45.
[7] *Loc. cit.* p. 34.
[8] *Loc. cit.* p. 51, tab. 3. figs. 1 and 2. nos. 20 *a* and 20 *b*.
[9] *Loc. cit.* p. 60, pls. 22 and 23. fig. 1. 20.
[10] Cuvier figures in *L. varius* this muscle as double; but both parts have the same letter q, pl. 68. fig. 2.

bicipital groove, between the insertion of the teres major and the high-reaching inner portion of the triceps.

The long head reaches down to the supracondyloid arch. This therefore corresponds to what, according to Mr. John Wood's[1] reading, is his "coraco-brachialis longus."

Meckel[2] says that this muscle is found divided in the *Makis* as in many other animals.

In *L. varius* we found the coraco-brachialis and biceps on the right side to be attached to the coracoid process by a sesamoid bone.

In *L. nigrifrons* it is also double. The long portion arises tendinous from the coracoid, and continues so, mingling the fibres of the second portion, to the middle of the humerus, where it becomes fleshy, and is inserted upon the supracondyloid arch. The short arch is also tendinous, but sooner becomes muscular.

In *Galago crassicaudatus* a long, strong, and a short weaker belly exist (Pl. II. fig. 3, Pl. III. fig. 5, and Pl. IV. fig. 14, *C.b*[1] & *C.b*[2]).

This muscle has likewise a second slip in *G. allenii*, and the two parts have much the same origin and insertion as in *Lemur catta*. Also in *G. peli*[3].

In *Loris gracilis* and in *Nycticebus tardigradus*[4] we ourselves have found the coraco-brachialis to consist of two portions. S. van der Kolk and Vrolik[5], however, say nothing of the short head, although remarking that it proceeds as far as the internal condyle of the humerus.

Van Campen avers it is double in *Perodicticus*[6]; as likewise does Burmeister in *Tarsius*[7]; and Professor Owen records the same condition existent in *Cheiromys*[8].

Brachialis anticus[9].—This arises from the whole outer (radial) side of the humerus to its summit, being overlapped by the external part of the triceps; it also arises from the front of the humerus as far inwards as the insertion of the coraco-brachialis, but nevertheless it does not at all embrace the insertion of the deltoid. It is inserted into the coronoid process of the ulna.

In *Lemur varius*, *L. xanthomystax*, and *L. nigrifrons* this muscle is as in *L. catta*. There is no junction of the fibres with those of the supinator longus, although the muscles are indeed very close together.

The same in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. fig. 6, and Pl. IV. figs. 13 & 14, *B.a.*).

It is spoken of by Burmeister[10] in *Tarsius* as brachialis internus.

No substantial difference from *L. catta* in *Cheiromys*[11].

[1] Journ. of Anat. and Physiol. (Cambridge) 1867, vol. i. p. 49. [2] *Loc. cit.* p. 281.
[3] Kingma, *l. c.* p. 24. [4] P. Z. S. 1865, p. 244. [5] *Op. cit.* p. 45. [6] *Loc. cit.* p. 33.
[7] *Loc. cit.* p. 49, tab. 3. fig. 2, nos. 14 and 14*a*. [8] *Loc. cit.* p. 60, pl. xxiii. fig. 1, nos. 14 and 14*b*.
[9] Figured in Cuvier's 'Recueil,' pl. 68. fig. 2, *s*, of *L. varius*, and pl. 67. fig. 1, *s*, in *Loris gracilis*.
[10] *Loc. cit.* p. 52, tab. 3. figs. 1, 21. [11] *Loc. cit.* p. 60, pl. xxiii. fig. 1, no. 21.

d. *Brachial Region* (*Extensors*).

Supinator longus.—Has origin from the external condyloid ridge of the humerus; and its flat tendon is inserted into the radial border of the radius, rather more than half an inch above its lower end, and immediately below the lower end of the long insertion of the pronator teres.

This muscle in *L. varius*[1] is inserted into the styloid process.

In *L. xanthomystax* it is similar, the lowest portion being weak and closely applied to the radius. It seems also to pass to the pisiform bone and deep palmar fascia. We could only follow its unusually thin tendon in *L. nigrifrons* as far as the styloid process.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. figs. 13 & 14, *S.l*), where, as in *G. allenii*, it arises as high almost as the middle of the shaft of the humerus, and occupies the third fourth of that bone. Its tendon is inserted into the styloid process.

In *Tarsius*[2] it is substantially the same as in *L. catta.*

Supinator radii brevis.—This muscle arises by tendinous fibres from the external condyle and annular ligament, but not at all from the ulna. Winding round the shaft of the radius, it is inserted into the anterior surface of that bone on a line leading obliquely downwards and outwards, and conterminous with the upper parts of the insertions of the pronator teres and flexor longus pollicis.

That of *Galago crassicaudatus*, which obtains in the other species of the genus, as also in *Nycticebus*, is shown in Pl. IV. fig. 13, *S.r.b.*

In *Tarsius*[3] it is substantially as in *L. catta.*

It is not mentioned by Owen in his description of *Cheiromys*; but we find it in that genus to be quite similarly conditioned to that of *L. catta.*

The Extensor carpi radialis longior arises below the supinator longus from the ridge leading from the external condyle. It terminates in a flat tendon which is very closely applied to that of the extensor carpi radialis brevior, and passes beneath that of the extensor ossis metacarpi pollicis, and then beneath that of the extensor secundi internodii pollicis. It is inserted into the radial side of the base of the second metacarpal.

In *L. varius* this and the following muscle are figured by Cuvier, pl. 69. fig. 1, δ & δ[1]; and in *Loris gracilis*, pl. 67. fig. 1, δ & δ[1].

That of *Galago crassicaudatus* is shown in Pl. II. fig. 3, and Pl. IV. figs. 13 & 14, *E.c.r.l.*

Extensor carpi radialis brevior.—A little smaller than the extensor carpi radialis longior. It arises from the external condyle; and its fibres terminate above the middle of the forearm in a flat tendon, which passes down like that of the last-named muscle, and is inserted into the outer border of the bone of the middle metacarpal.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. fig. 13, *E.c.r.b*).

[1] It is figured by Cuvier, pl. 69. fig. 1, *v*; and in *Loris gracilis*, pl. 67. fig. 1, *v*.

[2] *Loc. cit.* p. 55, tab. 5. fig. 3. 23, and tab. 3. fig. 1. 23.

[3] *Loc. cit.* p. 56, tab. 3. fig. 4. 36.

Extensor communis digitorum.—This muscle arises from the common tendon attached to the external condyle, and from the intermuscular septa and fascia covering the middle of the forearm. The fibres are inserted in a penniform manner on each side of a median tendon, which, near the wrist, divides into two. These again unite and form a wide tendon on the back of the hand, which gives origin to four flat diverging tendons which are not united by connecting slips, and which are inserted as usual.

In the right manus of *L. varius* we found but three tendons—a fourth one, inserted into the fourth digit, appearing to represent the extensor minimi digiti.

In Cuvier's plate of this species the muscle is represented as sending four separate tendons to the four ulnar digits, pl. 69. fig. 1, *e*.

In *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. fig. 13, *E.c.d*) and *G. allenii* this extensor and that of the minimi digiti are in close union, the former supplying tendons to the four digits. In the left arm of *G. crassicaudatus*, moreover, the fourth tendon sends a slip to the fourth digit, as well as to the fifth digit, and the third tendon sends one to the third digit as well as to the fourth digit. These extra slips are marked ** 4 & 3 in Pl. II.

In *Loris gracilis* this and the extensor minimi digiti also appear fused into one muscle, which splits into six tendons. Two of these go to the fifth digit, two go to the fourth digit, and the other two go to the index and third digit respectively. The arrangement of the tendons in this species is quite undefined in Cuvier's plate.

In *Nycticebus tardigradus*[1] the communis is also derived from the same belly as the minimi digiti; but the former ultimately subdivides into five tendons, whereof the fourth digit has two, one on its radial and one on its ulnar side.

In *Perodicticus*[2] this muscle has four tendons, two of which go to the fourth finger, one to the third, and one to the fifth finger.

Both in *Tarsius*, according to Burmeister[3], and in *Cheiromys*, according to Owen[4], the common extensor sends four tendons to the usual digits. The deeper-seated extensor with subsidiary tendons, which Professor Owen mentions in the latter animal, is evidently the same as that described by Burmeister in *Tarsius*, and which we take to represent the extensor minimi digiti. But independently of this last-mentioned muscle, we found in *Cheiromys* the indisputable extensor communis digitorum itself easily and clearly divisible into two fleshy bellies, more than halfway up the arm, each separate belly ending distally in a distinct tendon—that from the radial belly giving tendons to the index, third, and fourth digits, that from the ulnar belly giving a tendon to every digit except the pollex. The tendons, from where they diverge up to the digits, are more or less connected by an aponeurotic fascia, the two small tendons going to the attenuated middle digit (one of which comes from the ulnar belly, and the other from the radial one) being very intimately connected.

[1] P. Z. S. 1865, p. 247.

[2] *Loc. cit.* p. 36, tab. ii. fig. 11, *m*.

[3] *Loc. cit.* p. 62, tab. 3. fig. 1, no. 27, and tab. 5. fig. 2, no. 27.

[4] *Loc. cit.* pl. xxiii. fig. 2, no. 27.

In *Tarsius* Burmeister remarks that the four tendons of this muscle reunite into a single tendinous sheet on the back of the manus, from which sheet the four extensor tendons are given off.

Extensor minimi digiti.—A very small muscle with a very long tendon arising from the external condyle and the intermuscular septa. Its delicate tendon runs down beneath the annular ligament, and divides into two, which go to the ulnar side of the fourth and fifth digits respectively; that which goes to the fourth digit is joined by a delicate branch from the extensor indicis.

Meckel says in the *Lemurs* it attaches itself sometimes to the fourth and fifth digits.

On the left side of *L. varius* the extensor minimi digiti went to the fourth digit only, without being joined by another tendon from the indicis. In Cuvier's figure of this species, two tendons go to the fourth and fifth digits as usual, pl. 69. fig. 1, e^1.

In *Galago crassicaudatus* this muscle is so united with the extensor communis digitorum as to be very little seen. Its tendon receives no slip from the extensor indicis, but bifurcates, its branches going to the fourth and fifth digits as in *L. catta* (Pl. II. fig. 3, and Pl. IV. fig. 13, *E.m.d*).

In *G. allenii* it also arises in common with, but rather to the outer side of, the extensor communis digitorum. Its tendons, two in number and very delicate, are inserted as in *L. catta*, but without the extra indicial slip.

According to our observations, both in *Loris gracilis* and *Nycticebus tardigradus*[1] it also has a common origin with the extensor communis, but seemingly has only one tendon, which goes to the fifth digit.

It appears to be inseparably united with the extensor communis digitorum in the Potto[2].

Burmeister[3] says, at its origin it is in close union with the extensor carpi radialis brevior, its tendon comes off higher than the extensor communis, and, splitting, proceeds to the fourth and fifth digits.

In *Cheiromys* it is described by Owen[4] as a slip of the extensor communis with tendons to the fourth and fifth digits; but we found that in this species the muscle is well developed, though in close union at its upper part with the belly of the extensor communis digitorum. Its tendons are as in *L. catta*, except that there is no slip from the index.

Extensor carpi ulnaris.—This muscle is about the same size as the extensor communis, but has a much stronger tendon. It arises from the external condyle, the margin of the ulna, the septa, and aponeurosis, and is inserted into the base of the fifth metacarpal.

The same in *L. varius* and *L. nigrifrons*; but in *L. xanthomystax* its tendon divides,

[1] P. Z. S. 1865, p. 247.

[2] *Loc. cit.* p. 36, pl. ii. fig. 11, *m*.

[3] *Tarsius*, p. 62, under head of extensor com. digitorum, tab. 3. fig. 4. 35.

[4] P. 62, under head of extensor digitorum communis, pl. xxiii. fig. 2. 27*a*.

part being inserted into the pisiform, and part into the fifth metacarpal. This arrangement is what Mr. John Wood has found in the human subject[1].

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. fig. 13, *E.c.u*). In *G. allenii* it is large; origin as in *L. catta.*

In *Tarsius* this muscle is represented in tab. 3. fig. 1. 28.

Extensor indicis.—This is a very slender muscle, and much shorter than the extensor secundi internodii pollicis. It arises from the radial surface of the ulna and the interosseous ligaments. Its tendon receives fleshy fibres down almost to the wrist, and then bifurcates, going to the index and third digits—that going to the third digit sending off a delicate slip to that tendon of the extensor minimi digiti which goes to the fourth digit.

The right and the left sides differed in the specimen of *L. varius* dissected by us. The left had only a single tendon, going to the index, while on the right side it divided into two tendons, going to the third digit and index respectively.

Cuvier figures this muscle in the above species, but very indistinctly. It seems, however, to go to the second and third digits, pl. 69. fig. 1, ϵ^2.

In *L. xanthomystax* the belly giving origin to the tendon of the third digit is so distinct that it may be regarded as a separate muscle. It is the largest and longest of the two, occupying fully the middle third of the ulna. This all but separate slip is evidently the homologue of the radial extensor of the third digit, noticed by Mr. John Wood in his dissections of the human body with reference to its muscular variations[2].

In *G. crassicaudatus* (Pl. II. fig. 3, *E.i*, and Pl. IV. fig. 13, *E.i*^{1,2}) and *G. allenii* there is no extra slip of tendon to the fourth digit; but both of these species possess, without doubt, a double extensor indicis, or, in addition to the indicial, an *extensor medii digiti* (Wood). The muscular fibres of the indicial division pass up the higher of the two, lying beneath the extensor secundi internodii pollicis.

According to Meckel[3] this muscle in *Loris* is double. The superior and smallest portion attaches itself to the index and radial side of the median digit. The inferior is inserted in the ulnar side of the middle (third) digit. But Meckel further observes that in the *Lemurs*, properly so called, the extensor indicis is single, and, indeed, much as we have found it in *L. catta.* In our dissection of *Loris gracilis* the extensor indicis ended in a single tendon to the index finger.

Nycticebus[4] differed in the insertion on the right and left limbs in the specimen examined by us. On the right, tendons were given to the index and fourth digits; on the left, to the fifth and index.

The same condition exists in *Perodicticus*[5]; but in *Tarsius*[6] it springs also from the

[1] Proc. Roy. Soc. 1866, vol. xv. p. 237, and p. 232. fig. 5, *a*.
[2] *Loc. cit.* p. 238, and p. 233. fig. 6.
[3] *Loc. cit.* p. 324.
[4] P. Z. S. 1865, p. 247.
[5] *Loc. cit.* p. 37, tab. ii. fig. 12, *o.o.*
[6] *Loc. cit.* p. 63, tab. 5. fig. 6, no. 38.

radius, and divides into two tendons, going respectively to the index and median fingers, the former being the stronger of the two.

Cheiromys[1] has, according to Owen, also two tendons with a similar insertion. In our specimen, however, we find this muscle to be very remarkably complex. Its tendon is readily divisible into three parts, side by side, the middle one is the largest, and supplies the middle finger, but sends off a branch to the tendon of the fourth digit; the radial one divides and goes to the third and index digit (that to the index being extremely delicate); the ulnar one of the three goes to the fourth digit only. The divisibility of this muscle into three is not entirely confined to the tendinous part, but is more or less traceable into the muscular belly itself.

The EXTENSOR PRIMI INTERNODII POLLICIS is entirely wanting, as is also the case in all the Lemuroidea examined by us, as well as in *Perodicticus*, *Tarsius*, and *Cheiromys*.

EXTENSOR SECUNDI INTERNODII POLLICIS[2].—This is a long, slender muscle with a long tendon, and arises from the radial surface of the ulna (its origin extending as far upwards as behind the greater sigmoid notch), and from the interosseus membrane. The tendon does not receive muscular fibres lower down than the middle of the forearm, and, proceeding over the tendons of the radial extensor, is inserted into the proximal end of the second phalanx of the pollex.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. fig. 13, *E.s.i.p*).

In *Tarsius* it is described under the name extensor pollicis longus[3].

The same in *Cheiromys*, described by Owen under the name of extensor longus pollicis[4].

EXTENSOR OSSIS METACARPI POLLICIS[5].—This is a large and flat muscle arising from the middle four sixths of the posterior surface of the radius and from the interosseous ligament. Its very strong and flat tendon crosses those of the radial extensors, and, passing through a groove in the outermost part of the back of the radius, is inserted into the outer side of the base of the metacarpal of the pollex.

Substantially the same in *Galago*, *Loris*, *Nycticebus*[6], *Tarsius*, and *Cheiromys*. Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. figs. 13 & 14, *E.o.m.p*).

e. *Brachial Region (flexors).*

PRONATOR RADII TERES.—This muscle is largely developed, and has an exceedingly tendinous surface, especially towards its insertion. It arises from the internal condyle

[1] *Loc. cit.* p. 62.

[2] The tendon of this muscle is shown by Cuvier, pl. 69. fig. 1, ζ, in *L. varius*, and pl. 67. fig. 1, ζ, in *Loris gracilis*.

[3] *Loc. cit.* p. 63, tab. 3. fig. 4. 37.

[4] *Loc. cit.* p. 62, pl. xxiii. fig. 2, no. 37.

[5] Magnificent as is the posthumous work, on Myology, of Baron Cuvier, it nevertheless leaves much to be desired. Thus there is no view of the deep muscles of the forearm of the Lemuroids represented; so that this muscle, like the preceding and some others, has only its distal portion shown cropping out from beneath the superficial muscles. See pl. 69. fig. 1, ι, *L. varius*; pl. 67. fig. 1, ι, *Loris gracilis*.

[6] P. Z. S. 1865, p. 248.

and from the septum between itself and the flexor carpi radialis, but it takes no origin from the ulna. It is inserted for more than an inch along the outer margin of the radius and also into the anterior surface of the radius, between the insertion of the supinator brevis and part of the radial origin of the flexor longus pollicis.

In *L. varius* it is continued by strong muscular fibres as far down as the bottom of the shaft of the radius. Cuvier represents it as we have said, pl. 68. fig. 2, *x*.

In *G. allenii* it is large and very strong. It arises from the inner condyle and covers the median nerve; insertion into the shaft of the radius, its middle third. The external cutaneous nerve lies between it and the supinator longus. Alike in *Galago crassicaudatus* (Pl. IV. fig. 14, *P.r.t*).

In *Loris gracilis* Cuvier represents it very short as compared with *Lemur*[1]. Figured in *Nycticebus*, woodcut, fig. 12, *Pt*.

In *Tarsius*[2] it is substantially the same as in *Lemur*.

The Flexor carpi radialis[3] arises from the internal condyle by a strong tendon, and from the intermuscular septa. Its fibres terminate at about two-thirds down the forearm, in a tendon which is inserted in the ventral surface of the proximal end of the second metacarpal.

In *L. varius* it is figured by Cuvier, pl. 68. fig. 2; also in *Loris gracilis*, pl. 67. fig. 2.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. fig. 14, *F. c. r*).

Palmaris longus.—This muscle is about the same size as the flexor carpi radialis. It arises from the internal condyle and intermuscular septa, and a tendon begins to appear at the surface above the middle of the forearm; but muscular fibres continue to be inserted into it for two-thirds of its length; passing over the annular ligament, it becomes continuous with the palmar fascia.

Cuvier represents it as cut short in *L. varius*, pl. 68. fig. 2, *a*. Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. fig. 14, *Pa. l*). In *Tarsius*[4] it is as in *L. catta*.

Flexor carpi ulnaris.—This is rather large, and arises from the internal condyle, the inner edge of the olecranon and the upper five-sixths of the inner or, rather, posterior margin of the ulna. Its tendon, which becomes visible somewhat below the middle of the forearm, receives fleshy fibres as low down as the wrist, and is inserted into the pisiform bone and also into the ulnar side of the proximal end of the fifth metacarpal[5].

Alike in all the genera[6]. Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. fig. 14, *F.c.u*).

Flexor sublimis digitorum.—This is a small muscle, and only arises from the internal

[1] Pl. 67. fig. 2, *x*.

[2] *Loc. cit.* p. 54, tab. 3. figs. 1 & 2. 32.

[3] Burmeister, in *Tarsius*, p. 58, tab. 3. figs. 1 & 2. 31; and tab. 5. fig. 4. 31.

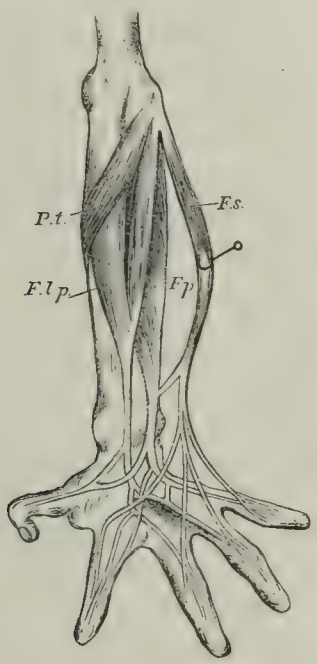
[4] *Op. cit.* p. 58, tab. 3. figs. 1 & 2. 30.

[5] In *L. varius*, figured by Cuvier, pl. 68. fig. 2, and also in *Loris gracilis*, pl. 67. fig. 2.

[6] That of *Tarsius* is described and figured by Burmeister, *op. cit.* p. 58, tab. 3. figs. 1 & 2. 29, and tab. 5. figs. 2, 3 & 4. 29.

condyle and the septum between it and that part of the flexor longus pollicis which arises from the same condyle. There is no median tendon; but from the deep surface of the muscle a small tendon is given off which joins the superficial surface of that of the flexor profundus (see woodcut, fig. 13,**). The main tendon of the flexor sublimis divides into four (of which that to the index is the largest), which are, as usual, the perforated tendons of the four ulnar digits.

Fig. 12.



Long flexor muscles and tendons of the hand in the Slow Loris (*Nycticebus tardigradus* (Linn.)).

P. t. Pronator teres.

F. s. Flexor sublimis digitorum.

F. p. Flexor profundus digitorum.

F. l. p. Flexor longus pollicis.

The hook represented dragging back the flexor sublimis passes over its median tendon.—From P. Z. S. 1865, p. 245.

In *L. varius* the small long tendon, on joining the profundus, exists as in *catta*; but the four perforated tendons to the digits are nearly of equal size, represented so by Cuvier, 'Myologie,' pl. 68. fig. 2, κ.

Delineated in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. fig. 14, *F.s.d*). The tendinous slip from this muscle to the flexor profundus digitorum in the latter Plate is indicated by **.

In *G. peli* Kingma[1] describes the four perforated tendons as splitting beneath the first phalanx of each digit, except that going to the fifth digit, which splits beneath the metacarpal. This he is disposed to consider a *lusus naturæ*; but Van Campen shows that the same thing exists in the Potto.

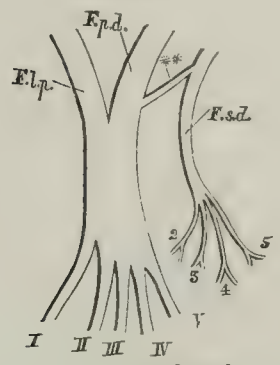
In the specimens of *G. allenii* we observed that the tendinous union with the profundus, when pursued up the arm, was that which formed the superficial slip on the middle and in front of the belly of the muscle.

[1] *Loc. cit.* p. 27.

In *Nycticebus*[1] (woodcut, fig. 15) and *Loris* there is a median tendon. In *Loris* we found no tendon going to the index (woodcut, fig. 14).

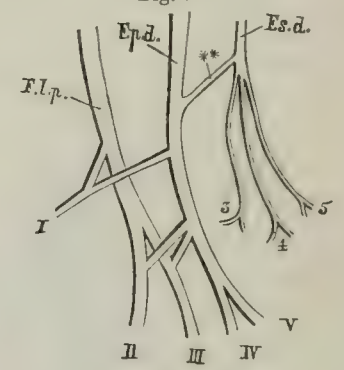
In *Perodicticus* it splits into three tendons; but Van Campen[2] says nothing of a tendon of union with the flexor profundus digitorum. It sends no tendon to the index digit.

Fig. 13.



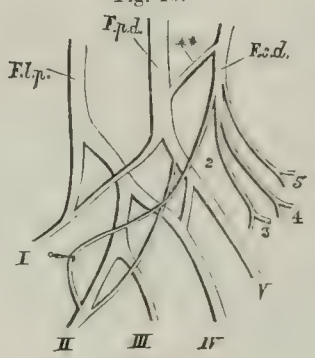
Lemur, Galago, and partly *Perodicticus.*

Fig. 14.



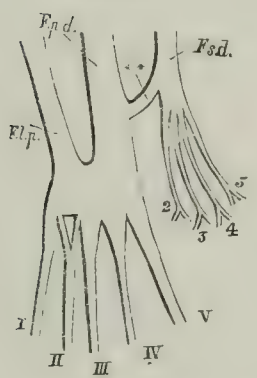
Loris gracilis.

Fig. 15.



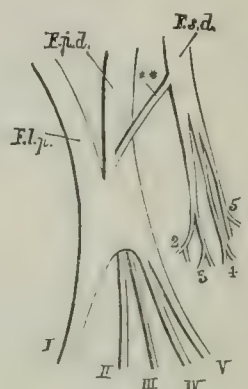
Nycticebus.

Fig. 16.



Tarsius.

Fig. 17.



Cheiromys.

Diagrams illustrating the distribution of the palmar tendons of the manus in several genera of Lemuroids. The same lettering is applicable in the different figures. I. II. III. IV. V. indicate respectively the digits and tendons of the deep flexors going thereto. *F.l.p.* Flexor longus pollicis. *F.p.d.* Flexor profundus digitorum. *F.s.d.* Flexor sublimis digitorum. 1, 2, 3, 4, 5. Numbers corresponding to the digits supplied by the flexor sublimis. The double asterisk represents the short tendon of union between the sublimis and profundus met with in each genus.

The arrangement of this muscle in *Tarsius*[3] is like that in *Lemur*, *Galago*, and *Loris*.

Owen[4] says the flexor sublimis digitorum in *Cheiromys* divides into two fasciculi in

[1] P. Z. S. 1865, p. 245, figs. 2 and 3, *F.s.*

[2] *Loc. cit.* p. 35.

[3] *Op. cit.* p. 59, tab. 3. fig. 3. no. 33.

[4] *Loc. cit.* p. 63, pl. xxiii. fig. 3. no. 33.

the middle of the forearm, these again subdividing into four tendons, besides the extra short tendon of union with the flexor profundus, which is given off from the inner or back part of the ulnar division.

In our dissection of this species we find the flexor sublimis to be a very large muscle indeed, and its divisions somewhat different from those described by Owen. Its difference of size, indeed, as compared with the same muscle in *Lemur* and *Galago*, is remarkable. It may be described as consisting of two portions. The first, a most superficial portion (which is the wider of the two), arises from the internal condyle, intermuscular fascia, and outer border of the tibia for its upper half. It sends a single strong tendon to the fourth digit. The second and more rounded or compressed portion arises also from the inner condyle, below the last, but has no origin from either bone of the forearm. At the lower third of the forearm it is divisible into two bellies and their tendons; the middle tendon (derived more from the radial half) joins the deep flexor muscle; the radial tendon subdivides into two, going to the index and third digits respectively. The ulnar tendon supplies the fifth digit only. (See woodcut, fig. 17.)

Flexor profundus digitorum.—A considerably larger muscle than the flexor sublimis. It arises from the upper two-thirds of the anterior surface of the ulna, the interosseous membrane, the coronoid process, and the adjacent part of the ulna external to the insertion of the brachialis anticus. It is from this last part that the slip comes which joins the flexor longus pollicis. The muscle ends in a strong tendon (smaller, however, than that of the flexor longus pollicis) which at the wrist receives on the radial side of its superficial surface the delicate tendon (woodcut, fig. 13**) from the flexor sublimis. Immediately after this it unites with the tendon of the flexor longus pollicis, and with it forms the deep and perforating tendons of the digits, taking, however, little, if any, share in the formation of that of the pollex.

In *Galago crassicaudatus* and in *G. allenii* this muscle may be described as having three distinct heads of origin. The most internal and slightly the largest muscular bundle (Pl. IV. fig. 14, *F.p.d*^{1}) arises from the posterior and internal surface of the olecranon process from the internal condyle and intermuscular fascia. Muscular fibres proceed as far as the upper end of the upper third of the forearm on the ulnar side; but on the radial margin there is a strip of tendon as high as the lower end of the upper third. A separate tendon goes as far as the wrist, where it joins the broad common tendon of the three portions of the muscle.

The second head of origin (the smallest) (Pl. IV. fig. 14, *F.p.d*^{2}) lies to the outer side of the last, and arises by a short tendon from the front aspect of the inner condyle, close to the perforation. The belly of this portion goes fully as far as the middle of the forearm, and ends in a narrow, delicate tendon, which joins the broad common tendon above the wrist upon its inner side.

The third portion of the flexor profundus (Pl. IV. fig. 14, *F.p.d*^{3}), as large as the

first head, arises by fleshy fibres from the upper and anterior third of the ulna, below the lesser sigmoid notch, and from the interosseous membrane.

These three form a broad tendon along with the flexor longus pollicis just above the wrist joint, which ultimately subdivides as in *Lemur*.

Although Van der Kolk and Vrolik do not mention this muscle in *Loris* separately from the flexor longus pollicis or the peculiarity in the tendons, yet we ourselves find in *Loris gracilis* that it has origin and tendinous insertions almost like *Nycticebus tardigradus*, differing in that it forms exclusively the tendon of the fourth and fifth digits and contributes bridge-like slips to the three radial ones (woodcut, fig. 14).

In *Nycticebus tardigradus*[1] it may be regarded as having but one extensive head of origin, which, after receiving its slip from the flexor sublimis, bifurcates, sending a tendon to the pollex, another delicate one to the index, another to the fourth, and exclusively forms the fifth (see diagram, fig. 15). Professor Huxley[2] did not find the delicate tendon which joins the index tendon of the flexor longus pollicis either from this or the flexor sublimis.

