No. 2.

Skull of same. Side view.

No. 3.

Skull of same. Upper view.

No. 4.

Skull of same. Lower view.

No. 5.

Left mandibular tooth of same. (Pl. XXIV., fig. 3.)

A. Front view.

B. Back view.

C. Section.

No. 6.

Left tympanic bone of same. (Pl. XXIV., fig 1.)

A. Lower surface.

B. Upper ,,

No. 7.

Sternum of same. (Pl. XXVI.)

No. 8.

Skull of *Epiodon novæ zealandiæ*, female, obtained in Akaroa Harbour. Side view. (Pl. XXVI.)

No. 9.

Skull of same. Upper view.

No. 10.

Skull of same. Lower view.

No. 11.

Mandibular right tooth of the same. (Pl. XXIV., fig. 2.)

A. Left side.

B. Right side.

C. Section.

Art. LV.—*Notes on* Mesoplodon floweri. By Julius von Haast, Ph.D., F.R.S., Director of the Canterbury Museum, New Zealand.

[*Read before the Philosophical Institute of Canterbury, 6th September, 1876.*]

Plate.

In the beginning of April, 1874, the information reached me that a Whale about eighteen feet long had been stranded on the sea beach near Saltwater Creek, about thirty miles north of Banks Peninsula, and although I did not lose any time in securing the skeleton for the Canterbury Museum, I was too late to obtain the necessary information as to form, colour, position of fins, etc., the animal having in the meantime been stripped in order to obtain the blubber. Fortunately, however, no bone was lost, and on examination the animal proved to be a *Mesoplodon*, closely allied to a specimen obtained at the Cape of Good Hope, of which the skull has been described by Professor R. Owen, and figured Vol. XXIII. of the Palæontographical

Fig. 1.

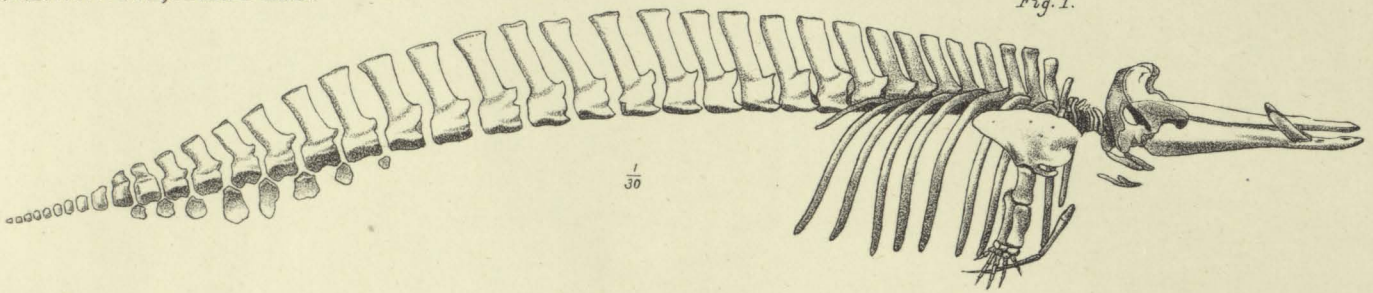

Fig 2.

