

*Navomorpha lineatum.**Callidium lineatum*, Fab. Syst. Ent. i. p. 189.*Coptomma lineatum*, White, Voy. Ereb. & Terr., Ins. p. 20, t. 4. f. 5.*Navomorpha sulcatum.**Callidium sulcatum*, Fab. Syst. Ent. i. p. 189.*Coptomma acutipenne*, White, l. c. t. 4. f. 2.

I have examined Fabricius's type in the Banksian collection, and fail to detect any differences between it and the *acutipenne*, White.

Auckland ; Christchurch.

[To be continued.]

V.—*On the Skulls of Sea-bears and Sea-lions (Otariadæ), and on the Seals of the Auckland Islands.* By Dr. J. E. GRAY, F.R.S. &c.

THE British Museum contains a large series of the skulls of Sea-lions and Sea-bears, I believe more numerous than those of all other museums in Europe or North America put together ; but the British-Museum collection, though large, does not afford a complete series of the different ages of any one species. Thus there are adult skulls of three species of Sea-lions, and also a number of skulls of the young, but not of the intermediate ages. It is the same with the different species of Sea-bears ; there are skulls of adult and of very young of several species. The most interesting series is that of the Antarctic Hairy Sea-bear (*Phocarcos Hookeri*).

The examination of the Museum series leads one, I think, to the following conclusions :—

The milk-teeth, like those of the Seals, are very small, and are changed soon after birth, and are immediately followed by the permanent series, in the following order :—

The cutting-teeth are changed first, and after them the grinders, which are followed by the canines, which do not appear above the gums until after all the grinders are developed, and they continue to develop during the growth of the young animal. The crowns of the second series of teeth are, when they are first formed, of the size and form which they retain during the life of the animal, and are only altered in the adult age by the wearing away of the edge of the lobes of the crown which are developed during youth. The roots are being gradually developed during growth ; they are at first

hollow, but become solid, and some rather thickened in old age. The grinders of the second series, when they are first developed in the very young animal, are rather crowded; but they soon become regularly placed, and they occupy the same length in the margin of the jaw and the same situation relative to the front edge of the zygoma and other parts of the jaw in the young and the perfect animal; so that the position of the grinders in these parts affords a very good character for the distinction of the species, and the dividing them into generic groups.

Zoologists who have not had the opportunity of examining the skulls of the Sea-lions and Sea-bears seem to believe that the teeth of these animals vary greatly in the form of their crowns and their position relative to other parts of the jaw during the age of the animal, and find a difficulty in making out the characters of the species.

The skulls, during their growth from youth to adult age, chiefly lengthen between the back of the face and the brain-case; and the palate of the young is generally broad behind, with a broad opening and a broad front margin to the internal nostrils; but as the skull ages, the back of the palate and the opening to the internal nostrils gradually become narrower, and the lobes on the hinder part of the side fold together over the internal nostril.

The lower edge of the lower jaws of the large skulls of old Sea-lions, probably all males, is much spread out and expanded.

Judging by the very few specimens of the skulls of the very young Sea-bears in the British Museum, and by the figures of the skulls of the young that have been published, they offer two variations in respect of the shape of the internal nostrils:—

In the first the opening of the internal nostril at the end of the palate of the young, as of the adult animal, is short, broad, truncated in front, with sometimes a central notch; and the edge of the internal nostril, in the very young animals, as in *Otaria*, is near to the line between the condyles, but not so near as in that genus; and as the animal grows, and the bones of the face lengthen, the opening of the internal nostril extends further forward, and becomes gradually oblong, narrower, and arched in front, as in *Gypsophoca tropicalis*, *Phocarcos elongatus*, and *Euotaria nigrescens*.

In the second, the hinder opening of the nostril of the very young skull in *Callorhinus*, as figured by Mr. Allen, in *Eumetopias Stelleri*, as shown by the specimens in the Museum, and (judging by the half-grown specimens) in *Arctocephalus*

antarcticus and *Zalophus Gilliespii* is elongate, coming far forward, and acute in front, and becomes shorter, narrower, and rounded in front in the full-grown animals.