Van Campen[3] describes this along with the flexor longus pollicis as one muscle in *Perodicticus*. He says that it consists of two separate parts, the tendons of which unite together, arising from the condyle, &c., and ending in four tendons going respectively to the pollex, the third, fourth, and fifth digit. The author remarks that the index digit receives no tendon. This might almost have been anticipated from the all but aborted condition of the index digit.

The flexor profundus and the flexor longus pollicis are described by Burmeister in *Tarsius*[4] as one enormous muscle, they together having five heads of origin.

The first springs from the internal condyle beneath and attached to the flexor carpi radialis; its under surface is tendinous.

The second head comes from the inner side of the radius, and joins the first.

The third head springs deeply under and close to the first, from the anterior surface of the internal condyle.

The fourth head comes with oblique fibres from the upper border of the ulna, and lower down joins the third head.

The fifth head, which is the largest, springs from the olecranon and upper end of the ulna, joining the third and fourth heads and then receiving the slip from the flexor sublimis. After this it joins the tendon of the first and the second heads. Then the thumb and the index finger have their deep flexor tendons mainly derived from the first and second heads. Those of the fourth and the fifth fingers mainly come from the tendon of the fifth head, that of the middle finger mainly from the third and fourth heads.

[1] P. Z. S. 1865, p. 245, fig. 2.

[2] Hunterian Lectures, 1864, Med. Times and Gazette, Aug. 6, vol. ii. no. 756, p. 145.

[3] *Loc. cit.* p. 36.

[4] *Loc. cit.* pp. 60 and 61, tab. 3. figs. 1 and 3. no. 34 &c.

From this it appears to us that the first and second heads represent the flexor longus pollicis, the other three heads constituting the flexor profundus digitorum, which thus exclusively supply the third, the fourth, and the fifth digits (woodcut, fig. 16).

In *Cheiromys* we find but a single head to this muscle, but a very large one, extending from the internal condyle more than three-fourths down the forearm. Its tendon receives the tendinous communication (woodcut, fig. 17, **) from the sublimis, and immediately below this becomes adherent to the tendon of the flexor longus pollicis. It supplies exclusively the tendons of the fourth and fifth digits, and in great part that of the pollex, the portion from the sublimis merging in this pollicial portion. The thumb thus derives power from the profundus and sublimis as well as from its own powerful flexion. The tendinous fibres for the pollex derived from the profundus and sublimis cross over (are superficial to) the strong tendon of the flexor longus pollicis.

Flexor longus pollicis.—This is by far the largest muscle of the forearm, and is closely connected (at and near the interosseous membrane) with the flexor profundus, while about halfway down the forearm it receives a distinct slip from that muscle.

It consists of two portions, which unite a little above the middle of the forearm. One part arises from the whole anterior surface of the radius (from the tubercle above to near the pronator quadratus below) and from the interosseous membrane.

The other portion springs from the septum between it and the flexor sublimis and from the internal condyle. The slip from the flexor profundus joins the deep surface of the first and radial portion just below its junction with the second part. The muscle gives origin to a very strong tendon, which at the wrist becomes intimately united with that of the flexor profundus, and with it forms the deep flexor tendons, that for the pollex being given off from the radial side of the conjoined tendon a little below the junction.

Only a fraction of this muscle is represented by Cuvier in his delineations of the myology of the Lemuroids, pl. 68. fig. 2, λ.

Lemur varius and *L. nigrifrons* present no difference from *L. catta*; and the Galagos are substantially the same. That of *Galago crassicaudatus* is figured in Pl. IV. fig. 14, *F.l.p*^{1}, and *F.l.p*^{2}. In *G. peli* no distinct flexor longus pollicis is described by Kingma.

In *Loris gracilis* there is a greater resemblance to the condition found in *Nycticebus*, to be described presently; but it sends no tendon to the third and fourth digits. It contributes to form the deep flexor tendon of the pollex and those of the index and third digits, but supplies no digit exclusively, as in the latter genus.

Contrary to what obtains in *Lemur* and *Galago*, *Nycticebus tardigradus* has the flexor longus pollicis remarkably distinct from the flexor profundus, which, moreover, it considerably exceeds in size. It supplies exclusively the deep flexor tendon of the third digit, and contributes to form that of the hallux and fourth digit and the main part of that of the index.

This muscle ceases to be so distinct in *Perodicticus*[1], and more resembles its condition as existing in *Lemur* and *Galago*. Its distribution is as before stated in describing the flexor profundus.

In *Tarsius* the flexor longus pollicis seems to be represented by the first two bellies of the deep flexor muscle described by Burmeister[2]. It supplies alone the pollex, and almost exclusively the index.

As to *Cheiromys*, our specimen does not present precisely the same conditions as those described by Professor Owen[3]. It is readily resolved into three distinct heads, the middle one of which is very delicate, and has a long tendon extending high up, *i. e.* above the middle of the forearm.

This head takes origin, deeply, from the anterior surface of the humerus, just above the trochlea, beneath the head next described.

This second head springs from the inner condyle and intermuscular fascia in close union with the palmaris longus and flexor sublimis. It constitutes a large fleshy belly to the middle of the forearm, where it joins the other heads.

The third and deepest head arises from the middle third of the shaft of the radius. This broad portion continues fleshy almost to the wrist.

These three heads unite to form a broad, strong, flat tendon, which becomes adherent at the wrist to that of the profundus. Immediately below this it divides into two tendons, which supply the second and third digits; and fibres from its superficial surface join others from the flexor sublimis and profundus to form the flexor tendon of the pollex. We failed to observe that convergence of fibres upon the third digit which is mentioned by the learned Professor.

The Pronator quadratus arises from the ridge on the ulnar side of the lowest fourth of the ulna, and is inserted into the lowest fourth of the outer margin of the radius.

Alike in all the other genera[4]. In *Galago crassicaudatus* it is figured (Pl. IV. fig. 14, *P. q*).

f. *The Hand, Palmar and Dorsal Surfaces.*

Palmaris brevis.—This is distinct, though small, and arises from the fascia covering the pisiform bone, and is inserted into the skin on the ulnar side of the palm.

It is also distinctly present in *L. varius*, *L. xanthomystax*, and *L. nigrifrons*.

If present, not satisfactorily made out by us either in the *Galagos*, *Loris*, or *Nycticebus*.

Our specimen having been skinned, we are unable to speak of this muscle in *Cheiromys*; and it is not described by Owen.

Lumbricales.—These are four in number. The outermost springs from the radial side of the deep flexor tendon of the index, and is inserted into the radial side of that digit.

[1] *Loc. cit.* p. 35.

[2] *Loc. cit.* p. 61, tab. 3. figs. 1 & 3, no. 34.

[3] *Loc. cit.* p. 63, pl. xxiii. fig. 4.

[4] *Tarsius, loc. cit.* tab. 5. figs. 3, 4, & 5, no. 39.

The next one springs from the radial side and superficial surface of the deep flexor tendon of third digit, and is inserted into the radial side of the same digit.

The third springs from the radial side of the tendon of the next digit, and is inserted into the same side of the same, or fourth digit.

The fourth arises from the ulnar side of the tendon going to the fourth digit, and is inserted into the radial side of the fifth digit.

In *L. varius* and *L. xanthomystax* they are also strong and well developed. The third lumbrical muscle comes more from the surface and between the fourth and fifth tendons, and not alone from the radial side of the fourth digital tendon.

As far as can be judged from the figure given by Cuvier[1], the lumbricales of his specimen, *L. varius*, appear to agree with the conditions of our *L. catta*.

In *Galago crassicaudatus* the lumbrical muscles are four in number, and arise and are inserted on the radial sides of the deep flexor tendons (Pl. II. fig. 3, L^1, L^2, L^3, L^4, and Pl. IV. fig. 14, L^1, L^2, L^3, L^4).

In *G. allenii* we did not find the first of the above-described four lumbricales in *L. catta*; but the three present corresponded to the three last of *L. catta*.

In *Nycticebus tardigradus* there are four radially inserted lumbricales[2].

In *Perodicticus*[3] there are but three lumbricales.

There are four lumbricales in *Tarsius*[4] which spring from the radial sides of the flexor tendons.

In *Cheiromys* we only find three, the first springs from the ulnar side of the flexor tendon of the index, and is inserted into radial side of the third digit. The second one springs from the radial side of the tendon of the fourth digit, and is inserted into the same side of that digit. The third one springs from the ulnar side of the tendon of the fourth digit, and is inserted into the radial side of the fifth digit.

The Abductor pollicis is not very distinct, its inner side being so closely connected with the outer part of the flexor brevis. It arises from the annular ligament external to the tendon of the flexor carpii radialis, and from the sesamoid bone in front of the trapezium. It is inserted into the base of the outer side of the first phalanx of the pollex.

In *L. varius*[5] and *L. xanthomystax* the abductor pollicis arises from the ossicle outside the trapezium.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. figs. 14 & 15, *Ab. p*).

It is well represented by Burmeister in *Tarsius*, tab. 5. fig. 4, no. 41.

Adductor pollicis[6].—This is a large and powerful muscle arising from the whole length of the third metacarpal bone and from the fascia on the palmar surface of the base of the second metacarpal. It is inserted with the inner part of the flexor brevis pollicis.

[1] Pl. 68. fig. 2, φ.
[2] P. Z. S. 1865, p. 247, fig. 4.
[3] *Loc. cit.* p. 36.
[4] *Loc. cit.* p. 65, tab. 3. fig. 3, no. 47.
[5] Figured by Cuvier, pl. 68. fig. 2, ξ.
[6] Recueil, pl. 68. fig. 2, ρ.

Insertion in *L. xanthomystax* the proximal end of the first phalanx; there appears also to be a small, but distinct, slip of this muscle arising proximally to the larger superficial portion; this arrangement is somewhat similar to that of the muscles of the foot.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. figs. 13, 14, & 15, *Ad. p*), whereas in *G. allenii* it is not nearly so strong as in *L. catta*. The fibres which pass to the second metatarsal are hardly distinguishable from the deep palmar fascia.

In *Tarsius*[1] the adductor of the pollex appears to consist of two parts.

In *Cheiromys* this muscle arises from the second metacarpal, and from the fascia on the palmar surface of the proximal part of the third metacarpal. A distal fascicle of this muscle is separated by a distinct interval, and represents a transversus manus. The similarity of structure (as regards muscles) of the manus and pes is strikingly shown in the Aye-Aye by the form of the adductor pollicis with its distinct slip homotypal with the transversus pedis.

Flexor brevis pollicis[2].—The greater part of this muscle is external to the long flexor tendon of the pollex. It arises from the trapezium and annular ligament, and is inserted into the base of the first phalanx of the pollex.

Displayed in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. IV. figs. 14 & 15, *F. b. p*).

Burmeister represents this muscle in *Tarsius*, *loc. cit.* tab. 5. fig. 4, no. 43.

Opponens pollicis.—This muscle is represented but by a comparatively few fibres, which arise from the trapezium, and are inserted into the base of the metacarpal bone of the pollex.

In *L. xanthomystax* it is large and strong.

In *Tarsius* it is quite as in *L. catta*, and is well represented by Burmeister, *loc. cit.* tab. 5. fig. 5, no. 49.

In the specimen of *Cheiromys* dissected by us this muscle was destroyed on the skinning of the body.

Flexor brevis minimi digiti.—This seems to be scarcely distinct from the abductor, with which it is inserted. It arises from the unciform bone and annular ligament.

Both *L. varius* and *L. xanthomystax* have it distinctly separate from the abductor, and it is comparatively strong.

In *Galago crassicaudatus* the flexor brevis minimi digiti is tolerably clearly defined (it is represented in Pl. II. fig. 3, and Pl. IV. figs. 14 & 15, *F. b. m. d*). It is somewhat indistinct in *G. allenii*, but with an origin and insertion as in *L. catta*.

Figured in *Nycticebus tardigradus*, P. Z. S. 1865, p. 247, fig. 4.

In *Tarsius* this is described by Burmeister as a division of the abductor digiti minimi, p. 66, tab. 5. fig. 42, *b*.

We have found it tolerably distinct in *Cheiromys*.

The Abductor minimi digiti is a considerable muscle, which takes origin from the

[1] *Loc. cit.* p. 65, tab. 5. figs. 4 & 5, no. 45.

[2] Well defined in pl. 68. fig. 2, *o*, of the 'Myologie.'

pisiform bone, and is inserted by a long flat tendon into the outer side of the base of the first phalanx of the fifth digit.

Substantially the same in all the other genera of Lemuroids. It is shown in pl. 68. fig. 2, *v*, of Cuvier's 'Recueil,' *Lemur varius*, and by us in *Galago crassicaudatus*, Pl. II. fig. 3, and Pl. IV. figs. 14 & 15, *Ab.m.d*, in *Nycticebus tardigradus*, P. Z. S. 1865, p. 247, fig. 4, and in *Tarsius*, tab. 5. fig. 5. 42 *a*.

The Opponens minimi digiti is very distinct. It arises from the unciform bone and annular ligament, and is inserted into the whole length of the metacarpal bone of the fifth digit.

In *Galago crassicaudatus* and in *G. allenii* this muscle is small, but distinct (Pl. IV. fig. 15, *Op.m.d*). It is indicated in the enlarged view of the palmar surface of the manus of *Nycticebus*, *infra*, woodcut, fig. 18.

It is not mentioned by Burmeister in *Tarsius*; and in *Cheiromys* we have found it as in *L. catta*.

Interossei.—The interossei muscles of the hand resemble those existing in Man. Each digit, except the pollex, has in fact a pair of interossei (which are, indeed, true flexores breves); the outer one of the fifth digit, however, is described separately under the name of "Abductor minimi digiti."

Those of *Nycticebus tardigradus* are delineated in the accompanying woodcut, fig. 18.

Fig. 18.

Enlarged and somewhat diagrammatic view of the palmar surface of the hand in the Slow Loris, to show the small muscles of the pollex and fifth digit, also the interossei and insertions of the lumbricales. The latter are cut short and reflected.—From P. Z. S. 1865, p. 247.

In the genus *Galago* the interossei of the manus, so far as appearance and attachment are concerned, might with propriety be divided into dorsal and palmar; but as their action is mainly abduction and flexion, it may suffice to describe them as short palmar flexors. Considered thus, each metacarpal bone, excepting the thumb, is provided with a double interosseous muscle, the opponens minimi digiti being reckoned as one of these. Besides these eight, there are two superficial interosseous slips on the

palm. These arise side by side from the ligaments and deep carpal fascia close to the proximal ends of the two median metacarpals. The one is inserted into the ulnar side of the second metacarpal; the other also by a short tendon into the fascia on the radial side of the fifth metacarpal, its distal end. The distribution of the so-called dorsal interosseal slips almost agrees with the condition described in *Tarsius*. Those of the Grand Galago are drawn in Pl. II. fig. 3, and Pl. IV. fig. 13, I. I. I. I; and in the enlarged view, Pl. IV. fig. 15, the two interossei superficiales are marked Is. Is.

Burmeister[1] describes the interossei as consisting of internal and external ones.

According to him the internal interossei[2] are four in number, and spring deeply between the metacarpals. The first attaches itself to the ulnar side of the index. The second divides into parts, going respectively to the ulnar side of the third digit, and to the radial side of the fourth digit. The third to the ulnar side of the fourth digit. The fourth is inserted to the radial side of the fifth digit.

The external interossei, as he states[3], spring from the dorsal side of the metacarpals; they also are four in number. The first (abductor indicis) is inserted into the radial side of the first phalanx of the index. The second divides, and goes to the adjacent sides of the second and third digits. The third goes to the adjacent sides of the third and fourth digits. The fourth is inserted into the adjacent sides of the fourth and fifth fingers.

In *Cheiromys*, in addition to the ordinary interossei, we find a small more superficial layer which arises in the deep fascia of the carpus, and divides into two small bellies. One of these is inserted into the ulnar side of the index digit, the other into the radial side of the fifth digit. The ordinary interossei form a considerable body of muscle on the dorsum of the fourth and fifth metacarpals.

3. *Muscles of the Trunk.*

a. *Ventral Region (Thoracic and Abdominal Parietes).*

Supracostal Muscles.—On each side of the thorax, between the long insertion of the scaleni and origin of the pectorals, but superficial to the intercostal muscles, there are two small but very distinct muscles. These appear to be the variety so named by Mr. John Wood in his paper on "Additional Varieties in Human Myology," read before the Royal Society in June 1865[4]—and also to two unnamed extrapectoral muscular bundles described and figured by Van Campen in the Potto[5] (*Perodicticus*) as early as 1859.

We ourselves have observed equivalent muscles (though unpublished) in several Mammals, *e. g.* the Common Zebra, Brown Bear. Giraffe, &c.

But Cuvier, in those plates which form his posthumous 'Recueil de Myologie' (the

[1] *Loc. cit.* p. 66. [2] *Loc. cit.* tab. 5. fig. 5, no. 46. [3] *Loc. cit.* tab. 5. fig. 3, nos. 44 & 48.

[4] P. 381, and reprint from the Proceedings of the Royal Society, 15 June, 1865, p. 3, fig. 1, *d*.

[5] *Loc. cit.* p. 27, pl. 2. fig. 10.

preface of which bears the date 1849), has figured a single, but very large, supracostal muscle in *L. varius*, pl. 69. fig. 2. 18; this he has called sternocostal.

The first supracostalis muscle in *Lemur catta* arises by tendinous fibres from the cartilages of the fourth, fifth, sixth, and seventh ribs, and is inserted into the first rib just external to the origin of the subclavius, and crossing over the anterior end of the rectus (Pl. IV. fig. 12, *Sp.co*[1]). The second supracostal muscle in the same animal arises from the fourth and fifth ribs, just external to the outer ends of their cartilages, and closely connected with the fourth and fifth digitations of the serratus magnus. It is inserted, by a distinct though delicate tendon, into the first rib (Pl. IV. fig. 12, *Sp.co*[2]).

This muscle was absent in our specimen of *L. varius*, and, if present, not distinct in *L. nigrifrons*.

In *L. xanthomystax*, on the contrary, the first supracostal, as described in *L. catta*, was present, and with nearly the same attachments. What might represent the second supracostal we were rather doubtful about. A second small slip did exist on the right side only; but this lay rather to the inner side, and therefore probably may have been a portion of the sternal prolongation of the rectus muscle.

In *Galago crassicaudatus* and in *G. allenii* a few fibres only appear to pass forwards and outwards over the anterior prolongation of the rectus from the third to the first rib. This strip may be considered the first supracostal muscle (Pl. V. fig. 16, *Sp.co*).

We found a supracostal in *Nycticebus tardigradus* extending from the third to the first rib.

In the *Potto*, Van Campen found two supracostals (as already mentioned), and has well represented them.

Such muscular slips are not recorded by Burmeister in *Tarsius*, nor by Owen in *Cheiromys*; but in our specimen of the latter we find one remarkably large supracostal, having a tendinous origin from the cartilage of the third rib close to the sternum, and inserted into the first rib just external to the insertion of the subclavius, and just over the external half of the insertion of the rectus. The scalenus is immediately external to it.

Triangularis sterni.—In *Lemur catta* this is represented by a tolerably thick and continuous muscular layer reaching from the ensiform cartilage to the second rib. Inwardly it is attached to the sternum; and outwardly, by a series of serrate prolongations, it goes to the costal cartilages from the seventh to the second. It is noticed by Burmeister in *Tarsius*.

In *Cheiromys* we found this muscle well developed, arising as usual and passing from the sternum by digitations to the cartilages of the ribs, reaching from the third rib to the eighth inclusive.

External oblique[1].—This is a very elongated muscle which arises by digitations from the ribs, from the fifth to the twelfth inclusive, the three uppermost digitations being

[1] Very imperfectly represented by Cuvier in *L. varius*, pl. 68. fig. 1. 13, and in *Loris gracilis*, pl. 67. figs. 1 and 2. 13.

interposed between corresponding digitations of the serratus magnus. It also arises from the lumbar fascia, beneath the latissimus dorsi and behind (below) that muscle, and from the anterior spine of the ilium. It is inserted into the aponeurosis of the abdomen, and is closely connected anteriorly (above), at its inner border, with the rectus.

The fascia forms a wide, rather elongated abdominal ring, the inner pillar of which is much the stronger, and is inserted into the anterior margin of the pubis. The fibres composing the external pillar are more delicate, and interlace with those covering the cremaster, which muscle is much developed.

In *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 5 & 6, and Pl. IV. fig. 9, *Ex. o*).

In *Nycticebus tardigradus*[1] there is no variety in its attachments.

Perodicticus[2] has it springing from eight of the lower ribs.

Tarsius[3] from the cartilages of all the ribs to the third uppermost.

Internal oblique.—Fleshy laterally, but aponeurotic for a wide space towards the middle line of the body. It arises from the outer half of the crural arch, from the spine of the ilium, and the lumbar fascia beneath the external oblique. The fibres ascend and are inserted into the aponeurosis of the abdomen and the cartilages of the four hindmost ribs.

In *L. varius* and in *L. xanthomystax* this is as in *L. catta*, except that in the latter it is inserted into three only of the costal cartilages.

In *Galago crassicaudatus* this muscle (Pl. III. fig. 6, *In.o*) is only partially brought into view between the erector spinæ and external oblique, a portion of the latter muscle being removed. In *G. allenii* the internal oblique is pretty much intermixed with the transversalis, but corresponds tolerably well in its attachments to the above description of *L. catta.*

According to Van Campen, in *Perodicticus*[4] this muscle is thinner than the external oblique, and its tendinous aponeurosis close to the fascia lata to form a distinct Poupart's ligament. It is attached to the three hindmost ribs.

It presents no peculiarities in *Tarsius*[5].

In *Cheiromys* we find it muscular up to the margin of the rectus, and not aponeurotic as in *Lemur catta.*

The Transversalis is much more muscular than is the internal oblique. It arises from the spine of the ilium and from the fascia enclosing the erector spinæ, also from the inner surfaces of the hindmost four or five costal cartilages.

This muscle continues fleshy much further towards the middle line of the abdomen than does the internal oblique; and a very wide space intervenes between its hinder (lower) border and the brim of the pelvis, as it takes no origin from the crural arch.

In *L. varius* and *L. xanthomystax* it is scarcely more fleshy than is the internal oblique; that is to say, they are both so.

[1] P. Z. S. 1865, p. 248.

[2] *Loc. cit.* p. 28.

[3] *Op. cit.* p. 45, tab. 3. fig. 1, no. 1.

[4] *Potto*, p. 29.

[5] *Loc. cit.* p. 45, tab. 4. fig. 2. no. iii.

In *G. allenii* the transversalis is pretty much interwoven with the internal oblique, but corresponds tolerably well in attachments with what has been said of *L. catta*.

Perodicticus[1] has this muscle rather thin; fibres from it and the internal oblique go to form a cremaster.

In *Tarsius*[2] it is very thin and difficult to separate.

In *Cheiromys* it is very closely adherent to the internal oblique, and is not more muscular than the latter.

Rectus abdominis.—In *Lemur catta* this muscle, arising as usual, is inserted with strongly marked tendinous fibres into the first rib, the outer margin of the manubrium, and the sternal end of the cartilages of the second rib. We could find no indication of any of the nine tendinous intersections stated by Meckel[3] to exist in *Lemur mongos*. It is very broad at its origin.

In *L. varius* the muscular fibres stop at the second rib, and a tendon proceeds to the first one. Only a delicate tendon goes to the second rib at its sternal end. There is also a tendinous intersection, oblique in direction, and situated about two inches in front of the pubis. In this species Cuvier has only represented a small part of the thoracic portion of this muscle, pl. 69. figs. 1 and 2. 15.

In *L. xanthomystax* it nearly corresponds to what is said above of *L. catta*, and is strong and fleshy, excepting in the pectoral region, where it is thin. On the left side of the specimen examined by us, its fibres appeared to be continuous with the external oblique; and thus the digitations of this muscle may by Meckel[4] have been considered to belong to the rectus abdominis.

It is also continued by a long band of longitudinal fibres to the first rib in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. fig. 5, and Pl. V. fig. 16, *R.ab*).

In *G. allenii* it arises from the first rib, and receives slips from opposite the fourth, fifth, and sixth ribs. It reaches the cartilages of the lower ribs; and its fibres unite with the external oblique.

Nycticebus tardigradus[5] has the muscular band carried to the first rib.

In *Perodicticus*[6] and *Tarsius*[7] there are no tendinous intersections, but each has a similar insertion into the first rib.

In *Cheiromys* this muscle is not noticed by Owen any more than are the other abdominal muscles. We found it to ascend to the first rib in a broad, flat, muscular band, becoming tendinous at the second rib, the tendon being inserted into the middle third of the first rib. It passed beneath the supracostal, and at so great a distance from the sternum that at first we thought it was the second supracostal (of *L. catta*), which muscle may perhaps form part of it. The tendon of the subclavius meets that of the rectus on the inner side of the latter. This muscle has no tendinous intersections. It is remarkably broad at its pubic origin.

[1] *Loc. cit.* p. 29. [2] *Loc. cit.* p. 46, tab. 4. fig. 9. no. iv. [3] *Loc. cit.* p. 201. [4] *Loc. cit.* p. 201.
[5] P. Z. S. 1865, p. 248. [6] *Loc. cit.* p. 28. [7] *Loc. cit.* p. 45, tab. 4. figs. 2 & 9. no. ii.

Pyramidalis.—We could find no distinct trace of this muscle in either *Lemur catta*, *L. varius*, *L. nigrifrons*, or *Nycticebus tardigradus*, nor in the Galagos.

Its presence in *G. peli* is denied by Kingma [1].

Van Campen and Burmeister agree also as to its absence in the *Potto* [2] and *Tarsius* [3].

It is also absent in *Cheiromys*; but the breadth of origin of the rectus in this and other forms of Lemuroids suggests that the pyramidalis may be present but included in the former.

b. *Dorsal Region (superficial layer).*

Trapezius.—This in *Lemur catta* is a very thin muscular layer, its anterior (cervical) portion being entirely aponeurotic. It arises from the ligamentum nuchæ as far forwards as about the middle of the neck, also from the spines of the first nine dorsal vertebræ. It is inserted into the whole length of the anterior margin of the spine of the scapula to the extremity of the acromion, and by aponeurosis into nearly half the length of its posterior margin. This muscle is crossed and covered at the anterior part of its insertion by the levator claviculæ.

In *L. varius* [4] and *L. xanthomystax* the anterior part of its origin was not aponeurotic, but muscular. The latter has an origin from the eighteenth spinous process; and its posterior fibres cover those of the latissimus dorsi at the spine.

In *Galago* it is almost the same as in *Lemur catta*. See *G. crassicaudatus*, Pl. II. fig. 3, and Pl. III. figs. 6 & 7, *Tz* and *Tz**, where it is entirely muscular and reaches backwards to the eleventh dorsal spine.

In *Nycticebus* it only reaches as far as the fifth dorsal vertebra.

It is small in *Loris gracilis* (see Cuvier, pl. 67. fig. 1, *a* [2]).

In *Tarsius* [5] its origin extends to about the twelfth dorsal vertebra.

In *Cheiromys*, according to our specimen, it was almost entirely muscular, and not crossed by the levator claviculæ, but, on the contrary, entirely hid the latter. It arises from the whole length of the ligamentum nuchæ, the back of the skull, and the first seven dorsal vertebræ (Pl. III. fig. 8, *Tz* and *Tz**).

The depressor scapulæ.—A muscle of this kind has been described by Burmeister [6] in *Tarsius*, and also by Kingma [7] in *Otolicnus peli*. The latter speaks of it as a delicate muscular layer arising from the lumbar fascia, becoming thicker and narrower further forwards, and attaching itself to the anterior inner angle of the scapula, covering part of the latissimus dorsi.

In *Lemur* (*L. niger*) the rhomboideus is quite distinct from latissimus dorsi. There is no depressor scapulæ.

In all the Galagos we found the rhomboideus well defined from the latissimus dorsi,

[1] *Loc. cit.* p. 28. [2] *Op. cit.* p. 28. [3] *Loc. cit.* p. 45.

[4] Indistinctly figured by Cuvier, pl. 69. fig. 2, a [2]. [5] *Loc. cit.* p. 46, tab. 3. fig. I. 1, and tab. 4. fig. I. 1.

[6] *Loc. cit.* p. 46, tab. 3. figs. 1, 2. [7] *Loc. cit.* p. 22.

and no trace of a depressor scapulæ, except on the right side of one specimen of *G. crassicaudatus*, where a few muscular fibres arise from a delicate fascia immediately beneath the latissimus and run on into the teres major, being more or less adherent to the posterior vertebral angle of the scapula (Pl. III. fig. 7, *D. sc*).

In *Nycticebus* the rhomboid is well defined below, and there is no depressor scapulæ.

In the *Potto*[1] such a muscle appears to be absent.

In *Tarsius*[2], as before said, this is stated to exist, arising as a thin, long muscle from the lumbar fascia in the region of the last rib and adjacent parts. It passes forwards, overlapping the latissimus dorsi, and is strongly inserted into the posterior vertebral angle of the scapula. It is said to be in relation with the trapezius, and to cover the teres minor and infraspinatus.

In *Cheiromys* we found no distinct muscle; but, as we have said, a portion of the conjoined rhomboideus and latissimus dorsi (more belonging to the former muscle, however) is inserted into the posterior vertebral angle of the scapula and adjacent portion of its axillary margin. See Pl. III. fig. 8. This appears to answer to Kingma's separate muscle.

Rhomboideus[3].—In *Lemur catta* it is less extensive in its origin than as described by Meckel[4] in the Lemurs generally. It arises from the spinous processes of the last two cervical and first four dorsal vertebræ, and is inserted into the vertebral border of the scapula.

In *Galago crassicaudatus* (Pl. III. figs. 6 & 7, *Rh*) it has attachment from the third cervical to fourth dorsal vertebræ.

