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# SEALS

BY

G. E. H. BARRETT-HAMILTON



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Through the courtesy of the authorities of the British Museum of Natural History the seals collected in the Antarctic by the Belgian Antarctic Expedition have been placed in my hands for study. The collection is not large, but is the first in which the specimens have been properly prepared and the sex ascertained. All the *Phocidae* inhabiting the Antarctic Seas (except the Elephant Seal) are represented, the specimens having been obtained from the pack-ice east of the Palmer Archipelago, where the *BELGICA* was for so long confined. In addition there is an immature specimen of the South American sea lion, *Otaria jubata* Schr. from Argentina. Amongst the greatest rarities are four skulls, a skeleton and two skins of Weddell's seal, *Leptonychotes Weddelli* (Lesson). Of this species the British Museum possesses only four skulls, but two are imperfect. Of even more interest are two skeletons (with skulls) of Ross' seal, *Ommatophoca Rossi* Gray, of which the two type specimens, both in the British Museum, are believed to be the only previously known specimens. The *BELGICA* specimens throw much light upon the curious variation in the dentition of this species. Further, the strange appearance, the gular pouch and the voice of the animal are now for the first time made known to us by Monsieur Racovitza. But perhaps the most important result of the Belgian Expedition from a mammalian point of view is purely negative. The voyage of the *BELGICA* has well-nigh proved the death-blow to the hopes of those who believed that some new and startling forms of mammalia might yet remain undiscovered by man in the Antarctic.

## *Ommatophoca Rossi* (Ross' Seal).

*Ommatophoca Rossi*, J. E. GRAY. The Zoology of the Voyage of the H. M. S. Erebus and Terror, pp. 7-8, pl. VII & VIII, 1844.

MATERIAL RECEIVED : — No. 700 (898), *skull and skeleton* (complete) — « Mâle adulte. Banquise antarctique, Lat. 70° 01' S. et Long. 85° 20' O. Greenw., 31 Décembre 1898 ».

No. 897 — *skull and skeleton* — « Femelle adulte. Banquise antarctique, par env. 70° Lat. S. et 83° 30' Long. O. Greenw., 17 Decembre 1898 ».

N.B. No skins were received. No. 700 was received as a specimen of *Lobodon carcinophagus* (femelle adulte, banquise antarctique, 18 Septembre 1898), while a specimen said to be of this species and described as « no. 898 » has not been received. It is probable then that some mistake has occurred with reference to the labelling of these specimens, but there can be no question as to the identification of nos. 700 & 897 (1).

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(1) L'erreur provient certainement d'un changement d'étiquette, qui s'est produit au moment où les squelettes ont été expédiés à Londres, après avoir été préparés au Musée de Bruxelles. — Le n° 700 désignait primitivement un

DIMENSIONS. The following are the principal dimensions of the two skulls together with those of the two already in the collection of the British Museum : —

	Basal length.	Baso-palatal length.	Greatest breadth at zygoma.	Greatest breadth of cranium.	Length of nasals.	Length of upper cheek-tooth series.	Length of lower cheek-tooth series.	Length of exposed portion of upper canines.	Greatest diameter of upper canines.	Antero-posterior length of third lower cheek-tooth.	Height of exposed portion of third lower cheek-tooth.	
<b>Collected by the " Belgica ,,</b>												
No. 897, an adult ♀, the largest skull known.	242	88	176	117	76	46.5	52 R 50 L	11	7.5	7.5	5.75	Teeth fresh and unworn : No sagittal crest.
No. 700, a ♂, not adult, although labelled so by its captors.	220	78	157	103	57	49	46.5	8	6.5	8	5	Teeth slightly worn. No sagittal crest.
<b>In the Collection of the British Museum.</b>												
No. 324 a (43-11-25-4), apparently an adult ♀ — Sir James Ross' Antarctic Expedition of 1839 to 1843. The original of Gray's Figure and Description in the Zoology of the Voyage of H. M. S. Erebus and Terror and <i>Type</i> of the species. (The skeleton and skin of this specimen are also in the collection).	230	90	177	117	80	(1) 43 R 47.5 L	44.5 R 45.5 L	(2) 16(11)	8.5	8.5	8.5	Teeth slightly worn. No sagittal crest. Skull damaged.
No. 324, b, an apparently immature ♀, the history of which is similar to that of no. 324a.	222	92	167.5	109	65	45.5 R 47.5 L	44.5 R 44.5 L	13.5	8	8	7.5	Teeth unworn. No sagittal crest. Skull fragmentary.
R = right side : L = left side.												
(1) Owing to the constant rising of the cheek-teeth from the jaw the length of the series, as measured at the base, may actually decrease with advancing age, since the exposed upper portion of the roots of a cheek-tooth is less bulky than its crown.												
(2) Similarly the amount of the canines exposed is somewhat variable. The figure in brackets expresses the length of the portion exposed in this specimen before exposure of the roots.												

*Lobodon* femelle, qui n'a pas été retrouvé. Le n° 898 est un *Ommatophoca* mâle, qui sur mes feuilles de mensurations porte la mention : adulte (âge 1 an ?). La longueur de cet exemplaire était de 1910 millimètres (de l'extrémité du museau à l'extrémité de la queue); ce chiffre est notablement inférieur à celui atteint par la ♀ n° 897, qui mesurait 2280 millimètres, et qui était manifestement plus âgée. — Je compte d'ailleurs publier prochainement, sur la biologie des Phoques antarctiques, un mémoire, dans lequel on trouvera les dimensions détaillées de 30 adultes et 15 fœtus de phoques des quatre espèces rencontrées par l'Expédition antarctique belge.

EMILE G. RACOVITZA.

REMARKS : — Owing to the immaturity of the ♂ specimen (no. 700), the two skulls collected by the BELGICA furnish no evidence that the sexes, when adult, are distinguishable either by the size of the teeth, by that of the whole skull or by the development of the sagittal or coronoid crests ; and the two specimens in the British Museum are so similar to them that I have been unable to determine their sex. Of the former the larger skull (no. 897) is considerably finer than either of Ross' specimens : the lesser skull (no. 700) is not adult and is the smallest of the four. The differences of size represent individuals of different ages. As is usual in the case of other Pinnipeds the cheek-teeth of immature specimens may be crowded or may over-leap each other : the space between them increases and the position of their long axis relatively to the jaw itself alters with the lengthening of the bones in which their roots are embedded.

Apart from the teeth (to be considered separately) I find little individual variation in the skulls of *Ommatophoca*. The most variable character (apart from the dentition) seems to be the amount of the superior maxilla which enters into the boundary of the superior nares. The length of the section of the boundary formed by one of these bones varies in the different specimens from 9 to 17 millimetres.

DENTITION : — The two skulls of this seal, brought home by Ross, and preserved in the British Museum afford a most remarkable instance of variation in dentition, as first described by Gray, (1) Bateson and (2) Dr Kükenthal.

