

2. *The CETACEA of the SUFFOLK CRAG.* By R. LYDEKKER, Esq.,  
B.A., F.G.S., &c. (Read November 3, 1886.)

[PLATE II.]

THE fossil Cetacea of the Suffolk Crag have already formed the subject of several memoirs and papers, although no complete treatise has as yet appeared on the whole group. Of the more important memoirs the earliest is one by the late Prof. Henslow, which appeared in the Society's 'Proceedings' for 1843\*, and contains a description by Prof. Sir R. Owen of four specimens of the tympanics of the *Balænidæ*. In Sir R. Owen's 'History of British Fossil Mammals and Birds' (1846) these specimens are again described, and the genus *Balænodon* is founded on the evidence of an imperfect tooth. In 1864 Prof. E. Ray Lankester † published a paper on Crag fossils containing a notice of some delphinoid remains; while in another memoir, which appeared during the same year in the Society's 'Journal' ‡, Prof. Huxley described the rostrum of one of the Ziphioids under the new generic title of *Belemnoziphius*. In 1870, Sir R. Owen contributed a monograph of the Ziphioids to the Palæontographical Society; and in the latter part of the same year Prof. Lankester § published the description of a rostrum belonging to the same group. Finally, in 1884, Prof. Flower, in part 2 of the 'Catalogue of the Vertebrata in the Museum of the Royal College of Surgeons,' provisionally referred a considerable number of tympanics of *Balænidæ* to the four species determined by Sir R. Owen, without entering into the question of the correctness of the generic determination. Two specimens were, however, regarded as distinct from all these four species; one of these was referred to *Balæna* and the other to *Balænoptera*. Some incidental references to Crag Cetacea occur in the works of foreign palæontologists, which need not be definitely quoted.

In the course of preparing the 'Catalogue of the Fossil Mammalia in the British Museum,' I have been led not only to examine every specimen of the remains of Crag Cetacea contained in that collection, but have also examined the collections of the Museum of the Royal College of Surgeons, of the Museum of Practical Geology, and of the Ipswich Museum; and I have also paid a visit to the Brussels Museum in order to compare the unrivalled collection of Pliocene Cetacea contained in that institution with the English specimens ||.

\* Proc. Geol. Soc. vol. iv. pp. 283-286.

† Ann. & Mag. Nat. Hist. ser. 3, vol. xiv. p. 356.

‡ Quart. Journ. Geol. Soc. vol. xx. p. 388.

§ *Ibid.* vol. xxvi. p. 502.

|| I desire to express my obligations to the Director-General of the Geological Survey, and Mr. E. T. Newton, of the Museum of Practical Geology, to Dr. J. E. Taylor, of the Ipswich Museum, and to the Director and M. L. Dollo of the Brussels Museum, for their courtesy in placing the collections under their charge at my disposal, as well as for the opportunity of borrowing some of the most important specimens.

As the result of these extensive comparisons, I have been able not only to add a considerable number of species to the British fauna, but to make several important emendations in regard to nomenclature, and also as to the affinities of certain forms which have hitherto been but very improperly known; and I have accordingly thought it advisable, (with the permission of the Director and the Keeper of the Geological Department of the British Museum) to bring these results in a collective form under the Society's notice. I think I may be congratulated that I have not found it necessary to make any new species.

Before proceeding to the descriptive part of the paper it may be advisable to state that my own observations fully confirm the conclusions arrived at by Prof. Lankester, as to the essentially Diestian affinities of the English Crag Cetacea. In the Coralline Crag the specimens are usually met with in an unrolled condition; and although the remains found in the bone-bed at the base of the Red Crag are much rolled and water-worn, yet specimens belonging to the same species are found occasionally in the upper portions of that deposit, in a more or less uninjured condition, which clearly proves that such species were inhabitants of the Pliocene sea during the deposition of the Red Crag. With these introductory remarks the consideration of the fossils themselves may be undertaken\*.