In *G. allenii* we found one side to have but a single rhomboideus muscle, with a similar origin and insertion to that of *Lemur catta*; but on the opposite side of our specimen there appeared a very slight separation of the fibres, sufficient to indicate a rhomboideus major and minor, the latter of which seemed the larger of the two.

There is but one rhomboid muscle in *Nycticebus*[5], which has a higher origin than in *L. catta*, namely, from between the fourth and fifth cervical neural spines down to the fifth dorsal.

In *Perodicticus*[6] it is similar, the major and minor being united.

There are said to be two rhomboidei in *Tarsius*[7]; but one of them is evidently our rhomboideus capitis.

Cheiromys has a largely developed single rhomboideus, which is entirely muscular. It arises from the ligamentum nuchæ for the whole length of the neck and from the first two dorsal vertebræ. (Professor Owen has not described this muscle, nor yet the following one.) Its posterior margin is fused with the latissimus dorsi, so that no limit

[1] *Loc. cit.* p. 31.
[2] *Loc. cit.*
[3] See Cuvier, pl. 69. fig. 1, c^1, c^2 (*L. varius*).
[4] Anat. Comp. vol. vi. p. 244.
[5] P. Z. S. 1865, p. 242.
[6] *Op. cit.* p. 31.
[7] *Op. cit.* p. 47, tab. 4. fig. 1. 6.

between them can be defined; and its hindmost part is inserted into the posterior vertebral margin and adjacent part of the axillary border of the scapula[1] (Pl. III. fig. 8, *Rh*).

Rhomboideus capitis.—An exceedingly long and thin strip. It arises from the occiput, and is inserted, by a very delicate tendon, just beneath the anterior end of the insertion of the single rhomboideus muscle. At its insertion it is closely attached to the levator anguli scapulæ.

In *L. varius* Cuvier represents it as rather strong (*l. c.* pl. 69. fig. 2, *c*). Its insertion is shown in *L. catta*, pl. 71. fig. 1, *c*.

If at all present in *Galago alleni*, it is most intimately united with the trapezius; and in *G. crassicaudatus* the tendency to separation from the conjoined rhomboideus major and minor is very faint, as is delineated in Pl. III. fig. 6. Its presence is noted by Kingma in *G. peli*[2].

In *Nycticebus* this muscle presents nearly the same conditions as in *Lemur catta*. In the *Potto* the existence of this muscle is not noticed by Van Campen.

In *Tarsius*[3] a rhomboideus capitis is evidently present, but is said only to extend to the ligamentum nuchæ.

In *Cheiromys* this muscle is rather fleshy. Its insertion into the anterior vertebral angle of the scapula is also covered by that of the single rhomboideus.

Levator clavicul.æ.—In *Lemur catta* this is a long band of muscular fibres which arises from the ventral surface of the transverse process of the atlas, and is inserted into the spine of the scapula—not, however, into the true acromion process, but into the triangular backwardly (downwardly) projecting metacromion-like process, which is so strongly developed in *Lemur*. At its insertion it overlaps[4] and is entirely superficial to the trapezius, the insertion of which last is continued on to the very extremity of the acromion process. This, combined with its very different origin, makes it difficult to understand how Meckel[5] could have thought that this muscle might "dans les Makis" be easily taken for the otherwise absent clavicular portion of the trapezius.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 5, 6, & 7, and Pl. IV. figs. 13 & 14. *L.cl*). The presence of this muscle is noted by Kingma[6] in *G. peli*.

We found it present also in *Loris gracilis* and in *Nycticebus tardigradus*[7], but with an insertion only into the outer end of the clavicle, as Cuvier seems to have found it[8].

This muscle is absent, according to Van Campen, in the *Potto*[9]. Burmeister, in *Tarsius*[10], describes this muscle under the name of the levator anticus scapulæ.

It is not distinctly mentioned by Owen as existing in *Cheiromys*, but in our specimen was very largely developed and inserted broadly into rather more than the middle third

[1] This part is probably the depressor scapulæ.

[2] *Loc. cit.* p. 23.

[3] *Loc. cit.* p. 47, tab. 4. fig. 2. The smaller and upper muscle marked with the figure 6.

[4] As shown by Cuvier in *L. varius*, pl. 69. fig. 2, *d*.

[5] *Op. cit.* vol. vi. p. 238.

[6] *Loc. cit.* p. 22.

[7] P. Z. S. 1865, p. 243.

[8] *Loc. cit.* pl. 67. fig. 2, *d*.

[9] *Loc. cit.* p. 31.

[10] *Loc. cit.* p. 46, tab. 4. fig. 1. 3.

of the spine of the scapula. Unlike that in *Lemur* the muscle inferiorly is entirely overlapped and hidden by the trapezius (Pl. III. fig. 8, *Lc*).

Levator anguli scapulæ.—This is so closely united at its posterior (lower) end with the serratus magnus, that it may be regarded as the cervical portion of the latter muscle[1]. It arises from the root of the transverse process of the atlas, and from the transverse processes of all the other cervical vertebræ, and is inserted into the border of the scapula from midway between the insertions of the omohyoid and rhomboideus capitis to the insertion of the latter, into the delicate tendons of which some of its fibres are inserted. It is not covered by the rhomboideus, its insertion being anterior to the insertion of that muscle.

Meckel says, "dans les *Loris* et les Makis proprement dits il se rend seulement à l'atlas" (*loc. cit.* p. 236); but then he attributes an extensive cervical origin to the serratus magnus (*l. c.* p. 248).

What may either represent a large levator anguli scapulæ or a continuation into the neck of the serratus magnus, is figured in *Galago crassicaudatus* (Pls. III. & IV. figs. 6 & 9, *L.a.s=S.mg*).

In the *Potto*[2] it arises from the transverse processes of the five most anterior cervical vertebræ.

In *Tarsius*[3] to the transverse processes of the six hindermost cervical vertebræ.

c. *Dorsal Region* (*deep layer*).

Serratus magnus.—Arising from the first eight ribs by as many digitations, that from the first rib being the broadest, it is inserted into the whole vertebral margin of the scapula posterior to the insertion of the levator anguli scapulæ. It is nearly coequal in extent with the rhomboideus. This muscle is closely connected with the long insertion of the scalenus at the third rib; and its three hindermost (lowest) serrations interdigitate with those of the external oblique.

In *L. varius* it appears to have attachments to the whole of the cervical vertebræ.

In *L. xanthomystax* it is in union with the second slip of the scalenus.

In *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 5 & 6, Pl. IV. figs. 13 & 14, and Pl. V. fig. 16, *S.mg*) the combined serratus magnus and levator anguli scapulæ arise from all the transverse processes of the cervical vertebræ and the first eight ribs. Insertion the vertebral margin of the scapula. In *G. allenii* to the seventh rib.

In *Nycticebus* it arises from the first ten ribs.

In *Perodicticus*, according to Van Campen[4], this muscle arises from eleven ribs.

In *Tarsius*[5] it springs by eight digitations from the second to the ninth rib.

We have found it in *Cheiromys* quite as in *L. catta*.

[1] The two muscles spoken of are indicated by one letter by Cuvier in *L. catta* and *L. varius*, pl. 69. fig. 2, and pl. 71. figs. 1, 2, 3, g.

[2] *Loc. cit.* p. 31.

[3] *Loc. cit.* p. 47, tab. 4. fig. 1. 5.

[4] *Loc. cit.* p. 28.

[5] *Loc. cit.* p. 48, tab. 3. fig. 1. 8.

Latissimus dorsi[1].—This arises from the spines of the dorsal vertebræ from the sixth backwards, and from the lumbar fascia; it is inserted as usual. We could detect no trace[2] of any slips going to the pectoralis major as mentioned by Meckel[3], and as is the case in the Lemurs.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. figs. 5, 6, & 7, and Pl. IV. figs. 13 & 14, *La.d*).

In the *Potto*[4] it springs from the ten hindermost dorsal vertebræ.

In *Tarsius*[5] it is as in *L. catta*, but overlapped by the depressor scapulæ.

In *Cheiromys*[6] from the last five ribs and the common tendon of the erector spinæ. As has been said, its outer margin is fused indistinguishably with the rhomboideus.

For the Dorso-epitrochlear muscle, see *antea*, p. 32.

Serratus posticus anterior[7].—This is a thin, small muscle which has origin by a delicate aponeurosis from the last cervical and the first four dorsal vertebræ, and is inserted into the second, third, fourth, fifth, and sixth ribs.

In *L. varius* it is also inserted into the first rib. In *L. xanthomystax* it has the same number of insertions, namely six, but it is altogether more aponeurotic than muscular.

In *Galago crassicaudatus* (Pl. III. fig. 6, and Pl. IV. fig. 9, *S.p.a*) as in our type *L. catta*.

In *G. allenii* it arises by aponeurosis from the third and fourth last cervical vertebræ and the anterior dorsal vertebræ, and is inserted into the third, fourth, and fifth ribs.

This muscle is wanting in *Perodicticus*; or at least Van Campen says so[8].

In *Tarsius*[9] it has six serrations, extending from the second to the seventh rib.

In *Cheiromys* this muscle is as in *L. catta*, excepting that it only reaches the fifth rib.

Serratus posticus posterior.—This is very indistinctly marked. It appears to arise from the fascia lumborum, and to be inserted into the last four or five ribs, not counting the very short thirteenth rib.

The muscle and its digitations are clearly defined in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. III. fig. 6, and Pl. IV. fig. 9, *S.p.p*), where its attachments are as in *Lemur catta*.

We only noticed two digitations in *Nycticebus tardigradus*.

According to Van Campen[10] this muscle in *Potto* "is there as ordinary."

In *Tarsius*[11] it has six digitations; from the seventh to the thirteenth rib, and is stronger than the serratus posticus anterior.

In *Cheiromys* it is, in our specimen, distinctly marked, and inserted by broad digita-

[1] See Cuvier, *l. c.* pl. 68. fig. 1, and pl. 69. fig. 1, I. in *L. varius*, and pl. 67. fig. I. in *Loris gracilis*.

[2] Cuvier in his figure of *L. varius*, pl. 68. fig. 1, 5ᶜ, represents a slip as coming from the latissimus dorsi, joining the third part of the pectoralis major near its insertion; it is, however, spoken of as cutaneous.

[3] *Loc. cit.* p. 267. [4] *Loc. cit.* p. 30. [5] *Loc. cit.* p. 50, tab. 3. fig. 1. 16.

[6] *Loc. cit.* p. 59. [7] See Cuvier, pl. 71. fig. 1. 10. [8] *Loc. cit.* p. 31.

[9] *Loc. cit.* p. 39, tab. 4. figs. 1 & A. [10] *Loc. cit.* p. 31. [11] *Loc. cit.* p. 39.

tions into the last six ribs, interdigitating with the external oblique. Owen does not refer to this muscle.

Sacro-lumbalis[1].—Rapidly narrowing after emergence from the general mass of the erector spinæ, the sacro-lumbalis is inserted by tendons into the posterior (inferior) borders of all the ribs, except the thirteenth, taking fresh origin (as the accessorius) by tendons springing from the anterior (superior) margins of the nine or ten hindermost ribs.

In *L. xanthomystax* it has attachments by muscular fibres to all the twelve ribs present; the outer tendons are attached to the nine anterior ribs only.

Figured in *Galago crassicaudatus* (Pl. III. fig. 6, and Pl. IV. figs. 9 & 10, *S.l*).

In *G. allenii* it is small and thin, and branches from the longissimus rather behind (below) the last short rib. It is attached to all the ribs.

Its attachment to the ribs in *Nycticebus tardigradus* is from the fifteenth to the first.

In *Tarsius*[2] it appears to agree very nearly with *L. catta*, as it does substantially in *Cheiromys*.

The Cervicalis ascendens is the continuation of the preceding muscle (sacro-lumbalis) forwards. It is separately inserted by a single tendon into the transverse process of the seventh cervical vertebra.

See dissection of *Galago crassicaudatus* (Pl. IV. fig. 9, *C.as*).

Burmeister[3] speaks of a continuation of the sacro-lumbalis to the transverse process of the seventh cervical vertebra; but the muscle he compares with the cervicalis descendens has nothing to do with it, but is the cervical part of the semispinalis.

Longissimus dorsi[4].—Having origin from the parts adjoining the conjoined lumbar muscular mass, this is ultimately inserted into the anapophyses and transverse processes of the lumbar and dorsal vertebræ by tendons.

In *Nycticebus* its origin is from the eleventh dorsal vertebra; the other Lemurs, *Galago*, *Tarsius*, and *Cheiromys*, agree with *L. catta*. It is shown in *Galago crassicaudatus* (Pl. III. fig. 6, and Pl. IV. figs. 9 & 10, *Lo.d*).

The Transversalis cervicis continues the foregoing muscle to the transverse processes of the seventh, sixth, fifth, and fourth cervical vertebræ.

In *L. varius* and *L. xanthomystax* it extends up to the third cervical vertebra.

It is delineated in *Galago crassicaudatus* (Pl. IV. fig. 9, *Tr.c*).

In *Nycticebus tardigradus* it reaches from the seventh to the second cervical vertebra inclusive. In *Tarsius*[5] this muscle continues up to the atlas, being attached to the six first cervical vertebræ.

Spinalis dorsi.—We could not satisfactorily define this as a distinct muscle in *Lemur catta*, as it seemed inseparable from the fibres of the longissimus dorsi. The other genera examined by us did not exhibit any clear line of demarcation.

[1] Figured by Cuvier in *L. catta*, pl. 71. fig. 2, C.

[2] *Loc. cit.* p. 40, tab. 4. fig. 4, B.

[3] *Loc. cit.* p. 40.

[4] Figured by Cuvier in *L. catta*, pl. 71. fig. 2, B.

[5] *Loc. cit.* p. 38, tab. 4. fig. 4, *f*.

Semispinalis, as usual, extends forwards, upwards, and inwards from the metapophyses to the spinous processes. Of its two parts the semispinalis dorsi is thick in the lumbar region, and with strong and rather short tendons; but in the dorsal region it is more slender and the tendon much longer, the latter extending over four or five vertebræ. The other part, the semispinalis colli[1] is thick, and the tendons are short and inconspicuous.

We have dragged out these muscles and slightly exaggerated their tendons in *Galago crassicaudatus* (Pl. IV. figs. 10 & 11, $\frac{1}{2}$ *Sp.c* and $\frac{1}{2}$ *Sp.d*).

In *Tarsius* the cervical portion of this muscle is compared by Burmeister[2] to the cervicalis descendens.

Multifidus spinæ.—In *Lemur* this, as in Man, fills the grooves between the transverse and spinous processes. It is very fleshy all along the spine; and though the tendons are distinctly seen going from the former to the latter, yet the whole mass is very continuous.

See *Galago crassicaudatus* (Pl. IV. figs. 10 & 11, *Ml.s*), each muscular bundle being divided from its fellow, so that the continuity of the whole mass is lost.

4. *Muscles of the Tail.*

Caudal Region (Dorsal and Ventral Surfaces).

Levator caudæ externus.—This is evidently more or less the continuation backwards of the longissimus dorsi. It arises from the upper (posterior) surfaces of the lumbar and sacral transverse processes, and from the proximal caudal vertebræ. It consists of numerous fleshy bellies, ending in very long and slender tendons, which pass inwards and backwards to be inserted into the caudal metapophyses. This muscle is considerably larger than the levator caudæ internus. In *L. varius* it arises by five tendons from the metapophyses of the lumbar vertebræ.

Displayed in position in the Grand Galago, Pl. II. fig. 3, *L.c.e*, and with the tendons dragged out in Pl. VI. fig. 25, *L.c.e*.

Levator caudæ internus.—This division forms the continuation backwards of the semispinalis and the muscles internal to that. It arises from the spinous processes of the sacral vertebræ, and is inserted by tendons into the caudal metapophyses, being continued backwards as a series of fleshy bundles between the caudal zygapophyses and the middle of the dorsum of the tail. Shown in *Galago*, Pl. II. fig. 3, *L.c.i*, and tendons separated, Pl. VI. fig. 25, *L.c.i*.

The above two caudal muscles in the short-tailed genera, as might be expected, are very imperfectly developed; yet distinct rudiments of both exist. The former muscle in *Nycticebus* has a very few fleshy fibres, with an outer border of tendon continued from the loins on the backs of the sacral vertebræ almost to the coccygeal ones, where very fine tendons, like a fascia, seem to proceed to the end of the tail. The latter muscle

[1] Figured by Cuvier in *L. catta*, pl. 71. fig. 3, E.

[2] *Loc. cit.* p. 38, tab. 4. fig. 4, *r*.

has a similar appearance to that described, and overlies it, the two filling the flattened surface between the spines and tips of the transverse processes.

Pubo-coccygeus and ilio-coccygeus.—These muscles are represented by a broad, flat sheet of muscle arising from the sacro-iliac synchondrosis and the fascia investing the psoas parvus, also from the inside of the so-called "horizontal" ramus of the pubis, as far as the symphysis. Their united insertion is into the chevron bone placed between the third and the fourth caudal vertebræ.

Partly shown in Pls. II. and VI. figs. 3 & 25, and severed, excepting origin and insertion, in Pl. V. fig. 19, *P. & i. c.*

In the Slow Loris the united representative of the above is comparatively of large size, though thin. It covers the obturator internus from near the pubis to the posterior end of the brim of the pelvis, and is inserted on the under surface of the third caudal element.

The Sacro-coccygeus arises by considerable fleshy bellies from the ventral surface of the bodies of all the sacral and the first five caudal vertebræ. It is continued backwards between the chevron bones and transverse processes of the caudal vertebræ with numerous long tendons, like the levator caudæ externus.

Indicated in position in *Galago crassicaudatus* (Pl. II. fig. 3, *S.c*), and with tendons apart (Pls. V. and VI. figs. 19 & 25, *S.c*).

Nycticebus has this well developed and muscular; it is partly united to the internal sphincter ani and to the surface of the infra-coccygeus, and is inserted on the caudal vertebræ.

The Ischio-coccygeus has origin from the spine of the ischium and the part immediately anterior (superior) to it, above (behind) the acetabulum. Expanding in a fan-like manner, it is inserted into the tail beneath the transverse processes of the first four caudal vertebræ.

It exhibits little or no difference in the Galagos, see Pl. VI. fig. 25, *Is.c.*

It is broad and strong in the Nycticebinæ, and drags the abortive tail well downwards and forwards, so that this organ in the live animal almost seems absent.

The Infra-coccygeus arises by muscular fibres from the last sacral and the first five caudal vertebræ. It connects together the chevron bones of contiguous vertebræ for about half the length of the tail.

In *Galago* it connects the caudal vertebræ in the middle line below, but barely attains the sacrum (Pl. V. fig. 19, *I.c*).

The two small infra-coccygeal muscles in the Slow Loris lie close together, and appear as a narrow muscular riband lying on the inferior sacral surface. Tendons cannot be traced into the rudimentary tail.

Intertransversarii caudæ.—This muscle (or series of muscles) is, as Meckel remarks of *Ateles*[1], of considerable size at the root of the tail. It arises from the dorsum of the

[1] *Loc. cit.* vol. vi. p. 179.

thick transverse process of the first sacral vertebra, also from the fascia connected with the upper (posterior) margin of the ilium.

It gives origin to tendons which are inserted upon the caudal transverse processes, which it connects together, the tendons arising from the posterior transverse process of one vertebra and going to the anterior transverse process of the vertebra next but one behind that from the transverse process of which it springs.

These semiunited series of muscular bellies and tendons are seen in position in the Thick-tailed *Galago*, Pls. V. & VI. figs. 19 & 25, *It.cd*, and a segment of the tail with two muscles of the one side hooked out in Pl. VI. fig. 26, *It.cd*.

These can hardly be said to be present in the short-tailed genera. We could not define them in *N. tardigradus*.

5. *Muscles of the Pelvic Limb.*

a. *Pelvic Regions (Dorsal and Ventral aspect).*

Gluteus maximus, or Ecto-gluteus of Owen[1].—In *Lemur* this is a very large and powerful muscle[2], with an extensive origin and also an extensive insertion. Its origin is partly aponeurotic and partly muscular. It arises by aponeurosis from the anterior superior (posterior superior of Man) angle of the ilium, from the lumbar fascia (at its posterior part), and from the spines of the sacral vertebræ. It arises by muscular fibres from the inferior anterior (anterior superior of Man) spines of the ilium and from the transverse processes of the first three caudal vertebræ. The part which arises by muscle from the inferior anterior spine of the ilium is that which is described as the tensor fasciæ latæ by Burmeister in *Tarsius*, and is connected only by aponeurosis with the part which arises from the anterior superior angle of that bone—this aponeurosis covering over the gluteus medius lying beneath. This muscle is inserted (gliding over the outside of the peroneal trochanter) into the third trochanter, and into the posterior surface of the femur side by side with the adductor magnus, and very closely connected with it. No fibres are inserted into the aponeurosis of the thigh.

There is a certain distinctness between the part arising from the pelvis and that coming from the tail; the long supracaudal muscles passing above the origin of the caudal part, and beneath that of the sacral portion.

In *L. xanthomystax* and *L. nigrifrons* the insertion extended right down to the external condyle.

In *Galago* the aponeurotic interval is less perceptible, and there is a strong tendon running along the inferior margin of the part inserted into the third trochanter. See

[1] In the Trans. Zool. Soc. vol. v. pp. 15, 65, Prof. Owen has proposed the terms "ecto-," "meso-," and "ento-," for the gluteal muscles respectively, as indicating their relative position; for in Mammals their proportional volume is not the same as in Man.

[2] Figured by Cuvier in *L. varius*, pl. 70. fig. 1, *a*; and in *Loris gracilis*, pl. 67. fig. 1, *a*.

dissections of *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 21, and Pl. VI. fig. 25, *G.mx*[1], *G. mx*[2], *G.mx*[1*], and *G.mx*[2*]).

In *Nycticebus* the aponeurotic interval is slight; and there is no origin from the tail.

In the *Potto*, according to Van Campen[1], it is partly inserted into the great trochanter.

In *Tarsius*[2] this muscle is very similar to its homologue in *L. catta*; but its caudal portion, as in *Galago*, is more distinct, and is described by Burmeister as the pyriformis.

The same in *Cheiromys* as in *L. catta*, except that it arises from the first two caudal vertebræ, and has no aponeurotic interval.

Gluteus medius[3], or Mesogluteus of Owen.—This is very thick and fleshy, and arises from the whole outer surface of the ilium and from the aponeurosis separating the levator caudæ externus and the intertransversarii caudæ from the ischiococcygeus and pyriformis. It is inserted into the outer side of the peroneal trochanter, near its posterior margin, anterior to and below the insertion of the pyriformis, with which muscle the posterior portion of the gluteus medius is closely united.

In some specimens of *Lemur* examined by us the inferior portion (anterior of Man) was more or less separable, so much so as to suggest the possibility of its being a scansorius. Such a separate part appears to exist in *Tarsius*, and is described by Burmeister (p. 69, and tab. 4. fig. 5. no. 6) as a part of the gluteus minimus.

The gluteus medius of *Galago crassicaudatus* is depicted in Pl. VI. fig. 25, *G. md.*

The Gluteus minimus, or Ento-gluteus of Owen, is much smaller than the other glutei[4], and arises from the posterior and lower part of the outer surface of the ilium. It is inserted by a narrow tendon into a projecting tubercle in the middle of the sharp anterior margin of the peroneal trochanter.

This muscle in *L. nigrifrons* arose from the whole inferior (anterior) border of the ilium.

In *Galago crassicaudatus* and in *G. allenii* it is quite distinct from the gluteus medius, but very small and short, arising only round the upper part of the acetabulum. It rather corresponds with the gemelli in appearance than with the ordinary glutei (Pl. VI. fig. 25, *G. mi*).

In *Perodicticus* Van Campen[5] says that the gluteus tertius is inserted into the trochanteric fossa.

In *Tarsius* it appears to be as in *L. catta*; but Burmeister[6] describes as a part of it what in our Lemuroids forms a part of the gluteus medius.

It is the same in *Cheiromys*[7] as in *Lemur catta.*

The Scansorius does not exist as a distinct muscle in any of the Lemuroidea.

Pyriformis.—A large muscle[8] which, at its anterior border, is closely connected with

[1] *Loc. cit.* p. 39. [2] *Loc. cit.* pp. 68, 69, tab. 3. fig. 1. 4, 4*a*, & 7.

[3] Figured by Cuvier in *L. varius*, pl. 70. fig. 2, a[1], and by Owen, *loc. cit.* p. 66, pl. xxv. fig. 3. no. 51.

[4] Indicated by Cuvier in *L. varius*, pl. 70. fig. 2, a[2]. [5] *Loc. cit.* p. 39.

[6] *Loc. cit.* p. 69, tab. 4. fig. 6. no. 6. [7] See Owen, *l. c.* p. 66. [8] Figured by Cuvier, pl. 70. fig. 2, f.

the gluteus medius. It arises from the inferior (anterior) surface of the sacrum, reaching as high up as the middle of the auricular surface. Converging as usual, it is inserted into almost the very summit of the posterior border of the peroneal trochanter, beneath the insertion of the gluteus medius.

This muscle is connected with the gluteus medius by tendon as well as by muscular fibre, both in *L. varius* and *L. nigrifrons*. In *L. xanthomystax* it is also partly adherent to the gluteus medius, but still more distinct than in those two species.

Galago agrees with *Lemur*, excepting that the muscle reaches no higher than the lower part of the sacro-iliac synchondrosis (Pl. V. fig. 19, and Pl. VI. fig. 25, *Py*).

In *Tarsius*, as before said, Burmeister[1] has described as pyriformis a part of the gluteus maximus He says, indeed, that a double pyriformis exists in this genus. His first pyriformis (tab. 4. fig. 5. no. 7) is part of our gluteus maximus; his second part is described as a triangular muscle springing from the sacrum and going to the thigh; this portion appears to be the pyriformis proper. We are inclined to doubt the accuracy of the delineation of this muscle.

It is described by Professor Owen in *Cheiromys*, p. 145.

Gemellus superior.—This springs from the spine of the ischium, and is inserted into the anterior (upper) part of the deep surface of the tendon of the obturator internus, and, in common with it, into the trochanter fossa.

The gemelli are figured by Cuvier in *L. varius*, pl. 70. fig. 2, *e* and e^1.

The other genera present similar characters. Illustrated in *Galago crassicaudatus*, Pl. VI. fig. 25, *G.s*, and in *Tarsius*, *l. c.* p. 70. tab. in fig. 6. no. 8, *b*.

Gemellus inferior[2].—This, which is larger than the preceding, arises from the upper (posterior) surface of the tuberosity of the ischium and from the lower part of the so-called "ascending" ramus of the ischium. It is inserted into the posterior (inferior) surface of the tendon of the obturator internus and also into the adjacent part of the tendon of the obturator externus, and also between them both into the trochanteric fossa. The two gemelli muscles are closely connected together, especially at their origin.

That of *Galago crassicaudatus* is shown in Pl. V. fig. 21, and Pl. VI. fig. 25, *G. i*.

When describing the pectineus, Owen[3] mentions that "beneath it are strong and thick gemelli converging from their origin on the anterior surface of the pubis and ischium to the interspace between the small and large trochanter."

Obturator externus[4].—A very thick layer with origin from the whole external circumference of the obturator foramen and from the lower half of the obturator membrane. It is inserted, by a very strong tendon, into the lowest portion of the fossa behind the peroneal trochanter.

[1] *Loc. cit.* p. 69, tab. 4. fig. 5. no. 7, *a*.

[2] *Tarsius, loc. cit.* pl. 70. tab. 4. fig. 6. no. 8, *a*.

[3] *Loc. cit.* p. 66.

[4] *Tarsius, loc. cit.* p. 71, tab. 4. fig. 6. no. 10.

In *Lemur xanthomystax* it was observed by us to cover the whole of the obturator membrane.

Represented in *Galago crassicaudatus* (Pl. V. fig. 21, *Ob. e*).

The Obturator internus, which has much tendinous fibre on its surface, arises from the whole internal circumference of the obturator foramen, except, perhaps, on its upper posterior side. It is inserted immediately above the insertion of the obturator externus.

We consider the tendon very strong in *Galago allenii*. The muscle in *G. crassicaudatus* is shown in Pl. V. fig. 19, and the tendon of insertion Pl. VI. fig. 25, *Ob. i*.

Quadratus femoris.—This is a very voluminous muscle. It arises from the tuberosity of the ischium immediately in front of the origins of the biceps and semimembranosus (*i. e.* these origins are superficial to it), but extending slightly further inwards towards the middle line of the body and still further outwards. It is inserted into the back of the femur for the whole interspace between the insertion of the gluteus maximus and that of the adductor magnus. It lies in the same plane as the last mentioned muscle, and is intimately connected, on its inner side, with the adductor brevis.

In *L. varius* it is shown by Cuvier, 'Myologie,' pl. 70. fig. 2, *b*.

Displayed in the dissections of *Galago crassicaudatus* (Pl. V. fig. 21, and Pl. VI. fig. 25, *Q.f*).

In *Nycticebus* it is not large, but is the reverse in *Loris gracilis*.

This muscle is not mentioned by Van Campen in *Perodicticus*; but perhaps he has taken the adductor magnus for it.

In *Tarsius* it appears to be as in *L. catta* from the description; but only a small portion is represented in Burmeister's plate 70. figs. 4, 6, no. 12.

Iliacus.—In *Lemur catta*[1] it arises from the internal surface of the ilium external to the ilio-pectineal line, and is inserted by a tendon common to it and the psoas magnus into the peroneal trochanter.

In the genus *Lemur* it can hardly be said to be double; but in *Galago* (*i. e.* in *G. garnettii* and *G. allenii*) the disposition is not perfectly the same in each animal, although it may be considered as arising in two portions. In *G. garnettii* the portion from the ilium is small, and only arises from the anterior superior spinous process of Man. The second portion, coming from the body of the last lumbar vertebra, joins the above-mentioned; and they have undoubtedly a single insertion, namely, by a strong, flat tendon into the border of the tibial trochanter, being very slightly connected with the insertion of the psoas magnus, which is fleshy. *G. crassicaudatus* with this, Pl. V. figs. 19 & 20, *Il*.