In one of these skulls (no. 43-11-25-4) the first cheek-tooth is single rooted : the remaining four are double-rooted. Taking the analogy from other seals we may regard the dental formula as  $pm \frac{4 \times 4}{4 \times 4} m. \frac{1 \times 1}{1 \times 1}$ , a combination which is supposed to represent the normal arrangement in the species. In no. 324 b, on the contrary, the upper jaw is provided with six cheek-teeth on the left side, the first two of which are smaller ; and it is reasonable to suppose that they represent the first cheek-tooth of no. 43-11-25-4, since the corresponding tooth on the right side, although single, is provided with two distinct crowns and looks when *in situ* exactly like two teeth united in a single cavity. It would seem then that, whereas the first cheek-tooth of the left side is represented by two distinct teeth they would appear to have owed their origin to some kind of splitting process, since on the right side this process has been imperfectly carried out, leaving an organ which is exactly half-way between one and two teeth, being in fact a single root with two crowns. The remaining teeth of the series differ markedly from the corresponding teeth of no. 43-11-25-4 in that only one of them is distinctly double-rooted. The bifurcation of the root is represented in the remainder merely by a slight basal notch, most prominent in the last tooth on the left side, and by a central groove which passing up each side of the root and being deeper externally evidently represents the double rooting of the cheek-teeth of no. 43-11-25-4. The groove is so prominent in the last tooth on the right side that the tooth is actually double rooted, although not so markedly so as in the corresponding tooth of no. 43-11-25-4.

The teeth of the lower jaw represent in various degrees, the steps between single and double-rooted teeth. Each of the anterior pair is double-crowned, but single-rooted, like the first tooth on the right side of the upper jaw. The second and third teeth on each side possess a broad, compressed, single root, divided by a rather deep, central, longitudinal groove on each

(1) See : Proc. Zool. Soc., 1892, pp. 105-107 and 114-115, and : « Materials for the Study of Variation » etc., London and New York, pp. 237-238, 1894.

(2) In : Jenaische Zeitschrift für Naturwissenschaft, xxviii Bd. [N. F. XXI], p. 115, 1893.

side. The fourth and fifth are distinctly double-rooted, but not so conspicuously as are the corresponding teeth of no. 43-11-25-4.

Of the two *BELGICA* skulls, no. 897 agrees in the number of its cheek-teeth and the character of their roots with no. 43-11-25-4. The teeth however, (especially the lower incisors) are rather small. No. 700, on the other hand, presents us with an entirely new combination. In this head there are six teeth on either side of the upper jaw, but here the splitting process would, I suppose, be regarded by Mr. Bateson as having taken place not at the anterior but at the posterior end of the series. Thus the two last teeth on either side are much smaller than the remainder and, still following Mr. Bateson's assumption, might be taken to represent the fifth tooth of a normal head. The first of the pair is in each case double-rooted; the second is single-rooted on the left and imperfectly provided with two roots on the right. The remaining teeth of the upper jaw are similar to those of no. 43-11-25-4, except only that the double root of number two is very feebly developed and the small basal notch runs up the tooth as a groove as in no. 324 b. In the teeth of the lower jaw we have every gradation from the tapering, single-rooted number one, through the flattened and grooved number two and the slightly double-rooted number three, to numbers four and five, both double-rooted and with, in the latter case, widely separated fangs.

We have here then a very remarkable instance of variation. Of four skulls two are alike and, following Mr. Bateson, presumably normal. In the two remaining skulls Mr. Bateson would see a very great tendency for the teeth to reproduce themselves. Thus in both, to still follow this supposition, we actually get a new tooth added to the series, apparently by the (1) reproduction of one of the normal teeth, but whereas in no. 700 this occurs on both sides of the upper jaw and the tooth which has reproduced itself is the last of the series, in no. 324 b it is the first tooth of the series which is affected and that only imperfectly on one side. In the lower jaw of the same specimen both the first cheek-teeth are imperfectly divided and possess double crowns. Amongst the other teeth any stage of the splitting or reproductive process may be found from a simple tooth with one root through a single-crowned double-rooted or single-rooted double-crowned tooth to a pair of single-rooted or even double-rooted teeth. The latter, however, still keep up their reminiscence of the supposed splitting process by being together only about equal in size and substance to the ordinary single tooth which they represent, a truly unexpected state of things, from which it would almost appear that a tooth with two roots may be halfway on the road to become two teeth.

The teeth of *Ommatophoca*, besides furnishing data for conclusions somewhat of the kind here indicated, have supplied Mr. Bateson with the material upon which to base an attack upon modern views of the homologies of mammalian teeth, an attack combated at some length by Dr. Kükenthal. In view of the fact that it will be my duty to describe the specimens brought home by the *Southern Cross*, I do not propose to add to the discussion opinions based upon scanty material, but must here rest content with a mere description of the variations which occur, with a passing allusion to the arguments of Mr. Bateson and Dr. Kükenthal.

**DISTINGUISHING CHARACTERISTICS :** — (A) The **skull** of Ross's seal cannot possibly be confounded with that of any other living Pinniped. Its great resemblance lies with that of *Cystophora cristata* Erxl. of arctic waters. In general size it about equals that of *Leptonychotes Weddelli*,

(1) I take the term from Mr. Bateson.

and is slightly smaller than that of *Lobodon carcinophagus*, but here the resemblance ceases, and the broad interzygomatic and short, thick naso-palatal regions, together with the vertical inclination of the nares at once mark its distinctness.

The resemblances of the skull to that of *Cystophora* and consequently on a small scale to that of *Macrorhinus* were, I think, first described by Sir W. Turner, who remarked that the two skulls approach each other in the vertical direction of the anterior nares, in the relation of the latter to the infra-orbital foramina, in the great width of the orbits and interzygomatic region and in the length of the ascending part of the premaxillae which are so short as to leave a definite part of the anterior nares bounded by the maxillae. He might have added the feebleness of the postcanine dentition. The skull of *Ommatophoca* differs, however, in the greater length of the nasals and also in the fact that the maxillae articulate with the outer border of the nasals and do not leave the anterior part of this border free. Further the palate plates of the palatal bones are shorter in *Ommatophoca* than in *Cystophora*, a character evidently connected with the resonant vocal powers of the animal, there is one more incisor on each side of the lower jaw, the upper incisors are immensely more feeble, and the shape of the crowns of the grinders is quite different.

A similar conformation of the premaxillae is found to a lesser degree in the skull of *Lobodon*.

The dentition of *Ommatophoca* is remarkably feeble. Thus with a skull attaining to more than double the size of that of *Phoca groenlandica* or *P. vitulina*, the teeth are about equal in size to those of the former and actually less than those of the latter species. The only southern species which at all nearly approaches *Ommatophoca* in the size of the teeth is *Leptonychotes Weddelli*; but here again the canines of the latter species are many times larger than those of the former, while the cheek-teeth also are larger and of a different shape. In *Ommatophoca* they are provided with three cusps, the central of which is the longest and is recurved. In *Leptonychotes* the rudiments of posterior or anterior cusps even when present are obscured by the prominence of the central cusp.

