Dabry de Thiersant, Piscicult. et Pêche en Chine (1872), pl. xxxvii. figs. 9 & 10, under the name of *Gobius* ? *Tsin-ting-yu* and *G.* ? *Pa-chee-tsee-yu*, from Sze Chuen.

EXPLANATION OF THE PLATES.

Plate XXIII.

Fig. 1. *Crossochilus styani*, p. 268.
2. *Gobio nummifer* (p. 269), head and anterior part of body.
3. *Homalosoma stenosoma* (p. 270).
3*a*. „ „ upper view of head and pectoral fins.

Plate XXIV.

Fig. 1. *Opsariichthys acanthogenys* (p. 269).
1*a*. „ „ upper view of head.
2. „ *platypus* (p. 270), side view of head.

4. A Note upon *Galago garnetti*. By Frank E. Beddard, M.A., F.R.S., Prosector and Vice-Secretary to the Society.

[Received March 5, 1901.]

(Text-figures 71–74.)

I believe that attention has not been directed to a curious point of likeness between the *hind* foot of the *Galago garnetti* and the *fore* foot of *Hapalemur griseus* which I propose to describe in the present note.

As is to be seen in the accompanying drawing (text-fig. 71, p. 272), there is upon the ankle of this Lemur close to the roots of the 2nd and the 5th digits a patch of spine-like structures which are exceedingly like those borne upon the wrist of the male *Hapalemur griseus* as figured by myself [1], Mr. Bland Sutton [2], and Prof. A. Milne-Edwards [3].

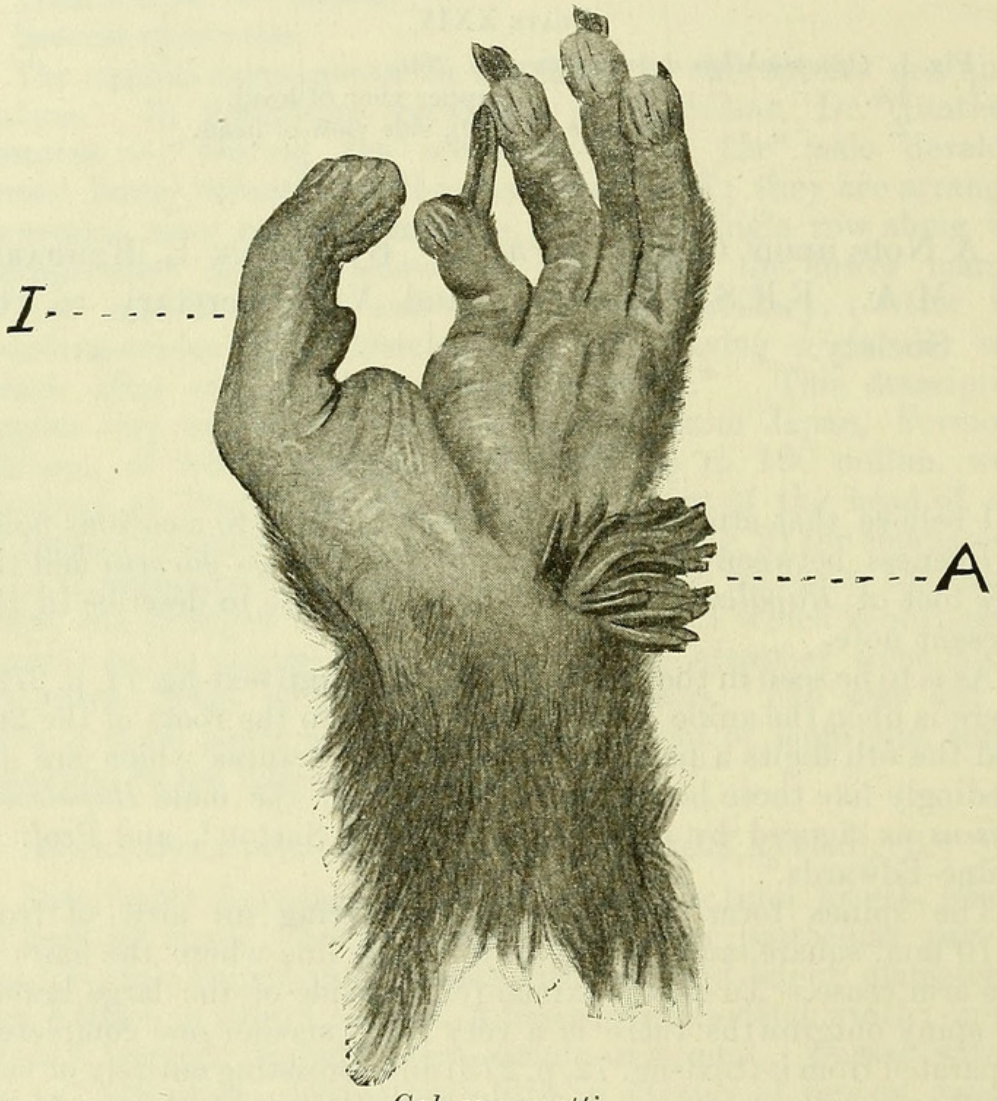
The spines form a dense tuft occupying an area of from 8–10 mm. square, and they lie beyond the line where the hairs of the arm cease. To the proximal (elbow) side of the large branch of spiny outgrowths there is a very much smaller one completely separated from it (text-fig. 72, p. 273) and consisting entirely of very small spiny outgrowths. As is correctly shown in Messrs. Murie and Mivart's paper upon the anatomy of the Lemuroidea, the hair upon the fourth foot (of *Galago crassicaudata*) [4] ends off in a V-shaped line, the arms of the V being directed towards the hand. This agrees with the condition which I have observed in *G. garnetti*, the chief difference being (apart of course from the spiny structures which it is the object of the present communication to describe) that the area of naked skin upon the ankle is more extensive.