In *G. allenii* the first or innermost portion arises from the whole anterior border of the ilium, excepting as much as is occupied by the second slip. It is inserted into the tibial trochanter by muscular fibres. The obturator nerve passes between the upper

[1] Cuvier has only shown a small portion of this muscle in *L. catta*, pl. 70. figs. 2 & 3, *i*.

part of the muscle and the psoas magnus. The second division of the iliacus in *G. allenii* has a similar but rather higher origin, to the anterior superior spinous process. It lies outside the last and is the more laterally compressed of the two. Its insertion into the trochanter is by a strong, broad tendon, the three tendons of the psoas muscles and the iliacus being close together.

The subvertebral muscles, psoas, iliacus, &c., in *Loris gracilis* answer exactly the condition described by Meckel (*l. c.* p. 374), viz.:—there is an inner tendinous psoas parvus attaching itself inferiorly (posteriorly) to the front of the lowest lumbar vertebra, but no insertion into the ilium or pubes: secondly, there is a normal psoas and iliacus; and the fourth muscle of Meckel (query, our external iliacus?) arises nearly as high as the dorsal vertebræ, and, quite separate below, ends in a strong, round tendon inserted into the tibial trochanter.

In *Nycticebus tardigradus*[1] there appears to be but one large muscular mass representing the iliacus. It arises from the sides of the bodies of the lumbar vertebræ below the third, and from the front of the sacrum, but it has no origin from the ilium.

Van Campen has remarked nothing peculiar in this muscle in *Perodicticus*[2], nor has Burmeister in *Tarsius*[3].

In *Cheiromys* it is as in *L. catta*; our specimen agrees with Owen's description.

Psoas magnus.—Arises from the bodies and transverse processes of the last three lumbar vertebræ, and joining the iliacus it is inserted along with it, by a common tendon, into the tibial trochanter.

In *L. varius*, *L. xanthomystax*, and *L. nigrifrons*, however, it can only be separated with difficulty from what seems in these animals a single iliacus.

In *Galago crassicaudatus* (Pl. V. figs. 19 & 20, *Ps.m*) and in *G. allenii* it is like *L. catta*; but in *G. garnettii* we especially noted that it also arose very broadly from the inner surface of the ilium.

In *Nycticebus*[1], as already hinted at, it arises from the last two dorsal and six upper lumbar vertebræ.

In *Tarsius*[4] this muscle is said to be double, and arises as high as the last dorsal.

Psoas parvus.—This is a very large muscle, about as large as the psoas magnus. It arises from the bodies of the last dorsal and first three lumbar vertebræ, and ends in a very strong and expanded tendon, which, as it were, binds down the psoas magnus, and is inserted into the iliopectineal eminence.

In *L. xanthomystax* it arises from the second, third, and fourth lumbar vertebræ, and is equally as strong as in *L. catta*, ending in a similar tendinous insertion.

In *Galago crassicaudatus* (Pl. V. figs. 19 & 20, *Ps.p*) the muscle is long but not nearly so large as the psoas magnus. It has a fleshy origin from the fronts of the bodies of the third, fourth, and fifth lumbar, but not from the dorsal vertebræ.

[1] P. Z. S. 1865, p. 248. [2] *Loc. cit.* p. 140. [3] *Op. cit.* p. 67, tab. 4. fig. 5. no. 3.
[4] *Loc. cit.* p. 67, tab. 4. fig. 2. 2 & 2 *a*.

It ends in a narrow but strong tendon inserted into the prominence at the brim of the pelvis.

In *G. allenii* the same, but only from the three upper lumbar vertebræ.

In our specimen of *Loris gracilis* it was either absent or only subvertebral.

In *Nycticebus* it is much as in *L. catta*, but arises only from the second and third lumbar vertebræ[1].

In *Tarsius* it is like *L. catta*, but is represented as bifurcating, allowing (as Burmeister shows in his plate) the iliacus and psoas magnus to pass between[2].

In *Cheiromys* it is quite like *L. catta*, and not at all ill defined.

Quadratus lumborum.—This muscle is represented by a series of tendons with a very small quantity of muscular fibre, and extends backwards from the eleventh dorsal vertebra to the inner surface of the ilium.

In *L. varius* it reaches no further forwards (higher) than the anterior edge of the last dorsal. In *L. xanthomystax* it springs from the third last or tenth dorsal vertebra. In *L. nigrifrons* it is like *L. catta*.

Displayed in position on the one side and dragged out on the other in the partial dissection of *Galago crassicaudatus* (Pl. V. fig. 19, *Q.l*).

In this animal as in *G. garnettii* the quadratus lumborum is much as in *L. catta*, and is in close relation with the iliacus. It is composed of a series of tendons and intervening muscular fibre arising from the bodies and transverse processes of the last dorsal and three anterior lumbar vertebræ. Somewhat like the spinalis dorsi, this muscle sends tendons backwards to the transverse processes of the two hindermost lumbar vertebræ, and one to the crest of the ilium.

Its attachments in *Loris* and *Nycticebus* are the two transverse processes of the lumbar vertebræ from about the fourth downwards to the ilium.

In *Tarsius*[3] it seems to be essentially similar; and in *Cheiromys* it is quite as in *L. catta*.

b. *Femoral Region.*

The Pectineus[4] arises from the so-called horizontal ramus of the pubis, external to the origin of the gracilis. It is inserted into the ridge leading from the tibial trochanter to the linea aspera.

This muscle in *Galago crassicaudatus* is figured in Pl. V. figs. 19 & 20, *Pe*.

In *Loris*, as Meckel says, this muscle is very strong, and there are four adductors besides.

In *Tarsius* it is as in *L. catta*. Burmeister considers it the antagonist of the quadrator femoris[5].

[1] Mivart and Murie, *loc. cit.* p. 248. [2] *Loc. cit.* p. 67, tab. 4. fig. 2. 1. [3] *Loc. cit.* p. 68.

[4] The muscle named pectineus in Cuvier's plate of *L. varius* is evidently rather a psoas magnus. See pl. 70. fig. 3, *k*; but in *Loris gracilis* it is correctly marked, pl. 67. fig. 2, *k*.

[5] *Loc. cit.* p. 71, tab. 5. fig. 1. 13.

Rectus femoris.—This muscle arises from the prominent posterior inferior (inferior anterior) spinous process of the ilium by a very strong tendon, and also, as in Man[1], by a branch of the same tendon from the anterior (superior) margin of the acetabulum. It is considerably overlapped by the vastus externus, and is inserted as usual into the patella in common with the other parts of the (here very distinct) quadriceps extensor.

See Cuvier, pl. 70. figs. 1, 2, & 3, *p* (*L. varius*), and pl. 67. figs. 1 & 2, *p* (*Loris gracilis.*

It has most certainly a double tendon of origin in *L. varius*, *L. xanthomystax*, and in *L. nigrifrons.*

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. figs. 19 & 20, and Pl. VI. fig. 25, *R.f*). It is double-headed. In *Galago garnettii* the united tendon extends for two-fifths of the whole length of the muscle. In *G. allenii* the muscular portion is as long as the lower two-thirds of the femur, which is likewise the case in the Grand Galago.

There is a double tendon in *Nycticebus*, in *Cheiromys*[2], and in *Tarsius*[3].

Vastus internus[4].—In *Lemur catta* this is a small muscle arising from the inner surface of the femur, its origin extending beside the insertion of the psoas and iliacus.

Cuvier figures it in *L. varius* (see his 'Recueil,' pl. 70. fig. 3, *n*) and in *Loris gracilis* (*l. c.* pl. 67. fig. 2, *n*); that of *Galago crassicaudatus* is shown by ourselves (Pl. II. fig. 3, and Pl. V. figs. 19 & 20, *V. i*).

In *Tarsius*[5] this muscle is said to be divisible into two layers, the lower one of which seems to be an internal division of our crureus.

Vastus externus[6].—A very long muscle indeed, and embracing the whole outer side of the thigh, even overlapping the rectus. It arises from the outer and anterior margin of the peroneal trochanter and from the outer side of the third trochanter, and it is inserted as usual.

Cuvier figures it in his 'Recueil,' pl. 70. fig. 1, *m* (*L. varius*), and pl. 67. fig. 1, *m* (*Loris gracilis*).

It is uncommonly large in *Galago crassicaudatus*, and, if at all, is very indistinctly divided. Exhibited in Pl. II. fig. 3, Pl. V. fig. 19, and Pl. VI. fig. 25, *V. e.*

In *Loris* and *Nycticebus* it is very much smaller relatively than it is in the *Lemurs* and *Galagos.*

In *Cheiromys* it is of great size and single, as in *Lemur* and *Galago.*

In *Tarsius* this muscle is not only of very large size, but separable into two distinct

[1] Henley mentions a single origin !

[2] *Loc. cit.* p. 66, pls. xxiv., xxv. figs. 1–3, no. 16.

[3] *Loc. cit.* p. 72, tab. 4. fig. 5. 16, and tab. 3. fig. 1. 16.

[4] Owen, *Cheiromys*, *l. c.* p. 66, pl. xxiv. and xxv. figs. 1 and 2, 18.

[5] *Loc. cit.* pp. 72, 73, tab. 3. fig. 1. 18, and tab. 4. fig. 5. 18 *a*.

[6] Trans. Zool. Soc. vol. v. p. 66, pl. xxv. figs. 1 & 3, no. 17.

muscles, named by Burmeister, the one vastus externus (his no. 17), and the other cruralis (his no. 19)[1].

These two muscles are again separable, according to him, into a superior and inferior layer, as is also the case with regard to the vastus internus, as Burmeister says that the exterior muscles are divisible into two distinct layers, making in all seven exterior muscles of the thigh. The first layer consists, besides the rectus femoris, of the vastus externus, the vastus internus, and the cruralis; the second layer of the so-called deep vastus externus, deep vastus internus, and deep cruralis.

Of these seven muscles as many as two (namely, the cruralis and the superficial vastus externus) correspond to our vastus externus of *L. catta*. Burmeister's deep cruralis is our crureus; his deep vastus internus has no representative in the Lemuroids examined by us, unless, as we think, it is a separable inner part of our crureus, and his deep vastus externus a similar external portion of the same.

Crureus.—This is a very distinct and separate muscle, extending along the whole length of the femur. It is narrow and somewhat compressed at its upper part, and arises from the whole of the front and middle of the outer side of the femur as high as its neck, extending round that bone from the insertion of the gluteus maximus on one side to that of the adductor magnus on the other. It has a broadly tendinous glistening surface, and is inserted as usual.

In *L. varius* there can hardly be said to be a subcrureus present; but the crureus muscle itself descends on either side of the condyles, while the main tendon passes on to the patella. The muscle is figured in this species by Cuvier, *l. c.* pl. 70. fig. 2, *o*.

In *L. nigrifrons* we found a distinct subcrureus muscle; this lies beneath the lower tendinous part of the crureus, and it covers almost the lower half of the shaft of the bone. It is most muscular on the outside.

In *Galago crassicaudatus* (Pl. V. figs. 19 & 20, and Pl. VI. fig. 25, *Cr.*), as in other species of the genus examined, the crureus is much as in *L. catta*, the fibres reaching very far round, but not quite to the linea aspera.

In *Nycticebus tardigradus* the crureus presents the same characters as in *L. catta*.

In *Tarsius*[2] this muscle is described as the cruralis inferior (no. 16 *a*) (the deep cruralis before spoken of). In this animal it is very large, and two smaller portions of it are separable, and described by Burmeister respectively as vastus externus inferior (no. 17 *a*) and vastus internus inferior (no. 18 *a*).

In *Cheiromys* the crureus is exactly the same as in *L. catta*; and what Professor Owen describes as an outer division of the muscle is in our specimen inseparable (except artificially) from the vastus externus. Professor Owen[3] says "The outer division of the crureus (fig. 3, 19) is rather a distinct muscle, which might be termed the deep-seated vastus externus; it arises from the fore and outer part of the femur to the condyloid

[1] *Loc. cit.* p. 72, tab. 3. fig 1.

[2] *Loc. cit.* p. 73, tab. 4. fig. 5.

[3] Trans. Zool. Soc. vol. v. p. 66, pl. xxv. figs. 2 & 3.

expansion, and is inserted by a fascia into the outer part of the ligamentum patellæ and capsule of the knee-joint."

The SARTORIUS, a wide and thin muscle, arises from the inferior (anterior) margin of the ilium at its posterior (lower) half, and is inserted in common with the gracilis into the tibia.

Cuvier figures it in *L. varius* (*l. c.* pl. 70. fig. 3, *t*) and in *Loris gracilis* (*l. c.* pl. 67. fig. 2, *t*). That of *Galago crassicaudatus* is delineated in Pl. II. fig. 3, and Pl. V. fig. 19, *Sa.*

Burmeister describes and figures it in *Tarsius*, p. 73, tab. 3. fig. 1. 15; and Owen in *Cheiromys*, p. 64, pls. 24, 25, no. 15.

The GRACILIS is very broad, especially at its origin, which extends along the whole length of the symphysis pubis, nearly half the anterior (superior) margin of the so-called horizontal ramus of the pubis, and for about a quarter of an inch along its so-called descending ramus. It passes downwards and outwards, and at rather more than an inch from its insertion it becomes intimately connected with the semitendinosus, and afterwards with the sartorius, the three being inserted by a common tendon into the outer side of the anterior surface of the tibia, about half an inch below the patella.

It is figured by Cuvier in *L. varius* (*l. c.* pl. 70. fig. 3, *u*) and in *Loris gracilis* (*l. c.* pl. 67. fig. 2, *u*). The gracilis in *Loris gracilis* has two heads, as Meckel says; but the apparent third head is really the semitendinosus, which muscle also joins the gracilis in *Nycticebus.*

In *Galago* it is inserted along with the sartorius, which partially overlaps and hides it. *G. crassicaudatus* (Pl. II. fig. 3, and Pl. V. figs. 19 & 20, *Gr*) shows its origin and insertion, the muscle being relatively smaller than in our type.

There is little or no difference presented in *Nycticebus*[1]. We did not find the division spoken of by Meckel[2].

In *Tarsius*[3] it is very small indeed, the smallest of all the thigh muscles.

In *Cheiromys*[4] it is much as in *Lemur catta.*

ADDUCTOR MAGNUS.—This is the longest, largest, and most externally inserted of the adductors. It has a strongly tendinous origin from the margin of the so-called descending ramus of the pubis; the origin of the posterior part of the gracilis being superficial to it. It is inserted into rather more than the middle third of the femur.

The distinction between this muscle and the adductor brevis is not defined in Cuvier's plate of *L. varius*, but they are together marked l^1 and l^2, pl. 70. fig. 3. The same is the case in *Loris gracilis*, pl. 67. fig. 2, l^1 and l^2.

In *L. xanthomystax*, the limb having been separated from the body, the origins of the adductors were severed; therefore the origin of the following slip was not noticed.

[1] P. Z. S. 1865, p. 249.

[2] Anat. Comp. vol. vi. p. 397.

[3] *Loc. cit.* p. 74, tab. 3. fig. 1, no. 14.

[4] *Loc. cit.* p. 65, pl. 64. no. 14.

The slip referred to, viz. a roundish belly, terminating in fascia in the middle of the length of the femur, near the insertion of the conjoined adductors magnus and brevis.

With an origin similar to that of the Ringtailed Lemur, the adductor magnus in *Galago crassicaudatus* has an insertion for two-thirds of the upper and postero-inner shaft of the femur (Pl. V. figs. 19, 20, & 21, *Ad. m*).

In *Nycticebus tardigradus* the adductor magnus arises from the tuberosity of the ischium for a breadth of 0″·4, and is inserted by a broad linear interval from the base of the great trochanter to the lower two-thirds of the shaft. This muscle is not perforated by the femoral artery.

According to Burmeister the adductor muscles in *Tarsius*[1] are two in number. The inner springs from the descending ramus of the pubis, and also from the ascending branch of the ischium, and is inserted into the inner side of the linea aspera for rather more than half the shaft of the femur. The posterior adductor springs by tendon from the tuberosity and the rest of the ascending branch of the ischium, and is inserted into the posterior surface of the femur above the last (tab. 4. fig. 5. 12). The inner one of Burmeister seems in the main to be our adductor magnus, which, however, is the outermost adductor as regards its insertion.

In *Cheiromys* we find it is quite as in *L. catta*. What Professor[2] Owen describes as the adductor magnus, is evidently our quadratus femoris, as we are inclined to think is the case with the adductor magnus of Van Campen[3].

Adductor longus.—This the shortest, smallest, and most internally inserted of the adductor muscles. It arises from the anterior upper extremity of the symphysis pubis and from the so-called horizontal ramus of the pubis, beneath the gracilis. It becomes entirely aponeurotic near its insertion, which is into the femur just within and in close union with that of the adductor brevis.

This muscle appears in Cuvier's plate of *L. varius*[4] to be confused with the pectineus, what is described as the pectineus being really the psoas. In his figure of *Loris gracilis*, however, they are represented distinctly[5].

It is not quite so short in *L. nigrifrons*, and it is muscular, with an insertion almost to the upper part of the adductor magnus.

A narrow strip-like plane of muscular fibres represents the adductor longus in the Thick-tailed Galago (Pl. V. figs. 19 & 20, *Ad. l*). Its origin is as in *L. catta*, and insertion like that of *L. nigrifrons*. It is in close apposition with the pectineus.

We found a slight difference in the right and left legs of *Nycticebus tardigradus*. The condition in the former was much as in *L. catta*. We noted that the upper margin of its insertion was conterminous with the pectineus, but that the adductor longus descended fully 0″·3 below it. In the left limb there seemed to be a division between the two

[1] *Loc. cit.* p. 71.
[2] *Loc. cit.* p. 65, pl. xxv. fig. 3.
[3] *Perodicticus, l. c.* p. 41.
[4] Pl. 70. fig. 3, *l*.
[5] Pl. 67. fig. 2, where *l* points to the adductor longus, and *k* to the true pectineus.

planes of its fibres, so that two muscles could be reckoned—the smaller being the anterior with a less insertion into the femur.

In comparing Burmeister's description with our own, we cannot say whether this muscle or adductor brevis is represented by his posterior adductor.

In *Cheiromys* it is exactly as in *L. catta*. What Owen[1] describes as the adductor longus, is apparently both our adductor longus and adductor brevis.

The Adductor brevis[2] is a shorter muscle than the adductor longus, but is much thicker at its origin, where it is more or less separable into two parts, which become completely blended together below. It arises from the pubis beneath the origin of the gracilis; and its fibres, radiating as it descends, are inserted into the back of the femur internally to the insertion of the adductor magnus. Its insertion extends about ·4 of an inch higher up the femur than that of the adductor magnus, but does not extend so low down as that muscle by as much as 1·2 inch.

Figured in *Galago crassicaudatus* (Pl. V. figs. 19 & 21, *Ad. b*).

In *Nycticebus* the adductor brevis is longer than the adductor longus, and is much narrower; it arises by a narrow tendon just in front of the tuberosity of the ischium, beneath the gracilis. The fibres below join those of the adductor magnus, and they are inserted together.

Van Campen[3] speaks of a fourth adductor as existing in *Perodicticus*, arising from the horizontal ramus of the pubis, beneath the pectineus, and going to the small trochanter of the femur. As before said, we cannot determine the representative of this muscle in *Tarsius*.

In *Cheiromys* we found the adductor brevis substantially as in *L. catta*, its tendency to division quite as much pronounced.

Tensor vaginæ femoris[4].—We are inclined to agree with Meckel in considering this muscle to be absent in *Lemur*, as the part so named by Burmeister in *Tarsius* seems rather to be a mere portion of the gluteus maximus. In all our Galagos but one we also failed to detect any trace of this muscle; in one specimen of *G. crassicaudatus*, however, there appeared to be some muscular fibres arising from the crest of the ilium and inserted into the fascia lata, which was of unusual strength. We have not, however, thought proper to introduce this into our plate as a distinct muscle, partly because of its very exceptional occurrence, and partly because we do not feel sure that it is not rather to be considered an exceptional development of the gluteus maximus.

In *Nycticebus* some fibres come from the lower belly to the groin, which may represent the muscle in question.

In *Tarsius*[5] the muscle described as tensor fasciæ latæ is, according to our view, only part of the gluteus maximus.

[1] *Loc. cit.* p. 65, pl. xxv. fig. 2, no. 12.

[2] As before said, in Cuvier's figures this is not marked off from the adductor magnus.

[3] *Loc. cit.* p. 42.

[4] This muscle is not represented in Cuvier's plates of the Lemuroids.

[5] *Loc. cit.* p. 68, tab. 3. fig. 1, 4 *a*.

Professor Owen found in *Cheiromys* a condition similar to that which we noticed in our *Galago crassicaudatus*; for he says[1] "the tensor vaginæ femoris is represented by a small fasciculus from the anterior superior spine of the ilium, which extends into the fascia covering the fore and outer part of the thigh." In our specimen, however, we find no trace of such a structure.

The BICEPS FEMORIS[2] arises by a long and very strong tendon from the outermost and most posterior part of the tuberosity of the ischium. The tendon is continued in the substance of the muscle, and on its inner surface, for more than half its length. The fibres spring from this tendon in a penniform manner, but very many more taking origin from its outer than its inner side. Those fibres which spring from the posterior part of the outer side of the tendon are inserted into the aponeurosis connecting this muscle with the vastus externus. All the other fibres radiate and are lost in the fascia investing the outer side of the leg.

In *L. varius* the tendon is only for nearly half the length of the muscle, and hardly quite so far in *L. nigrifrons*.

The biceps in *Galago* is simpler than in *Lemur*. It has a long, strong tendon of origin from the tuberosity of the ischium, and a very moderately thick belly, ending in an equally very strong, but flattened, tendon, which is inserted into the outer tuberosity of the tibia. See *G. crassicaudatus*, Pl. II. fig. 3, *B.f*, and Pl. V. fig. 25, *B.f*. Kingma[3] says it is single in *G. peli*.

Loris gracilis, while resembling our type, has this muscle, the semimembranosus, and the semitendinosus remarkably connected at their origins.

In *Nycticebus*[4] it is as in *Lemur catta*, but it is inserted only outside the lower leg.

Burmeister figures it in *Tarsius*[5].

Cheiromys in the main agrees with *L. catta*; Owen's[6] partly muscular origin is only the origin in common of this muscle and the semitendinosus. His origin from the femur is only its adhesion to the vastus externus.

SEMIMEMBRANOSUS[7].—This muscle is round and fleshy at its middle, flat and tendinous at its origin, and very narrow and entirely tendinous at its insertion. It arises from the tuberosity of the ischium, beneath the biceps, but not extending so far backwards, also from the so-called ascending ramus of the ischium at its posterior margin. It is inserted by a strong, round tendon, which passes beneath the internal lateral ligament into the head of the tibia.

In *L. varius*, figured by Cuvier, 'Myology,' pl. 70. figs. 2 & 3, *s*, and in *Loris*, pl. 67. fig. 2, *s*.

[1] *Loc. cit.* p. 64, pls. xxiv. & xxv. figs. 1–3.

[2] Figured in *Lemur varius* by Cuvier, pl. 70. figs. 1, 2, & 3, *q*, and in *Loris gracilis*, pl. 67. figs. 1 & 2, *q*.

[3] Observationes de *Otolicno peli*, p. 30.

[4] P. Z. S. 1865, p. 249.

[5] P. 74, tab. 3. fig. 1. no. 20.

[6] *Loc. cit.* p. 65, pl. xxv. fig. 1. 20.

[7] *Nycticebus tardigradus*, P. Z. S. 1865, p. 249; *Tarsius*, p. 74, tab. 3. fig. 1. no. 22; *Cheiromys*, p. 65, pl. xxv. figs. 2 & 3. nos. 20 & 22.

Delineated in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 19, and Pl. VI. fig. 25, *S.mb*). Substantially it is the same in *G. allenii* as in *L. catta*, but it does not arise from the ascending ramus of the ischium.

In *Nycticebus*, *Tarsius*, and *Cheiromys* it is nearly as in *L. catta*.

Semitendinosus [1].—Arising in common with the biceps from the outer margin of the tuberosity of the ischium, and also in great part from the tendon of origin of the last-mentioned muscle, it is inserted into the tibia in common with the gracilis. It has no origin from the caudal vertebræ.

In Cuvier's representation of *Lemur varius*, pl. 70. fig. 2, *r*, the distal part of this muscle is represented as bifurcating, the larger portion joining the gracilis as usual, but the smaller portion passes to the outside of the leg in conjunction with the biceps.

In *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 19, and Pl. VI. fig. 25, *S.t*).

In *Cheiromys*, according to Professor Owen [2], this muscle is double, having an additional slip arising from the second caudal vertebra adjoining the caudal origin of the gluteus. Our observation confirms this statement.

c. *Tibio-fibular Region of Leg* (*extensors*).

Tibialis anticus [3].—This muscle is quite single, and only of a moderate size. It arises from the upper two-thirds of the peroneal surface of the tibia, as far back as the interosseous membrane. Its insertion is into the anterior end of the tibial margin of the entocuneiform, and not at all into the metatarsal of the hallux. Part of the outer border of this muscle is in contact with part of the inner margin of the peroneus longus.

L. varius, *L. xanthomystax*, and *L. nigrifrons* (Pl. VI. fig. 27, $T.a^1$, $T.a^2$) possess what may be considered a double tibialis anticus muscle. The larger portion or division ($T.a^1$) answers to the condition above described in *L. catta*. The smaller portion ($T.a^2$) has an origin along with the larger one, but superficial and perinead to it. Its small but distinct belly gives origin, at its lower end, to a slender tendon which is inserted into the plantar surface of the proximal end of the first metatarsal. This tendon runs in the same groove as the other part of the tibialis anticus proper, and lies in front of it.

In *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 22, and Pl. VI. figs. 25 & 29, *T.a*), *G. garnettii*, and *G. allenii* it is very large and broad. Its relations to the peroneus longus, peroneus brevis, and extensor longus digitorum, as well as insertion, are the same as in *L. catta*.

There is no division in *Loris gracilis* or in *Nycticebus tardigradus* [4].

[1] Figured by Cuvier in *Loris gracilis*, pl. 67. fig. 2, *r*; by Burmeister in *Tarsius*, p. 74, tab. 3. fig. 1. no. 21.

[2] *Loc. cit.* p. 65, pl. xxv. fig. 1, *a*.

[3] Figured by Cuvier in *L. varius*, pl. 70. figs. 1 & 3, δ, and in *Loris gracilis*, pl. 67. fig. 1, δ.

[4] P. Z. S. 1865, p. 249.

In *Tarsius*[1] it is as in *Lemur catta*.

In *Cheiromys* Professor Owen[2] only speaks of a single tibialis anticus muscle and tendon answering to that described in *L. catta*; but in both limbs of our specimen there was a double tibialis anticus precisely similar in its conditions to that above described in *L. varius*, *xanthomystax*, and *nigrifrons*.

Extensor longus digitorum[3].—This in the right leg of *L. catta* dissected by us was a long, slender and flat muscle, with the edge forwards and overlapped towards its middle by the junction of the tibialis anticus with the peroneus longus. It arose from the head of the tibia, the interosseous membrane, and the inner side of the fibula, but not from its head. It gave origin to four tendons, which went to the four peroneal digits, those going to the second and third digits being joined by the corresponding tendons of the extensor brevis, while that going to the fourth was joined by the peroneus quarti as well as by the corresponding tendon of the extensor brevis, and that going to the fifth digit by the peroneus quinti digiti.

In the left leg of the same animal we observed that a long, prominent tendon on the front edge of the muscle was that of almost a distinct muscle by itself, which had a very small muscular belly reaching as low down as the whole upper third of the leg. Its delicate tendon, when raised from the belly of the true extensor longus digitorum, could be traced singly as far as the ankle and in the front of the foot. It bifurcated, going to the second and third digits. A slip united that going to the third digit with the long extensor tendon of the fourth digit.

Is this a representative of the extensor indicis of the arm?

In *L. xanthomystax* the arrangement is like that of the left leg of *L. catta*; and in *L. varius* also, except that there are only tendons to the third, fourth, and fifth digits.

The condition of the specimen of *L. nigrifrons* which we dissected was not the best for accuracy as regards this muscle. The following was what we observed. In the partially injured right foot the small tendinous slip noticed in *L. varius* and *L. xanthomystax* was visible; this sent a slip to the second and third digits, as in the two last-mentioned species. The extensor brevis also joined the tendons of the extensor digitorum. There was, moreover, a minute (broken) tendon going to the fourth digit, as also a very long, thin tendon joining the fifth; where this last tendon came from was not made out by us. In the left foot (Pl. VI. fig. 27, *E.l.d*) the main tendon splits into two, whereof one supplies the second and third digits, the other the fourth and fifth. But the fourth also gives off a slip which unites it to the third and second.

In *G. crassicaudatus* (Pls. II. & VI. figs. 3 & 25, *E.l.d*) this muscle gives off three tendons, the outermost one going almost exclusively to the fifth digit, the middle one bifurcating, one branch going to the fourth digit, the other joining a branch of the inner-

[1] Burmeister, *loc. cit.* p. 75, tab. 3. fig. 1. no. 24, and tab. 5. figs. 6 & 7. 24.

[2] *Op. cit.* p. 67, pl. xxv. figs. 1 & 3. no. 24.

[3] See Cuvier, pl. 70. fig. 1, *ζ*, in *Lemur varius*.

most of the three tendons; this innermost tendon also bifurcates, one branch going to the index, the other joining the branch of the median tendon before mentioned, and, together with it, forming the extensor tendon of the third digit.

In *G. garnettii* it corresponds in the main with that in *L. catta*. The inner and outer slips of tendons are in it given off highest.

In *G. allenii* we satisfied ourselves that the junction of the extensor longus digitorum with the peronei does not exist; in other respects the arrangement agrees with that of *L. catta*.