*Balænidæ*.—Commencing with the Balænine section of the family, it appears to me to be advisable to include in the genus *Balæna* both *Balænotus* and *Balænula* of Van Beneden, as these forms seem to be nothing more than primitive Right Whales, in which the ankylosis of the cervical vertebræ had not attained the full development characteristic of the existing forms. Of the four tympanics described by Sir R. Owen in the fourth volume of the Society's 'Proceedings,' and in the 'British Fossil Mammals and Birds,' under this generic designation, the only one that really belongs to *Balæna* is *B. affinis*. The type-tympanic is not of very large size, but there are specimens in the British Museum (*e.g.* No. 46681) corresponding in form which indicate a species fully as large as, and apparently closely allied to, the Greenland Whale; there are similar specimens in the Brussels Museum which have been referred to *B. primigenia*, Van Beneden (a reference which, if correct, would indicate that the latter name is a synonym of *B. affinis*), but which differ from typical tympanics of that species. The tympanic of *B. affinis* is characterized by its elongated shape and flat anterior surface, its nearly straight inferior border, which is approximately parallel with the superior border of the inner wall, the height of the inner wall at the Eustachian part of the aperture, the produced antero-inferior angle, and the slight thickening of the involucrum †.

In addition to this type of tympanic the Red Crag contains numerous examples of the tympanics of other large Whales, which in their convex inferior border, absence of a produced antero-inferior

\* As the references to the nomenclature will be given in the British Museum Catalogue, it will be unnecessary to quote them in this paper.

† The reflected superior portion of the inner wall.

angle, and the comparative lowness of the Eustachian portion of the aperture agree with the existing Whales of the southern and temperate oceans (*B. biscayensis* and *B. australis*). Very great variation in respect of certain details is found in this type of tympanic, the difference between extreme examples being so great that if we had only a few specimens to deal with, it would be necessary to refer them to more than one species; but in a large series it is found that these variations apparently pass imperceptibly into one another, and all the forms are therefore provisionally referred to one species, which is *B. primigenia* of Van Beneden. In the typical form of tympanic\*, which we may call variety A, the inner wall is very high, its superior border oblique, the flattening of the anterior surface extending nearly or quite down to the border, the involucreum considerably thickened, and the inferior border somewhat angulated. There is a very perfect immature tympanic of this specimen in the British Museum (No. 46686), which was identified several years ago by Prof. Van Beneden, and there are others in the Museum of Practical Geology, and in the Ipswich Museum, and one fine example in the Museum of the College of Surgeons (No. 2831). By the courtesy of Mr. Colchester, of Ipswich, I figure (woodcut, fig. 1) a

Fig. 1.—*Balæna primigenia*, Van Beneden, var. A. *The imperfect right tympanic; from the Red Crag.* Half nat. size.



specimen of a right tympanic of this type, which has not been subjected to rolling. In this specimen (of which a cast has been taken by Mr. Colchester's permission for the British Museum) the obliquity of the superior border of the inner wall is only moderate.

In the form which may be called variety B, of which there is a very fine example in the Museum of Practical Geology (Pl. II. figs. 1, 1a), the obliquity of the superior border of the inner wall is excessively developed, although most of the other characters are

\* See Van Beneden, Ann. Mus. R. Hist. Nat. Belg. vol. iv. pt. 2, pl. xix. figs. 1-4 and 9-12.

similar to those of the type form. This very remarkable type of tympanic presents an approximation to the still more remarkable tympanic of the genus *Neobalæna*, the resemblance being so decided as to indicate the probability of there having been a genetic connection between the two forms. The form which I note as variety C is represented by a tympanic in the British Museum (No. 46685), which, while agreeing in many respects with the type-form, is distinguished by its extreme lateral compression and the total absence of any thickening of the involucreum.

The last variety, which we may term D, is characterized by the lowness of the inner wall, the parallelism of its superior border to the long axis of the bone, the slight downward extent of the flattening of the anterior surface, and the absence of any distinct angulation of the inferior border. There is a fine example of this form in the British Museum (Pl. II. figs. 2, 2a), and a smaller one in the Museum of Practical Geology. It is not always easy to distinguish between some of the smaller tympanics of this type and those of *B. insignis*; but those of the latter are usually more inflated, thicker inferiorly, and with a distinct angulation of the inferior border. Tympanics agreeing with those of *B. (Balænotus) insignis* and *B. (Balænula) balænoptis*, Van Beneden, occur in the Red Crag; and the British Museum possesses an atlas vertebra (No. M. 3542) from the Coralline Crag referred by Professor Van Beneden to the latter species. Both these Whales are of small size, but *B. balænoptis* is the smaller of the two. Prof. Van Beneden mentions certain structural differences by which the tympanics of these two species can be distinguished; but I confess that I was unable to satisfy myself of the validity of such distinctions from an examination of the type specimens in the Brussels Museum: in naming the Crag specimens, I have been forced to content myself with referring the smaller ones to *B. balænoptis*, and the larger to *B. insignis*; and it is difficult, in the case of some immature specimens, to say whether they may not belong to young individuals of the larger species. There is a very beautiful example of the right tympanic of the former species, which was obtained from the Red Crag of Woodbridge, preserved in the Ipswich Museum. The tympanic of *B. insignis* frequently exhibits a flattening of the inferior surface which recalls the structure obtaining in the following section.