[1] P. Z. S. 1884, p. 393, fig. 1. [2] P. Z. S. 1887, p. 369, fig. 1.
[3] Hist. Nat. Phys. et Pol. de Madagascar, Mamm. pl. 122 Z.
[4] Trans. Zool. Soc. vii. p. 11, woodcut, fig. 8.

The patch of spines lies behind the pad lettered 5 in the figure of Murie and Mivart.

The spines themselves are of a brown colour, paler therefore than the corresponding structures in *Hapalemur griseus*. The longest of them are quite 10 mm. in length; and this fact coupled with the relative smallness of the area which they cover renders them rather more conspicuous than in *Hapalemur*. On the other hand, they might be readily destroyed in the preparation of a skin, and thus have escaped notice at the hands of zoologists. Whether they are

Text-fig. 71.



Galago garnetti.

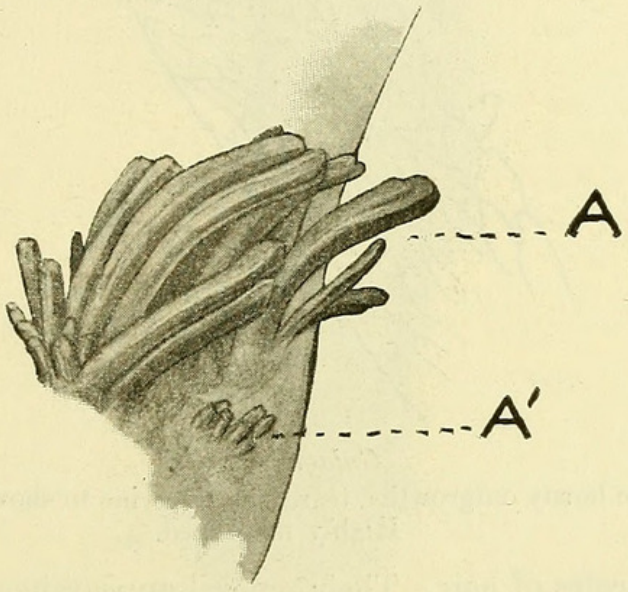
Right hind foot:—I, hallux; A, patch of horny outgrowths.