(B) **Skeleton.** — I regret that the time at my disposal has not permitted me to make a minute examination of the skeleton. The numbers of vertebrae in the skeleton of the type specimen in the British Museum are 7 in the cervical, 14 in the thoracic, 8 in the lumbar and 4 in the sacral regions respectively. In most seals the numbers of thoracic and lumbar vertebrae appears to be usually 15 and 3, more rarely 14 and 6 (see Gadow's Edition of Flower's Osteology of the Mammalia pp. 81-82, 1885).

(c) Of the **external appearance** of Ross' seal we knew practically nothing before the return of the Belgian Antarctic Expedition. Gray's plate tells us little, and that naturalist stated that the skin upon which the original description of the species was based was « greenish yellow, with close oblique yellow (1) stripes on the side, pale beneath ». Unfortunately no fresh skins have reached this country with the present collection, but an examination of the skin described by Gray shows that the colours are as nearly as possible olive above gradually shading into tawny olive beneath, with lighter yellowish regions on the breast and neck. There is no very distinct line of demarcation between the colours of the upper and under surfaces. There are hardly any spots, but the « stripes » of Gray are present at the junction of the two colours and are represented on

(1) Similar streaks are represented in Dr. Cook's photograph, reproduced as figure 10 of Monsieur Racovitza's paper.

the flanks by streaks of the colour of the undersurface about a quarter of an inch in breadth which run obliquely forward invading that of the uppersurface. Occasionally where these streaks are interrupted a spot or two is formed. Otherwise the creature is spotless.

The only other description of this seal which I have read are the few lines devoted to it by (1) Mr. W. S. Bruce, who remarks that in size and form it is very like the crab-eating seal, for the young of which indeed he seems at first to have confused it. Its coat is, however, « somewhat sleeker, of a beautiful pale mottled grey colour, darker on the back and lighter on the belly, and varying in intensity in different individuals ». I cannot help thinking that possibly Mr. Bruce may have been mistaken in his identification of an animal which is described with such vividness by Monsieur Racovitza as being highly distinct from all the other species which frequent the antarctic pack-ice. His words may refer to the young of *Lobodon* which frequently appears to have a mottled appearance.

The tail has been damaged, but seems to have reached a length of about three or four inches.

The flippers, both fore and hind, are extremely small, and I can find no trace of claws in the skin. If they were present on the fore-flippers, they must have been quite rudimentary. The head, judging by the appearance of the skull must be extremely thick and pug-dog-like, as indeed is well-shown by Monsieur Racovitza's photograph. The body, in fact, in the words of Monsieur Racovitza « n'est plus qu'un sac fusiforme pourvu de membres très réduits..... C'est le plus phoque des phoques, car chez lui toute forme de quadrupède a disparu. »

HABITS AND HABITAT : — Practically nothing has been previously known of the distribution of Ross' seal. The two original specimens had no more precisely defined locality attached to them than the vague term « antarctic seas ». Judging then by the fact that these had for fifty years remained the only known examples of their race in museums, it could only be surmised that the living animal must be of extremely rare occurrence or that its habitat must be highly remote or inaccessible. The Belgian Expedition has now shown us that Ross' seal is an inhabitant of the Antarctic pack-ice, where, however, it would appear to be of comparatively rare occurrence, for the members of the expedition met with it only on thirteen occasions. It was not found in the Strait of de Gerlache in the Palmer Archipelago. It feeds exclusively on large cephalopods.

M. Bruce's, language (if he were not mistaken) does not lead to the belief that he found Ross' seal a rare species. On the contrary, he speaks of Ross' and the crab-eating seals as being « in greatest abundance », on the pack-ice and many of the former were found to be in young. The two species « lay four, five, or even ten on a single piece of pack-ice; the greatest number I saw on a piece of ice at a time was forty-seven ».

One of Monsieur Racovitza's most remarkable observations is connected with the vocal powers of this seal. « Ce Phoque (he writes) possède une voix très curieuse et les sons qu'il émet sont très variés. C'est un véritable virtuose antarctique. Son larynx fortement gonflé constitue une caisse de résonance et le voile du palais très développé distendu par de l'air, constitue à l'animal une sorte de cornemuse. On entend d'abord, chez la bête irritée, une sorte de roucoulement de tourterelle enrôlée, auquel succède le gloussement d'une poule affolée de terreur et la finale c'est un reniflement sans harmonie produit par l'air violemment expulsé par les narines ».

(1) Proceedings of the Royal Physical Society of Edinburgh, vol. XII, 1892-1894, pp. 350-354, 1894; also: Report of the Sixty-third Meeting of the British Association for the advancement of Science held at Nottingham in September 1893, p. 807, 1894.

**Ogmorhinus leptonyx**, (The Leopard Seal).

*Phoca leptonyx*, H. M. D. de Blainville. Journal de Physique etc., t. xc1, pp. 288-289 and 297-298, Octobre 1820.

MATERIAL RECEIVED : — No. 899, *skull*. — « Mâle jeune (un an ?). Banquise Antarctique, par env. 69° 10' Lat. S. et 79° Long. O. Greenw., 20 Février 1898. » No skin was received.

The single skull received is evidently, as described by the naturalists of the expedition, that of a young male. The following are its principal dimensions in millimetres, together with those of the skulls of this species in the collection of the British Museum : —

	Basal length.	Baso-palatal length.	Greatest breadth at zygoma.	Greatest breadth of cranium.	Length of nasals.	Length of upper cheek-tooth series.	Length of lower cheek-tooth series.	Length of exposed portion of upper canines.	Greatest diameter of upper canines.	Antero-posterior diameter of 3rd. lower cheek-tooth, taken at the base of the tooth.	Height of exposed portion of third lower cheek-tooth.	
<b>Collected by the "Belgica",</b>												
No 899. ♂ juv.	283	156	125	130	87	80	81	35	18	17	18	Teeth clean and unworn : cheek-teeth crowded.
<b>In the Collection of the British Museum of Natural History.</b>												
No. 325 d., 46. 4. 15. 23, adult. Antarctic Seas. Presented by the Admiralty. Sir James Ross's Antarctic Expedition of 1839 to 1843.	392	182	210	132	107	115	114	36	19	19.5	16.5	Teeth clean and but slightly worn. Height of sagittal crest 11 mm.
No. 325 n, 85. 10. 20. 1, adult. Falkland Islands. Mr. E. A. Holmstead.	390	173	222	132	101	100	91.5	32	19	16	14	Teeth worn. Height of sagittal crest at base 12 mm.
No. 325 i, old. Lord Howe Island. Voyage of the "Herald", Sept. 1853 J. Me G.	382	168	220	132	118	101.5	100.5	(Damaged) 27 (approx.)	17.5	15.5	17.5	Teeth much damaged and worn. Height of sagittal crest 7 mm.
No. 93. 9. 14. 1, not quite adult. Near New Georgia. Capt. D. Gray.	382	163	188	134	—	101	—	35	20	—	—	No lower jaw. Teeth clean and unworn. First upper cheek-tooth close to canines. Sagittal crest slight. (Height about 2.5 mm. at base).
No. 325 b, 46. 15. 24, adult. Antarctic Seas. Presented by the Admiralty. Sir J. Ross's Antarctic Expedition of 1839 to 1843. The skin of this specimen is in the Museum.	379	162	207	135	—	98	94.4	36.5	19	15.5	16.6	Teeth worn. Height of sagittal crest 5-6 mm.