In the Balænoptine section, which is characterized by the absence of ankylosis of the cervical vertebræ and the more inflated and rounded tympanic, in which the Eustachian channel is usually well defined, it may be observed that a very large number of genera and species have been founded by Prof. Van Beneden on the evidence of remains from the Antwerp Crag. Some of these forms have not yet been figured, and their names are therefore little better than MS. ones; while in those which have been fully described it appears to me that some of the generic divisions are unnecessary, and I cannot help thinking that in certain instances some of the forms to which specific names have been applied are not improbably only individual or sexual variations; but as it is impossible to prove this,

I cannot but adopt such species\*. In regard, however, to the names applied to two of these species, it is necessary to replace those given by Prof. Van Beneden by the earlier Owenian ones. It may be added that the great number of species in this section renders the specific determination of detached vertebræ in many instances a matter of great difficulty and uncertainty; and it may also be mentioned that owing to the more fragile nature of the outer wall of the tympanic in the Rorquals, fairly perfect specimens of these bones are much less common in the Red Crag than in the case of the Right Whales.

In the genus *Megaptera* (in which the tympanic is more inflated and its involucre more pear-shaped than in *Balænoptera*) we may, I think, certainly include the genus *Burtinopsis* of Van Beneden, which has been described as intermediate between *Megaptera* and *Balænoptera*, although the tympanics figured by Van Beneden † are undistinguishable in structure from those of *Megaptera boops*. To *Megaptera affinis*, Van Beneden, I provisionally refer an immature right tympanic (Pl. II. figs. 4, 4 a) from the Coralline Crag, which is preserved in the Museum of Practical Geology, and in its blunted anterior extremity agrees very closely with the larger example figured by Van Beneden in the Ann. Mus. R. Hist. Nat. Belg. vol. vii. pt. 3, pl. xliii. figs. 1, 2.

A left periotic, from the Red Crag, in the British Museum (No. 39020), from the narrow and elongated form of the portion containing the semicircular canals, evidently belongs to the present genus (as distinct from *Balænoptera* and *Cetotherium*); and as it is apparently adult, and much smaller than the corresponding bone of *M. affinis* figured by Van Beneden in the Ann. Mus. R. Hist. Nat. Belg. vol. vii. pt. 3, pl. xlii. fig. 4, and is apparently too large for *M. (Burtinopsis) minuta*, Van Beneden, the probability is that it belongs to the somewhat larger *M. (Burtinopsis) similis*, Van Beneden. The small *M. minuta* is represented by a nearly perfect left tympanic (Pl. II. figs. 5, 5 a) from the Coralline Crag, which is preserved in the Ipswich Museum, and agrees exactly with the tympanic figured by Van Beneden, *op. cit.* pl. xvii. figs. 9–11, under the name of *Burtinopsis*. Except by its smaller size, the English specimen can scarcely be distinguished from the tympanic of the existing *M. boops*.

To the genus *Balænoptera* belongs the so-called *Balæna definita*, Owen, of which there is a fairly perfect tympanic in the Ipswich Museum (Pl. II. figs. 3, 3 a). This specimen agrees exactly with the imperfect type tympanic (of which a cast is preserved in the Museum of the College of Surgeons ‡); and as it differs from the corresponding bone of *B. Goropi*, Van Beneden, by its larger size, its

\* In many instances it does not appear to me by any means certain that the vertebræ belong to the same species as the tympanics, and it is therefore advisable to regard the latter as the types of such species.

† Ann. Mus. R. Hist. Nat. Belg. vol. vii. pt. 3, pls. lxxxix. & xvii. The recent tympanic figured in pl. lxxxix. figs. 15, 16, under the name of *Balænoptera antarctica*, certainly belongs to *Megaptera boops*, and might have been drawn from a specimen in the British Museum (No. 2.76.16.18).