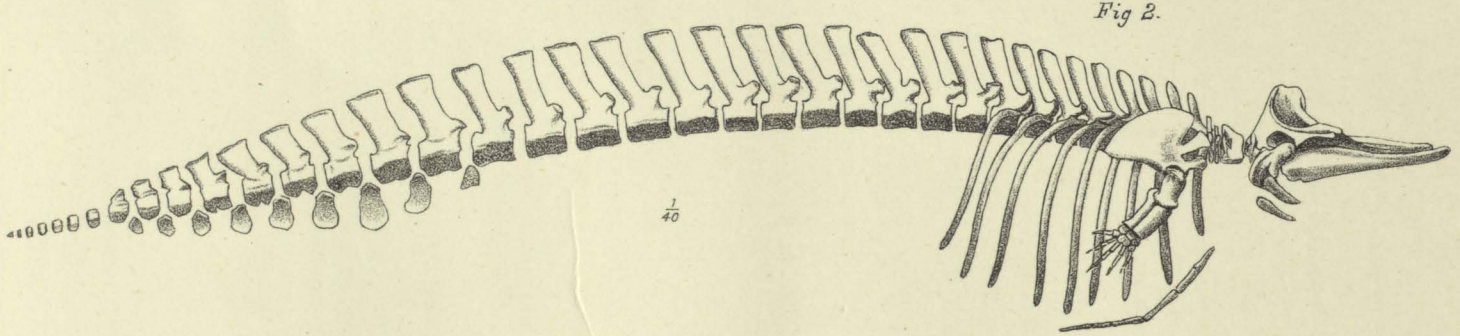

Fig. 1. MESOPLODON ELOWERI.
Fig. 2. EPIODON NOVÆ ZEALANDIÆ.

Society of London, under the title of *Ziphius (Dolichodon layardi)* *, Gray,

As far as I am aware, nothing is known of that interesting animal, except the skull, with the lower jaw, between which and the New Zealand specimen under review, there exist some points of difference, as I shall point out further on; moreover, as I believe that the same species of Ziphioid Whale would scarcely exist in two regions so far distant from each other, I have thought it more expedient to designate the New Zealand species by the specific distinction of *M. floweri*, in honour of the accomplished anatomist, Professor W. H. Flower, F.R.S., to whom the New Zealand naturalists owe a great debt of gratitude for his excellent memoir on *Berardius arnuxii*.

The animal proved on dissection to be a full-grown male, and of mature age, the terminal epiphyses of the body of the vertebræ being so thoroughly anchylosed, that the line of junction could not be detected, and we can draw the conclusion, from its osteological characteristics, that it must have combined considerable strength with great swiftness, whilst at the same time the large and remarkable strap-like teeth must have given it a peculiar appearance. The skeleton (Pl. XXV., Fig. 2) as now mounted has a total length of 17 feet 9 inches, which closely corresponds with the measurement given to me, and taken before the flesh was removed from the skeleton.

The skull (Pl. XXVI., Fig. 2) resembles in all its general features so closely the skull of *M. layardi*, as described by Professor Owen, that it would be superfluous to offer any detailed account of it. Amongst other peculiarities, the prefrontals have also the rami well defined form, and appear as a dense convex ridge between the premaxillaries, as in the Cape specimen. Notwithstanding this general likeness, if we compare closely the figures of both skulls, it is nevertheless apparent that there exist some differences between them, of which I wish to point out the following :—

The frontals in the Cape specimen rise higher above the maxillaries than in the New Zealand specimen, and the occipital portion of the skull is far more rounded in the former than in the latter, in which the supra-occipital stands nearly vertical, whilst in the Cape specimen this portion of the skull has a considerable slope towards the foramen magnum. At the junction of the basi-occipital with the temporal, the former enters the latter with a sharp angular projection, whilst in the New Zealand specimen it has a rounded edge.

The inter-parietal in the New Zealand specimen runs up to the crest as a much narrower bone than in the Cape one, in which it has a rounded form near its junction with the frontals. Besides the difference in the mandibu-

* Pro. Zool. Soc., 1865, p, 353.

lar teeth, to be pointed out hereafter, I find that the lower jaw is far deeper in proportion to its length in the New Zealand specimen. Measured on the drawing of that bone on Plate 1, Vol. XXIII. of the Palæontographical Society of London the total length of the lower jaw of *M. layardi* from the point to angle is to the greatest depth as $8\frac{1}{5}$ to 1, whilst in the New Zealand specimen it is as $6\frac{1}{2}$ to 1. In *M. layardi* the lower jaw is much slenderer, the upper and lower border being very slightly inclined to one another, whereas in *M. floweri* the two borders form a much opener angle with one another, the upper border being very convex near the coronoid process. If both skulls were available for comparison side by side, I have no doubt that other differences would be detected, especially by a comparative anatomist of more experience than I possess.