In *Nycticebus tardigradus*[1] "it is a very slender muscle, the smallest of the leg-extensors and flexors of the lower limb; yet it has a double origin, as also in *Cheiromys*. The smaller head arises by a thin muscular bundle from the outer side of the tuberosity of the tibia, with also a small pencil of fibres coming from the inner side of the head of the fibula; the larger origin consists of a rhombidal, flat, muscular fasciculus attached to the inner side of the middle third of the fibula. The muscle gives a tendon which splits into four subdivisions, sending one to each of the four outer digits, that to the index being smallest. *Loris gracilis* agrees with the above.

In the *Potto*[2] it divides into three tendons (bound together by a thin aponeurosis), going to the third, fourth, and fifth digits respectively.

In *Tarsius*[3] it is double, and has both origins from the fibula; its tendons go one to the outer toes, the other, larger, to the fourth and fifth digits.

In *Cheiromys* this muscle, according to Professor Owen[4], only arises from the tibia and interosseous membrane, but in two portions, the two tendons of which, passing through distinct sheaths, go to the four outer digits. In our specimen it has also a slight origin from the tibia; but the muscular part cannot be said to be double, and it passed below through a single sheath.

The Extensor proprius hallucis[5] is a slender muscle, similar to the extensor longus digitorum. It arises, beneath the last mentioned muscle, from the head of the tibia, also from the interosseous membrane and the middle third of the tibial border of the fibula. It is inserted into the base of the second phalanx of the hallux.

Does the second head of the tibialis anticus in *L. xanthomystax* represent the extensor proprius hallucis? This is certainly not the case in *L. nigrifrons*, where there is a double tibialis anticus besides an extensor proprius hallucis (Pl. VI. fig. 27, *E.p.h*).

In the other genera it is as in *Lemur catta*; that of *Galago crassicaudatus* is shown in Pl. II. fig. 3, and Pl. VI. fig. 25, *E.p.h.*

Though called extensor, this is a remarkably powerful abductor, being the muscle which throws the hallux away from the index, as in the action of spanning in Man. It antagonizes the peroneus longus exactly. These two muscles having nearly a similar origin, the foot is in a manner slung in a sling, and they rotate the entire pes as far

[1] P. Z. S. 1865, p. 250.
[2] *Loc. cit.* p. 43.
[3] *Loc. cit.* p. 79, tab. 4. fig. 5, no. 35.
[4] *Loc. cit.* p. 68.
[5] *Tarsius*, p. 79, tab. 4. fig. 5, 39, and tab. 5. figs. 6 & 9, no. 39.

back as the ankle, facilitated by the peculiar tarsal joint. This peculiarity of the foot or pes is well seen in the *Galagos*, in *Perodicticus*, and *Nycticebus*.

Peroneus longus[1].—This is rather a large muscle overlapping the extensor longus digitorum, and meeting the tibialis anticus on the front of the leg towards its middle[2]. It arises from the posterior part of the head of the tibia and from rather more than a fourth of the outer side of the fibula. Its fibres are inserted in a penniform manner into a long and strong tendon, which passes behind the external malleolus, and is inserted into the proximal end of the metatarsal of the hallux on its plantar side.

In the three other Lemurs examined the origin of this muscle was as far as the half of the fibula, and its tendon was very small. That of *L. nigrifrons* is displayed in Pl. VI. fig. 27, *P. l.*

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. VI. fig. 25, *P. l*).

In *Cheiromys* it is the same, except, as Owen correctly says, from the upper two-thirds of the fibula (*l. c.* p. 67, pl. xxv. figs. 1–3, no. 25).

Peroneus brevis[3].—It arises from about the lower third and four-fifths of the anterior surface of fibula, and is muscular down to the ankle. Its flat and broad tendon winds round the outer malleolus, and is inserted into the peroneal side of the base of the fifth metatarsal bone.

There is no difference (*L. xanthomystax*) in the origin; but the tendon is separated into two below, which, as they come to the back of the foot, again unite as in the Lemurs generally. A single tendon is shown in *L. nigrifrons*, Pl. VI. fig. 27, *P. b.*

A split tendon of insertion, pierced by the tendon of the peroneus quinti digiti, is manifest in *Galago crassicaudatus*, Pl. VI. fig. 25, *P.b* and *P.b**; and the muscle and what appears as a single tendon in Pl. II. fig. 3, *P.b* and *P.b**. In *G. garnettii* it arises from the middle third of the shaft of the fibula, but in *G. allenii* nearly the whole length of that bone. The insertion in both is as in *L. catta.*

The Peroneus tertius is entirely absent in *Lemur catta*, as also in all the Lemuroidea examined by us. The record of dissection of *Perodicticus*, *Tarsius*, and *Cheiromys* agrees.

Peroneus quarti digiti[4].—This muscle is as small and has a tendon as delicate as the peroneus quinti digiti. It arises from the outer surface of the fibula below and outside the muscle last mentioned and beneath the peroneus longus. Its tendon passes down side by side with that of the peroneus quinti to the external malleolus, where it passes to the inside of the tendon of the peroneus brevis. About the middle of the fifth metacarpal it joins the tendon of the outermost part of the extensor brevis, and with it

[1] Figured by Cuvier, 'Recueil,' pl. 70. fig. 1, ϵ, for *Lemur varius*, and for *Loris gracilis*, pl. 67. fig. 1, ϵ.

[2] *Nycticebus tardigradus*, P. Z. S. 1865, p. 250, fig. 6, *P. l. Tarsius*, p. 77, tab. 3. fig. 1, no. 25, and tab. 5. figs. 6, 7, 10, no. 25.

[3] Cuvier in *Lemur varius*, pl. 70. fig. 1, ϵ'; figured also in *Tarsius*, p. 77, tab. 3. fig. 1, no. 26, and tab. 5. figs. 6, 7, & 10, no. 26.

[4] Not distinguished by separate lettering in Cuvier's 'Myologie,' though a tendon is represented as going to the fourth digit, and there is a slight division as if to form our peroneus quarti and quinti (pl. 70. fig. 1, ϵ²).

is inserted into the extensor sheath of the fourth digit; thus the muscle, though it arises externally to the peroneus quinti digiti, is inserted internally to it.

L. varius, *L. xanthomystax*, and *L. nigrifrons* (Pl. VI. fig. 27, *P.4.d*) quite resemble *L. catta* as regards this muscle.

Not present in *Galago crassicaudatus*, *G. garnettii*, or in *G. allenii*.

Neither this muscle nor that of the peroneus quinti digiti are mentioned either by Van Campen in *Perodicticus*, or by Owen in *Cheiromys*. Nevertheless in our specimen of the last-mentioned animal we found it distinctly present, and exactly conditioned as in *L. catta*. It is, however, described by Burmeister[1] under the name extensor longus quarti digiti.

Peroneus quinti digiti[2].—This is a very small muscle indeed, with a long and very delicate tendon. It arises from the anterior surface of the fibula below, underneath the peroneus longus, but above the origin of the peroneus quarti digiti. The delicate tendon passes down the outside of the tendon of the peroneus brevis, and is inserted into the peroneal side of the extensor sheath of the fifth digit.

In *L. varius* and *L. nigrifrons* (Pl. VI. fig. 27, *P.5.d*, *P.5.d**) exactly the same conditions obtain.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. VI. fig. 25, *P.5.d*), where, as in *G. garnettii*, it has a similar origin and insertion to that in *L. catta*, but its tendon keeps to the inner side of that of the peroneus brevis until after having passed the ankle. In *G. allenii* the extreme tenuity of the tendon is alone remarkable.

The peroneus quinti digiti exists in *Nycticebus tardigradus*[3]; but we did not find it, or the peroneus quarti digiti, in *Loris gracilis*.

Meckel[4] seems to have had both the peroneus quarti and quinti muscles in view when alluding to a third peroneus with tendons to the fourth and fifth digits being present in the *Lemurs*.

As has been said, Van Campen is silent as to its existence in the *Potto*.

In *Tarsius* it is described by Burmeister[5] as the extensor longus digiti minimi.

In *Cheiromys* we found this muscle exactly similar to its condition in *L. catta*.

d. *Tibio-fibular Region of Leg (flexors).*

Gastrocnemius[6].—This muscle is rather small, and arises by two heads of nearly equal size, each with a sesamoid bone. The two fleshy bellies unite in the middle of the leg with the strong tendo Achillis, which is inserted, as usual, into the tuberosity of the os calcis.

[1] *Loc. cit.* p. 79, tab. 4. fig. 5, no. 38, and tab. 5. fig. 6, no. 38.

[2] See Cuvier, pl. 70. fig. 1, ϵ^2 (*L. varius*).

[3] P. Z. S. 1865, p. 250.

[4] Vol. vi. p. 438.

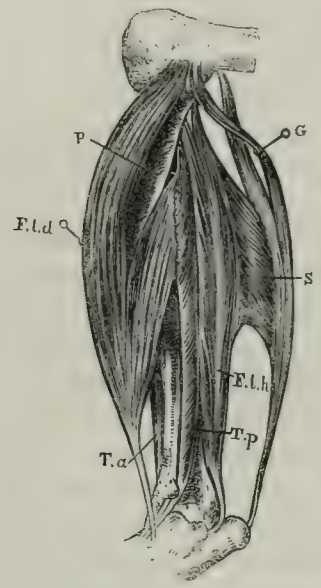
[5] P. 79, tab. 4. fig. 5, no. 37, and tab. 5. fig. 6, no. 37.

[6] Cuvier's 'Myologie,' pl. 70. figs. 1 & 3, *a*; in *Tarsius*, pl. 67. figs. 1 & 2, *a*; and in *Cheiromys*, *loc. cit.* p. 66, pls. xxiv. & xxv. figs. 27, *a*, *b*.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 22, and Pl. VI. fig. 25, *Ga*).

In *Nycticebus tardigradus* and *Loris gracilis* it is exceedingly small. (See woodcut, fig. 19.

Fig. 19.



Hind limb between knee and ankle in the Slow Loris, from P. Z. S. 1865, p. 251.

P. Popliteus.
G. Gastrocnemius.
S. Soleus.
F. l. d. Flexor longus digitorum.
F. l. h. Flexor longus hallucis.
T. a. Tibialis anticus.
T. p. Tibialis posticus.

Soleus[1].—A long and narrow muscle, fleshy in the middle and tendinous at each end, though more so above than below. It arises from the posterior side of the head of the fibula, and not at all from the tibia, becomes adherent to the inner surface of the tendo Achillis at about the middle of the leg, and is continued down with it to the calcaneum, into which the two tendons have a common insertion.

Meckel[2] says it arises from the whole of the fibula in *Loris gracilis*; and we found it to be attached to that bone for a considerable extent, viz. from its lower five-sixths.

In the Grand Galago (Pl. VI. fig. 25, *So*) it very nearly agrees with what obtains in *Nycticebus tardigradus*[3], where it is flat and rhomboidal, and without any tendon. Arising from the posterior margin of the head of the fibula and inner border of the flexor longus hallucis, it loses itself in the conjoined belly of the gastrocnemius.

Perodicticus[4] has this muscle similarly to *Nycticebus*, namely, fused with the gastrocnemius.

In *Tarsius*[5] it is a long, round, spindle-shaped muscle arising from the head of the fibula, and joins the tendo Achillis below the muscular portion of the gastrocnemius.

Plantaris.—A very strong muscle arising from the peroneal condyle of the femur in common with the head of the gastrocnemius of that side; it ends rather below the middle of the leg, in a strong tendon, which passes to the tibial side of the tendo

[1] Cuvier, pl. 70. fig. 3, ℭ.
[2] Anat. Comp. vol. vi. p. 421.
[3] *Loc. cit.* p. 251, fig. 5.
[4] *Loc. cit.* p. 44.
[5] *Loc. cit.* p. 76, tab. 4. fig. 7, no. 28.

Achillis, and ultimately behind it, passing beneath the os calcis (from which and from the lowest part of the tendo Achillis it is separated by a bursa), and becomes continuous with the plantar fascia.

Figured by us in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. VI. fig. 25, *Pla*). Kingma says that he sought in vain for this muscle in *G. peli*[1].

It was absent in the specimens of *Nycticebus* and *Loris* examined by us, and, according to Van Campen's dissection, is absent in the *Potto*[2].

In *Tarsius*[3] the plantaris arises from the external condyle side by side with the gastrocnemius, and passes down, attaching itself to the calcaneum and plantar surfaces of the foot.

The FLEXOR LONGUS DIGITORUM[4] is a very long, but rather small, muscle arising from the upper two-thirds of the posterior surface of the tibia, below the popliteus, and from the peroneal side of the head of that bone, its uppermost part ascending between the tibia and the rotator fibulæ, and above and across the interosseous membrane to the front of the leg, so as to be in contact with the summit of the posterior margin of the tibialis anticus. It is inserted by a strong tendon which passes on the tibial side of the tendon of the flexor longus hallucis. It then gives off a delicate tendon which joins a corresponding and larger one from the flexor longus hallucis (to form the flexor tendon of the hallux), and afterwards becomes intimately blended with the main part of the tendon of the last-mentioned muscle, the two giving rise to the four perforating tendons of the four outer digits, but the flexor longus digitorum forming almost exclusively that of the fifth digit, and but a small part of those going to the second, third, and fourth digits.

Shown in the Grand Galago, Pl. II. fig. 3, in Pl. V. figs. 22, 23, & 24, and Pl. VI. figs. 25, 28, & 29, *F. l. d.*

We find in *Loris gracilis* precisely the same condition as in *Nycticebus* (presently to be described), with the exception that the tendons to the four outer digits are all given off at the same height.

In *Nycticebus tardigradus*[5] the flexor longus digitorum has three origins and three bellies—one origin from the inner condyle of the femur, another from the inner border of the tibia joining the last, and the third origin is from the posterior surface of the tibia below the popliteus.

This muscle is described in *Perodicticus*[6] as consisting of two separate parts uniting into a common tendon in the plantar aspect of the foot, and representing both the flexor longus digitorum and flexor longus hallucis. It springs from the tibia, fibula, and interosseous membrane, but not from the femur. In this respect, both in its origin

[1] *Loc. cit.* p. 31.
[2] *Loc. cit.* p. 44.
[3] *Loc. cit.* p. 76, tab. 4. fig. 7, no. 29, and tab. 5. figs. 8, 9, & 10, no. 29.
[4] Cuvier, pl. 70. fig. 3, . (*L. varius*), and pl. 67. fig. 2, ι (*Loris gracilis*).
[5] P. Z. S. 1865, p. 252, figs. 5 & 6.
[6] *Loc. cit.* pp. 44, 45.

and slight subdivision of its tendon, this conjoined muscle more closely resembles that in *Lemur* than that in *Nycticebus* or *Loris*.

In *Tarsius*[1] it is said (no doubt by a misprint) to spring from the head and posterior surface of the *fibula*. In passing down it becomes slightly connected with the tendon of the flexor longus hallucis; it then splits into four separate tendons, supplying the four outer digits, but it takes no share in that of the hallux.

Its tendon, again, in Professor Owen's specimen of *Cheiromys*[2], took no part in forming that to the hallux, but its quadruple division for the outer digits united with three slips coming from the flexor longus hallucis. In our specimen its condition perfectly resembles that described as existing in *L. catta*.

Flexor longus hallucis[3].—This is a considerably larger muscle than the flexor longus digitorum. It arises from the whole posterior surface of the fibula to its summit, and from the whole of the interosseous membrane, also from the peroneal side of the tibia towards its distal end. Its strong tendon passes in an exceedingly deep groove between the astragalus and the inwardly inflected tuberosity of the os calcis, and is external to and quite separate from the tendon of the flexor longus digitorum. In the sole of the foot it gives off a large tendon to the hallux, and then blends with the tendon of the last-mentioned muscle, forming with it the perforating tendons of the four outer digits, and forming the main part of those of the second, third, and fourth digits.

Galago crassicaudatus (Pl. II. fig. 3, Pl. V. figs. 23 & 24, and Pl. VI. fig. 28, *F.l.h*), *G. garnettii*, and *G. allenii* have this muscle without any origin from the tibia; but its insertion is as in *L. catta*.

We found *Loris gracilis* to agree with what we shall presently state regarding *Nycticebus*. Its tendons, however, start in common, excepting that to the hallux. It also concurs in forming the tendon of the fifth digit.

In *Nycticebus tardigradus*[4] it has two heads of origin—one from the fibula, the other, smaller, from the tendon of the popliteus. Its insertion further agrees with *L. catta*; only in this last the slip of tendon of the flexor longus digitorum going to the hallux is not so strong in *Nycticebus*.

In *Perodicticus* it is not described as a separate muscle, but as part of the flexor digitorum communis[5].

In *Tarsius*[6] this muscle furnishes the flexor tendon of the hallux, and is only united partially along the outer margin of its tendon with that of the flexor longus digitorum. It is said (no doubt by a misprint) to arise from the tibia, instead of from the fibula.

In *Cheiromys* it is quite as in *Lemur catta*.

[1] *Loc. cit.* p. 78, tab. 3. fig. 1. no. 32, and tab. 4. fig. 5. 32, and tab. 5. figs. 8 & 9. 32.

[2] *Loc. cit.* p. 67, pls. xxiv. & xxv. figs. 1 & 2, no. 32. Professor Owen has misprinted tibia for fibula and fibula for tibia in the origin of this and the following muscles.

[3] Cuvier, in *L. varius*, pl. 70. fig. 3, *i*[1].

[4] P. Z. S. 1865, p. 253, figs. 5 & 6.

[5] *Loc. cit.* p. 44, pl. iii. fig. 15, *c*.

[6] *Loc. cit.* p. 77, tab. 5. figs. 8 & 9. no. 31.

Tibialis posticus[1].—This is a very thin but a very long muscle, with a very long tendon; and this is so enclosed by the flexor longus digitorum and flexor longus hallucis as to be entirely hidden down almost to the internal malleolus. It arises from the tibial surface of the fibula, almost to its summit, and from the interosseous membrane. Its tendon is somewhat attached to the distal end of the naviculus, but is finally inserted into the proximal end of the plantar surface of the ento-cuneiform.

In *Galago crassicaudatus* (Pl. V. figs. 23 & 24, *T.p*), *G. garnettii*, and *G. allenii* there is a superficial median tendon upon the muscular fibre almost its entire length; but the tendon of insertion commences only above the ankle to the inner side of the malleolus, which it crosses, and is attached to the proximal end of the naviculare.

Popliteus.—This muscle arises from a pit outside the peroneal condyle by a strong tendon which runs beneath the external lateral ligament. The muscular fibres spread out as usual, and are inserted into the posterior surface of the tibia above the origin of the flexor longus digitorum.

Found in the same condition in all the Lemurs and Galagos, also in *Nycticebus*[2], *Loris*, *Perodicticus*[3], and *Tarsius*[4]—and in *Cheiromys*, although Owen does not mention it. Figured in *Galago crassicaudatus* (Pl. V. figs. 23 & 24, and Pl. VI. fig. 28, *Po*).

Rotator fibulæ (Pl. V. figs. 22 & 23, and Pl. VI. figs. 28 & 29, *R.fb*).—This small but very peculiar muscle is somewhat rhomboidal in shape, and extends from the summit of the posterior surface of the tibia to the anterior surface of the fibula, its insertion into the fibula being rather more vertically extended than is its origin from the tibia. Its fibres pass downwards and outwards, and therefore in an opposite direction to those of the interosseous membrane, the upper part of which membrane appears to be absent. The posterior surface of the rotator fibulæ is covered by the popliteus, the flexor longus hallucis, and the tibialis posticus, while its anterior surface is in contact with and covered by the peroneus longus, and by the very singularly situated upper end of the flexor longus digitorum.

The muscle described by Professor Owen[5] as existing in *Phalangista* has its fibres inclined in an opposite direction to those of our muscle; and Professor Huxley, in his recent Hunterian Course of Lectures, has announced the same fact with regard to the Wombat; and as we believe this Lemurine muscle is as yet altogether undescribed, we propose to bestow on it the above appellation.

We have carefully verified the existence of this muscle in both legs of each of the species of *Lemur* and *Galago* dissected by us, but could find no trace of it in *Nycticebus* and *Loris*; and Burmeister and Owen are silent as to its existence in *Tarsius* and *Cheiromys*. Nevertheless in our specimen of *Cheiromys* we find this muscle fully as

[1] Cuvier, pl. 70. fig. 3, δ^1 (in *Lemur varius*).

[2] *Loc. cit.* p. 251, fig. 5, r.

[3] *Loc. cit.* p. 43, pl. iii. fig. 15, *a*.

[4] *Loc. cit.* p. 75, tab. 4. fig. 5, no. 23.

[5] Todd's Cyclop. of Anat. and Physiol. vol. iii. p. 291, fig. 113, *i*. In the text the fibres are spoken of as passing "outwards and downwards;" but the accompanying figure contradicts this statement.

well developed as in *Lemur*, and presenting the very same relations to all the surrounding parts.

e. *Region of the Foot (dorsal and plantar surfaces).*

Extensor brevis digitorum [1].—This muscle seems to be somewhat irregular, differing in the feet of the same individual. It arises from the upper surface of the cuboid, ectocuneiform, naviculare, and the anterior part of the os calcis, and may consist of two, three, or four portions, and may send tendons to the hallux and second, third, and fourth digits, as we found in the right foot of *Lemur catta*—or the second, third, and fourth digits only, as we found in the left foot of *Lemur catta* and *L. varius*. There is also a small deeper layer of muscular fibres attached to the cuboid and the fascia investing the interossei and metatarsals.

In the left foot of *L. catta* the extensor brevis digitorum consisted of two bellies, only one (the tibial one), with its superficial layers, sending a tendon to the fibular side of the proximal end of the first phalanx of the second digit; the second belly bifurcated in the middle of the foot, its two tendons going to the corresponding joints of the third and fourth digits. No tendon went to the hallux. A third layer of muscle arose by a tendon from the cuboid, and ended in a flat muscle attached by muscular fibres to the surface of the interossei between the third and fourth digits, nearly to their distal ends.

In the right foot of *L. varius* we observed it to consist of two bellies and of three tendons therefrom:—one tendon to the fibular side of the index, but not joining the extensor longus digitorum; two more to the third and fourth digits, these also on the fibular sides.

An extension of fibres to the styloid process of the fibula is found in *L. xanthomystax*.

In the right foot of *L. nigrifrons* it is composed of two main slips, and sends tendons to the second and fifth digits, which join the extensor communis digitorum, also a small one to the hallux. In the left foot of the same animal (Pl. VI. fig. 27, *E.b.d*) the muscular fibres were pretty well fused into a single mass, but three separate tendons were derived, supplying the second, third, and fourth digits respectively.

In *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. VI. fig. 25, *E.b.d*) and in *G. allenii* the right foot had four muscular slips and tendons, as in the right foot of *L. catta*.

In *Galago garnettii* this muscle is essentially divided into two slips, the large and innermost one arising from the anterior upper (dorsal) surface of the os calcis, and is inserted by a rather long and strong tendon into the proximal end of the second phalanx of the hallux. The second slip has a similar origin, but is inserted by a much more delicate tendon into the second digit, in union with the tendon of the extensor longus digitorum.

In *Nycticebus tardigradus* the extensor brevis digitorum consists of five muscular

[1] Cuvier, *l.c.* pl. 70. fig. 1, ♀ (in *Lemur varius*), and pl. 67. fig. 1, ♀ (in *Loris gracilis*).

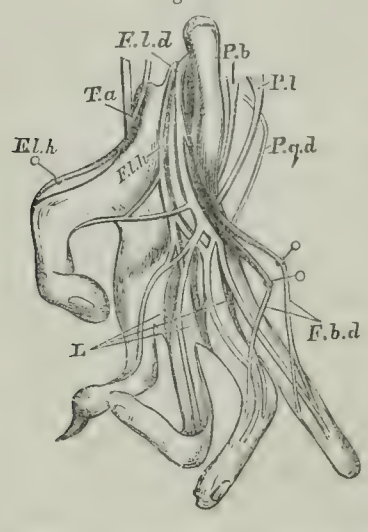
bellies and as many tendons. One, arising from the astragalus and calcaneum (their outer surfaces), is inserted into the hallux, and may be regarded as the extensor brevis hallucis. Another, the outermost and somewhat superficial layer, has a similar origin to the last; its tendon is inserted into the peroneal side of the fourth digit. The other three bellies cover more deeply the dorsum of the foot, and at their proximal end are united together, but distally divide and send tendons to the second, fourth, and fifth digits respectively, the third digit having no tendon derived from this muscle.

Perodicticus agrees with *Galago garnettii* in having two slips and as many tendons. That to the hallux Van Campen names the extensor brevis hallucis[1].

In *Tarsius* Burmeister[2] describes the short extensor as consisting of three parts—the extensor brevis hallucis (40), the extensor of the second digit (51), and the extensor brevis digiti tertii (52). The last muscle is very elongated, arising, as it does, high up on the outside of the extremely long os calcis.

In *Cheiromys* Professor Owen[3] found an extensor brevis of more or less separate parts, and going to the hallux and second and third digits. In our specimen, strange to say, no short extensor goes to the hallux in either foot, but in both feet there is a thin muscular layer arising from the tarsus (and but indistinctly divided into slips) and going by three tendons to the second, third, and fourth digits; that of the second digit gives off a small slip (on its peroneal side) uniting with that of the third digit.

Fig. 20.



Diagrammatical sketch.—Flexor tendons of the foot in the Slow Loris, from P. Z. S. 1865, p. 253.

F. l. d. Flexor longus digitorum.
F. l. h. Flexor longus hallucis.
F. b. d. Flexor brevis digitorum.
L. Lumbricales.
P. b. Peroneus brevis.
P. l. Peroneus longus.
P. q. d. Peroneus quinti digiti.
T. a. Tibialis anticus.
E. l. h. Extensor longus hallucis.

Flexor brevis digitorum.—This is represented by two more or less distinct muscles, one arising from the plantar fascia, and furnishing the perforated tendon of the index of the foot and half that of the third digit, the other springing from the plantar surface

[1] *Loc. cit.* pp. 44 & 45, pl. iii. fig. 14, *i*.
[2] *Loc. cit.* p. 83, tab. 4. fig. 5, and tab. 5. figs. 6 & 7.
[3] *Loc. cit.* p. 68.

of the deep flexor tendon, and forming the other half of the perforated tendon of the third digit and the whole of those of the fourth and fifth digits.

In Cuvier's figure of *Lemur varius*, pl. 70. fig. 3, this muscle also seems to consist of two portions similar to those above described by us; but the part springing from the plantar fascia and supplying the perforated tendon of the index is not represented as furnishing any tendon to the third digit, while its fleshy belly is not separated from those of the abductors of the hallux and fifth digits respectively, the whole being marked κ and named "court fléchisseur commun" (calcanéo-sous-onguien). The other part, which springs from the deep flexor tendons, supplies the perforated ones of the third, fourth, and fifth digits; it is distinguished by π and is the "lombricaux (*planti-sous-phalangiens*)."

The arrangement which we have found in the Thick-tailed and Garnett's Galago is a kind of modification between *G. allenii* and what Burmeister describes and figures in *Tarsius* (see *infra*). The deepest fleshy division corresponds to Burmeister's third portion (see *G. crassicaudatus*, Pl. V. fig. 24, *F.b.d*), moreover in *G. garnettii* supplying a perforated tendon to the second digit; his F. b. h. superficialis is but a few very delicate muscular fibres on the under surface of the hallucial plantar extension (Pl. V. fig. 24, *P.f.s**, and Pl. II. fig. 3, *P.f.s*); besides there are films of fleshy substance attached to the deep side of the plantar fascia where it goes to the fourth and fifth digits, Pl. V. fig. 24, *P.f.s***, forming, indeed, almost separate muscles. Burmeister's F. b. d. secundi, therefore, may either be represented by a palmar fascial slip or derived from the true flexor brevis. The tendency of the distribution on the whole seems to point to a superficial, a middle, and a deep set of flexor muscles, besides the lumbrical and interosseal sets.

In *G. allenii* fibres arose from the deep surface of the superficial plantar fascia (continuous with the plantaris); it was connected not only with the index but with the hallux. Also from the plantar surface of the deep tendon the second part arises, which furnishes a *distinct* perforated tendon to the third, fourth, and fifth digits.

According to Cuvier[1], in *Loris gracilis* there appear to be four fasciculi going to the four peroneal digits.

In *Nycticebus*[2] the flexor brevis is a small muscle, of which fasciculi arise from the deep flexor tendon and go to the fourth and fifth digits.

In *Tarsius*[3] this muscle is described as consisting of three portions: the first, his flexor brevis hallucis superficialis (36 *a*), arises from the superficial plantar fascia and goes to the hallux; the second, his flexor brevis digiti secundi, arises from the same fascia and goes to the second phalanx of the index; the third portion, his flexores breves digiti tertii, quarti, et quinti (36 *b*), springs from the plantar surface of the deep flexor tendon, and forms the perforated tendons of the third, fourth, and fifth digits.

[1] Pl. 67. fig. 2, κ.

[2] P. Z. S. 1865, p. 253, fig. 6, *F.b.d.*

[3] *Loc. cit.* pp. 80 & 81, tab. 5. figs. 8 & 9, nos. 36 *a* & 36 *b*.

In *Cheiromys* this double muscle is just as in *L. catta*, except that the part springing from the flexor tendon supplies the whole of the perforated tendon of the third digit.

Lumbricales [1].—These are four in number, and arise from the tibial side of the deep flexor tendons of the four peroneal digits, and are inserted into the tibial side of the same digits.

The so-called lumbricales figured in Cuvier's 'Recueil' are really part of the flexor brevis digitorum, as we have before said.

The lumbricales are figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. V. fig. 24, L^1, L^2, L^3, L^4).

In *Nycticebus tardigradus* these are only three in number, none going to the index.

Flexor brevis hallucis.—Relatively it is a large muscle, which arises from the meso- and ectocuneiform bones. Embracing the long flexor tendon of the hallux, it is inserted as usual.

This is called in Cuvier's 'Myologie' "court abducteur du pouce," pl. 70. fig. 3, μ.