‡ Nos. 2805 and 2832 in the same collection belong to this species.

greater inflection, greater height of the inner wall, smaller depth of the Eustachian notch, sharper posterior angle, and more gibbous involucrum, there is little doubt of its specific distinctness, and every probability of its being identical with the so-called *B. Sibbaldina*, Van Beneden, of which the tympanic has been hitherto unknown. This is confirmed by a very fine late cervical vertebra from the Red Crag in the Ipswich Museum, which corresponds exactly with the type specimens of the latter form in the Brussels Museum. The rather smaller *B. Goropi*, Van Beneden \*, is represented by an imperfect tympanic from the Red Crag, in the British Museum (No. 39016), and probably by some vertebræ in the same collection. Of the still smaller *B. borealina*, Van Beneden, there is an imperfect tympanic (of which the British Museum has a cast) in the Ipswich Museum, from the Red Crag, as well as two similar specimens in the British Museum (Nos. 3907-8). The next form is that named by Owen *Balæna emarginata* (with which *B. gibbosa*, Owen, appears to be identical †), which is represented by several tympanics in the Museum of the College of Surgeons ‡, and by one in the British Museum (No. 39016 a); these specimens are absolutely undistinguishable from the tympanics found in the Antwerp Crag, which Van Beneden has named *Balænoptera rostratella*, a name which must give place to the earlier one applied by Owen, so that the species must be known as *Balænoptera emarginata*. With regard to the genus *Plesiocetus* of Van Beneden, I think it advisable to adopt Brandt's view of including it in his genus *Cetotherium*, with which *Heterocetus* §, Van Beneden, may also apparently be grouped. The tympanic is readily distinguished from that of *Balænoptera* by its anteriorly pointed form, the triangular shape of the roughened inferior surface, and the less flattened involucrum. To *C. Brialmonti* (Van Beneden) I refer an imperfect axis-vertebra from the Red Crag, in the British Museum (No. 46734); while the smaller *C. dubium* (Van Beneden) is represented by two imperfect tympanics in the Museum of the College of Surgeons (Nos. 2852, A and B) ||, and probably by some periotics in the British Museum (e. g. No. 30261). Some vertebræ in the latter collection probably belong either to this species or to *C. Burtini* (Van Beneden); while others which belong either to the latter or to *C. Hupschi* (Van Beneden) I have provisionally referred to the last-named species. The still smaller *C. brevifrons* (Van Beneden ¶) is represented by an axis-vertebra in the British, and another in the Ipswich Museum, while it is not

\* Syn. *B. musculoides*, Van Beneden; the reasons for adopting the former name will be given in the Cat. Foss. Mamm. Brit. Mus. pt. v.

† The form of the involucrum on which Owen distinguished this second species alters with age.

‡ Nos. 2822-2825. Some of the other specimens included under the same head are distinct.

§ This is really not more than a MS. name.

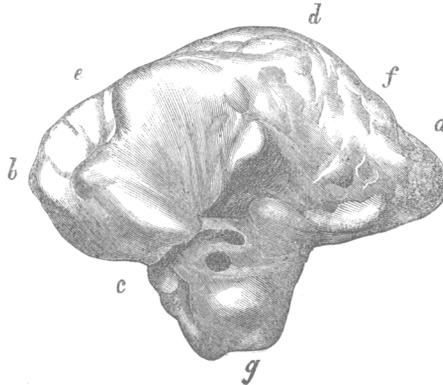
|| These numbers do not appear in the published 'Catalogue,' but have been entered in MS. by Dr. Garson in the Museum copy.

¶ Syn. *Heterocetus brevifrons*. The type specimens are not figured, and I have identified the English examples by comparison with those in the Brussels Museum.

improbable that a small tympanic in the latter collection may also belong to this species. A tympanic from the Red Crag, in the Museum of Practical Geology (represented by a cast in the British Museum), indicates the occurrence of *Herpetocetus scaldiensis*, Van Beneden, in this country, and No. 2816 \* in the Museum of the College of Surgeons is a second example. The tympanic of this genus (which exhibits some affinity in the structure of the mandible with the *Physeteridæ*) is readily recognized by its egg-like shape, the small and sharply defined involucrum, and the filling-up of the anterior portion of the cavity by osseous matter.

*Physeteridæ*.—In the *Physeteridæ* the periotic † (which, as in the other families of the Odontoceti, is not ankylosed to the tympanic) articulates anteriorly by a smooth facet (*a*, Pl. II. fig. 6) with the tympanic, and posteriorly is broad and has a distinct median longitudinal ridge (*b*) on the same face for articulation with the free border of the latter bone. The genus *Eucetus*, Du Bus, which appears to be allied in dental characters to *Physeter*, is represented

Fig. 2.—*Eucetus amblyodon*, Du Bus. The left periotic; from the Red Crag. Two thirds nat. size. British Museum (No. 27854). Letters as in Plate II.



in nearly all Crag collections by many teeth, which belong to the type species *E. amblyodon*; the cement is of great thickness, the dentine-core fusiform, and the osteodentine nodular. I provisionally refer to this species ‡ a large left periotic in the British Museum (woodcut, fig. 2), which in the partial production of its posterior extremity more nearly resembles the periotic of *Hyperoodon* than

\* Entered in the Catalogue under the head of *Balæna defnita*.