There is an important difference in the amount of curvature of the large tooth on each side of the lower jaw, which in the Cape specimen is so much arched that the apices of both teeth actually meet above the rostrum—a peculiarity which the late Dr. Gray thought could scarcely be a malformation.

In the New Zealand specimen that curvature, although existing, is not so pronounced, the point of the tooth standing in a vertical line above the centre of the root. Its form and position agree entirely with those of the tooth of the lower jaw brought from the Chatham Islands by Mr. H. Travers, and described and figured by Dr. Hector as *Dolichodon* (*Mesoplodon*) *layardi*.* Behind this mandibular tooth there is no partial hollow on the upper margin of the lower jaw, as if it were the cavity of an old tooth that had fallen out, as is the case in the Cape specimen, and which was first pointed out by Dr. Gray in his "Catalogue of Seals and Whales in the British Museum." The New Zealand specimen under review thus conforms also in this respect to the lower jaw obtained in the Chatham Islands.

The anterior edge of both teeth are, however, perfectly intact, and not worn away like those in the Cape and Chatham Islands specimen—a peculiarity which might be traced to individual habits, and is, I suppose, not of any specific character.

There is no doubt that the New Zealand and Chatham Islands specimens would open their mouth, as there is sufficient space for the rostrum to pass between the apices of the teeth. However, there has evidently been some abrasion on the inner side of both teeth, near the crown, as they are here somewhat worn down and polished.

* "Trans. N.Z. Inst.," Vol V., p. 166, Pl. III., 1-5. [Gray has distinguished the New Zealand species as *D. traversii*. "Trans. N.Z. Inst.," Vol. VI., p. 96.—Ed.]

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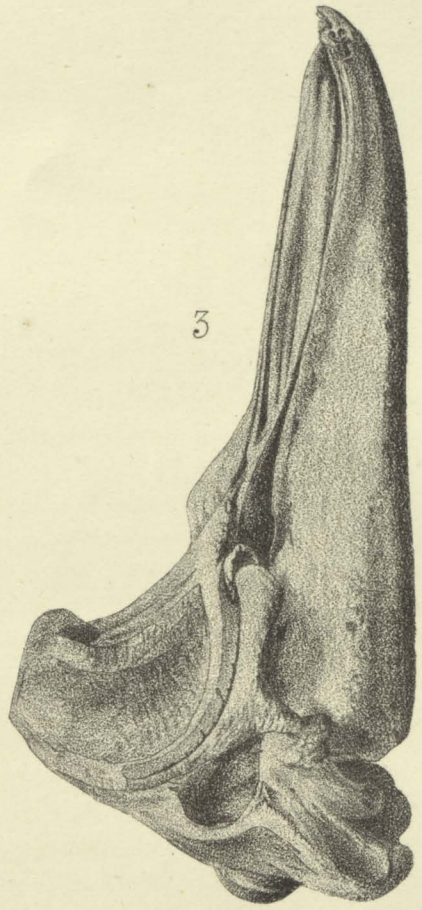

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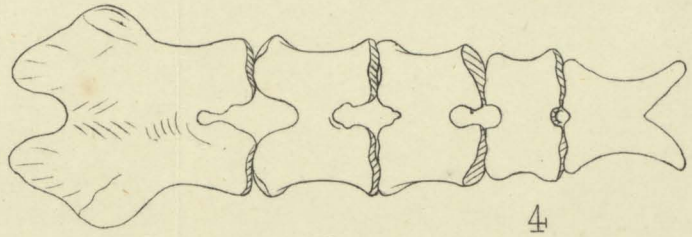

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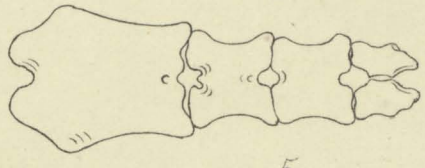

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J.B. lith.

The small enamelled portion rising on the anterior edge of the apex is not quite so large as in the Cape specimen.

The lower jaw from the Chatham Islands is 1·75 inches shorter than that of the specimen under review, in which latter the mandibular tooth is also much longer, which may be regarded as an individual difference only.