	Basal length.	Baso-palatal length.	Greatest breadth at zygoma.	Greatest breadth of cranium.	Length of nasals.	Length of upper cheek-tooth series.	Length of lower cheek-tooth series.	Length of exposed portion of upper canines.	Greatest diameter of upper canines.	Antero-posterior diameter of 3rd. lower cheek-tooth, taken at the base of the tooth.	Height of exposed portion of third lower cheek-tooth.	
<b>In the Collection of the British Museum of Natural History.</b>												
No. 325 a, 43. 1. 8. 4, adult.	368	163	207	133		98	98	37	21	19	18.5	Teeth clean and unworn. Sagittal crest fairly developed, reaching 5 mm.
No. 325 h, adult. Antarctic Seas. Presented by the Admiralty. Sir James Ross's Antarctic Expedition of 1839 to 1843.	360	168	223	Damaged	103	98.5	98	33	19.5	17.5	17.5	Teeth slightly worn. Sagittal crest developed but damaged.
No. 325 c, adult? The Skeleton of this specimen is in the Museum.	360	Damaged	186.5	133		98	98	34.5	19.5	18	19	Skull damaged. Teeth worn. Height of Sagittal crest 5-6 mm.
No. 325 f. 47. 9. 4. 2, young.	315	131	176	135	—	88	87	35.5	19	19	18.5	Teeth fresh and crowded. Sagittal crest undeveloped
No. 325 l. 80. 7. 28. 5, adult. Falkland Islands Dr. Coppinger.	340	157	172.5	129				Damaged				Sagittal crest barely perceptible.
No. 325 g, immature. Antarctic Seas. Presented by the Admiralty. Sir James Ross's Antarctic Expedition of 1839 to 1843.	325	140	175	132	—	85	84	30	16	14	14	Teeth clean and unworn. First cheek-teeth very near canines. Sagittal crest slight.
<p>The skulls are arranged (with one exception) in order of size. Until reading the statement of Mr. Bruce that the females are larger than the males, I had supposed that all the skulls except the last two were those of males. There is a great difference between the clean and unworn teeth of some specimens and the worn teeth of others, but the teeth of the largest specimen are strangely clean and almost unworn. The teeth of immature specimens are crowded closely together in the jaw.</p>												

REMARKS.— The collection in the British Museum of Natural History is rich in specimens of this large Seal. Thus the single skull of a young specimen brought home by the *BELGICA* adds nothing to our knowledge of the species, albeit it is the only example of which the sex has been noted by the collectors. This is an important point, since very considerable differences of size and proportion are to be found amongst the skulls of this species. I at one time supposed that these must be attributed to differences of sex, and believed that the larger specimens with finer canines, enormous development of the lambdoid crests, and, in some cases, conspicuous sagittal crests,

would prove to be males. I find, however, that (1) according to Mr. W. S. Bruce, Dr. Donald found the female Leopard-Seals larger than the males. This observation, if not based upon some error, is of considerable interest, as I am not aware of any similar case amongst the *Pinnipedia*, in which the males are frequently larger than the females. At all events, until the point is finally settled by further investigation, we shall do well to hesitate before attempting to guess the sex of any skull of this Seal.

Whether, however, the larger skulls be those of males or females, there are, as in the case of *Lobodon*, so many specimens of intermediate proportions that the determination of their sex, except in life, must always be a matter of difficulty. It can only be supposed that, as in the case of the males of *Otaria ursina* and *O. jubata*, the size and development of the larger sex of Leopard-Seals are exceedingly variable characters.

As might have been expected, the cheek-teeth of this species show far more than those of the other three Antarctic Seals the effects of wear and use. The sphenoidal suture seems to remain unfused throughout life.

Conspicuous individual variations in the skulls of this species are rare, but it may be worth placing on record that the posterior margin of the palate of no. 325d. of the British Museum collection is crescentic, and not V-shaped, as in all the other specimens. This variation is said to be paralleled in the case of a single specimen (no. 1095) in the collection of the Royal College of Surgeons, London.

**DISTINGUISHING CHARACTERISTICS :** — (A). The *skull* of this seal, having been described by Owen in the Catalogue of the Osteological Museum of the College of Surgeons, is well known. (See Nos. 3938 to 3941). Two characters at once distinguish it from that of every other Phocid, viz : — firstly, its great length ; and, secondly, the extraordinary character of its teeth which are distinguishable at all ages by their large proportions and the peculiar arrangement of the cusps. Of these there are three placed one after the other in a line running parallel to the long axis of the jaw. The two smaller, the first and last, have their apices usually curved towards the large central cusp, which itself bears a recurved apex.

(B) *Externally* the Leopard-Seal is remarkable for its large size, its elongated body and its spotted skin. M. Racovitza (2) says that the length of the animal is more than three metres, and that the colour of its coat is « gris foncé, moucheté de taches jaunes, » and Mr. Bruce writes that these seals reminded him of snakes.

Of the *habits and habitat* of the Leopard-Seals M. Racovitza has little to tell us, contenting himself only with the remark that as regards the Seal's reputation as an enemy of the Penguins he can only say that he has seen two Leopard-Seals quarrelling over the carcass of a Forster's Penguin (*Aptenodytes Forsteri*) which had been thrown down near them. (op. cit.)

(1) See : Proc. Phys. Soc. Edinburgh, XII, pp. 350-354.

(2) *La Vie des Animaux et des Plantes dans l'Antarctique*, published by the « Société Royale belge de Géographie » p. 33, 1900.

### **Lobodon carcinophagus.** (The White or Crab-eating Seal).

*Phoca carcinophaga*, Captain H. Jacquinet and Dr. Pucheran in the Zoological Atlas of captain Dumont-d'Urville's *Voyage au Pole-Sud et dans l'Océanie sur les corvettes l'ASTROLABE et la ZÉLÉE*, plates 10 (animal) and 10a (skull) (1), 1842-1853.

MATERIAL RECEIVED : — No 696, *complete skeleton* — « Mâle adulte. Banquise Antarctique, 69° 50' Lat. S. et 83° 03' Long. O. Greenw., 13 Septembre 1898 ».

No. 697, *skull* — « Femelle adulte. Banquise Antarctique, par env. 70° Lat. S. et 82° 30' Long. O. Greenw., 18 Septembre 1898 ».