† While the tympanic is the most characteristic bone in the *Balænidæ*, the periotic (which is more commonly preserved in the fossil condition) is the one affording the best generic characters in the *Physeteridæ* and *Delphinidæ*.

‡ On account of its large size and the circumstance that teeth of *Eucetus* are much commoner than those of *Balænodon*.

that of *Physeter*, and thus, if rightly referred, confirms the generic distinctness of the present form from the latter. The small *Homonectus Villersi*, Du Bus, is, I believe, represented by a tooth from the Red Crag, in the British Museum (No. 49966), and not improbably by other teeth in the Ipswich Museum.

I now come to the genus *Balænodon*, Owen, which was founded upon an imperfect tooth, whose affinities have given rise to much discussion\*. In describing the type specimen, Owen regarded it as a segment of a complete tooth, and described the central axis as dentine, and the outer coat as cement; but a comparison with teeth in the Brussels Museum, to which Du Bus applied the name of *Scaldicetus Carreti*, has shown that the cement has entirely disappeared, and that the axis is really the ossified pulp-cavity, and the outer coat the dentine. The English specimen is specifically identical with the Belgian ones, and the name *Balænodon* must therefore supersede *Scaldicetus*. The complete teeth of the genus have their crowns tipped with enamel. Of the allied but smaller genus *Physodon* †, Gervais, there are teeth in the British Museum from the Red Crag corresponding to those of *P. grandis* (Du Bus), while one imperfect tooth (No. 44109) may not improbably belong to *P. fusiformis* (Du Bus). The genus *Hoplocetus* comprehends other *Physeteroids* with enamel-tipped teeth, which are characterized by the excessive thickness of their cement and the presence of a constriction at the base of the crown. Certain worn (and probably derived) teeth from the Red Crag in the British Museum and other collections appear to indicate the occurrence of the Miocene *H. crassidens*, Gervais, while others may be referred to the Diestian *H. borghoutensis*, Gervais, and others, again (more doubtfully), to *H. curvidens* of the same epoch.

In the Ziphiine subfamily *Hyperoodon* is represented by a very perfect right periotic from the Red Crag in the Ipswich Museum (Pl. II. fig. 6). This specimen, which has the accessory ossicle (*c*) still attached, cannot be distinguished from the corresponding bone of the existing *H. rostratus*, and evidently indicates the existence either of that or of a closely allied form in the Pliocene; the occurrence of cervical vertebræ of a member of this genus in the Antwerp Crag has been recorded by Prof. Van Beneden ‡. The genus *Choneziphius*, which appears to be in some respects intermediate between *Hyperoodon* and *Mesoplodon*, and differs from the latter by the non-ossification of the supravomerine cartilage, is represented by the typical *C. planirostris* (Cuv.). The so-called *Ziphius planus*, Owen, also belongs to the same genus, but the type specimen of that species is not sufficiently perfect to determine whether *Choneziphius Packardi*, Lankester (which is of rather later date), is really entitled to specific distinction. I refer to this genus a left periotic (Pl. II. fig. 7) from the Red Crag, preserved in the Museum of Practical Geology, which

\* Gervais identified *Balænodon* with *Hoplocetus*, while Van Beneden and Lankester thought it might be a *Squalodon*.

† Syn. *Palæodelphis*, Du Bus.

‡ Bull. Ac. R. Belg. sér. 2, vol. x. p. 407 (1860).