It is to be observed that the two forms of the opening to the palate have been observed in the two species of the genus *Euotaria*.

All these variations have been considered characteristic of species when only one skull has been examined; but the accession of a larger series of skulls shows how these parts vary during growth, and perhaps from accidental circumstances, and shows the necessity of examining a series of specimens of each species.

The British Museum contains some skulls that exhibit the differences that exist in the skulls of the two sexes of these animals. The skulls of the males, in common with the males of the Seals, are known by the larger size of the canines; and their large size renders a broader muzzle necessary to contain them. Probably other characters would be observed if we had a larger series, and knew the sexes to which they belonged. For example, the British Museum possesses several skulls of the *Phocarcos Hookeri* from the Southern seas. The one figured in the 'Zoology of the Erebus and Terror' appears, on account of the small size of the canines, to be that of a full-grown female; and there are two skulls from the same expedition which appear from the size of their canines, which are being gradually developed, to be skulls of full-sized but young males. The two males, 336 *b* and 336 *e*, have larger crowns to the grinders, and the lower jaw of each is strong and broad; whereas the skull of the older female, 336 *a*, which has the canine teeth and outer upper cutting-teeth perfectly developed, has these teeth much slenderer than in the skulls of what I consider to be males; the grinders have smaller crowns, which are placed rather further apart from one another than in the males, but occupy the same length of the margin of the jaw. These skulls also present a difference in the size of the occipital condyles. The occipital condyles of the two young males are large, $2\frac{7}{12}$ in. wide, while the occipital condyle of the adult female is much smaller, only $2\frac{1}{6}$ in. wide in the widest part; and they are of rather a different shape in the skulls of the two sexes.

Since this paper was written, I have received the third part of the 'Proceedings of the Zoological Society' for 1873, which contains a paper by Mr. J. W. Clark, the keeper of the Anatomical Museum of the University of Cambridge, "On the Eared Seals of the Auckland Islands," from which it appears that

Mr. Clark has bought two skulls and the fragments of a third, now in the Museum of Cambridge, obtained from the Auckland Islands during the French expedition of the 'Astrolabe' in the years 1837-1840. He has determined, with the assistance of Mr. E. Gerrard, and by comparison of them with the named skulls in the British Museum, that they belong to *Otaria Hookeri*; and he concludes, from the size of the canine teeth, that the larger is the skull of a male of this species (of which a side and a palatine view are figured P. Z. S. 1873, pp. 754, 755), and the two smaller ones those of females.

Mr. J. W. Clark observes, p. 757:—"It follows that *Otaria Hookeri* has been determined and hitherto known only from female skulls;" and at p. 760 he further observes:—"It is curious that no male specimen" (skull) "should have been brought back, except the one that M. Dumoutier reserved for himself" (which is now in the Museum of Cambridge, and figured by Mr. Clark).

There were in the British-Museum collection, at the time Mr. Clark consulted it to identify the skulls he bought in Paris, the skulls of an adult and a younger male and three skulls of females of this species. The skulls belonged to stuffed specimens of a male and two females, and the skeletons with their skulls belonged to two males and a female.

All except one skeleton of these were brought home by the Antarctic Expedition under the command of Captain Sir. J. Ross; and the skull of the female specimen was chosen to be figured in the 'Zoology of the Erebus and Terror' as being in the most perfect state. The other skeleton was brought from New Zealand.

Mr. Clark observes, "It will be most interesting to discover whether *Otaria Hookeri* is restricted to the Auckland Islands, or whether it extends to any part of New Zealand or Australia." There is in the British Museum the skeleton of a young male from New Zealand, presented to the Museum in 1851 by Sir George Grey.