No. 699, *complete skeleton with skin* — « Fœtus femelle, quelques jours avant la naissance. Banquise Antarctique, par env. 70° Lat. S. et 82° 30' Long. O. Greenw., 18 Septembre 1898 ». Coloration of animal : « lèvres noires ; palais noirâtre ; zone dentaire et langue, rose ; tétons, anus et vagin, noirs ; yeux brunâtres pâles. Longueur totale 1290 mm. »

No. 892, *skin* — « Jeune femelle (deux mois et demi ?). Banquise Antarctique, 69° 54' Lat. S. et env. 82° 30' Long. O. Greenw., 6 Décembre 1898. » — Coloration of animal : « iris brun ; paupières, lèvres, anus, vagin, tétons et palais noirs ; langue noire et rose. Longueur totale 1575 mm. »

No. 894, *skin* — « Mâle, jeune adulte (plus d'un an ?). Banquise Antarctique, par env. 70° Lat. S. et 81° 30' Long. O. Greenw., 8 Novembre 1898. » Coloration of animal : « iris brun foncé ; narines, lèvres, anus et orifice de la gaine du penis, noirs ; gueule rose avec taches noires ; penis rose avec sommet noirâtre. Longueur totale 2290 mm. »

No. 896, *complete skeleton* — « Jeune femelle (un mois et demi ?). Banquise Antarctique, par env. 69° 50' Lat. S. et 81° Long. O. Greenw., 1 Novembre 1898 ».

No. 901, *skull* — « Femelle adulte. Banquise Antarctique, 71° 19' Lat. S. et 85° 28' Long. O. Greenw., 5 Mars 1898 ».

As has been already stated under the heading of *Ommatophoca rossi* the specimen labelled No. 700 does not belong to this species but to *Ommatophoca*.

DIMENSIONS. — In the following table are given some of the principal dimensions of the skulls obtained by the BELGICA together with those of the specimens in the collection of the British Museum. The latter are arranged in order of size, the largest standing first. An attempt has been made to determine the sex of each skull from the data afforded by the skulls collected by the BELGICA, but there are so many skulls in which the characters are unreliable that this can only be regarded as hypothetical.

(1) The plates are good, but there is no description. The portion of the atlas which contains these plates must have been published before 1844, for Gray alludes to it in his *Zoology of the Voyage of H. M. S. Erebus and Terror*, which was published in 1844.

	Basal length.	Baso-palatal length.	Greatest breadth at zygoma.	Greatest breadth of cranium.	Length of nasals.	Length of upper cheek-tooth series.	Length of lower cheek-tooth series.	Length of exposed portion of upper canines.	Greatest diameter of upper canines.	Antero-posterior length of third lower cheek-tooth.	Height of exposed portion of third lower cheek-tooth.	
<b>Collected by the " Belgica ,,</b>												
No. 894. adult ♂. (The skin was also received).	272	149	162	134	70	85	81	20.5	14.5	14.5	15	Cheek-teeth worn anteriorly: incisors broken and worn. Sagittal crest slight.
No. 696. immature ♂.	258	Damaged	147	120	88	82	82	17	15	14.5	15.5	Cheek-teeth clean & fresh, the crowns not yet fully above the jaw. Skull not nearly so swollen & massive as No. 894. No sagittal crest.
No. 697, ♀, apparently adult.	270	»	157	123	73	81	79	20	14.5	12	12	Anterior cheek-teeth and incisors worn. Sagittal crest slight.
No. 901, ♀, apparently adult.	270	148	151	122	63	76	76	18	11.5	12	15	Anterior cheek-teeth slightly worn: incisors worn and broken. Sagittal crest slight.
No. 892, immature ♀. (The skin also was received).	201		120	115	66	67	68	16	9	13.5	13.5	
No. 896, immature ♀.	180.5		111	113				Teeth just appearing above jaw.				
No. 899. ♀ fetus. (The skin was also received).	168		106	108	58			Teeth still in alveoli.				
<b>In the Collection of the British Museum of Natural History</b>												
No. 326 e, ♂, probably adult. Antarctic Seas. Sir James Ross's Antarctic Expedition of 1839 to 1843. Lient. Smith, R. N. Figured at up. 13 of Gray's Hand-List of 1874.	285	146	150.5	118	58	80.5	76	20	13	13.5	13	Anterior cheek-teeth and incisors worn. Sagittal crest just perceptible.
No. 326. (43. 11. 16. 8), apparently an old ♂. From the same Expedition. (The skin is also in the collection).	277	149	165	131	56	85	82.5	21	17	14	15.5	Teeth worn. No sagittal crest.
No. 326 d. an apparently adult ♂. Same origin and donor as No. 326 e.	270	143	155	123	61	83.5	81	19.5	13	13.5	14.5	Teeth beginning to wear. Sagittal crest small.

	Basal length.	Baso-palatal length.	Greatest breadth at zygoma.	Greatest breadth of cranium.	Length of nasals.	Length of upper cheek-tooth series.	Length of lower cheek-tooth series.	Length of exposed portion of upper canines.	Greatest diameter of upper canines.	Antero-posterior length of third lower cheek-tooth.	Height of exposed portion of third lower cheek-tooth.	
<b>In the Collection of the British Museum of Natural History</b>												
No. 46. 4. 15. 13, apparently adult ♂. Sir James Ross's Antarctic Expedition of 1839 to 1843. Presented by the Admiralty. (The skin of this specimen is also in the collection and is No. 46. 4. 15).	270	150	122	Damaged	81	82	20	14	13.5	13		Teeth clean and hardly worn. Sagittal crest slight. Skull much damaged.
No. 97. 3. 4. 1, apparently an adult ♀. Presented by R. M. Martin	268 (approx.)	135	152 (approx.)	123	76	77	75	17	15	14	15	Teeth beginning to wear. No sagittal crest. Skull damaged.
No. 326, c (44. 11. 16. 4), apparently an adult ♂.	260	139	143	123		77	75.5	20	13	15	12	Teeth fresh and unworn. No sagittal crest.
No. 326, i (46. 4. 15. 15), apparently an immature ♀. Antarctic Seas. Sir James Ross's Antarctic Expedition of 1839 to 1843. Presented by the Admiralty. The skin of this specimen is also in the collection and is No. 46. 4. 15. 31.	217		131	118	—	67.5	65	16	11.5	13	11.5	Cheek-teeth crowded in jaws. No sagittal crest. A quite young skull. Much damaged and broken.
No. 326, a (43. 11. 16. 20), apparently an immature ♀. History similar to that of 326, i. Figured in «The Zoology of the Voyage of H.M.S. Erebus and Terror». (The stuffed skin of this specimen is also in the collection).	217	114	118	114	60	67.5	66	18	12	15	10	Teeth not fully grown above the jaw. No sagittal crest.
No. 326, b (46. 4. 15. 20), an apparently immature ♂. History similar to that of No. 326, i (The skin of this specimen, also in the collection, is No. 46. 4. 15. 20).	210	112	119	117	66	65	66	22	13.5	13.5	10	Cheek-teeth much crowded. No sagittal crest.
No. 43. 11. 16. 4, nearly adult, sex uncertain.	"	"	"	117		77	77	19	13	12.5	14	A much damaged skull.

	Basal length.	Baso-palatal length.	Greatest breadth at zygoma.	Greatest breadth of cranium.	Length of nasals.	Length of upper cheek-tooth series.	Length of lower cheek-tooth series.	Length of exposed portion of upper canines.	Greatest diameter of upper canines.	Antero-posterior length of third lower cheek-tooth.	Height of exposed portion of third lower cheek-tooth.	
<b>In the Collection of the British Museum of Natural History</b>												
No. 326, h, apparently an immature ♂.		111		115	—	65	66	17.5	14	14	13	} Cheek-teeth crowded in jaw. A quite young skull: much damaged.
No. 326, f (46. 4. 15. 19), apparently an immature ♀. History similar to that of No. 326, i. (The skin of this specimen is also in the collection and is numbered 46. 11. 15. 7).	197	100	113	117	52	64	65	13.5	9	13.5	10	

REMARKS : — As in *Ommatophoca* the development of the sagittal crest is extremely slight and the lambdoid crest is even weaker than in that genus. So too the nearest approach to a crest is to be found along the junction of the parietals and frontals near the middle line.