is intermediate between the corresponding bone of *Hyperoodon* and that of *Mesoplodon*, and accords well in relative size with the present genus. This bone (in which the accessory ossicle (*c*) is absent) is nearer to that of *Mesoplodon* than to *Hyperoodon*, but approaches the latter in the shortness of the posterior extremity, the large size of the cavity for the accessory ossicle, and the great development of the longitudinal ridge (*b*) on the tympanic aspect of this portion; the anterior articular facet (*a*) for the tympanic is also less concave than in *Mesoplodon*. The latter genus may be taken to include both *Belemnoziphius* of Huxley and those Crag species placed by Owen in *Ziphius* which do not belong to *Choneziphius*. With regard to species, the identity of Owen's *Z. medilineatus* with *Dioplodon Bécani*, Gervais, of the Antwerp Crag, has been shown by the latter writer; and as my own observations in the Brussels Museum fully confirm the view expressed by Du Bus as to the identity of the latter with *Ziphius longirostris*, Cuvier (the locality of the type specimens of which is unknown), I think we can have no hesitation in adopting the name of *Mesoplodon longirostris* for this species, which agrees in size with the existing *M. australis*. A left periotic (Pl. II. fig. 8) belonging either to this or one of the equal-sized species, is preserved in the Jermyn-Street Museum, and is almost undistinguishable from the corresponding bone of *M. australis*; the accessory ossicle on the posterior portion of the tympanic aspect is absent in the fossil. The characteristic features of the periotic of *Mesoplodon* are the production and pointed extremity of the posterior portion, the comparatively small vertical height of the longitudinal articular ridge on the tympanic aspect of the same, the small size and oval shape of the accessory ossicle, and the deep transverse concavity of the anterior articular facet for the tympanic. The other described Crag species are *M. tenuirostris* (Owen), *M. gibbus* (Owen), *M. angustus* (Owen), *M. angulatus* (Owen), and *M. compressus*\* (Huxley); and to these may perhaps be added a form of which there is a rostrum in the Ipswich Museum to which the MS. name of *M. Floweri* has been applied by Mr. Canham †.

*Squalodontide*.—The Crag *Squalodon*, of which there are several molar teeth in the Ipswich Museum, may in all probability, as Prof. Lankester suggests, be identified with the large *S. antwerpiensis*, Van Beneden.

*Delphinidae*.—The periotic of this family (Pl. II. fig. 11) is distinguished by the grooving of the anterior facet (*a*) for articulation with the tympanic, and the narrowness of the posterior tympanic surface, on which the ridge for articulation with the free border of the tympanic is ill-defined and situated close to one edge. The occurrence in the Red Crag of an *Orca* considerably smaller than the existing *O. gladiator* is indicated by a right periotic (Pl. II. fig. 9) in the Museum of Practical Geology, and by an unworn and very perfect tooth (Pl. II. fig. 10) collected by Dr. J. E. Taylor and preserved

\* *Belemnoziphius compressus*, Huxley, appears identical with *Ziphius compressus*, Owen.

† See Flower, Cat. Vert. Mus. R. Coll. Surg. pt. 2, p. 562, No. 2915 (1884).

in the Ipswich Museum. The periotic agrees very closely in structure with a specimen of the corresponding bone of *O. gladiator* in the Museum of the College of Surgeons, and accords in relative size with the tooth. As I am unable to distinguish the latter from the teeth of the small *Orca citoniensis*, Capellini\*, from the Pliocene of Italy, I am disposed to refer the English form to that species. The next form for consideration is that to which Prof. Lankester† applied the name *Delphinus uncidens* (the generic term being used in the Linnean sense), with which *D. orcoides* of the same author may be united, since the larger teeth to which the latter name was applied are merely the hinder ones of the same species. Some confusion occurs in the description of the larger teeth, since they are stated to agree in size with those of *Pseudorca* and *Orca* ‡, whereas they really correspond in this and other respects with those of *Globicephalus*, to which genus they may be referred. The evidence for this reference does not, however, depend solely upon the teeth, since there is in the British Museum a very beautiful associated left periotic and tympanic from the Coralline Crag (the former bone being represented in Pl. II. fig. 11), which agree precisely in size with the corresponding bones of *G. melas*, and only present slight structural differences of specific value. Rolled periotics and tympanics of this type are of extremely common occurrence in the Red Crag, an example of the former being represented in pl. viii. figs. 2, 3 of Prof. Lankester's memoir. To render the foregoing evidence absolutely conclusive, the British Museum possesses a lumbar vertebra (No. 28271) from the Red Crag which is undistinguishable from the corresponding bone of *G. melas*. There are several less perfect vertebræ of the same type in the latter collection, while some unnamed vertebræ in the Brussels Museum apparently indicate the occurrence of the same species in the Antwerp Crag. The last form I have to notice is one indicated by numerous periotics and tympanics in the British Museum and other collections, which indicate a Dolphin agreeing in size with the existing *Lagenorhynchus acutus*; I have not, however, been able to determine the genus of this type, which may include more than one species, and may be identical with one or both of two Belgian species to which Prof. Van Beneden has applied the name of *Delphinus Wasii* and *D. Delannoii* (the generic term being used in a wide sense). The specimens in the Brussels Museum do not, however, include any examples of the periotic, so that I could not institute any comparison between the Belgian and the English specimens.