Mr. Clark goes on to say, "If I am right in my opinion that *Otaria Hookeri* is not found at Cape Horn, the identification of it with the Eared Seal of Pennant, the *Phoca flavescens* of Shaw, and the *Otaria flavescens* of Desmarest, falls to the ground. Pennant's specimen came from the Straits of Magellan."

It is very true that all the specimens of *O. Hookeri* in the Museum, like all the other specimens received from the Antarctic Expedition, were without special habitats. Dr. Burmeister, in the 'Annals and Magazine of Natural History,' 1866, xviii. p. 99, describes and figures the skull of a specimen

of *Arctocephalus falklandicus*, "about 3 feet long, taken at the mouth of the Rio de la Plata, where they were formerly common, on the Islas de los lobos"—that is, "the islands of the Sea-wolves."

On comparing Dr. Burmeister's figure of the teeth with those of the skulls of the different Sea-bears, I can only come to the conclusion, from the size of the lobes of the crowns of the teeth, that this figure represented the young *O. Hookeri*; and therefore if this animal is found at the mouth of the Rio de la Plata and at New Zealand, there is no reason why it should not be found at the Straits of Magellan, especially when we consider the enormous number of the southern seals that are collected both for their skins and oil, and that several are recorded as having been found in localities where they are no longer to be found, or at least not in sufficient abundance to be "fished for;" and as I know no other *Otaria* of a pale yellowish colour, I am still inclined to regard the Eared Seal of Pennant as a synonym of *O. Hookeri*.

Mr. J. W. Clark gives an abstract of the history of the Auckland Islands from Mr. Shillinglaw's introduction to, and extracts from, his publication of Captain Musgrave's Journal of the wreck of the 'Grafton' and 20 months' stay on the island: an edition of this book was published first at Melbourne in 1865; and it was reprinted in London in 1866, with the introduction last. Mr. Clark concludes that there are two species of Seals in the Aucklands:—(1) a large Black Seal; and (2) the Sea-lion, called the Tiger Seal because some of the females are spotted (P. Z. S. 1873, p. 753). Mr. Clark identifies the Sea-lion of Musgrave with *O. Hookeri*. It is to be observed that the males and females of *Otaria Hookeri* in the British Museum are plain-coloured and yellowish, and that, of the two specimens in the museum at Paris examined by Mr. Clark, brought from the Auckland Islands, the female is of a uniform yellow colour; so that I have a suspicion that Captain Musgrave, who has only a sealing captain's notion about the species of seals, confounded another seal with Hooker's Sea-bear, more especially as we have authority for believing that the Spotted Sea-leopard (*Stenorhynchus leptonyx*) is found in the Aucklands, and we have in the British Museum the skull of this seal from New-Zealand, presented by Dr. Knox, and it is a seal which has a most extensive distribution in the Antarctic and Southern seas. I know no species of Sea-lion or Sea-bear that has a spotted fur; whereas the Earless or True Seals are very often more or less spotted or eyed, and the Sea-leopard is particular among them for being distinctly spotted.

Mr. Clark observes, "I may mention that I was shown a skeleton of *Otaria jubata* marked as from the Aucklands,"—I suspect, from the Paris Museum, though it is not stated. There is no doubt that this is the Black Seal mentioned by Captain Musgrave; and it would be curious to examine the skeleton to see if it is a separate species of the Sea-lion (*Otaria jubata*) from that found on the coast of South America. Mr. Clark proceeds, "If this should be the case, which I do not believe on the evidence presented to me, it would greatly extend the range of that species; but it is very unlikely that there should be two Hair-Seals as well as a Fur-Seal on the islands."