Both the basilar and sphenoidal sutures close completely before the animal becomes very old, in contradiction to *Ommatophoca* and *Ogmorhinus* in which the sphenoidal suture seems to remain open throughout life.

As regards the sexes, those with the largest canines are most probably males, and those with the smallest females, but there are many specimens the sex of which, if unlabelled, it would be very hard to ascertain.

The extraordinary cheek-teeth, although apparently so liable to suffer from wear and tear, seem to preserve their appearance unworn in a very remarkable manner, wearing away in fact at a far less rapid rate than the more massive canines and incisors, and for the most part only at the anterior portion of the jaw and on the anterior surface of each tooth.

DISTINGUISHING CHARACTERISTICS : — (A) The *skull* although not possessing the enormous dimensions of that of *Ogmorhinus* may be at once distinguished at all ages by the peculiar grinding teeth, which are both large and remarkable for the complicated arrangement of cusps in which they terminate superiorly. As in *Ogmorhinus* there is a principal central cusp, but this is supported, not by two others, one on each side of it, but by one quite small cusp in front and by from one to three behind. The central cusp is far larger than the remainder and its apex, which is usually bulbous, points backwards. In addition to these dental characters, this species differs from the somewhat similarly sized *Leptonychotes* in its longer palate and longer, broader anterior portion of the skull, as well as in the quite differently shaped lower jaw. (See under *Leptonychotes*).

(B) The *skeleton* has been described in detail by Owen in the Catalogue of the Osteological Museum of the Royal College of Surgeons of London, p. 642 and in the Annals and Magazine of Natural History for 1843 at page 331.

(c) *Externally*, in the dimensions and proportions of its limbs and tail as well as in the size and number of its claws, this seal bears a close resemblance to *Leptonychotes*. Its head, however although not so blunt as that of *Ommatophoca* is thicker than that of *Leptonychotes*. But the colour is the most distinctive feature of the animal, since it is at all ages far lighter than that of any of the other species found in Antarctic seas. As to the exact hues and patterns we are, however, still in some doubt, which can only be dispelled by a detailed description of the living animal written by a competent field-naturalist. The original describers designate the pelage as « brun olive, parsemé çà et là, en dessus, aussi bien qu'en dessous, de grandes plaques de couleur jaunâtre, » a description which is borne out by the plate (no. 10). The skins collected by the BELGICA are, however, nearly white with only indistinct traces of mottling. In life they were, according to Monsieur Racovitza, « d'un blanc pelucheux à reflet verdâtre. » On the other hand Mr. W. S. Bruce <sup>(1)</sup> <sup>(2)</sup>, who took a voyage to the Antarctic on the steamship BALAENA, alludes to this species as a « creamy white seal with a darker dorsal stripe » Lastly the skins in the British Museum show that a good deal of mottling may be present in immature specimens. On the whole I suspect that the crab-eating seal gets whiter as it grows older.

Ross's seal might possibly be confused with this species, but has the head blunter and the colour darker.

HABITS AND HABITAT : — The Belgian Expedition found *Lobodon* the most frequent species on the pack-ice. It was also present with *Leptonychotes* in the Strait of Gerlache in the Palmer Archipelago. On being approached it showed a great anxiety to make its visitors acquainted with its dental armature, displaying its teeth and « en soufflant violemment par les narines ». A species of *Euphausia* forms its habitual nourishment. « Il nage la bouche ouverte dans les bancs de ces crustacés, à la façon des baleines, et en consomme de grandes quantités. » The young are brought forth on the pack-ice in September and, already of a considerable size, are clothed with a thicker coat than that of their parents. « La mère allaite quelques jours seulement son enfant; elle le laisse ensuite se débrouiller tout seul. »

Monsieur Racovitza's description of the method of feeding of this seal is interesting and I think it very probable that some light is thus thrown upon the wearing and use of the extraordinarily complicated cheek-teeth, the cusps of which may form a sieve through which is strained the water taken into the mouth with the *Euphausia*. At all events their shape is not that of instruments used much for mastication, a process which would rapidly show itself by their detrition in a far more marked manner than is actually the case. If my supposition be correct we have here a remarkable parallel to the baleen of the whale-bone whales.

(1) Report of the sixty-third meeting of the British Association for the Advancement of Science held at Nottingham in September 1893, p. 807, 1894.

(2) Proceedings of the Royal Physical Society of Edinburgh, vol. XII, p. 350, 1894.

### *Leptonychotes Weddelli* (Weddell's Seal, or the False Leopard-Seal).

*Otaria Weddellii*, R. P. Lesson, Ferrussac's Bull. d. Sci. Nat, vol. VII, pp. 437-438, 1826.

MATERIAL RECEIVED : — No. 891, *skin and skull*. — « Jeune mâle (trois mois?). Banquise Antarctique, 70° 18' Lat. S. et 83° 33' Long. O. Greenw., 2 Décembre 1898. » Coloration of animal : « Iris brun clair ; paupières, région externe des lèvres, anus, orifice de la gaine du penis et ombilic, noirs ; gueule et langue rose. Longueur totale 1550 mm. »

No. 893, *skin and skull*. — « Mâle adulte. Banquise Antarctique, par env. 70° Lat. S. et 81° 30' Long. O. Greenw., 7 Novembre 1898. » Coloration of animal : « Iris brun clair ; gueule et langue rose ; narines, anus, ombilic et orifice de la gaine du penis, noirs. Longueur totale 2695 mm. »

No. 895, *complete skeleton*. — « Femelle adulte. Banquise Antarctique, 69° 54' Lat. S. et 82° 30' Long. O. Greenw., 6 Décembre 1898. »

No. 900, *skull*. — « Mâle adulte, XVII<sup>e</sup> débarquement (Ilots Bob), Détroit de Gerlache, 9 Février 1898. »

DIMENSIONS. — The following are some of the principal dimensions of the skulls together with those of the skulls in the collection of the British Museum : —

	Basal length.	Baso-palatal length.	Greatest breadth at zygoma.	Greatest breadth of cranium.	Length of nasals.	Length of upper cheek-tooth series.	Length of lower cheek-tooth series.	Length of exposed portion of upper canines.	Greatest diameter of upper canines	Antero-posterior diameter of base of 3 <sup>rd</sup> lower cheek-tooth.	Height of exposed portion of third lower cheek-tooth.	
<b>Collected by the " Belgica "</b>												
No. 893, adult ♂.	268	118	178	130	68	65	56	26.5	17.5	10	9	Teeth worn. Sagittal crest barely perceptible.
No. 900, adult ♂.	257	123	178	130	72	61.5	54	25.5	18.5	10.5	9	Ditto, ditto.
No. 891, immature ♂.	Damaged	85	Damaged		40	46	45	21	12.5	10	5.5	Molars crowded. No sagittal crest.
No. 895, adult ♀.	242	103	150	122		54	52	23.5	14.5	10.5	8	Teeth a little worn. Sagittal crest almost imperceptible.