present in other species of the genus as a general rule or not, I am unable to say; but I can at any rate assert that there is no such modification of the skin of the foot of *Galago maholi*, the only species which I am at the present moment able to examine in the flesh. The dried skin of *G. monteiri* shows no traces of these structures, but I do not regard that piece of evidence as so strong.

There can be no doubt that in *Hapalemur griseus* the corresponding structures are a permanent and apparently universal

characteristic of the species, at least of the males of that species. It is quite likely therefore that these horny spinelets are equally characteristic of *Galago garnetti*, though unfortunately through an oversight I am not able to say anything about the sex of the individual examined by myself. Mr. Sutton held that in *Hapalemur* "the patch of spines was in reality formed by the hardened secretion of the gland underlying them." In this case the structure could have no possible relation to hair or spines, or to any mammalian integumental callosities; they would be rather comparable to the cuticular "hairs" and spines of Arthropods. One argument against Mr. Sutton's view appears to me to be this: the lumen of sebaceous and other integumental glands—indeed of all glandular structures—is either circular or oval; in any case without angles. Now the spinelets of this *Galago*, as may be readily noted in the more highly magnified drawing (text-fig. 72) which I exhibit, are distinctly quadrangular; and the same angular character was noticeable in the arm-spines of *Hapalemur*.

Text-fig. 72.



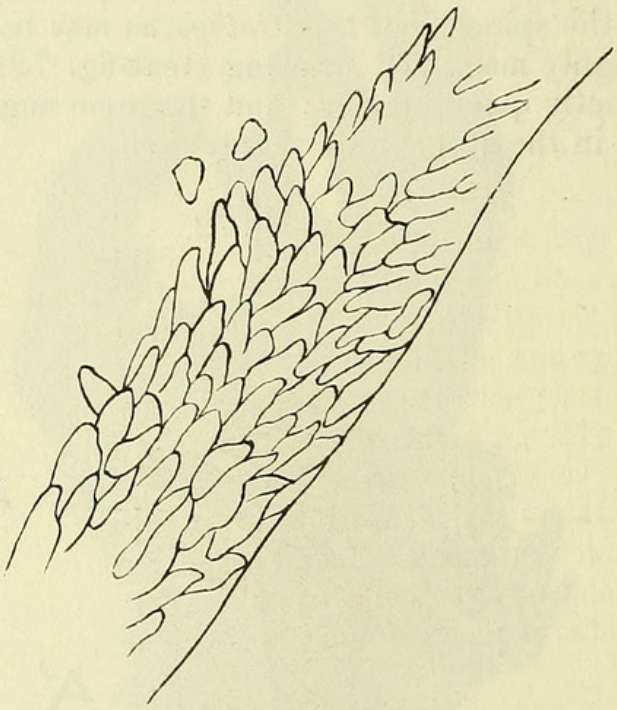
Galago garnetti.

Patch of horny outgrowths, more highly magnified.
A, the main patch; A', a group of smaller outgrowths.

It is difficult to imagine that the squeezed-out secretion of a tubular gland would have an angular contour. The existence of a large gland in *Hapalemur* lying beneath (though as far as I can recollect not exactly corresponding to) the patch of spines lends of course some colour to the view of the glandular origin of the structure in question in that Lemur. After removal of the skin in *Galago garnetti*, no gland was to be observed beneath the patch of spines. I do not propose to assert the total absence of integumental glands in this region; but no large glandular body comparable to that of *Hapalemur griseus* was visible. To produce such

large fibres as are those which constitute this peculiar organ in *Hapalemur griseus* and *Galago garnetti* would seem to need something larger than the normal glands of the integument, if we are to explain them as a glandular secretion. The spinelets are hard and horny, much of the consistence of nails. When softened a little with potash, they can be readily split longitudinally into fibres. When this is done, the spinelets appear to be made up of irregularly-shaped flakes (see text-fig. 73) which imbricate in a scaly fashion not at all unlike the outer coat of hairs. The individual flakes readily become detached when a fragment is teased with needles. They are rather angular and of different shapes, not at all

Text-fig. 73.