In *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 24, and Pl. VI. fig. 30, *F.b.h*) and both in *G. garnettii* and *G. allenii* it arises from the deep plantar fascia and plantar surface of the interossei. Insertion, the outer side and plantar surface of the proximal phalanx of the hallux.

Burmeister [2] describes this muscle in *Tarsius* under the names flexor brevis hallucis profundus, his flexor brevis hallucis superficialis being only a portion of our flexor brevis digitorum. It arises by two heads, one from the ectocuneiform and the proximal end of the first metatarsal, the other head from the meso- and ectocuneiform—and is inserted as in *L. catta*.

Abductor hallucis.—Also a strong muscle, arising from the plantar fascia and inserted by a strong tendon into the proximal phalanx of the great toe.

This is confounded in Cuvier's 'Recueil' with the plantar part of the flexor brevis, as before said when speaking of that muscle, pl. 70. fig. 3 (*Lemur varius*).

In the genus *Galago* the origin is the sesamoid bone at the proximal end of the hallux and deep plantar fascia. Insertion, metatarso-phalangeal ligament and plantar surface of the proximal phalanx of the hallux. Figured in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 25, and Pl. VI. fig. 30, *Ab.h*).

In *Tarsius* [3] it goes from the naviculare to the hallux.

Adductor hallucis and transversus pedis [4].—In *Lemur catta* we found but a single broad slip representing these muscles. It arises from the third metatarsal bone, and is inserted into the proximal phalanx of the pollex.

[1] *Tarsius*, p. 78, tab. 5. fig. 9. no. 34.

[2] *Loc. cit.* p. 81, tab. 5. fig. 10. no. 44, and also fig. 9. no. 45, the dotted line leading to this last number having been by mistake carried on beyond the muscle it ought to indicate (namely, the transversus pedis inferior) to the flexor brevis hallucis.

[3] *Loc. cit.* p. 80, tab. 5. fig. 8. no. 41.

[4] Cuvier, *l. c.* pl. 70. figs. 1 & 3, ν & ν^1.

In *L. varius* we found two slips arising from the second and third metatarsals and from the fascia investing the interossei between those bones.

It is small in the Galagos as compared with the Lemurs. In *G. garnettii* the adductor hallucis is separable into two slips, both arising from the plantar fascia, covering the interossei at the distal end of the second metacarpal and proximal end of the first phalanx of the second digit. Insertion, the one into the proximal end of the first phalanx of the hallux, the other into its distal end. The adductor hallucis partially covers the insertion of the first.

There is but one triangular-shaped slip in *G. crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 24, and Pl. VI. fig. 30) and in *G. allenii*, which is strong. Origin, the surface of the interossei of the second digit and the sesamoid bone at the proximal end of the hallux. Insertion, the distal end of the proximal phalanx of the hallux.

In *Nycticebus tardigradus* (see fig. 7, p. 254, P. Z. S. 1865).

Burmeister[1] describes the adductor hallucis as distinct from both, a superior and an inferior transversis pedis; but their insertions and origin are essentially similar to the more single muscular mass of the Lemuroids.

In *Cheiromys*, according to our dissection, there is but a single muscular mass, if (as we have taken it) the muscular belly on the peroneal side of the long flexor tendon of the hallux be part of the flexor brevis hallucis. This single triangular mass may be more or less artificially divided into a smaller part arising from the proximal end of the plantar surface of the third metatarsal, and into another larger portion arising from the distal end of the same surface of the second and third metatarsals. They are inserted into the proximal end of the proximal phalanx of the hallux.

Flexor brevis minimi digiti.—A muscle of moderate size, which arises from the base of the metatarsal bone of the fifth digit, and is inserted into the base of the first phalanx of that digit.

The muscle named in Cuvier's 'Recueil' "adductor minimi digiti," pl. 70. fig. 3, ξ, is, in all probability, really the flexor brevis.

Figured in *Galago crassicaudatus* (Pl. II. fig. 3, and Pl. VI. fig. 25, *F.b.m.d*) and in *Nycticebus tardigradus* (woodcut, fig. 21).

It is the same in *Cheiromys* and *Tarsius* as in *Lemur catta*; but Burmeister calls it "m. adductor minimi digiti," p. 88, tab. 5. fig. 10. no. 48.

Abductor minimi digiti[2].—This is very large and fleshy, and arises from the under surface of the os calcis near its tuberosity, and from the tibial side of that tuberosity. It is inserted by a strong tendon into the peroneal side of the base of the proximal phalanx of the fifth digit.

[1] *Loc. cit.* p. 81, tab. 5. figs. 8 & 10.

[2] Confounded in the posthumous plates of Cuvier with that part of the flexor brevis which springs from the plantar fascia, as before said in speaking of that muscle, pl. 70. fig. 3 (*Lemur varius*).

Of great length in *Galago crassicaudatus* (Pl. V. fig. 24, and Pl. VI. fig. 30, *Ab.m.d*), also in *Nycticebus* (woodcut, fig. 21).

Fig. 21.

Enlarged view of the plantar surface of the foot of *Nycticebus tardigradus*, to show the small muscles of the hallux and fifth digits, the interossei, and the lumbricales attached to the outwardly dragged flexor tendons.—From P. Z. S. 1865, p. 254.

It is the same in *Tarsius* (p. 82, tab. 5. fig. 9, no. 47), where it is even larger than in *Galago*, because of the still larger tarsal bones.

Abductor ossis metacarpi quinti[1].—It arises from the peroneal side of the os calcis, and is inserted into the base of the fifth metatarsal towards its peroneal side. It is much smaller than the abductor minimi digiti.

The muscle represented in *L. varius* in Cuvier's 'Recueil,' pl. 70. fig. 1, *o*, is probably this muscle, although erroneously called the accessorius.

Very diminutive, and partly fused with the abductor minimi digiti in *L. nigrifrons*.

It is represented in *Galago crassicaudatus* (Pl. II. fig. 3, Pl. V. fig. 24, and Pl. VI. fig. 30, *Ab.o.m.q*) and *G. garnettii* by a fair amount of muscular fibre, which occupies the outer and plantar aspect of the os calcis. Its broadish tendon is inserted into the proximal end of the fifth metatarsal. We traced it in *G. allenii* beyond the cuboid, although it possibly may go to the fifth metatarsal.

The Accessorius is entirely absent in *Lemur catta*, the Galagos, *Nycticebus*, *Tarsius*, and *Cheiromys*, unless the deep fleshy belly of the flexor brevis digitorum be in part regarded as such. What is called in Cuvier's 'Recueil' the "accessorius," pl. 70. fig. 1, *o*, is, in all probability, really the extensor ossis metacarpi quinti.

Interossei of Foot.—In *Lemur catta* there are two to each digit, except the hallux, and counting the flexor brevis minimi digiti as one. Over and above these there is a more superficial slip or belly arising from the tarsal fascia, and going to the peroneal

[1] In *Tarsius*, Burmeister, *l. c.* p. 82, tab. 5. fig. 9. no. 46, that anatomist's abductor digiti minimi externus.

side of the flexor of the index, and another having origin from between the bones of the third and fourth metatarsal, and going to the tibial side of the fifth digit.

The Thick-tailed Galago agrees with our type in the distribution and number of the interossei (see enlarged view, Pl. VI. fig. 30, *I, I, I, I*, double interossei, and Is^1 & Is^2, superficial interosseal slips); some of these also appear on the dorsum of the foot; but we have preferred to regard them altogether as deep plantar flexors, although no doubt some of them are abductors of the digits to each other.

There are three distinct double interossei in *G. allenii*, which arise from the tarsus, and are inserted by tendons into sesamoid bones on either side of the distal end of the metatarsals. Besides the above, there is a single and more superficial muscle arising by tendon from the plantar surface of the internal side of the fourth metatarsal, and inserted into the outer (peroneal) side of the proximal end of the proximal phalanx of the same digit.

Nycticebus tardigradus and *Cheiromys* agree in having a superficial and deep layer of interossei.

In *Tarsius*[1], besides the ordinary four double interossei, there are two superficial fasciculi going to the second and fourth digits. Respecting the first of these it is called "abductor digiti secundi" (49), the second is represented in table 5. fig. 10, just internal to the insertion (48), but is not described in the text.

Opponens minimi digiti pedis.—In *Lemur catta* several fibres were observed distinctly inserted into the whole length of the fifth metatarsal. This little muscle appeared to arise between the fourth and fifth digits upon the plantar surface.

These are not mentioned by G. Burmeister in *Tarsius*.

RÉSUMÉ AND DEDUCTIONS.

In our introductory remarks we alluded to the intermediate position assigned to the Lemuroids by most naturalists, namely, below the higher Primates (Man and Apes), but above all other Mammals. We shall now consider how far this is justified by those external characters and by the Myology of the forms which have been the subjects of our study.

Some of the more exceptional structures presented by certain forms may be explicable by peculiarity of habit, or by special exigencies of existence; but others seem to be altogether destitute of any marked utility to their present possessors, and one or two are so bizarre as to render it very difficult, if not impossible, to conceive their ever having materially helped to preserve even the remote ancestors of existing species.

Besides considerable variation (and in spite of certain strongly marked family resem-

[1] *Loc. cit.* p. 82.

blances) in the nature of the hairy covering, the form of the body, and length of the limbs in genera of the group, the ear, as we have demonstrated, pertains to three types. If *Lemur* be taken as a standard, then *Cheiromys* much surpasses it in the relative size of the concha. *Tarsius*, *Galago*, and *Microcebus* diverge somewhat from *Cheiromys*, but agree pretty well together; they vary chiefly in the amount of excavation of the posterior helical pit. *Nycticebus*, *Perodicticus*, *Loris*, and *Arctocebus* are allied in the diminution of the pinna, in the depth of the posterior helical pit, and in the possession of the peculiar horizontal folds of the antihelix already adverted to.

The precise advantages gained or the developmental relation and value of the above differences are not so very easily discerned. Reasons, no doubt, might be conjectured, such as adaptation to nocturnal habits, or derivation from an ancient type. Thus the large and wonderful moveable ears of the Galagos &c. probably assist them in their nightly predatory excursions, either guiding them to their prey, or warning them of hostile approach. On the other hand, the short-eared *Nycticebinæ* are not, as far as we know, one whit less nocturnal in their habits than are the *Galagininæ* and *Chiromyidæ*, while their means of escape are much less effective.

Man and the Gorilla[1] are characterized by having a pendulous ear-lobule; while in the Chimpanzee and Orang it is sessile. In other quadrumana the lobule diminishes, or is so very small as to be considered absent. As we descend from Man and the *Simiinæ*, which possess a considerable incurved marginal helix, to the lower subfamilies of Monkeys, we find less inflexion of the helix, the upper or anterior portion only retaining a fold. In some Apes, e. g. *Cynocephalus* and *Macacus*, there is a faint depression or rudimentary posterior helical pit, while in others, as *Hylobates* and *Ateles*, no trace of this exists. Although the Primates have in many instances a transverse bifurcation of the antihelix, yet none have this forming a pouch. The flat pinna is oval or roundish, the *Cynopithecinæ* possessing a tendency to angularity.

The Lemuroids, while presenting a similitude to Man and Apes in the outer organ of hearing, do not conform in every particular. So far as size and shape are concerned, *Cynocephalus* might represent *Lemur*, and *Nyctipithecus* be equivalent to *Nycticebus*; but no Monkey whatsoever has the enlarged conch-like pinna matching that of *Cheiromys* and *Galago*.

On the other hand, the ears of some lower animals approximate considerably to the Lemurine peculiarities. Thus the Carnivora, the Cheiroptera[2], the Rodentia, nay, even the Marsupialia repeat characters manifested in them. For example, the Dog, Cat, and other well-known Carnivores have the posterior helical pit of remarkable size; and other genera among Bats have a most extensive pinna. The common Rat has the power

[1] Owen, Trans. Zool. Soc. vol. v. p. 246.

[2] Burmeister's 'Tarsius,' p. 8, where he remarks, "So merkwürdig diese Bildungen auch erscheinen, so sind sie doch keineswegs ausschliessliche Eigenthümlichkeiten des Tarsiers, sondern finden sich in ähnlicher Weise theils bei den *Fledermäusen*, theils bei *Nagern*. Die innere Klappe hat z. B. auch *Cavia*."

of contracting the auricle similar and equal to *Galago*; nay, further, the Short-eared Phalanger (*Belideus breviceps*) furls its large conch-like ear and has a posterior helical pit and pouch-folds of the antihelix. We have, moreover, observed in Mauge's Dasyure (*D. maugæi*) a curious modification of the upper ridge of the parallel bifurcation of the antihelix. In this animal it assumes the form of an epiglottis overhanging the hollow, and partially overlapping the opposite ridge.

This likeness to lower types manifested by the ear of Lemuroids is not carried out quite to the same extent in the development of the fatty cushions or pads of the palms and soles. In none of the Carnivora, not even in the arboreal Kinkajou and Binturong, nor in any of the Bears, does the disposition of the pads accord with those of the former group. This might naturally be expected from the want of opposable power in the pollex and hallux, and the consequent reciprocal relation of the adjoining parts. The palm and sole of *Cercoleptes*, for instance, has the same number of pads as *Lemur* and *Galago*; but the thenar and hypothenar ones, as well as the pollicial and hallucial ones, are differently sized and placed. Another very obvious difference is the absence of those peculiar-looking tactile balls at the ends of the digits. Among the Rodentia and Cheiroptera the modification of the manus and pes are such that the palmar and plantar surfaces bear no close correspondence with those of the Lemuroidea. Strange to say, however, a resemblance crops out among the further removed marsupials. In the genus *Belideus* the distribution of the pads, enlarged digital tips, and fine parallel striations are but slight modifications of the conditions found in the Galagos and Slow Loris. Furthermore in *Dasyurus maugæi* the same surfaces, or rather the interspaces between the cushions, present that remarkable papillary or pitted sculpture so well pronounced in *Lemur* and *Cheiromys*.

Compared with *Lemur* and its allies, Man and the Apes possess less separation of the palmar and plantar pads; but they have nearly all those figured by us in the genera of Lemuroidea, though less raised. Generally there are longer thenar and hypothenar cushions, and three, or sometimes four, broadish and equal-sized proximal phalangeal ones. In the thumbless genera the pad is still present, though the digit is wanting. In none of the Simian families nor in Man are the digital extremities furnished with such comparatively large tactile cushions as are universal in the Lemuroids. In Cuvier's 'Recueil' Laurillard has given some excellent sketches of the palm and sole of *Simia innuus* and *Ateles belzebuth*, natural size, pls. 26 & 62.

The peculiar modification of the nail of the pedal index[1] is another of those strange anomalous characters of the Lemuroids, the utility of which it is difficult to conjecture; but still more mysterious is the gradual atrophy of the index of the hand, reaching almost to the last degree of degradation in *Perodicticus* and *Arctocebus*.

How this mutilation can have aided in the struggle for life, we must confess, baffles

[1] The pedal index of *Hyrax* also has a peculiarly modified nail, as was noticed by Prof. Huxley in his Hunterian Lectures.

our conjectures on the subject; for that a very appreciable gain to the individual can have resulted from the slightly lessened degree of required nourishment thence resulting (*i. e.* from that suppression) seems to us to be an almost absurd supposition.

Of quite a contrary nature and stage of development is that wonderfully lengthened, attenuated, and probe-like middle digit of the Aye-Aye, in which Prof. Owen discerns a final purpose in its adaptability to the extraction of Wood-boring Grubs, Dr. Sandwith[1] having witnessed this action in a specimen kept by him for a short time in the Mauritius. But on this point Mr. Bartlett's[2] observations on the living animal in the Zoological Gardens lead him to a different conclusion. Whatever be the physiological import of this extraordinary digital structure, it certainly recalls to mind and much resembles the very elongated middle finger of some Bats.

Turning now to the 'Myology,' we find structures which are presented by none of the higher Primates, while at the same time a remarkable uniformity runs through the whole of the family Lemuridæ. It is only in *Nycticebus* and *Loris* that we have found a marked divergence—though we expect that the African genera *Arctocebus* and *Perodicticus* will be found on examination to differ similarly from the other Lemuroids, and to resemble in the main their oriental allies the Slow and the Slender Loris.

Besides general similarity to a human type in the disposition of the groups of muscles, we may observe that *the following points equally obtain throughout the group*:—

1. There is a tendency to duplicity in the sterno-mastoid; that is, the cleidal portion presents more or less of separation without actually being distinct from its fellow sternal portion. 2. There is no median tendon in the omohyoid, excepting, it may be, in *Tarsius*, where it is said by Burmeister to be double-bellied. 3. The longus colli is divisible into three portions, which, however, is best seen in *Cheiromys*, the Potto, and the Galagos. 4. The deltoid is composed of three parts, less separable in the small than the larger specimens. 5. A teres minor exists, but is diminutive in size. 6. The triceps is four-headed. 7. Both a dorso-epitrochlear and anconeus are present; but the latter is said to be wanting in the Potto. 8. The coraco-brachialis is double-bellied. 9. There is no extensor primi internodii pollicis. 10. No pyramidalis is developed. 11. There is a rhomboideus capitis muscle; but no usual division into rhomboideus major and minor, a slight approach to this being only found in *Tarsius* and Allen's *Galago*. 12. A levator claviculæ is alone (doubtfully?) said to be absent (?) in *Potto*, all the others certainly have it. 13. The levator anguli scapuli is almost inseparable from the serratus magnus, and has attachment to all the cervical vertebræ. 14. All possess a thin serratus posticus anterior, though it is assumed to be absent in the Potto. 15. The gluteus maximus is double, or has two separate planes of fibres. 16. A scansorius does not exist. 17. The quadratus lumborum muscle arises by a series of tendons from the last dorsal and

[1] See his letter to Prof. Owen, Trans. Zool. Soc. vol. v. p. 37.

[2] P. Z. S. 1862, p. 223.

anterior lumbar vertebral. 18. A double tendon of origin is possessed by the rectus femoris. 19. The tensor vaginæ femoris is absent, or only rudimentary fibres are extant, in *Cheiromys*, *Nycticebus*, and *Galago crassicaudatus*. 20. The biceps femoris is simple, or only slightly modified in attachment and muscularity. 21. There is no peroneus tertius. 22. Those species examined possess an extra and superficial layer of palmar and plantar interosseous slips. 23. All the genera have a short tendon which unites the flexor sublimis and the flexor profundus digitorum muscles previously to their usual digital divisions.

There is nothing of a very singular nature in the muscles distinguishing any one genus from its fellows. As regards characters of a positive or negative kind that have been observed by us or by others, they may indeed be inconstant; nevertheless we place the undermentioned on record.

I. *Lemur*.—1. The temporalis assumes a partly double layer, in this respect exhibiting structure pointing towards Rodents and Carnivora. 2. In *L. xanthomystax* the stylo-hyoid is pierced by the digastric muscle. (Meckel distinguishes a muscle in Lemurs as the "masto-styloïdien.")

II. *Galago*.—No myological structure is peculiar to this genus, unless the absence of a pectoralis minor is a normal condition in *G. allenii*.

III. *Loris and Nycticebus*.—These are alike, except that the former in one instance examined by us had no psoas parvus.

IV. *Tarsius*.—1. The psoas magnus is said to be double. 2. The vastus externus has also two bellies. 3. There are, according to Burmeister, but two adductors of the thighs.

V. *Perodicticus*.—Van Campen has asserted that in the Potto the following muscles are wanting:—1. The anconeus. 2. The levator claviculæ. 3. The serratus posticus.

VI. *Cheiromys*.—The curiously constructed Aye-Aye differs muscularly from its kindred, in alone having 1, a double semitendinosus, and, 2, in the trapezius overlapping and hiding the insertion of the levator claviculæ.

We shall now place together the several genera which exhibit alliances or similarities with reference to the development of muscles or the distribution of tendons. At the same time we do not attach equal weight to all these seeming affinities, as some may but represent irregularities of tendinous distribution such as happen in Man; others, again, are more suggestive and better to be relied on as balancing characters of family relationship.

Group I. *Lemur, Galago, Cheiromys, and Tarsius.*

1. In the first three genera that anomalous muscle the rotator fibulæ is undoubtedly found: it may possibly be also extant in *Tarsius* (?), though the accurate Burmeister has not described such a structure.

2. A plantaris muscle exists in the genera under consideration.

3. The peroneus quinti digiti is well developed; it is likewise present in *Nycticebus*.

4. The biceps flexor cubiti consists of two bellies in the above group, and also in *Perodicticus*.

5. The extensor indicis has a single belly in *Lemur* (with one exception), *Cheiromys*, *Tarsius*, and besides in *Nycticebus* and *Perodicticus*, but not in *Galago*. Tendons go to the second and third digits in *Lemur*, *Galago*, and *Tarsius*. In *Cheiromys* and *Tarsius* (and once in *Lemur*) an extra tendon supplies the fourth digit, and in *Perodicticus* the fifth digit.

6. The extensor communis digitorum (manus) in *Lemur*, *Galago*, and *Tarsius* splits into four tendons (an exceptional example of *L. varius* having on one side but three, and a *Galago* possessing two subsidiary uniting transverse slips). Our specimen of *Cheiromys* presented a double-bellied muscle, subdividing into seven tendons, the second, third, and fourth digits receiving two tendons each.

7. In all the genera comprising Group I. the extensor minimi digiti of the hand has fourth and fifth digital tendons. Over and above, *L. catta* has an extra indicial derivative tendon,

8. The flexor sublimis digitorum has usually four perforated tendons.

9. At the wrist the flexor profundus digitorum and flexor longus pollicis have a single broad and strong common tendon.

10. In the above group, and also in the genus *Perodicticus*, the flexor longus pollicis is double-headed (once in *Cheiromys* it occurred three-headed); but in all no special tendons go to any digit but the pollex.

Group II. *Lemur, Cheiromys, and Tarsius.*

1. The three genera which we have here brought together are equally distinguished by the soleus muscle having, as in higher Primates, a long fleshy belly.

2. They each have a peroneus quarti digiti muscle.

3. *Lemur* and *Cheiromys*, but not *Tarsius*, have the flexor longus hallucis arising from both the tibia and fibula.

4. The masseter is double in *Cheiromys* and *Tarsius*, but not in *Lemur* or the other forms.

Group III. *Lemur and Tarsius.*

1. A subcrureus has been found by us only in *Lemur nigrifrons*, and by Burmeister in *Tarsius*.

2. In this division, partly including the genus *Galago*, the insertion of the rectus anticus major does not pass beyond the cervical region.

Group IV. *Lemur and Cheiromys.*

With the exception of *L. catta*, the species of the genus *Lemur* and the single one of *Cheiromys* have each a double-bellied and tendinous tibialis anticus muscle. In all other Lemuroids it is single.

Group V. *Lemur and Galago.*

We have found the palmar lumbricales to be four in number in the genus *Lemur* and in *Galago crassicaudatus.*

Group VI. *Lemur and Perodicticus.*

These widely different forms approach each other in having each two supracostal muscular slips.

Group VII. *Galago, Cheiromys, Nycticebus, and Perodicticus.*

1. All the genera in this group, excepting *G. crassicaudatus*, have but three lumbrical muscles in the hand.

2. Excluding *Perodicticus*, they have but a single supracostal slip.

Group VIII. *Galago and Tarsius.*

1. These agree in the occipito-frontalis and the retractor muscles of the ear being unusually well developed. The retrahens aurem is indeed compound in them, where it may be assumed a certain correlation of structure and growth exists in connexion with the remarkable folding movements of their capacious concha.

2. They alone of all the Lemuroidea dissected show a depressor scapulæ muscle.

3. In them the flexor profundus digitorum has three muscular bellies, whereas in the other genera they are more or less united.

4. In the two genera of this group the flexor longus hallucis has origin from the fibula only.

Group IX. *Galago and Loris.*

1. The iliacus appears only to be double in them alone; but the difficulty of separating the fibres of this usually single muscle renders their singularity in this respect doubtful. *Galago* certainly has a vertebral besides its iliac origin.

2. They, as well as *Lemur xanthomystax*, have a clearly double extensor indicis.

Group X. *Galago and Perodicticus.*

The myological agreement between these two genera consists in the extensor longus digitorum being single-bellied and divisible into three main tendons going to the corresponding digits.

Group XI. *Loris and Nycticebus.*

1. The biceps of the arm is a single muscle in these two Indian genera, but double, as before noticed, in all kindred forms.

2. In *Loris* and *Nycticebus*, and in them only of all the Lemuroidea, the flexor

longus digitorum pedis has three heads of origin and three muscular bellies—the origin, as in *Pteropus*, being partly from the femur.

3. They also agree, and differ from the other forms, in having the origin of the flexor longus hallucis from the fibula and from the tendon of the popliteus.

4. Neither possesses the short but remarkable rotator of the fibula which we have described in another part of our memoir.

5. The flexor longus pollicis is single in them only, and supplies two or three more digits besides the thumb.

Group XII. *Loris*, *Nycticebus*, *Perodicticus*, *&c.*

1. No trace of a plantaris muscle is found in these genera, nor in *Galago peli* either, according to Kingma.

2. The muscle named peroneus quinti digiti, again, is decidedly absent in *Loris*, and probably is also wanting in *Perodicticus*, though its presence has been demonstrated by ourselves in *Nycticebus*.

3. In *Loris*, *Nycticebus*, and also in *Galago*, no peroneus quarti digiti is developed.

4. The flexor sublimis digitorum has but three perforated tendons in *Loris* and *Perodicticus*; in *Nycticebus* there is in addition an undivided indicial tendon.

5. The three genera (*Loris*, *Nycticebus*, and partly *Perodicticus*) have not, like the Lemurs and Galagos, such complete adhesion into a broad common tendon of the deep flexor and long pollicial tendons of the hand; nor do the two first supply the index tendon.

6. The extensor communis digitorum (manus) has in *Perodicticus* four, in *Nycticebus* five, and in *Loris* six tendons. In the first two genera the fourth, and in *Loris* the fifth digit receives a double tendon; in the *Potto* the second digit has none.

7. In contradistinction to what occurs in *Lemur*, *Tarsius*, and *Galago*, the rectus anticus major is continued into the thorax or on to the dorsal vertebræ in *Loris* and *Nycticebus*, as likewise is the case in the aberrant *Cheiromys*. *Galago crassicaudatus* has it in an intermediate condition between these.

8. Only one tendon is derived from the extensor minimi digiti and goes to the fifth digit in *Loris*, *Nycticebus*, and *Perodicticus*.

9. In *Nycticebus*, *Perodicticus*, and in *Galago* (but not to the same extent in *Loris*) the soleus is a remarkably short and broad muscle and fused below with the gastrocnemius.

Some muscles are so irregular in their distribution that they cannot well be classed with any of the above groups. Amongst these may be mentioned the extensor brevis digitorum of the foot, which has as many as two, three, four, or five muscular slips and tendons in different specimens, or even on the opposite feet of the same specimen. The scalene muscles, again, may possess two, three, or four divisions; and in the Grand Galago a pencil of fibres pierces the serratus magnus. The latter muscle is inconstant

in its rib attachments. In like manner the caudal tendons and muscular bellies do not always present regularity of distribution, although, as a rule, they are pretty uniform.

We will now institute a few comparisons between the myology of the Lemuroidea and that of higher and lower forms.

The absence of an extensor primi internodii pollicis and of a peroneus tertius muscle, and the presence of levator claviculæ, dorsi epitrochlear, and abductor ossis metacarpi quinti muscles, show, as might of course be expected, that the Lemuroidea agree in muscular developments rather with the Apes than with the more common arrangement found in Man. The genera *Lemur*, *Galago*, *Cheiromys*, and possibly others possess the short deep leg-muscle which we have termed rotator fibulæ. *Tarsius* and some of the Galagos have likewise a distinct depressor scapulæ. So far as we know, neither of these muscles[1] has hitherto been described as occurring in the higher Primates or lower Mammals; and hence we may for the present consider them essentially Lemurine in character. In other respects myological distinction between the Lemuroidea and Anthropoidea is mainly confined to difference of attachments or tendinous distribution: and, furthermore, the muscular variations exhibited by the group are found in widely different lower families, though often resembling conditions extant in arboreal Rodents. Broadly speaking the muscles of the head approximate to a Rodent or Carnivorous type; whereas those of the extremities depart little from the higher Primates, excepting the long flexors of the palm and sole. As representative of what we here state, the complex condition of the ear-muscles and tendency to duplicity of the temporalis and masseter may be regarded as marks of degradation. In the hand the more or less complete separation and full development of the abductor, adductor, flexor brevis, and opponens pollicis, the flexor brevis, abductor, and opponens minimi digiti, and comparative absence of a flexor brevis manus, with diminutive size of palmaris brevis, are Simian in appearance and attachment. In the foot the flexor brevis digitorum and hallucis, the abductor and adductor hallucis, the transversus pedis, the flexor brevis, abductor and opponens minimi digiti, and the abductor ossis metacarpi quinti likewise are more truly Ape-like than fashioned after the lower Mammalian forms.

In the Lemurine suborder, as a whole, we witness Simian muscular organization with proclivities towards the structure of animals of lower grade.

Intermediate forms or gradations of myology are very numerous; among such are the following:—

The thoracic extension of the rectus capitis anticus major, which is met with in the Platyrrhine Ape *Ateles belzebuth*, and the Rodent *Castor fiber* The scalene muscles, in their length and in the frequency of an addition to their number, probably as much

[1] Unless the small "infraspinatus secundus" met with by Macalister (Nat. Hist. Soc. Dublin, April 5, 1866) in several species of Monkeys be equivalent or homologous with the depressor scapulæ of Burmeister and ourselves.

abide by the Primatial type as wander from it. A tendency to deviate towards a not uncommon condition in Rodents and Carnivora is seen in the extra divisions of the pectoralis major; but a double layer is also frequently met with in Apes.