I may conclude this paper with a list of the well-authenticated § species of Cetacea occurring in the Red and Coralline Crag, those species of which the identification is doubtful being indicated by a query.

\* Mem. Ac. Sci. Ist. Bologna, ser. 4, vol. iv. p. 670 (1883).

† Ann. & Mag. Nat. Hist. ser. 3, vol. xiv. p. 356 (1864).

‡ Mentioned as species of *Delphinus* in Prof. Lankester's memoir.

§ I omit a few forms which have been erroneously recorded from the Crag or of which the description is too vague to admit of identification.

BALÆNIDÆ.

- Balæna affinis*, Owen.  
— *primigenia*, Van Beneden.  
— *insignis* (Van Beneden).  
— *balænoopsis* (Van Beneden).  
*Megaptera affinis*, Van Beneden.  
— ? *similis* (Van Beneden).  
— *minuta* (Van Beneden).  
*Balænoptera definita* (Owen).  
— *Goropi*, Van Beneden.  
— *borealina*, Van Beneden.  
— *emarginata* (Owen).  
*Cetotherium Brialmonti* (Van Beneden).  
— *dubium* (Van Beneden).  
— ? *Hupschi* (Van Beneden).  
— *brevifrons* (Van Beneden).  
*Herpetocetus scaldiensis*, Van Beneden.

PHYSETERIDÆ.

- Eucetus amblyodon*, Du Bus.  
*Homocetus Villersi*, Du Bus.  
*Balænodon physaloides*, Owen.  
*Physodon grandis* (Du Bus).  
— ? *fusiformis* (Du Bus).  
*Hoplocetus crassidens*, Gervais.  
— *borgehoutensis*, Gervais.  
— ? *curvidens*, Gervais.  
*Hyperoodon*, sp.  
*Choneziphius planirostris* (Cuvier).  
— *planus* (Owen).  
— *Packardi*, Lankester.  
*Mesoplodon longirostris* (Cuvier).  
— *tenuirostris* (Owen).  
— *gibbus* (Owen).  
— *angustus* (Owen).  
— *angulatus* (Owen).  
— *compressus* (Huxley).  
— *Floweri*, Canham, MS.

SQUALODONTIDÆ.

- Squalodon antwerpiensis*, Van Beneden.

DELPHINIDÆ.

- Orca citoniensis*, Capellini.  
*Globicephalus uncidens* (Lankester).  
Delphinoid, gen. non det.

EXPLANATION OF PLATE II.