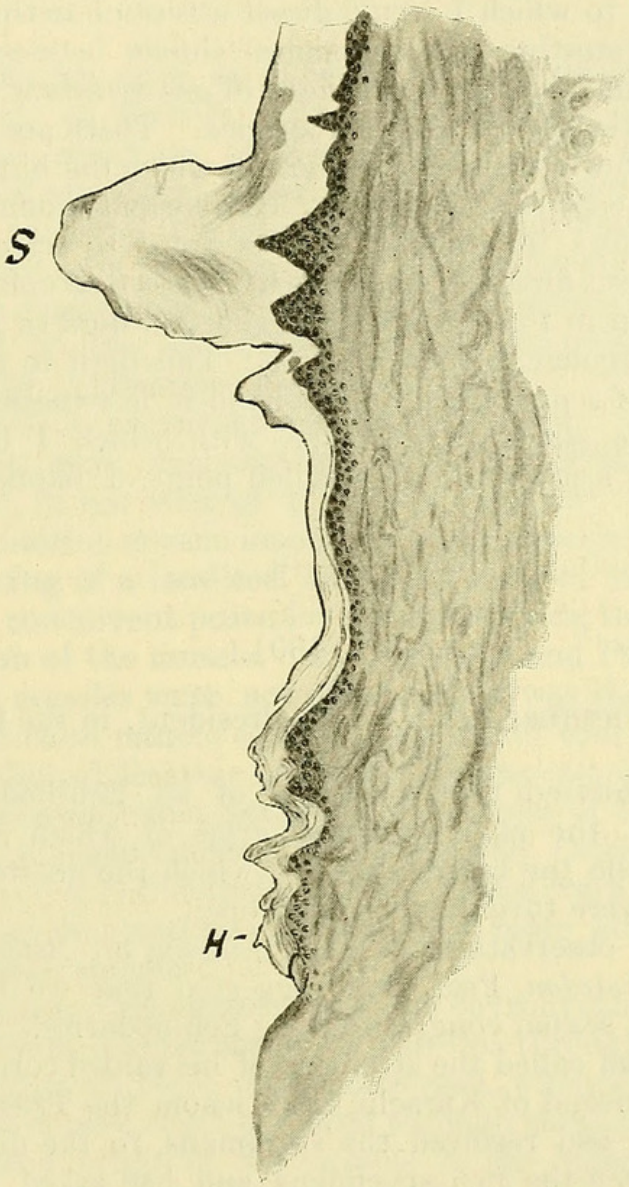
Galago garnetti.
One of the horny outgrowths, teased in glycerine to show cornified cells. Highly magnified.

unlike the scales of hair. Their general appearance will be gathered from an inspection of the accompanying drawing (text-fig. 73), which represents a fragment teased in glycerine after softening in potash. Treatment with acetic acid showed no traces of a nucleus in any of these flakes; but this negative result is not necessarily fatal to regarding them as cornified cells.

I made some transverse sections of this region of the integument (see text-fig. 74, p. 275) in order to see if there were any glands concealed in the thickness of the dermis which might be responsible for the formation of these spiny structures. There were a few sweat-glands, but so few that they were not an important feature of the sections. The sections showed the great contrast between the spine-covered area of the ankle and the hair-covered tracts which abut upon it and enable me, I think, to settle the nature of the spinelets. The hairy part of the skin has a very slight horny layer superficially;

this latter is easily recognized by its not staining with borax-carmine; it remains of a yellow colour. Imbedded in the dermis in this region are bundles of 5 or 6 hairs apiece, the exact number of which to each bundle I have not ascertained. The non-staining horny layer gets gradually thicker as the spine-covered area is approached, and at the same time the ridges upon the epidermis get more and more marked.