The following table of measurements will also supply further material for comparison :—

Dimensions of the Skull.

	Ft.	In.
Extreme length of cranium	3	5·75
Length of rostrum from the apex of the pre-maxillæ to a line drawn between the ante-orbital notches ...	2	3·48
Greatest height from top of nasals to lower border of pterygoids	1	3·80
Greatest breadth across post-orbital process of frontals..	1	3·22
Breadth of base of rostrum between bottom of ante-orbital notches	0	5·90
Breadth of rostrum in the middle	0	2·71
Greatest width of the two nares	0	2·15
Height of crest above occipital foramen	0	8·75
Distance from point of rostrum to crest over blowers in a straight line	2	8·48

Mandible.

Length of ramus	2	10·75
,, ,, symphysis	0	8·05
Vertical height of ramus at coronoid process	0	4·82
Distance from the condyle to the hinder edge of the base of the mandibular tooth	1	9·53
Breadth of exposed part of mandibular tooth along upper margin of ramus	0	4·51
Length of mandibular tooth measured along anterior edge from upper margin of ramus to crown ...	0	8·74

Hyoid Bones.

The basihyal and thyrohyals are united into one bone; the two latter are each 4·5 inches long and 2·1 inches broad at their junction with the basihyal. The anterior edge of this bone is formed by two processes advancing considerably beyond its general outline, and being separated in the centre by a deep notch, in which respect the bone resembles that of *Epiodon novæ zealandiæ*.

The two posterior points of the thyrohyals stand 7·2 inches apart. The stylohyals are 7·5 inches long; they possess a distinct head for their articu-

lation with the skull, and have afterwards for some distance still a roundish form, then gradually flattening, till, about 2·5 inches from their anterior end, they are 1·71 inches broad and 0·5 inch thick, the upper side having a sharp ridge and the lower side being flattened.

Vertebral Column.

The number of vertebræ is as follows:—

Cervical	7
Thoracic	10
Lumbar	10
Caudal	19
	46

Mesoplodon floweri thus agreeing in that respect with *Mesoplodon sowerbiensis*.

Cervical Vertebræ.

Measured along the lower side of their main bodies, the seven cervical vertebræ have a total length of 5·75 inches.

Of these the atlas, second and third vertebræ, are united to one large triangular bone, 8 inches broad and 6·10 inches high. Only their lower processes, of which those of the second are the largest, are free.

The third vertebræ has two distinct transverse processes, on each side of which the higher one (diapophysis) is a thin bone with its termination pointing downwards. The next four vertebræ are all free, and if we take into consideration that the skeleton under review belonged to a fully adult animal, there is no doubt that no further change in their relation to each other would have taken place.

The upper as well as the inferior transverse processes become gradually smaller as we advance towards the thoracic region. In the fourth vertebræ the inferior transverse process has still a horizontal direction. In the fifth it assumes a downward slope, which is continued to the seventh, where it consists only of a small tubercle. Above it on the side of the body of this vertebra is the articular surface for the head of the first rib. The fourth vertebra had evidently a small spinous process, which doubtless was broken off in cleaning it. In the fifth the spinous process is 1·05 inches; in the sixth, 1·53 inches; and in the seventh, 2 inches high, all leaning a little forwards.

The bodies of the four last vertebræ are broader than they are high.

Mesoplodon floweri therefore stands so far alone in regard to the arrangement of the cervical vertebræ; as no other Ziphioid Whale, as far as I am aware, has the three first cervical vertebræ anchylosed and each of the next four perfectly free.

Thoracic vertebræ.