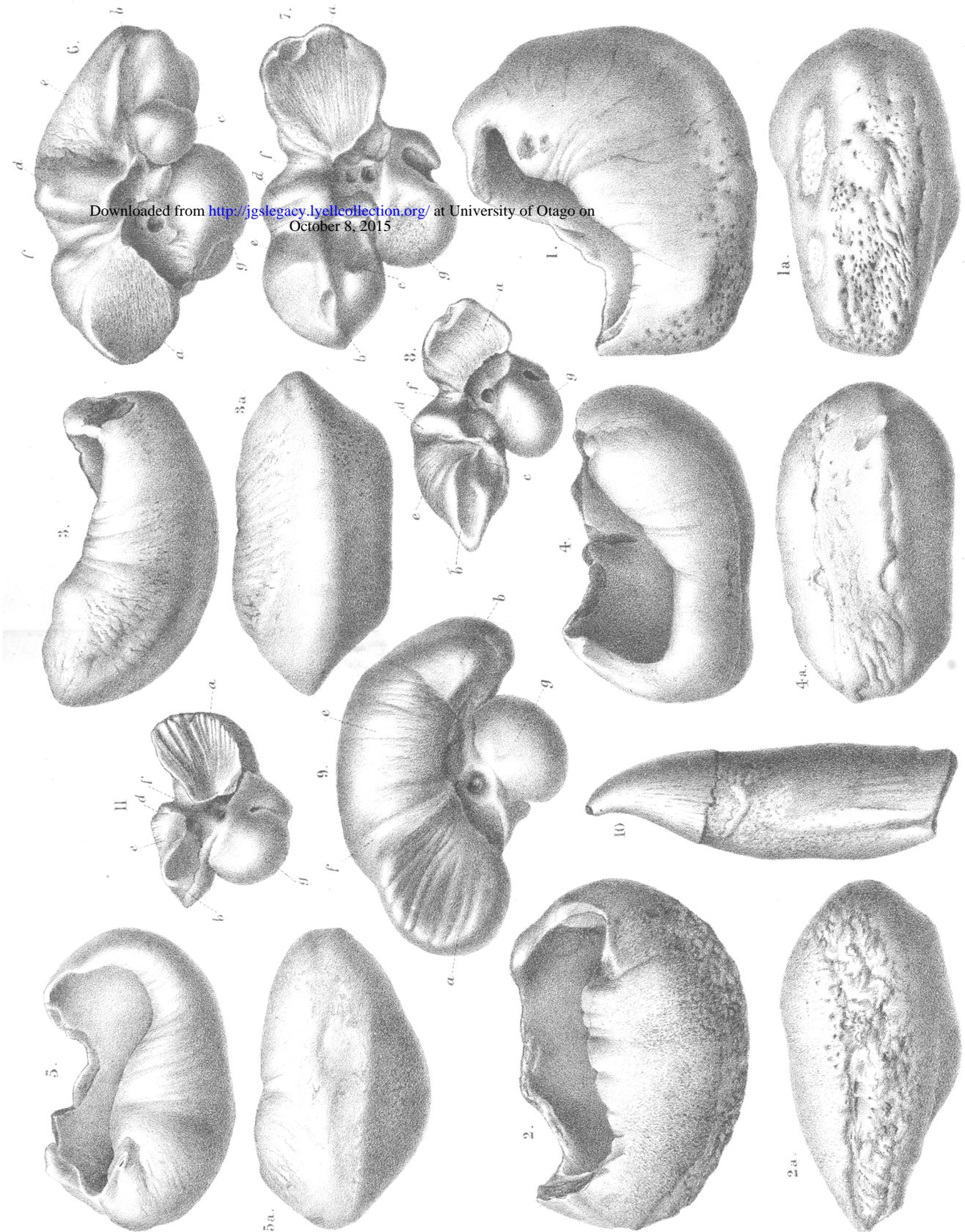
- Figs. 1, 1a. *Balena primigenia*, Van Beneden, var. B. The imperfect right tympanic; from the Red Crag. Museum of Practical Geology.  
2, 2a. *Balena primigenia*, Van Beneden, var. D. The imperfect right tympanic; from the Red Crag. British Museum (No. 45399).  
3, 3a. *Balenoptera definita* (Owen). The imperfect left tympanic; from the Red Crag. Ipswich Museum.  
4, 4a. *Megaptera affinis* (Van Beneden). The imperfect immature right tympanic; from the Coralline Crag. Museum of Practical Geology.  
5, 5a. *Megaptera minuta* (Van Beneden). The imperfect left tympanic; from the Coralline Crag. Ipswich Museum.  
6. *Hyperoodon*, sp. The right periotic; from the Red Crag. Ipswich Museum.  
7. *Choneziphius planirostris* (Cuv.). The left periotic; from the Red Crag. Museum of Practical Geology.  
8. *Mesoplodon* (? *longirostris* [Cuv.]). The left periotic; from the Red Crag. Museum of Practical Geology.  
9. *Orca citoniensis*, Capellini. The right periotic; from the Red Crag. Museum of Practical Geology.  
10. Ditto. A tooth; from the Red Crag. Ipswich Museum.  
11. *Globicephalus uncidens* (Lank.). The left periotic; from the Coralline Crag. British Museum (No. 36657).

Figs. 1, 2, 3, one half, figs. 4, 5, two thirds, figs. 6, 7, 8, 9, 10, 11, nat. size. All the tympanics are viewed from the inner and inferior, and the periotics from the tympanic aspect. *a*, anterior articular facet for tympanic; *b*, posterior articular ridge for tympanic; *c*, accessory ossicle, or hollow for the same; *d*, *e*, *f* mark the homology of the ridges and hollows in the different bones; *g*, the capsule containing the semicircular canals.

DISCUSSION.

Mr. NEWTON regretted the absence of Prof. Flower. He had tried to determine some of the specimens himself, and recognized how very difficult a task it was. He complimented Mr. Lydekker on his work. With regard to the fossil Physeteroid teeth, he was under the impression that there was more cement in them than in recent teeth.

Mr. LYDEKKER, in reply, said his remark as to the absence of cement only referred to the type specimen of *Balenodon*.



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