Text-fig. 74.



Galago garnetti.

Section through the skin of the forearm in the region of the horny outgrowth.

H, cornified epidermis, beneath which are seen nuclei of epidermic cells; S, one of the horny outgrowths. Highly magnified.

Ultimately the dense columns arise from the subjacent layer of non-staining horny epidermis which are the spiny structures themselves. It is impossible to detect any break between the spiny columns and the horny epidermis (text-fig. 74) of which they are extensions; nor are there any differences in minute structure that

would justify the placing of the horny spines in any other category than as modified tracts of epidermis. The whole structure is an exaggeration of the pads of thickened epidermis upon the soles of the foot, and is in all probability comparable to such callosities as those found in the Equidæ. In any case I claim to have disposed of any theory that could account for these horny spines as the hardened secretion of a gland. They are plainly of a corn- or wart-like texture, though possibly to be looked upon as a pathological condition which has persisted and become normal.

A final point to which I would direct attention in this communication is the interesting correspondence shown between hand and foot. A structure peculiar to the *hand* of one Lemur is now known to characterize the *foot* of another species. There are among the Mammalia but few details of structure in which the hind limb does not, as it were, copy the fore limb. This correspondence is shown among the Lemurs in another curious point to which attention has of course been directed, since the facts are well enough known. It is not unusual in that group for the second digit in both manus and pes to be peculiar in some respect. This digit in the foot has a claw instead of a nail, while in the hand it is sometimes aborted altogether. The structure, however, with which I deal in the present paper is a positive and detailed point of likeness between hand and foot.

April 2, 1901.

Dr. A. Günther, F.R.S., Vice-President, in the Chair.

Prof. Bell exhibited two specimens of an Echinoderm, *Astrophyton clavatum*, the many-branched arms of which were closely entertwined, while the bursal slits (by which the genital products are evacuated) were turgid and widely open.

Recalling the observations of Prof. Ludwig on *Asterina* and of Dr. Jickeli on *Antedon*, Prof. Bell suggested that we had here a third example of sexual congress among Echinoderms. He further stated that he had called the attention of his valued correspondent, Mr. F. W. Townsend of Karachi, from whom the Trustees of the British Museum had received the specimens, to the difference in coloration between the two specimens, and had asked him to use his opportunities for discovering if the difference was constant and sexual. Since he had come into the room, Mr. Byrne had suggested to him that the entanglement of the arms might aid in the fertilization of the ova.

Mr. R. E. Holding exhibited and made remarks upon the horns of a Japanese Deer (*Cervus sika*), indicating arrest in the development of the left horn, apparently due to a cerebral tumour and adhesions in the right hemisphere of the cerebrum. A dissection

showed an extensive inflammatory tumour on the right side, connected by a pedicle to the inner surface of the skull, perforating the bone by a circular opening, and causing thickening and breaking up of the horn-support.

Mr. Holding also exhibited the skull and horns of another Japanese Deer, showing a curious spur growing from the pedicle of the right horn, an uncommon position for a supernumerary horn; such horns, when they do occur, usually having their origin below the pedicle or above the burr.