I do not quite understand what Mr. Clark means by the latter sentence. According to his opinion, the Sea-lion of Musgrave is *Otaria Hookeri*, and the skull figured by Dr. Hector as the young of *A. cinereus* is "very probably the young of *O. Hookeri*;" and we are at the same time told that "*O. Hookeri* is a hair-seal." If the Black Seal of Musgrave, of which we have no account, is *Otaria jubata* or an allied species, it is undoubtedly a hair-seal. Then the *fur-seal* on the Auckland Islands is not accounted for, but *two hair-seals* are! It is to be observed that Captain Musgrave, with a true sealer's view of seals, believes that the Sea-lions which he is about to describe are "common to the higher north and southern latitudes;" so that he has not a very clear idea of zoological species.

I may mention that I have authority for believing the following seals are found on the Auckland Islands:—

1. *Stenorhynchus leptonyx*, most probably the Tiger Seal of Musgrave. This is a regular earless seal, without under-fur. Skull in the British Museum from New Zealand.

2. *Otaria (jubata?)*. Also without under-fur, always of a dark brown colour. Preserved in the Paris Museum? Most likely the Black Seal of Musgrave.

3. The pale Sea-bear (*Phocarcos Hookeri*). "The Sea-lion," Musgrave; *Otaria Hookeri*, J. W. Clark. A hair-seal without under-fur. Specimens of males and females with skulls in the British Museum.

4. The smaller fur-seal of the Aucklands, *Gypsophoca*, sp.?; *Arctocephalus cinereus* jun., Hector. A true fur-seal. This may be the fur-seal of the sealers; but most probably what they went to collect is another, larger species, perhaps the same as the fur-seal of New-Zealand, *Euotaria cinerea* (*Arctocephalus cinereus* of Hector).

We are informed by Captain Morell, as quoted by Mr. Clark, that "in 1823 Captain Johnson took from this and the

surrounding islets 13,000 as good fur-seal-skins as ever were brought into the New-York market." But as yet no small or large fur-seal from the Aucklands has reached Europe, unless it is the fur-seal of commerce (*Otaria falklandica*, Hamilton, Ann. & Mag. Nat. Hist. 1838, ii. p. 81, t. xli., and Jardine, Naturalist's Library, vi. p. 271, t. xxv.), of which we have specimens in the Museum without any reliable habitats and without skulls, which have been compared with the original specimens in the Museum of Edinburgh, said to have been brought from South Georgia or South Shetland by Captain Weddell; but the skins of these seals are very rare in the country now, which agrees with the account of their being no longer to be found in the Aucklands in 1830.

Mr. Clark finishes his paper by some remarks on my genus *Gypsophoca*. He doubts whether the skull received from the Auckland Islands and regarded by Dr. Hector as the young of *Arctocephalus cinereus* is a *Gypsophoca*, but thinks it "may very probably be a young *O. Hookeri*;" and he at the same time observes, "The skull in the British Museum from North Australia is that of so young a specimen that it would be difficult, unless one had a very large series of skulls of different sexes and ages to compare it with, to determine its species with certainty, though I suspect it will turn out to be *Arctocephalus cinereus*" (p. 759).

These observations of Mr. Clark's are exactly such as it is the object of this paper to prevent; and the fact of Mr. Clark having fallen into such a mistake shows the necessity of the subject being studied, even by the keepers of anatomical museums. The skull received by Dr. Hector from the Auckland Islands and the skull in the British Museum from North Australia, though neither of them is the skull of a full-grown or aged animal, are both fully developed and of animals which have their permanent teeth in a complete state, with even their canines developed; and they both have, besides the peculiarity in the form of the base of the skull, the last two upper grinders placed behind the back edge of the front of the zygomatic arch, in a way that is only found in the genus *Gypsophoca*, and is not found in either *Phocarcetos Hookeri* or *Euotaria cinerea*—or, as Mr. Clark chooses to call one, *Arctocephalus cinereus*, and, the other, *Otaria Hookeri*, although the latter has no relation to the restricted genus *Otaria*.



Gray, John Edward. 1874. "V.—On the skulls of sea-bears and sea-lions (Otariadæ), and on the seals of the Auckland Islands." *The Annals and magazine of natural history; zoology, botany, and geology* 14, 24–30.

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