The species under review possesses ten, of which the bodies are all flattened from top to bottom, and getting gradually of larger dimensions, the body of the first being 1·12 inches, and the tenth 4·20 inches postero-anterior length. The spinous process of the first is pointed, and stands slightly forward. That of the second stands nearly vertical, after which in the remaining eight vertebræ it gradually slopes more and more backward, and becomes higher and broader. This process in the second and third has rather a rounded apex, after which it becomes more truncated in the rest. Height of spine of first thoracic verebra, 4·25 inches; tenth, 9 inches. The articulation for the head of the second rib is situated at the posterior end of the first vertebra, low at the base of the arch; it rises gradually in the two next, so that in the third vertebra this articulation is placed some distance above that base—a position which it maintains in the fourth, fifth, and sixth, after which it disappears, the following ribs having only one articulation. The transverse process which springs from both sides of the arch is, in the three first vertebræ, a rounded apophysis; in the next four vetebræ it gradually enlarges, becoming, like in *Epiodon novæ zealandiæ*, laterally compressed, showing one strongly marked process pointing upwards and forwards, as well as a well-indicated and posteriorly-situated articulation for the tubercle of the ribs.

A separation into two distinct processes takes place in the eighth, the forward or anterior process of the apophysis now appearing as the metapophysis, and its lower or posterior process forming a lower transverse process, starting as a small rounded prominence from the anterior border of the upper portion of the body, and on which the articular surface for the eighth rib is situated, directed obliquely backwards.

In the ninth vertebra this separation is still more accomplished, the metapophysis being well developed, and the transverse process, which springs now from near the centre of the body, although thicker and more rounded than those of the succeeding vertebræ, takes already their usual form. It has an articular surface for the ninth rib on its posterior end, with the same direction as the preceding one.

The tenth vetebra, which is the largest of the series, has a very large transverse process, depressed and broad, on the edge of which the tenth small rib obliquely articulates. This transverse process is the broadest and longest of the whole series of vertebræ, those of the lumbar region beginning with the first, getting by degrees shorter and narrower.

The transverse process of the ninth thoracic vertebra has a horizontal and somewhat backward direction; that of the tenth stands straight, whilst the same process in the lumbar and the first series of the caudal vertebræ have, beside, a slightly downward, also a forward direction.

The bodies of the thoracic vertebræ up to the seventh have a flattened lower surface, after which a keel starts on the eighth, which is well pronounced on the ninth and tenth.

Lumbar vertebræ.

The ten lumbar vertebræ resemble each other very much in form. Gradually they become more elongated, the first having an antero-posterior length of 4·55 inches, and the eighth of 6·30 inches, after which they shorten again a little. They possess all a median keel, and are compressed in the centre below the transverse process. The spinous processes are large and high, increasing to the eighth, which is 11·50 inches high, after which they slightly decrease. The arches arise from the centre of the bodies, thus differing from *Berardius* and *Epiodon*, where they have a more anterior position.

Caudal vertebræ.

There are nineteen caudal vertebræ, of which the first ten have a deep channel running along their lower surface. The spinous processes gradually lose in height, that of the tenth vertebra consisting only of a slight excrescence.

The lower transverse processes also shorten by degrees, so that in the sixth they are represented by a small horizontal ridge, which is only faintly indicated in the seventh. In the eighth, ninth, and tenth vertebræ, all signs of such processes are missing, but they are also strongly laterally compressed. There are nine chevron bones, of which the last is missing. With the eleventh vertebra the second series of the caudal vertebræ begins, which in form greatly resemble those of the New Zealand *Epiodon*.

Ribs.

There are ten ribs on each side, of which seven have two articulations, and the three last only one. The first is the shortest of the whole series, with the exception of the last; it is also the broadest. There is scarcely a sign of an articular process for its articulation with the seventh cervical vertebra, and only a very slightly marked articular surface for the transverse process, both being indicated by a small indentation on the edge of the head of the rib.

The second rib has the same flattened form as the first; it is longer, and both articulating processes are better defined.

From the second to the sixth rib they gradually lengthen, after which they diminish again a little until we reach the tenth, which is the shortest of the whole series. The third, fourth, fifth, sixth, and seventh ribs have all well defined articulating processes, and nearly the same form, flattened at and near their head, after which, for nearly one-third of their total

length, they become more constricted, and assume a prismoid shape, after which they flatten and gain again in breadth, their terminal end being, however, narrower.