The subclavius is tolerably human in character. The compound deltoid is a change from the higher and simpler condition to the constantly divided state in which it is found among Rodents, Carnivora, Ruminants, Marsupials, &c. A diminished teres minor, as in Lemurines, is met with in some Rodents. In almost all the lower Mammals, but only in some of the higher Primates, the rectus abdominis goes to the first rib, as is characteristic of the Lemuroids. In Man, Apes, and Lemurs, the serratus anticus and posticus are quite separate and but moderate-sized; in some Rodents, and notably in *Hyrax*, they are continuous. A supracostal is the rule in the lower Mammalia; it is constantly met with in Lemuroids, but in the higher Apes it is not always present. The trapezius, the rhomboideus capitis, the levator claviculæ, and the levator anguli scapulæ, each and all, in development, relation, and attachment, are Ape-like, but not more so than in their compeers of lower grade.

That the biceps humeri should be double in one portion of the group and single in the other is not readily to be explained; as regards affinities, conditions similar to both one and the other are found in higher and in lower groups. The lengthening of the brachialis anticus, and its non-embracement of the deltoid, are points indicating alteration in this muscle from the Simian, towards the purely rotating character which it bears in digging and swimming Mammals.

The following muscles of the forearm are met with almost unaltered from Man and Apes:—the supinator longus and brevis, the extensor carpi ulnaris, the extensor secundi internodii pollicis, the pronator radii teres, the flexor carpi radialis, the palmaris longus, and the flexor carpi ulnaris.

A divided or multiple extensor indicis, supplying tendons to the second and third, or even the fourth digit, occurs in higher Quadrumanous genera; Lemuroids repeat the character, which becomes less marked in lower Mammals, inasmuch as where the tendon is divided they chiefly go to the index and third digit. We meet with a numerous subdivision of the long extensors to the back of the hand in several Simian genera; and even in Man the extensor communis and minimi digiti often exhibit extra development of tendons, particularly the minimi digiti, which splits into branches going to the fourth and fifth digits. In the Lemuroids these characters are more constantly manifested, notably in the Aye-Aye, as we have shown. No part of the muscular system of Lemuroids exemplifies the gradual change of the Quadrumanous type into lower forms so markedly as do the long flexors of the palm and sole. In the manus the deep palmar tendons show much variety; but in all a short slip unites the flexor sublimis with the profundus: this has been demonstrated by Turner[1] and others to be not an unfrequent

[1] "On Variability in Human Structure, with Illustrations from the flexor Muscles of the Fingers and Toes" (Trans. Roy. Soc. Edinb. p. 180 *et seq.*, fig. 2).

abnormality in Man. Only in scattered genera of the lower Mammals is the union found; but where it does exist it is large, and powerfully aids the combined actions of the superficial and deep flexors.

The multiple origin of the three muscles in question (flex. sublimis, profundus, and longus pollicis) is curious and interesting homologically as regards family relationship, and also as regards the serial homology between flexors of palm and sole. In the higher Quadrumana the tendons of the flexor profundus and pollicis more commonly, but not always, pass in separate slips below the annular ligament, the former muscle usually supplying the second, third, fourth, and fifth digits, the latter the pollex. Variations take place wherein the pollicial tendon splits and partly goes to the index, or where union takes place between the common deep flexor and longus pollicis, the latter even appearing as but a slender tendon from the former. These so-called variations culminate in the Lemuroids, and even reverse the primordial relationship of the muscles and tendons, inasmuch as the flexor longus pollicis encroaches considerably on the domain of the profundus, becomes far the larger muscle of the two, and in *Nycticebus* sends on the main tendons to the first, second, third, and fourth digits. The palmar tendinous type of the group diverges into two, one wherein the flexor profundus and pollicis unite as a broad flat tendon, ending in five equal or subequal digital segments: the genera *Lemur*, *Galago*, *Perodicticus*, *Tarsius*, and *Cheiromys* fall under this; the second, as witnessed in the Slow and Slender Loris, has separate proximal palmar tendons, the flexor longus pollicis becoming functionally the more important, and, as already said, acting as the tendinous lever of three or four of the radial digits, whilst the flexor profundus digitorum lessens its tendons to the fifth and fourth or only fifth digit, branchlets merely uniting it with the enlarged flexor longus pollicis tendons. These examples of differentiation are highly important as affording proof of the identity of the muscular relations of the hand and foot; for the flexor longus hallucis supplants, in great part, the flexor longus digitorum both in size of fleshy belly and tendinous insertion. The increase of force resulting from the palmar union is shown prominently in those lower Mammals where the manus serves the office of a scratching or digging apparatus, notably so in *Talpa*. It may be a question whether this change of tendinous type is not as much due to the uses and modes of life of the animals thus identically distinguished as purely to family organization. As regards the interossei, these manifest higher character in a slight exhibition of dorsal ones, but on the whole they more closely exemplify lower forms in being true flexores breves of the palm and sole. The extra superficial layers are of common occurrence, and indeed almost the rule, in inferior families.

In the arrangement and relative size of the psoas parvus magnus and iliacus the Lemuroids more resemble the Squirrel, Kangaroo, Seal, &c. than most Apes; this may follow as a consequence from the great extent of the lumbar region and similarity of some of these in habits, and is certainly no evidence of any affinity.

The gluteus maximus in the higher Quadrumana is usually simple, often large, but inserted seldom further than the great trochanter; in the Lemuroids it partakes of a passage form from the Apes towards Carnivora, Rodents, Cheiroptera, and other groups, by having a caudal division and being inserted much lower upon the shaft of the femur. A scansorius presents itself as a distinct fleshy muscle in most of the higher anthropoid Apes, neither does it disappear in the lower Simians, though often fused with the gluteus medius; it is next to absent in the Lemuroids, but again appears in Rodents and other lower Mammals. There are few better climbers than the Lemurine family, where, as we see, this muscle is diminutive or aborted, so that the name scansorius is not the most happily chosen one as expressive of its true function. What has been said regarding the development and presence of the scansorius applies in most respects to the tensor vaginæ femoris. The double origin of the rectus femoris is a normal condition in Man and persists in the Lemurs. The adductors of the thigh, though only three in Man, are occasionally more numerous in Apes and inferior Mammalia, The Lemurs stand midway as respects number, and they are feebler than in Monkeys, as Meckel has already observed (*l. c.* p. 379).

The division of the tibialis-anticus tendon and muscle is a structure exhibited by some of the highest Quadrumana; so that its persistence in some Lemuroids affords no grounds of separation from the Primates, although a divided origin of the tibialis anticus is found in some Rodents. The muscle in the Rabbit and Hare which Professor Huxley has termed the tibialis secundi (Hunterian Lectures, 1865), has no analogue in the Lemuroids; they exhibit, on the contrary, a well-defined quadrumanous tibialis posticus.

Thus then, on the whole, the muscular structure of Lemuroids harmonizes with their osteological characters in justifying their union in one order with the Apes and Man, while aberrant and inferior characters point to a subordinal distinctness.

We cannot conclude this Memoir without offering our thanks to our artist Mr. Berjeau for his earnest endeavours faithfully to render the natural appearances of the parts, while not losing sight of the necessity of clearness of detail.

EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1. Female *Galago crassicaudatus*, Geoff. (the individual described as *G. monteiri* by Bartlett, P. Z. S. 1863, p. 231, pl. xxviii.), from a photograph by Dr. Murie. Taken two-thirds life-size. The figures of the dissections in the Plates following, unless where otherwise denoted, are from the same specimen.

Fig. 2. Applies collectively to four greatly reduced figures of *Galago garnettii* (Ogilby). These are from sketches of the living animal by Mr. Wolf. They represent the various attitudes assumed by this species when allowed to gambol about freely after nightfall. The climbing position of figure 1 (*G. crassicaudatus*) applies equally to all the species of *Galago* which we have had the opportunity of observing.

PLATE II.

Fig. 3. Dissection of *Galago crassicaudatus*, natural size, to show the superficial muscular layer of the entire animal, the dermal fibres of the panniculus carnosus alone being removed.

The muscles and other parts are specified by the following lettering:—

1. *Head and Neck.*

O.f. Occipito-frontalis.
At.a. Attrahens aurem.
Te. Temporal.
O.p. Orbicularis palpebrarum.
Na. Naso-labial muscle.
O.o. Orbicularis oris.
Bu. Buccinator.
Ma. Masseter.
St.m. Sterno-mastoid.
Tz. Trapezius (cervical portion).

L.cl. Levator claviculæ.

On the Ear the numbers indicate:—

No. 1. Helix, its posterior margin.
„ 1*. „ its anterior margin.
„ 2. Fossa of the helix.
„ 2*. Pit above the antitragus.
„ 3. Antihelix.
„ 4. Fossa of the antihelix.
„ 5. Antitragus.
„ 6. Tragus.

P.gl. Parotid gland. *St.d.* Stenon's duct. *Sm.gl.* Submaxillary gland.

2. *Pectoral Limbs.*

D^1. Deltoid, its first or clavicular portion.
D^2. „ its second or acromial portion.
D^3. „ its third or spinal portion.

T^1. Triceps (long or scapular head).
T^2. „ (outer head).
T^3. „ (upper part of inner head).

P.ma. Pectoralis major (its humeral insertion).

B[1]. Biceps (long head or glenoidal division).

B[2]. Biceps (short or coracoid portion). In the right arm its lower part has been removed; but the dotted line indicates its continuity and insertion.

D.ep. Dorso-epitrochlear.

Anc. Anconeus.

S.l. Supinator longus.

E.c.r.l, *E.c.r.l**. Extensor carpi radialis longior.

E.c.r.b. Extensor carpi radialis brevior.

E.c.d. Extensor communis digitorum.

E.c.d. Extensor communis digitorum, tendon above digital divisions.

** 4 & 3. Extensor communis digitorum, extra slips to fourth and third digits.

E.c.u. Extensor carpi ulnaris.

E.i. „ indicis.

E.o.m.p. „ ossis metacarpi pollicis.

E.s.i.p. Extensor secundi internodii pollicis.

I,I,I,I. Interossei seen partly on dorsal and palmar surfaces of hand.

L[1].
L[2].
L[3].
L[4]. } Lumbricales.

B.a. Brachialis anticus.

C.b[1]. Coraco-brachialis (long head).

F.c.r. Flexor carpi radialis.

P.r.t. Pronator radii teres.

Pa.l. Palmaris longus.

F.s.d. Flexor sublimis digitorum.

F.p.d. „ profundus digitorum.

F.l.p. „ longus pollicis (thumb-tendon).

F.c.u. „ carpi ulnaris.

Ab.p. Abductor pollicis.

F.b.p. Flexor brevis pollicis.

Ad.p. Adductor pollicis.

F.b.m.d. Flexor brevis minimi digiti.

Ab.m.d. Abductor minimi digiti.

3. *Trunk and Tail.*

P.c. Panniculus carnosus. A small axillary piece is all that has been left of this subcutaneous muscle.

P.ma. Pectoralis major, and humeral insertion shown in right arm.

R.ab. Rectus abdominis (costal continuation).

Ex.o. External oblique.

*Tz**. Trapezius (dorsal portion), the cervical is marked *Tz*.

La.d. Latissimus dorsi.

S.mg. Serratus magnus, digitations with external oblique.

S.p.p. Serratus posticus posterior, digitations with external oblique.

L.c.i. Levator caudæ internus.

L.c.e. „ „ externus.

It.cd. The fleshy portion of the intertransversarii caudæ, which passes up to

P. & I.c. Pubo- and Ilio-coccygeus.

S.c. Sacro-coccygeus.

4. *Pelvic Limbs.*

G.mx[1]. Gluteus maximus (iliac portion).

G.mx[2]. „ „ (caudal portion).

Sa. Sartorius.

R.f. Rectus femoris.

V.e. Vastus externus.
V.i. „ internus.
Il. Iliacus.
Pe. & Ad.l. Pectineus and Adductor longus.
Ad.m. Adductor magnus.
S.t. Semitendinosus.
S.mb. Semimembranosus.
B.f. Biceps femoris.
*Ga, Ga**. Gastrocnemius.
Pla. Plantaris.
*T.a, T.a**. Tibialis anticus.
*P.l, P.l**. Peroneus longus.
*P.b, P.b**. „ brevis.
*P.5.d, P.5.d**. „ quinti digiti.
*E.l.d, E.l.d**. Extensor longus digitorum.
*E.b.d, E.b.d**. Extensor brevis digitorum.
E.p.h. Extensor proprius hallucis.
I. Interossei, seen on dorsal surface.
*Ab.o.m.*5. Abductor ossis metacarpi quinti.
*F.l.d, F.l.d**. Flexor longus digitorum.
*F.l.h, F.l.h**. „ „ hallucis.
T.p. Tibialis posticus.
L^1. *L*^{2}. *L*^{3}. *L*^{4}. } Lumbricales.
Ab.h. Abductor hallucis.
F.b.h. Flexor brevis hallucis.
Ad.h. Adductor hallucis.
F.b.d. Flexor brevis digitorum.

I.l.l^1. Internal lateral ligament of the knee-joint. *E.l.l.* External lateral ligament of knee-joint. *I.l.l*^{2}. Internal lateral ligament of the ankle-joint. *L.p.l.* Long plantar ligament. *L.d.l.* Long dorsal ligament.

Fig. 4. Sketch of the left ear of *Galago garnettii* (natural size, and from life), showing the manner in which it contracts.

P. Plications.

PLATE III.

Fig. 5. Thorax, ventral surface of neck, and inframandibular region in the Grand Galago. The dissection on the left side of the body displays the superincumbent muscular masses in position; while on the right side some of the muscles have been removed or cut short and thrown back, bringing the deeper-seated parts into view.

1. *Head and Neck.*

O.o. Orbicularis oris.
Bu. Buccinator.
Ma. Masseter.
My.h. Mylo-hyoid.
G.h. Genio-hyoid.
Ear 1. Posterior margin of helix.
„ 1*. Anterior margin of helix.
Ear 2. Fossa of helix (the glands are seen above the pointer).
„ 2*. Pit.
„ 3. Antihelix.
„ 4. Its fossa.
„ 7. Fossa of the concha.

Di, *Di**. Digastric. The pointer indicates the median tendon on the right side, part of the anterior belly being removed. On the left side the anterior belly is left entire, the posterior being hidden by the submaxillary gland.

St.m. Sterno-mastoid. Its mastoidal insertion on the right side is cut and thrown outwards.

Cl.m. Cleido-mastoid.

S.hy. Sterno-hyoid.

*S.hy**, *S.hy***. Portions, origin and insertion, of same muscle on right side, the middle being removed.

St.th. Sterno-thyroid (its attachments are hidden by the remaining portions of the sterno-hyoid).

Th.h. Thyro-hyoid.

O.h. Omo-hyoid.

L.cl. Levator claviculæ.

R.a.ma. Rectus capitis anticus major.

F.ar. Facial artery. *Sm.x.gl.* Submaxillary gland. *Th.gl.* Thyroid gland. *C.ar.* Common carotid artery. *P.n.* Pneumogastric nerve. *B.px.* Brachial plexus of nerves. The phrenic nerve is seen among these; and the inferior thyroid and transversalis cervicis arterial branches are seen crossing the plexus.

2. *Thorax and segments of Pectoral Limbs.*

P.ma. Pectoralis major.

*P.ma**. „ „ Its right humeral insertion cut through and thrown back.

P.mi. Pectoralis minor.

Sb. Subclavius.

S.sp. Supraspinatus.

S. Subscapularis.

T.ma. Teres major.

D^1. Deltoid (first or clavicular portion).

B^1. Biceps (first portion or long head).

B^2. „ (second portion or short head).

$C.b^1$. Coraco-brachialis (long head).

R.ab. Rectus abdominis.

Ex.o. External oblique.

S.mg. Serratus magnus.

La.d. Latissimus dorsi.

*La.d**. Segment of same on right side, showing tendon of insertion conjoined with that of the panniculus carnosus.

P.c. Part of the panniculus carnosus as it passes to its humeral insertion.

D.ep. Dorso-epitrochlear.

$T^{1\&3}$. Triceps, first and third heads.

*B.px**. Continuation of Brachial plexus and axilla, here partially covering the axillary artery.

Fig. 6. A dorsal view of the trunk, neck, and head of the same animal, also natural size, showing the superficial layer of muscles on the left side, and a deeper layer on the right side of the median line. Both scapulæ and portions of arms are backwardly extended, the better to display their fleshy investments.

1. *Head and Neck.*

O.f. Occipito-frontalis.
Te. Temporal.
Re^1. *Re*^{2}. *Re*^{3}. Tripartite division of the retrahens aurem muscle.
St.m. Cranial attachment, Sterno-mastoid.
Ma. Masseter.
L.cl. Levator claviculæ.
Tz. Nuchal portion, Trapezius.
Sp.cp. Splenius capitis. The dotted line indicates its spinal attachment below.
Co. Complexus. *Bi.c.* Biventer cervicis. Partially seen.
O.h. Omo-hyoid.
L.a.s.=*S.mg.* Levator anguli scapulæ, or cervical portion of Serratus magnus, dragged out. Its thoracic attachment is seen below (*S.mg**).
*Lo.d**. A small cervical portion of the Longissimus dorsi.
Smx.gl. Submaxillary gland.

2. *Trunk and Scapulo-humeral Regions.*

*Tz**. Dorsal portion of Trapezius.
Rh. Rhomboideus. Its outer border faintly shows a line of demarcation constituting an indefinite rhomboideus capitis.
La.d. Latissimus dorsi.
S.mg. Serratus magnus (interdigitating with obliquus externus).
Lo.d. Longissimus dorsi (a small portion carried into the neck is marked above *Lo.d**).
Ex.o. External oblique.
In.o. Internal oblique (portion of the external oblique being removed to show the internal muscle).
S.p.p. Serratus posticus posterior, the fine muscular digitations cut across, the dotted line indicating the aponeurotic continuation to the spine.
S.sp. Supraspinatus.
I.sp. Infraspinatus.
T.mi. Teres minor.
T.ma. ,, major.
B.a. Brachialis anticus.
D^2. Deltoid (second portion).
D^3. ,, (third portion).
T^1. Triceps (first head).
T^2. ,, (second head).
D.ep. Dorso-epitrochlear.
*S.p.a, S.p.a**. Serratus posticus anterior, partly seen below and above the rhomboideus.

Fig. 7. A partial dissection of the right side of the back at the scapular region in one specimen of *Galago crassicaudatus* (a female), showing a rudimentary depressor scapulæ and its relations to the other muscles.

Tz. Trapezius; the attachment to the vertebral border of the scapula, *Tz**, has been cut through and reflected. *Rh.* Rhomboideus. *D.sc.* The rudimentary depressor scapulæ muscle lying between. *La.d.* Latissimus dorsi, and *T.ma.* Teres major. It runs across a portion of the Serratus magnus (*S.m*). *I.sp.* Infraspinatus muscle. *D*^{2}, *D*^{3}. Second and third bellies of the deltoid. *B*^{1}, Biceps. *T*^{1}. Triceps.

Fig. 8. Similar view to fig. 7, but on the left side of the Aye-Aye (*Cheiromys madagascariensis*). The muscles are designated by the same lettering. No trace of a depressor scapulæ is present. The fibres of the latissimus dorsi commingle with those of the rhomboideus.

PLATE IV.

Deeper layers of the dorsal muscles, and dissected views of the anterior limb in *Galago crassicaudatus*, also the thoracic segment of *Lemur catta* to demonstrate its multiple pectoral and supracostal muscles.

Fig. 9. Right lateral half of the neck and chest in the Grand Galago, displaying the third or middle muscular layer. The Splenius and Rhomboideus muscles, seen from behind in Pl. III. fig. 6, have here been removed, and the continuation of the long dorsal muscles into the neck thus brought out.

Co. Complexus.
Bi.c. Biventer cervicis.
Di. Digastric (mastoidal attachment).
L.cl. Levator claviculæ.
T.ms. Trachelo-mastoid.
C.as. Cervicalis ascendens.
Tr.c. Transversalis cervicis.
S.l. Sacro-lumbalis.
Lo.d. Longissimus dorsi.
L.a.s.=*S.mg.* Levator anguli scapulæ, or cervical continuation of the Serratus magnus.
S.p.a. Serratus posticus anterior cut through; the dotted lines carry it on to the spine.
S.p.p. Serratus posticus posterior.
Ex.o. External oblique (its costal digitations).
In. Marks some of the intercostal muscles.

Sca[1]. Dotted line expressing continuation of first or long scalenus muscles, which, attached to the fourth rib, passed through the serratus magnus previously to its ascent into the neck.

Fig. 10. The vertebral column, seen behind, from the skull to the ilia, in the same animal, showing the fourth muscular layer on the right side and part of the next or deepest layer on the left side. Just sufficient of the ribs have been left to guide the eye to the dorsal division of the vertebræ.

Co. Complexus.
Bi.c. Biventer cervicis.
T.ms. Trachelo-mastoid, thrown outwards to show the spinal attachment of the two former muscles.
S.l. Sacro-lumbalis.
Lo.d. Longissimus dorsi.
$\frac{1}{2}$*Sp.d.* $\frac{1}{2}$ spinalis dorsi.
$\frac{1}{2}$*Sp.c.* „ cervicis.
Ml.s. Multifidus spinæ. The pointers include some of the lumbar portions of this complex muscle. The exposed dorsal parts are not lettered.

Fig. 11. Back view of the head and neck wherein the fifth or deepest layer of muscles alone remains; the five anterior dorsal vertebræ are present. On the right side the biventer cervicis has its occipital attachment cut away, and the cervical portion hooked back. On the same side the $\frac{1}{2}$ spinalis colli is in position; but on the left side it is dragged outwards to show its spinal tendons.

Bi. Biventer cervicis. $\frac{1}{2}$ *Sp.c.* Spinalis colli. *Ml.s.* Multifidus spinæ, anterior dorsal divisions.

R.p.ma. Rectus capitis posticus major.
R.p.mi. „ „ „ minor.
R.l. Rectus lateralis.
Te. Occipital portion of temporal muscle.
O.s. Obliquus superior.
O.i. „ inferior.
* Extra fibres of rectus capitis posticus major.
Di. Digastric cut through to the median tendon and turned back. The occipital insertion of the posterior belly is well seen.

M. Angle of Mandible.

Fig. 12. Semidiagrammatic view of the pectoral muscles in *Lemur catta.*

P.ma^1. First portion of the pectoralis major. *P.ma*^{2}. Its second portion. *P.ma*^{3}. The third or long division of the same muscle. *D.* Deltoid. *R.ab.* The part of the Rectus abdominis which passes to the first rib. *S.mg.* Several digitations of the Serratus magnus. *Sp.co*^{1}. First supracostal muscle, crossing the rectus. *Sp.co*^{2}. The second supracostal slip. *Sca.* Scalenus.

Cl. Clavicle.

Fig. 13. The anterior limb separated from the trunk, and the extensor muscles exposed in such a way as to show the origin and insertion of each.

S.mg. Serratus magnus, cut short close to its scapular attachment.
O.h. Tendon of insertion of omo-hyoid.
S.sp. Supraspinatus.
I.sp. Infraspinatus.
T.ma. Teres major.
T.mi. Teres minor.
S. Portion of subscapularis seen beneath the teres minor.
L.c. Levator claviculæ (its acromial insertion).
P.mi. Pectoralis minor (cut short).
P.ma. „ major (cut short).
D^2. Deltoid, second portion (cut short).
D^3. „ third portion (cut short).
La.d. Latissimus dorsi.
D.ep. Dorso-epitrochlear.
T^1. *T*^{2}. *T*^{3}. *T*^{4}. Triceps. Its four separate fleshy bellies indicated respectively by the numerals.
Anc. Anconeus.
B.a. Brachialis anticus.
B^1. Biceps (long glenoidal belly).
S.l. Supinator longus.
S.r.b. Supinator radii brevis.

E.c.r.l. Extensor carpii radialis longior.
E.c.r.b. „ „ „ brevior.
E.o.m.p. „ ossis metacarpi pollicis.
E.s.i.p and *E.s.i.p**. Extensor secundi internodi pollicis. Its belly and tendon.
E.c.u. Extensor carpi ulnaris.
E.i^{1,2} and *E.i*^{1,2*}. Extensor indicis. The two bellies and respective tendons.
E.c.d. Extensor communis digitorum (divided).
E.m.d. Extensor minimi digiti (double tendon).
F.b.p. Flexor brevis pollicis.
Ad.p. Adductor pollicis.
I.I.I. Interosseous muscles (dorsal aspect).

Fig. 14. The same anterior limb seen on its inner side, displaying chiefly the flexors. The lettering as low as the elbow-joint is nearly identical with that in fig. 13.

B^1. *B*^{2}. The first and second portions of the biceps; the latter joining the coraco-brachialis longus.
C.b^1. Coraco-brachialis (its long portion).
C.b^2. „ „ (its short portion).
B.a. Brachialis anticus.

Pa.l. Palmaris longus (origin and partial insertion), the belly removed.

F.c.u. Flexor carpi ulnaris (divided).
F.s.d. Flexor sublimis digitorum (divided).
** Tendinous union of superficial and deep flexor.
F.p.d^1. *F.p.d*^{2}. *F.p.d*^{3}. Flexor profundus digitorum; its three separate heads of origin.
P.q. Pronator quadratus.
S.l. Supinator longus, partly seen.
P.r.t. Pronator radii teres.
F.c.r. Flexor carpi radialis; portion of belly removed.
E.o.m.p. Insertion of extensor ossis metacarpi pollicis.
F.l.p. Flexor longus pollicis; tendon of insertion.
F.l.p^1. Flexor longus pollicis; first head.
F.l.p^2. Flexor longus pollicis; second head, divided into two.
Ab.p. Abductor pollicis.
Ad.p. Adductor pollicis.
Ab.m.d. Abductor minimi digiti.
F.b.m.d. Flexor brevis minimi digiti.
L^1. *L*^{2}. *L*^{3}. *L*^{4}. First, second, third, and fourth lumbrical muscles.

Fig. 15. Enlarged section of palm, a small part of the proximal phalanges and of the distal end of the radius and ulna being left. The superficial and deep interossei, and the small muscles of the pollex and of the fifth digit, are exhibited.

Ab.p. Abductor pollicis. *Ad.p.* Adductor pollicis; the pointer leads to the long and the short slips. *Ab.m.d.* Abductor minimi digiti. *F.b.m.d.* Flexor brevis minimi digiti. *I,I,I,I.* The first, second, third, and fourth double interossei. *Is, Is.* The two superficial interosseal slips. The numerals 1, 2, 3, 4, and 5 are appended to the several digits.

PLATE V.

Dissections of *Galago crassicaudatus*, being deep views of the head, neck, and lower (posterior) limb: all nearly natural size.

Fig. 16. Segment of the skull, the neck, and the thorax of the Thick-tailed Galago. prepared to show the deep ventral muscles of the neck and the supracostal slip. The sternal cartilages have been cut through on the left side, and the costal parts pushed outwards.

R.a.ma. Rectus capitis anticus major, in position on the right side, partially severed and pulled out on the left.
R.a.mi. Rectus capitis anticus minor.
R.l. Rectus lateralis.
L.c^1. Longus colli, first portion (dragged outwards).
L.c^2. Longus colli, second division (dragged outwards).
L.c^3. Longus colli, third or deep part.
S.mg. Serratus magnus.
Sca^1. Scalenus (the long thoracic division piercing the serratus).
Sca^2. Scalenus (short portion).
S.c. Supracostal.
R.ab. Rectus abdominis.

Ms. Mastoidal inflation of periotic. *Ste.* Sternum.

Fig. 17. Portion of the inferior palatine surface of skull, with part of the mandible. The latter loosened at its articulation and twisted inwards, to show the pterygoid muscles.

E.pt. External pterygoid, cut through, part of the insertion being seen on the upturned coronoid portion of the mandible. *I.pt.* Internal pterygoid, crossed by the inferior dental nerve and artery.

M. The right mandible. *Ms.* Mastoidal eminence. *I.d.n.* Inferior dental nerve and artery passing into inferior dental foramen.

Fig. 18. A somewhat similar view of the under surface of portion of the skull, also on the left side, but the position reversed. The tongue, not entire, has been pushed to one side, allowing a moiety of the palate to be seen. Posteriorly some of the stylo-pharyngeal and deep muscles of the neck are traced. The mandible is inclined outwards, to display the pterygoids.

I.pt. Internal pterygoid.
E.pt. External pterygoid.
R.a.ma. Rectus anticus and part of longus colli.
R.l. Rectus lateralis.
S.c.ph. Portion of the superior constrictor of the pharynx.
Sy.g. Stylo-glossus.
Sy.h. Stylo-hyoid.
Sy.ph. Stylo-pharyngeus.

M. Mandible. *To.* Tongue. *Ms.* Mastoidal bulla.

Fig. 19. Deep sets of muscles of the under surface of the lumbar, pelvic, and caudal regions. The symphysis pubis has been divided and the ischio-pubic portion of the right side dragged outwards, to expose the origin of the sacro-coccygeus, &c. The quadriceps extensor, adductors, and inner hamstring-muscles remain on the left limb.

Dph. Diaphragm, cut through, leaving its lumbar attachment.
*Ql,Ql**. Quadratus lumborum. In position on left side, and pulled out on right side, to show its tendons of origin and insertion.
Ps.m. Psoas magnus. *In situ* on left side, and part of origin severed on right side.
Ps.p. Psoas parvus. Entire on left side and tendon of insertion shown on right.
Il. Iliacus. Partly hidden on left side and on right severed and dragged out so as to expose its double origin pierced by the lumbar plexus.
Py. Pyriformis. Partly shown as it passes from the sacrum to the femur.
Gr. Gracilis. Origin cut and thrown back on right side; and *Gr** the insertion, common with the sartorius and semitendinosus, on the left limb.
Ob.i. Obturator internus; its flat musculo-tendinous surface of origin.
P & Ic. Pubo- and ilio-coccygeus, with fleshy belly severed on right side.
Sc. Sacro-coccygeus. *In situ* on left side, and tendons dragged out on right.