	Basal length.	Baso-palatal length.	Greatest breadth at zygoma.	Greatest breadth of cranium.	Length of nasals.	Length of upper cheek-tooth series.	Length of lower cheek-tooth series.	Length of exposed portion of upper canines.	Greatest diameter of upper canines.	Antero-posterior diameter of base of 3 <sup>rd</sup> lower cheek-tooth.	Height of exposed portion of third lower cheek-tooth.	
<b>In the Collection of the British Museum of Natural History.</b>												
No. 323 b., 44. 3. 21. 1, an apparently adult ♂. River Santa Cruz, East Patagonia. Capt. Fitzroy, R. N.	Damaged	113	Damaged		67	64	60	26	18.5	11	9 5	Teeth worn. Sagittal crest barely perceptible.
No. 323 d., 46. 2. 15. 22, an apparently adult ♂. Antarctic Seas Sir James Ross's Antarctic Expedition of 1839-1843. Presented by the Admiralty. Figured in J. E. Gray's Hand-list of Seals etc. in the British Mus., pl. X.	260	110	168	122	64	62	55.5	28	17	11	8	Ditto, ditto.
No. 97., 3.4. 2, an apparently adult ♂. Presented by R. M. Martin Esq.	260	110	Damaged	—	59	53.5	26.5	17.5	11.5		9	Teeth slightly worn. Sagittal crest barely perceptible.
No. 323 a., 44. 4. 6. 1, probably adult ♂. River Santa Cruz, East Patagonia. Capt. Fitzroy, R. N. The stuffed skin of this specimen is also in the collection.	243	Damaged	160	123	—	55	50	25.5	15.5	11	11.5	

REMARKS : — Nos. 893, 900 and 895 are particularly fine skulls, but, although they obviously belonged to adult animals, the development of the sagittal crest is practically imperceptible.

As regards the differences, if any, between the skulls of the two sexes we know next to nothing. The only skull labelled as that of a female which I have examined is no. 895. In this the canines are smaller than are those of the males, and, if this distinction be borne out by a series of specimens, all the skulls in the British Museum will prove to be, as I have provisionally labelled them, those of males. It should be noted, however, that the dimensions of no. 44. 4. 6. 1 are somewhat intermediate in character.

There seems to be a tendency, variably exhibited in the different individuals, but most marked in no. 893, to the appearance of a distinct space between the last two cheek-teeth of the upper jaw in a manner which reminds me somewhat of the corresponding teeth in *Otaria (Eumetopias) stelleri*, Fischer.

The cheek-teeth do not seem to be subject to much wearing down. The effect of use appears more conspicuously in the case of the canines and incisors, perhaps as the result of fighting.

The two skins and four skulls brought home by the *BELGICA* from the Antarctic pack-ice are very welcome additions to the meagre list of specimens of this seal in European Museums.

**DISTINGUISHING CHARACTERISTICS :** — (A) The *skull* of *Leptonychotes* has neither great size nor remarkable teeth to distinguish it at a glance from the remaining seals of the Antarctic Seas. Yet *Lobodon*, which is very similar in size, is the only seal with which it could possibly be confused. Even there, however, there are several obvious points of difference, and *Leptonychotes* (apart from its simple teeth) may be at once distinguished by the proportionately greater breadth of its brain-case and the high narrow facial regions of the skull as well as by its shorter palate. The underjaws of the two animals are also characteristic, that of *Lobodon* being far deeper, stronger and more massive than that of *Leptonychotes*.

(B). Of the *skeleton* I need say nothing. Both the skull and skeleton have been described in detail by Sir William Turner at pages 20 to 28 of his Report on the Seals collected by the « Challenger » Expedition.

(c). The two *skins* of this seal are quite different from those of either *Lobodon* or *Ommatophoca*. The head is far longer and more slender than that of the latter species, and the flippers resemble those of the former in that the hinder pair are very large while the anterior pair are smaller. As in *Lobodon* I can find no trace of claws on the hinder flippers of the dried skin, but each of the anterior pair is armed with five moderately developed claws. The tail reaches a length of four or five inches.

The colour the younger specimen (no. 891) is slaty grey above with the underside, both of body and flippers, dirty white. A fairly distinct line of demarcation runs between the colours of the two surfaces, passing from the base of the hind to that of the fore-flippers and thence to the nose, but including the upper lip in its area. On the flanks are a series of dirty white spots which, running obliquely forwards, are almost arranged in rows and give an impression that they are discontinuous streaks.

The older specimen (no. 893) is far yellower on the underside, but the greater part of the lower surface is soiled and presents a mixture of various tints of dirty yellow which it would be impossible to classify exactly. On the chest and neck a mixture of dirty yellow and slate grey colouring is arranged in a pattern which resembles marbling, but the underside of the jaw is without spots.

This seal is sufficiently distinguished by its coloration both from *Lobodon* and *Ommatophoca*.

**HABITS AND HABITAT :** — Weddell's Seal was found by the Expedition on the pack-ice, where it feeds on the Schizopod crustacean *Enphausia*. It was also found, with *Lobodon*, in the strait of de Gerlache, in the Palmer Archipelago. The young are born on the ice in September.

### **Otaria jubata** (*South American Sea Lion*).

*Phoca jubata*, Schreber.

One quite young skull of this Sea Lion was included in the collection. It is described as « no. 902. Jeune mâle (3 mois?). Ile des États, Argentine, 9 Janvier 1898 ».