Mr. G. P. Mudge gave an account of his researches on the Lingual Myology of Parrots, with a Classification of the Order based upon the structure of the Tongue. The ceratoglossus inferior exhibited structural modifications which could be grouped in nine stages, arranged in a graded series. In its most primitive form it consisted only of an anterior portion related to the basihyal; and in its most specialized condition of an additional posterior portion related to the hypobranchial, and connected with the anterior part by a strongly developed tendon. The primitive muscle possessed no tendon but a tendinous fascia. All stages in the development from the primitive to the specialized condition could be traced, in the form of a gradual posterior extension of the anterior primitive muscle along the hypobranchial and in the gradual thickening of a localized, elongated tract of the tendinous fascia, with its concurrent posterior extension along the developing posterior portion of the muscle. In *Brotogerys* and *Ptistes* the left- and right-hand muscles were not alike, and it was shown that the exceptional left-hand muscle of the latter Parrot could be directly derived from that of *Cacatua leadbeateri* by the completion of the incipient retrogression there indicated. In virtue of the structural features of this muscle, *Cacatua*, *Stringops*, *Ara*, *Calopsittacus*, and *Calyptorhynchus* were primitive, and the Lories were specialized; but some species of *Cacatua* and *Ara* were more advanced than others of the same genera.

The thyroglossus had arisen from the thyrohyoideus in three ways, each of which evolved along its own line through two stages: at the third stage all three ways converged, whence the further evolution of the muscle could be traced through three higher stages. The insertion and origin of the muscle in the highest stage was similar to that of its most primitive condition; but it was shown that there were reasons for regarding this apparently primitive condition as resulting from a secondary return to the original one.

The thyrohyoideus was shown to be much more extensive in its primitive condition than was now represented in the majority of Parrots. In respect of this, *Cacatua*, *Stringops*, *Calopsittacus*, *Calyptorhynchus*, *Microglossus*, *Eclectus*, and *Nestor* were primitive, since they possessed in the form of a thyrohyoideus accessorius evidence of the once more extensive nature of the muscle.

In *Stringops* the anterior mylohyoideus extended back to the

posterior end of the inter-ramal space, though the middle portion of the muscle had undergone retrogression. In all other Parrots the muscle was confined to the anterior fifth of this space, but in many of them evidences of its once more posterior extension could be found.

In the majority of Parrots the posterior mylohyoideus consisted of an outer stylohyoideus and an inner serpihyoideus. Various degrees in the retrogression of the outer portion could be traced, up to *Pezoporus*, in which the left-hand one had disappeared and the right nearly so, and to the Lories, in which it had quite disappeared on both sides of the tongue.

The structural characters of the tongue suggested that Parrots might be arranged in three families—Loriidæ, Nestoridæ, and Psittacidæ.

The investigation covered the study of the tongues of fifty-three species, ranging over the whole Order, the Cyclopsittacidæ excepted.

This memoir will be printed entire in the Society's 'Transactions.'

The following papers were read:—

1. On the Larynx of certain Whales (*Cogia*, *Balænoptera*, and *Ziphius*). By W. B. Benham, D.Sc., M.A., F.Z.S., Professor of Biology in the University of Otago, New Zealand.

[Received February 27, 1901.]

(Plates XXV.–XXVIII.[1])

(Text-figure 75.)

During the month of August, 1900, I had the opportunity of obtaining specimens of two species of Whales, both of which came ashore on the coast of Otago, near Dunedin, viz. a young newborn female Rorqual, *Balænoptera rostrata*, and an adult male *Cogia*, the small Cachalot (probably *C. breviceps*).

The young Rorqual was found on the beach just outside the Otago Harbour, and I received it at the Museum the day after it was thrown ashore; it was thus perfectly fresh and wholesome, and I was able to make a fairly complete dissection of it before its condition became unbearable. Since the soft anatomy of *Balænoptera* is pretty well known, thanks to the memoirs of Carte and Macalister, Delage, Turner, and others, I do not intend to give any account of it here. But on becoming possessed of some of the viscera of *Cogia*, about three weeks later, I was struck by the remarkable differences presented by the larynx in these two genera—a fact well known to students of the Cetacea.

The larynx of *Cogia* is, I believe, hitherto undescribed, for

[1] For an explanation of the Plates, see p. 299.