Ic. Infracoccygeus.
It.cd. Intertransversarii caudæ.
Pe. Pectineus.
Ad.l. Adductor longus.
Ad.m. „ magnus.
Ad.b. „ brevis.
R.f. Rectus femoris.
Cr. Crureus.

*Vi,Vi**. Vastus internus; origin and insertion.
V.e. Vastus externus; insertion.
S.mb. Semimembranosus.
St. Semitendinosus.
Sa. Sartorius; common insertion with the above.

L.px. Lumbar plexus of nerves.

Fig. 20. Adductors, &c. of femur on left side, seen in front. The brim of pelvis, ilium, and part of sacral vertebræ form the upper segment of the figure.

Ad.m. Adductor magnus.
Ad.l. „ longus.
Pe. Pectineus.
Sa. Sartorius (its origin).
Ps.p. Psoas parvus (tendon of insertion).
Ps.m. „ magnus „ „
Il. Iliacus „ „
Gr. Gracilis; origin thrown out.

R.f. Double-headed origin of rectus femoris.
G.md. Gluteus medius (insertion).
G.mx$^{1°}$. „ maximus (insertion of its so-called first portion).
V.i. Vastus internus (origin).
Cr. Crureus.

Fig. 21. Posterior view of buttocks and ischio-femoral region of left side. This figure is from the same specimen as fig. 20, only seen behind, with the sacrum and left moiety of pelvis bent forwards at a right angle, and consequently hidden from view.

Ad.m. Adductor magnus.
Ad.b. „ brevis.
Ob.e. Obturator externus.
G.mx^2. Gluteus maximus; insertion of second portion.
Q.f. Quadratus femoris; muscular portion and insertion, thrown outwards.
*Q.f**. Quadratus femoris; tendon of origin.
Ob.i. Obturator internus; cut tendon of insertion.
G.md. Gluteus medius (insertion).
Py. Pyriformis (insertion).
G.i. Gemellus inferior.
S.t. Semitendinosus (origin).
S.mb. Semimembranosus (origin).
Gr. Gracilis (origin).

Tro. Peroneal trochanter.

Fig. 22. Segments (femur, tibia, and fibula) of left lower limb, a front outer view showing the rotator fibulæ muscle and its relation to the origins of the leg-extensors.

R.fb. Rotator fibulæ.
E.l.d. Extensor longus digitorum.
T.a. Tibialis anticus.
E.p.h. Extensor proprius hallucis.
I.h. Conjoined insertion of the inner hamstring-muscles, thrown forwards.
Q.ex. Quadriceps extensor (the letter *P.* indicates the patella).
Ga. Gastrocnemius (origin).
B.f. Biceps femoris (insertion).
So. Soleus (origin).
Pl. Plantaris (origin).
P.b. Peroneus brevis.

Fig. 23. Same parts, seen from behind, some of the muscular origins being cut away. The posterior and crucial ligaments of knee-joint remain.

Po. Popliteus muscle severed, and the origin and insertion respectively thrown outwards and inwards.
R.fb. Rotator fibulæ; its fibres differing in direction from those of the popliteus, which lies completely above.

F.l.d. Flexor longus digitorum.
F.l.h. Flexor longus hallucis.
T.p. Tibialis posticus.

Fig. 24. Flexors of the lower leg and sole of foot. The superficial muscles of the calf have been removed, and those underneath pulled out on each side. The plantar tendons have in a similar manner been thrust out of position, to enable the eye to follow the course of each.

Po. Popliteus.
F.l.h. Flexor longus hallucis (fleshy belly).
F.l.h.* „ „ „ (plantar tendon).
F.l.d. Flexor longus digitorum (fleshy belly).
Tp, Tp.* Tibialis posticus.
P.fs. Plantar fascia.
F.b.d. Flexor brevis digitorum.
*Ab.o.m.*5. Abductor ossis metacarpi quinti.
Ab.m.d. Abductor minimi digiti.
L^1, L^2, L^3, L^4. Lumbricales.
Ad.h. Adductor hallucis.
Ab.h. Abductor hallucis.
F.b.h. Flexor brevis hallucis.

L.p.l. Long plantar ligament.

PLATE VI.

Fig. 25. Hind extremity and tail of the Grand Galago, showing in an outside view the deep muscles and tendons pulled asunder. The caudal tendons are enlarged, but the other parts about their natural proportions.

G.mx^1. Gluteus maximus, first portion, origin reflected.
G.mx^{1*}. Its insertion, cut short.
G.mx^2. Gluteus maximus, second portion, origin reflected.
G.mx^{2*}. Its insertion, cut close to the femur.
G.md. Gluteus medius.
G.mi. Gluteus minimus.
Py. Pyriformis.
G.s. Gemellus superior.
G.i. „ inferior.
Ob.i. Obturator internus.
B.f. Biceps femoris.
S.t. Semitendinosus.
Smb. Semimembranosus.
V.e. Vastus externus (origin).
R.f. Rectus femoris.
Cr. Crureus.
L.c.i. Levator caudæ internus.
L.c.e. Levator caudæ externus.
Is.c. Ischio-coccygeus.
P. & *I.c.* Pubo- and ilio-coccygeus.
S.c. Sacro-coccygeus.
I.t.cd. Intertransversariæ caudæ.
Ga. Gastrocnemius.
So. Soleus.
Pla. Plantaris.
F.l.h. Flexor longus hallucis.
P.l, P.l.* Peroneus longus; posterior origin and plantar tendon.
P.b, P.b.* Peroneus brevis; belly and tendon.
P.5.d, P.5.d.* Peroneus quinti digiti; belly and tendon.
T.a. Tibialis anticus.
E.p.h. Extensor proprius hallucis.
E.l.d. Extensor longus digitorum.
E.b.d. Extensor brevis digitorum.

Tro. Great trochanter. *L.d.l.* Long dorsal ligament of tarsus.

Fig. 26. A few of the caudal vertebræ of the same animal, seen on their under surfaces, and with the short caudal muscles *in situ* on the one side and pulled out on the other.

It.cd. Intertransversarii caudæ muscles. *S.c.* Portions of some of the tendons of insertion of the sacro-coccygeus.

Fig. 27. Anterior view of lower left hind leg and foot of the Black-fronted Lemur (*L. nigrifrons*), showing the double tibialis anticus muscle, &c., and short tarsal bones.

T.a^1. Tibialis anticus primus.
T.a^2. „ „ secundus.
E.p.h. Extensor proprius hallucis.
E.l.d. „ longus digitorum.
E.b.d. „ brevis digitorum.
1,2,3,4,5. Digits (distal ends, metatarsals).
P.l. Peroneus longus.
P.b. Peroneus brevis.
P.4.d, *P.4.d**. Peroneus quarti digiti.
P.5.d. Peroneus quinti digiti (muscular belly).
*P.5.d**. Peroneus quinti digiti (tendon of same.

Fig. 28. Slightly enlarged semidiagrammatic representation of the head of the tibia and fibula of the Ring-tailed Lemur (*L. catta*), showing the rotator fibulæ and its muscular relations, seen behind and slightly outwards; from a sketch by Mr. Mivart.

R.fb. Rotator fibulæ. *Po.* Popliteus, transversely cut through. *F.l.d.* Flexor longus digitorum, passing from before backwards. *T.p.* Tibialis posticus. *F.l.h.* Flexor longus hallucis.

Fig. 29. Anterior and outer view of the same. *Ta.* Tibialis anticus. The other letters are as in Fig. 28. Here the origin of the flexor longus digitorum is seen to be in front of the rotator fibulæ.

Fig. 30. Enlarged plantar surface of left foot of *Galago crassicaudatus*—the elongated tarsus being thus well displayed, and the short muscles and interossei better defined.

Ab.m.d. Abductor minimi digiti (dragged out),
*Ab.o.m.*5. Adductor ossis metacarpi quinti (dragged out).
F.b.m.d. Flexor brevis minimi digiti.
1,2,3,4,5. Digits, four of them being shown only as far as the proximal phalanx.
Ab.h. Abductor hallucis.
F.b.h. Flexor brevis hallucis.
Ad.h. Adductor hallucis.
I,I,I,I. Four pairs of double interosei.
Is^1,*Is*^{2}. First and second superficial single interosseous muscles.

L.p.l. Long plantar ligament.

Fig. 31. Short deep muscles of the ventral surface of the neck in the Aye-Aye (*Cheiromys madagascariensis*), reduced in size.

R.a.ma. Rectus capitis anticus major. *R.a.mi.* Rectus capitis anticus minor. *R.l.* Rectus lateralis. *L.c*^{1}. Longus colli; first portion. *L.c*^{2}. Second portion of same muscle, dragged out by a hook. *L.c*^{3}. Third portion of the longus colli.

Fig. 1.

Fig 2.

C. Berjeau. lith.

M. & N. Hanhart. imp

Dr Murie, Photo. J. Wolf. delt

I. GALACO CRASSICAUDATUS. ♀ ⅔ Nat size. 2. G. GARNETTII.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Std
Ma
Pgl.
St.m.
D1
D2
P.ma
B1
T3
T1
B2
B1
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Ano.
P.ma.
Rab.
Ex.o.
G.mx.1
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Fb.p.
Fl.p.
L3
Ab.p.
Fs.d
I
L4
Fb.md.
Ab.md.
Pr.t.
F.c.r.
Fs.d
Sl.
F.p.d.
Ec.r.l.
Pal.
F.cu
C.b.1
Ba.
Ad.p.
Fb.p.
E.s.i.f.
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E.omp.
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Ei.
Ei.
**4&3
Ab.md
E.cd*
E.cu.
Ec.d
Ec.r.b.
Sl.
E.cr.l.

Fig 3.

Fig 4.

G. garnettii.

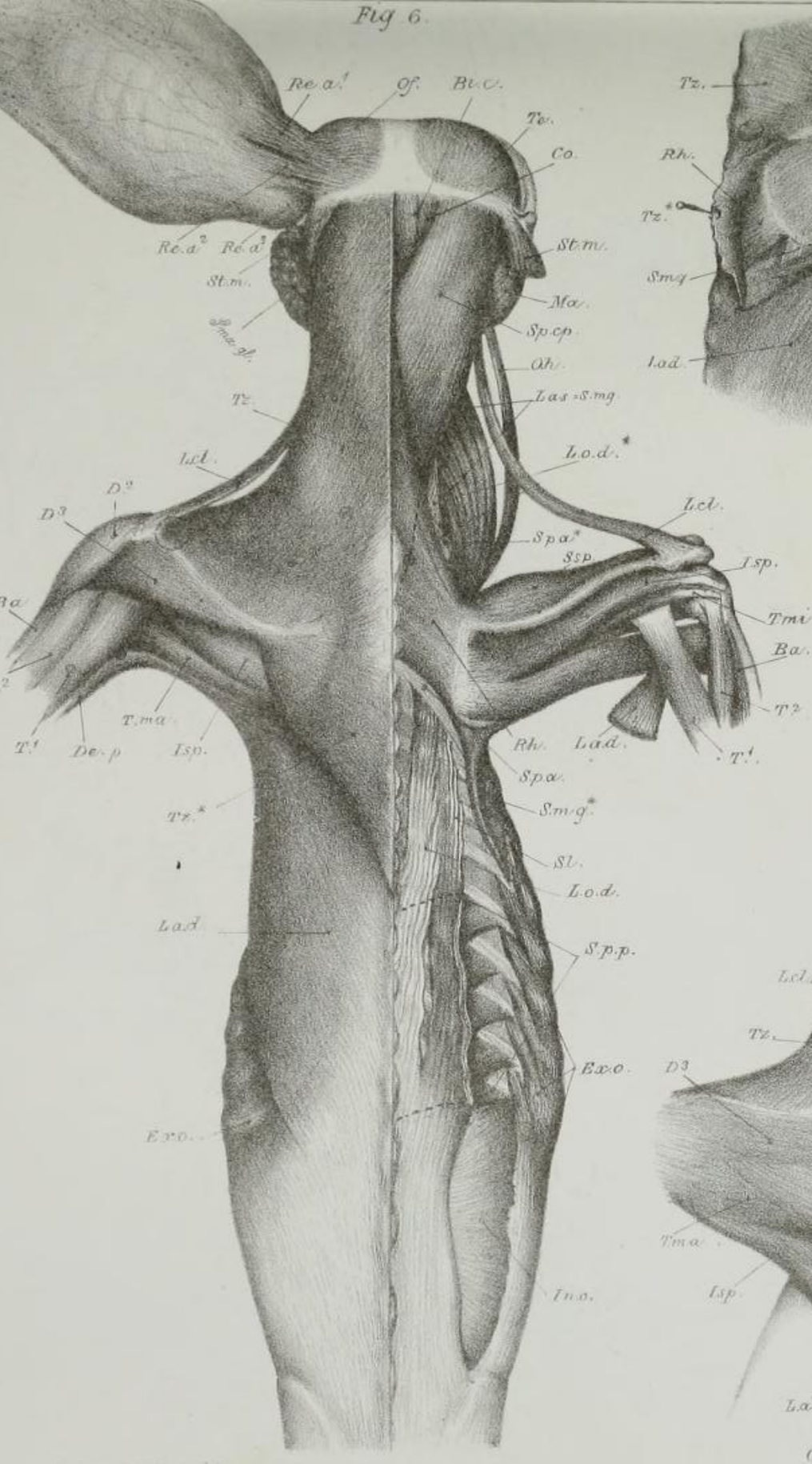
Fl.d. Ga. Ga* Sa. St Gr Ad.m Lc.e It.cd. P&I.c. G.mx.² S.c. R.f. Sa. Bf. Vᵉ Fl.h. Pla. Ad.h. Flh.* L² L¹ Fb.h. Ab.h. Tp. Gll² L³ L⁴ Fb.d. Fl.d.* Pfs. Spl. Fl.d. Ab.o.m.⁵ Gll¹ Ga. Pl. Ta. Pla. Pb. Eld. P.5.d

F.b.h. E.p.h E.b.d. Gdl. Ta* Pl.* Pb.* Ad.h. I. El.d.* E.b.d.*

C. Berjeau & Dr Murie. del. C. Berjeau lith. M & N. Hanhart imp.

GALAGO CRASSICAUDATUS. ♀, adult Nat. size.

Fig 6.



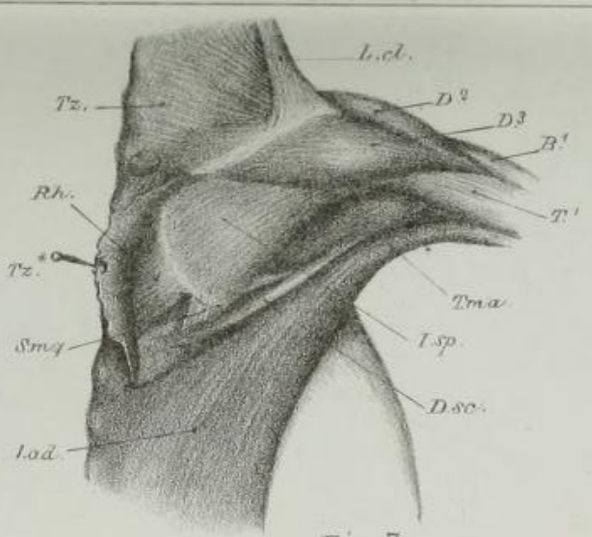


Fig 7.

Fig 5.

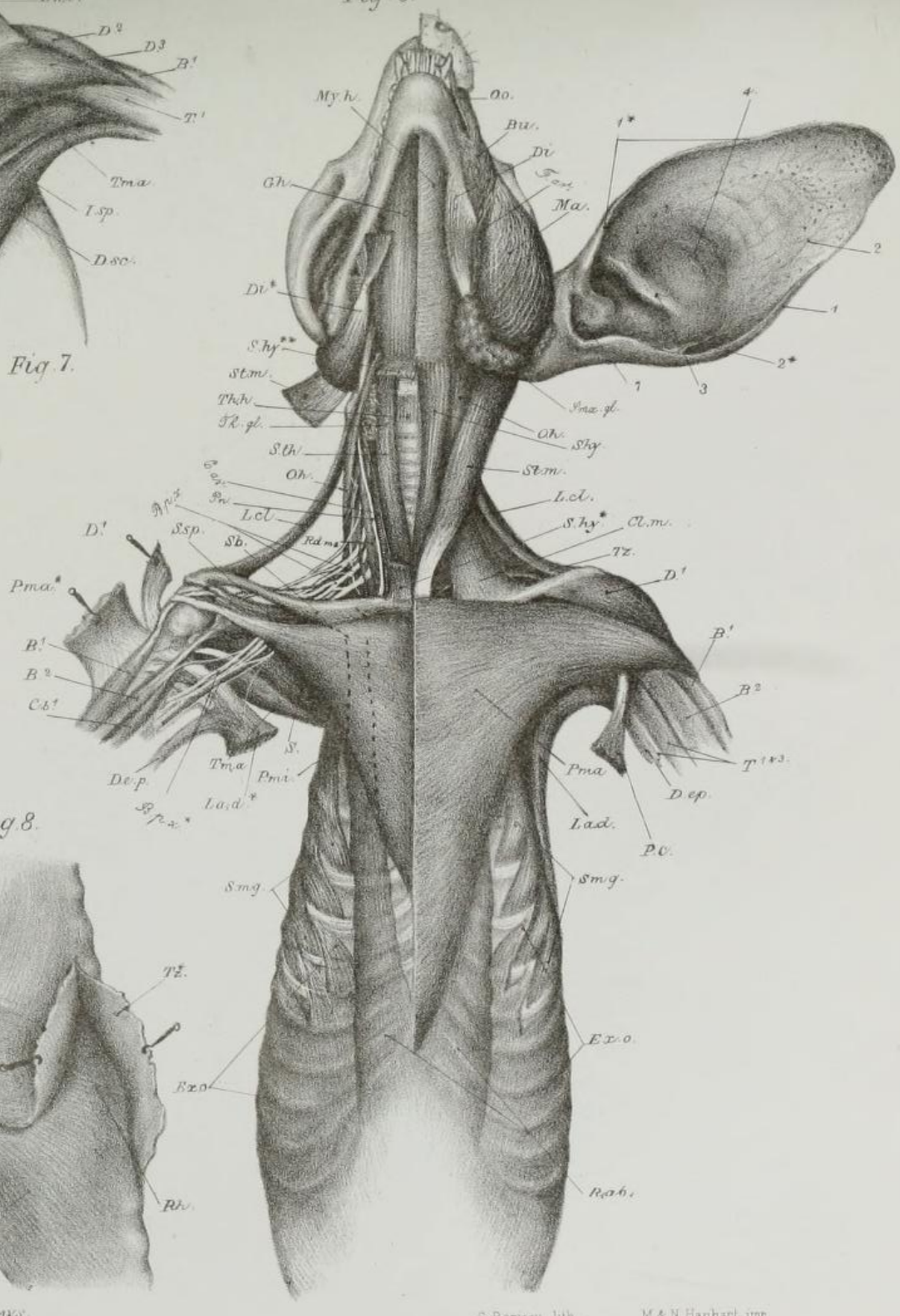
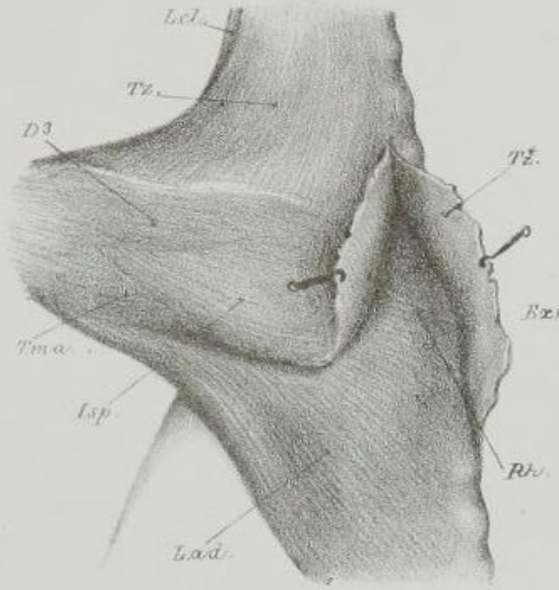


Fig 8.



Cheiromys.

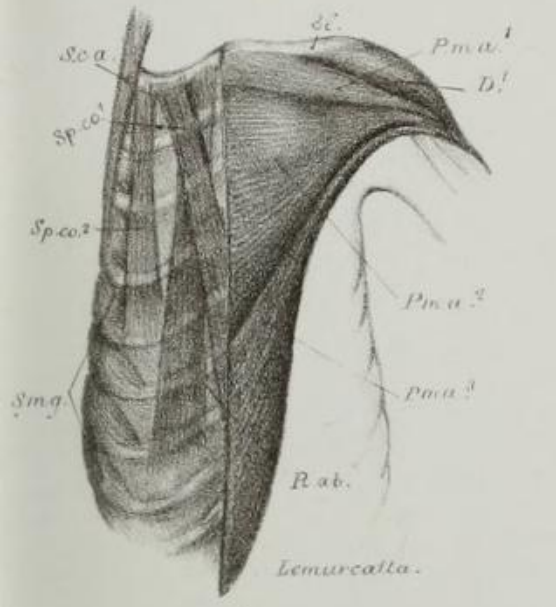
C. Berjeau & Dr Murie del.

C. Berjeau. lith.

M & N. Hanhart. imp

G. CRASSICAUDATUS.

Fig 12.



Lemur catta.

Fig 9

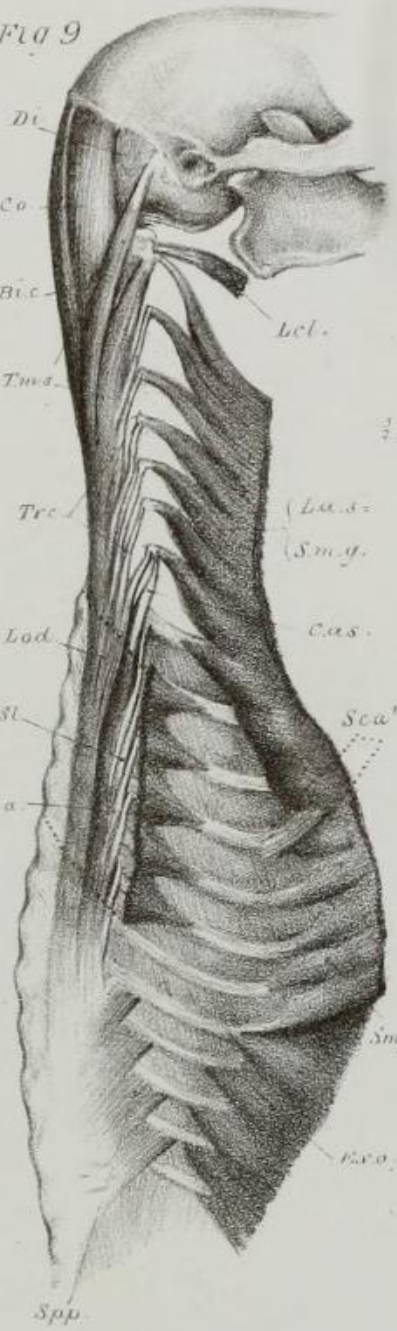
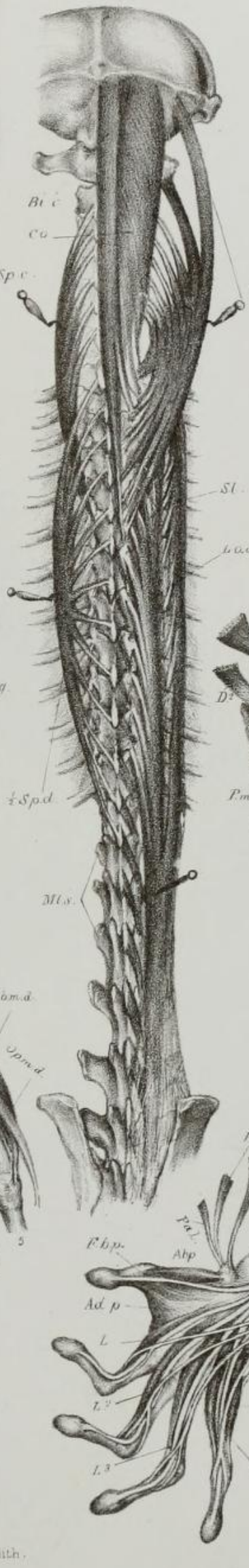


Fig 10.



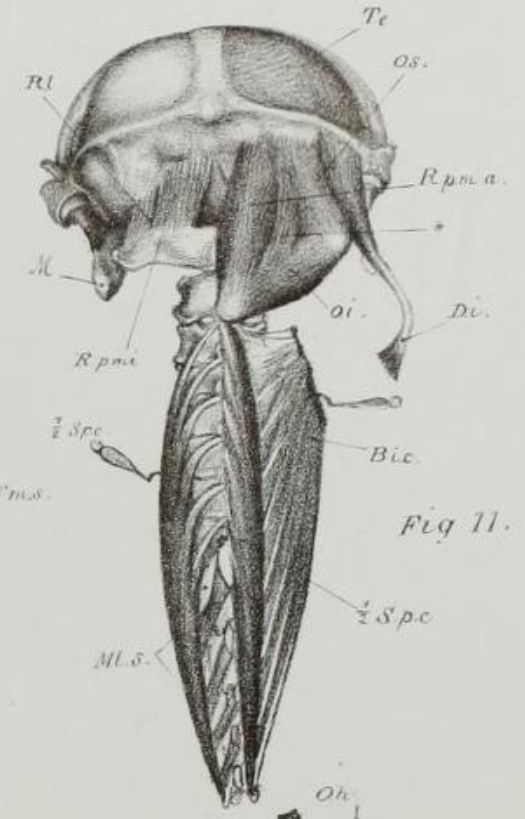


Fig 11.

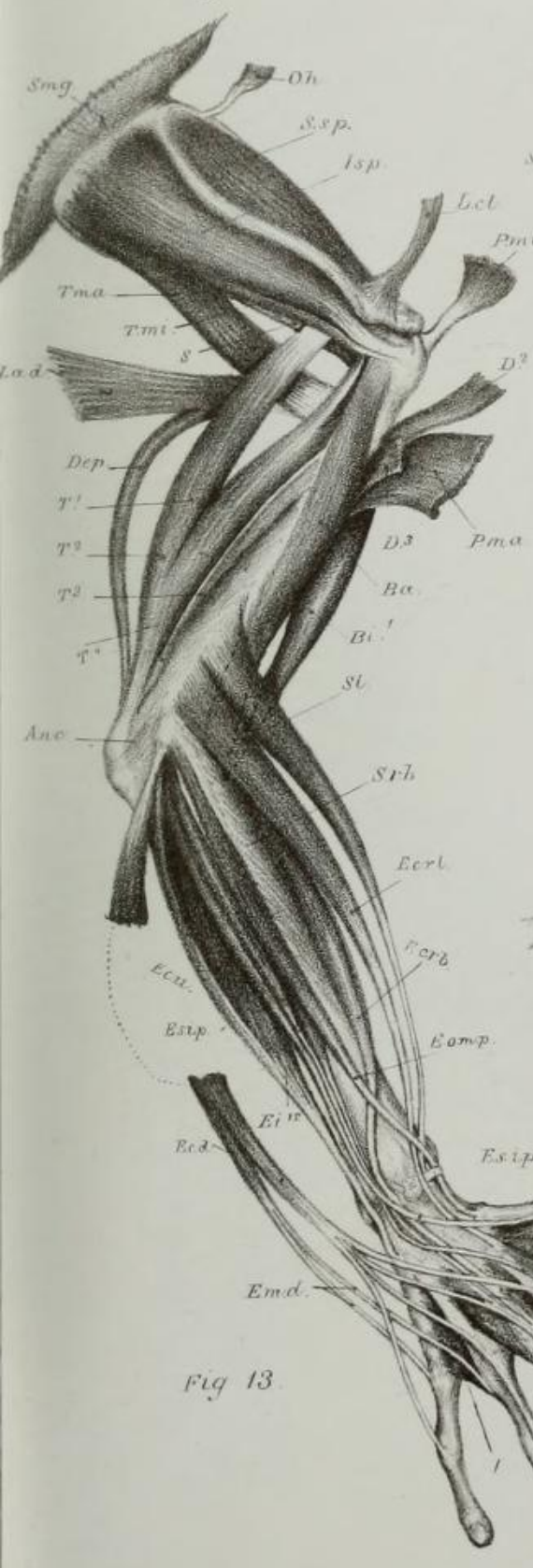


Fig 13.

Fig 15

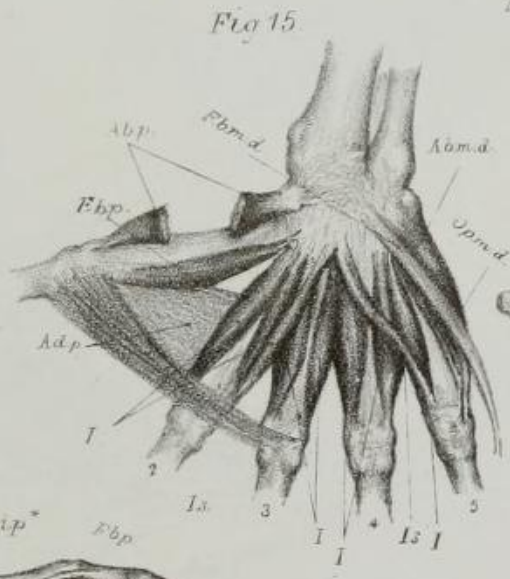


Fig 14.

C. Berjeau, & Dr Murie del.

C. Berjeau. lith.

M & N Hanhart. imp.

C CRASSICAUDATUS.

Fig 22

Fig 16

Fig 21

Fig 20

Fig 23

Fig 17

Fig 24

Fig 18

C. Berjeau & L.F. Mirvic del.

C. Berjeau lith.

M.A.N. Fanhart imp.

G. CRASSICAUDATUS

C Berjeau & Dr Munne, del

C. Berjeau, lith

M & N Hanhart, imp

G. CRASSICAUDATUS