The eighth and ninth ribs, which have only one articulating surface for their junction with the transverse process, have the same form as the foregoing, if we imagine their heads and necks removed.

The tenth rib is flattened throughout; it has also only one articulating surface, and, at its posterior end, runs out to a point.

The greatest length of each rib, measured in a straight line, is :—

	Ft.	In.
First	1	2·75
Second	1	9·50
Third	2	1·60
Fourth	2	4·10
Fifth	2	4·25
Sixth	2	4·80
Seventh	2	4·60
Eighth	2	3·50
Ninth	2	3·00
Tenth	0	10·25

Sternum (Pl. XXVI., Fig. 5).

The sternum consists of four principal segments, of which the fourth and smallest is separated into a left and right portion by a division in the centre, and which apparently would not have disappeared by anchylosis in a still more aged state of the skeleton. The first segment is the largest and broadest; it is without a keel, but is well rounded towards the central line. There is a deep excavation on its upper, and a shallower one on its lower portion. Similar excavations exist in the three other segments, by which three fenestræ of a rounded shape are formed. There are five articulating surfaces on each side for the sternal ribs: the first near the upper portion of the first segment, the second at the junction of the first and second segments, the third at the junction of the second and third segments, the fourth at the junction of the third and fourth segments, and the fifth at each side of the fourth segment on its lower portion.

Pectoral Limb.

The scapula is remarkably flat and without prominent ridges, so that there is scarcely any sign of the post-scapular fossa. In form it resembles that of *Mesoplodon sowerbiensis*. The acromium is broad, and has an upward slope in its anterior portion; the coracoid is flat and narrow, but widens considerably at its extremity, where it assumes a prismoid form.

The humerus, ulna, and radius resemble also considerably those of *M. sowerbiensis.* The epiphyses on both extremities are so well anchylosed, that scarcely the line of junction can be traced. The elements of the carpus are, with the exception of the magnum and trapezoid (which are united to one bone), all separate, thus resembling also the *M. sowerbiensis* and the New Zealand *Epiodon.* The same appears to be the case with the digits, which, however, have somewhat suffered, as the pectoral fins had been much lacerated before the skeleton was secured.

Pelvic Bone.

The pelvic bone for the attachment of the crura of the penis is of small size, and of rather irregular form. It is 4 inches long, 0·37 inches broad near both extremities, and 0·25 inches in the middle portion. It is rounded osteriorly, and flat anteriorly, getting gradually flatter as we reach the lower end of the bone. It is very light and spongy.

ILLUSTRATIONS EXHIBITED.

No. 12.	Skeleton of *Mesoplodon floweri.*		Pl. XXV., Fig. 2.
„ *13.*	Skull „ „ „	Side view.	Pl. XXVI., Fig. 2.
„ *14.*	„ „ „ „	Upper „	
„ *15.*	„ „ „ „	Lower „	
„ *16.*	Cavity of the trunk	As seen from the point.	
„ *17.*	Sternum.		Pl. XXVI., Fig. 5.

Art. LVI.—*On* Oulodon: *a new genus of Ziphioid Whales.*

By Julius von Haast, P.H.D., F.R.S.

[*Read before the Philosophical Institute of Canterbury, 6th September, 1876.*]

In the month of May of last year (1875) the Canterbury Museum received from W. Hood, Esq., of the Chatham Islands, three skulls of Ziphioid Whales, taken from specimens stranded with about 25 others during the summer of last year on the Waitangi beach of the main island of that group. They were described as "black fish," all belonging to the same shoal, by my informant, who moreover believes that the whole series belonged to the same species. Unfortunately the skulls were so badly separated from the body that the occipital portion has been cut off, so as to lay the brain cavity open, but as they were brought over with the greater portion of the skin still attached, some hitherto unknown and as I think peculiar characteristic features in the dentition of a ziphioid genus have fortunately been preserved.

These three skulls accord in many respects with the genus *Mesoplodon* of Gervais, of which I will point out only one, viz., that they possess one tooth in each ramus of the lower jaw opposite the posterior edge of the