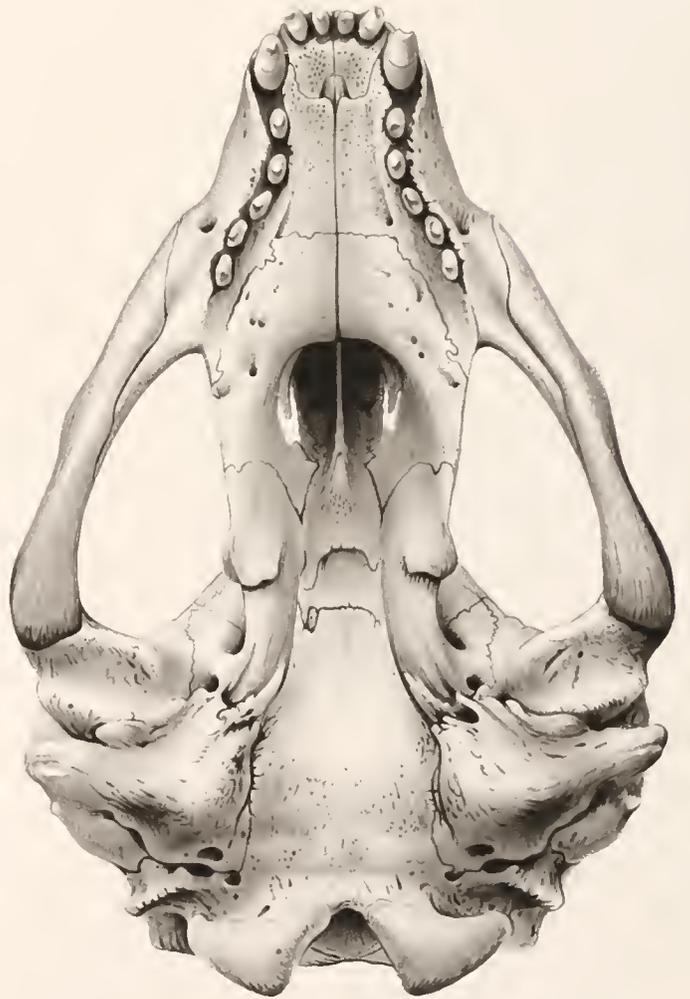
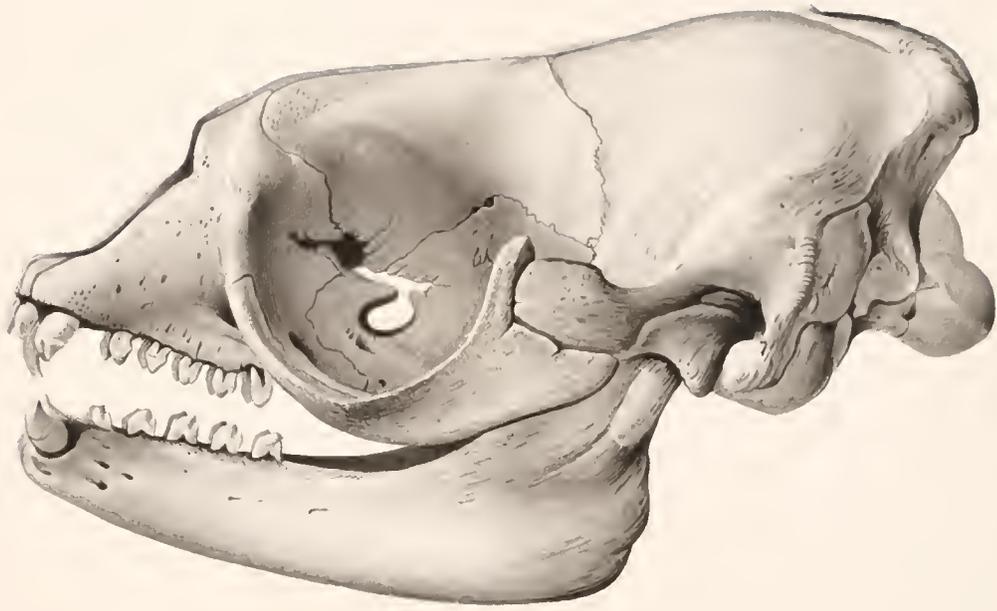
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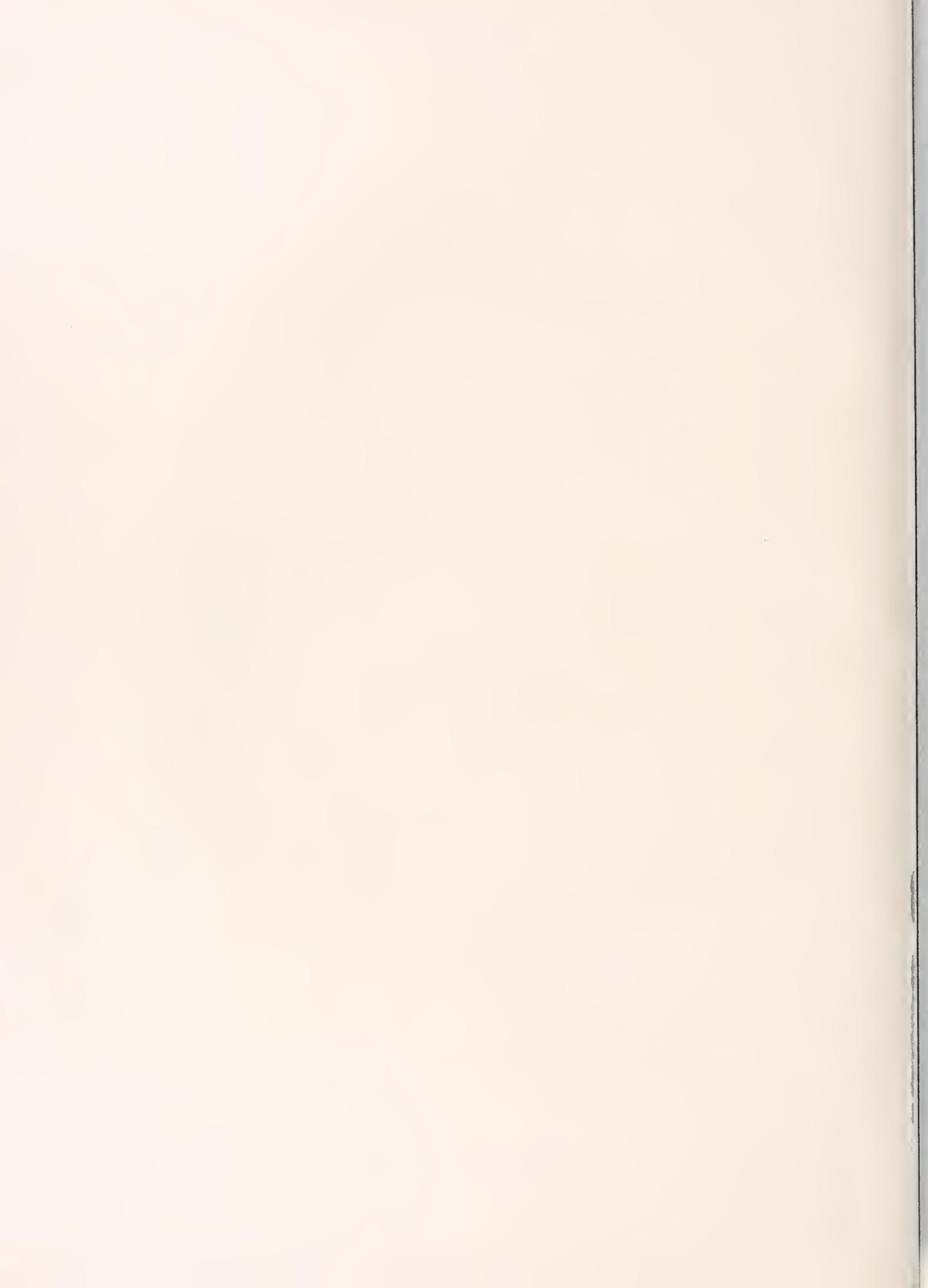
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SKULL OF OMMATOPHOCA ROSSI

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- Fig. 1. Profile view,  $\frac{1}{3}$  of natural size.  
Fig. 2. Vertex view of the same,  $\frac{1}{3}$  of natural size.  
Fig. 3. Inferior surface of the same,  $\frac{1}{3}$  of natural size.
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