

On a Cetacean,  
*Squalodon* (*Microzeuglodon*?) *Wingei* n. sp.,  
from the Oligocene of Jutland.

By

J. P. J. Ravn.

With 1 plate.

Remains of the extinct genus *Squalodon* and of genera closely allied to it have been found in widely extended areas of both the old and the new worlds. Most frequently the finds consist of isolated teeth and vertebrae or of fragments of the skull. Now and then remains were obtained from oligocene deposits, but most of them belong to the Miocene.

Although oligocene and miocene deposits are widely extended in the western parts of Denmark, yet remains of *Squalodon* have but recently been discovered there. In the following will be mentioned what has hitherto been found of this interesting genus in that country.

On a visit to the brick-field at Branden in North-Salling (Jutland), in the summer of 1907, I received from one of the labourers a tooth of a very characteristic shape. Subsequently, this tooth has been examined and described by the late Viceinspektør HERLUF WINGE, who arrived at the conclusion that it was one of the foremost incisors of the lower jaw and that it belonged to a species of *Squalodon* till now possibly unknown<sup>1</sup>. In the clay-deposits from which the

<sup>1</sup> HERLUF WINGE: Pattedyr. — Danmarks Fauna. 5. København, 1908.

HERLUF WINGE: Om *Plesiocetus* og *Squalodon* fra Danmark. — Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909.

tooth came, numerous shells of Mollusca were found, which show the clay to be of middle-oligocene age<sup>1</sup>.

In later years some other remains of fossil cetaceans have been forwarded from that locality to the Mineralogical and Geological Museum of the University of Copenhagen. Amongst them there are some vertebrae of various sizes. Of these, the bigger ones can scarcely belong to a cetacean as small as the one from which the tooth, described by WINGE, originates. The smaller ones are so little characteristic in shape that according to WINGE they are indeterminate. However, in 1912 a second tooth was forwarded to the Museum; unfortunately its root is almost entirely lacking, but the crown is very well preserved. Further, in 1921, the Museum received a tympanic, that was also examined by WINGE; according to him it might belong to a *Squalodon*, but a reliable determination was not possible. At last, a third tooth, together with some fragments of skull, were sent in to the Museum in the summer of 1925. On a visit that I paid to the brick-field, a short time afterwards, one of the labourers told me, that he was in possession of some bones of the same animal, and then these bones also were forwarded to the Museum.

Shortly before, I had on my journey visited the brick-field ("HARDER's Teglværk") which is below the old church of Skive in Jutland. The clay of that locality is of the same age as the clay at the brick-field of Branden. A labourer told me that some time ago he had found a curious thing resembling a "claw" of a tortoise. According to the description I presumed it might possibly be a serrate tooth of a *Squalodon*, and this supposition proved to be right, for the labourer had at home a rather well-preserved jaw-tooth of a *Squalodon*; it was acquired for the Museum. Then the labourer made investigations on the spot in the clay pit where the tooth had been found, and he succeeded in finding

---

<sup>1</sup> J. P. J. RAVN: Molluskfaunaen i Jyllands Tertiæraflejringer. — D. kgl. Danske Vidensk. Selsk. Skrifter. 7. Række, naturv. og mathem. Afd. Bd. 3. Kjøbenhavn, 1907. P. 225.

further 7 teeth together with numerous fragments of skull. That material too was acquired for the Museum.

Thus, remains of *Squalodon* have been found in two different localities in Denmark, viz. at Branden and at Skive. In both places they lay in middle-oligocene clay, consequently, they must be of the same age. There can scarcely be any doubt that the teeth and fragments found at Skive belong to one and the same individual, as they all originate from one and the same spot in the clay pit. On the other hand it is doubtful whether all the fragments from Branden belong to one and the same individual, as they were found in the course of several years, and we do not know, where in the pit they lay. However, in size, shape and appearance the three teeth do not differ more from one another than they may be presumed to belong to one and the same species, if not to one and the same individual, and the last tooth was found together with the fragments of cranium which were sent in to the Museum in the summer of 1925. So in all probability the cranium belongs to the same individual as does the tooth.

As mentioned above, the remains found of the skull are very fragmentary. So it is impossible to reconstruct the cranium, as, with regard to most of the fragments, it cannot be seen, to which bones they should be referred. However, some fragments from Branden could be referred to their places in the cranium, both the right and the left squamosals being rather well preserved, the first-named together with the right exoccipital. Unfortunately, these bones are not very useful for a determination of species, as they are known only from a rather small number of the skulls described, and moreover, a comparison is in some cases difficult, as the figures accompanying the descriptions do not always point out the shape and extension of every single bone. However, the discovery of these bones is of importance, the largest fragment found at Skive being a part of the right squamosal; a comparison of that with the corresponding bone from Branden shows, it is true, some difference, but yet that difference is not greater than it may be considered an individual one, and thus both the individuals in all probability

belong to one and the same species. Perhaps both the skulls may be supplemented by further discoveries, therefore, I shall not here give a description of the fragments hitherto found but only refer to the figures of the tympanic (Pl. I, Fig. 12).

Thus, in trying a determination of species particular stress should be laid on the teeth. Of the first tooth from Branden (Pl. I, Fig. 1) WINGE has already given a detailed description, which I here for practical reasons translate into English<sup>1</sup>.

"The tooth is well preserved. Yet, a little bit of the apex of the crown is broken off, likewise a little of the root. It is brownish grey in colour. It originates from a full-grown individual and has the root quite closed."

"——— In its present state it is 78 mm. long, whereof the crown measures 21. At the base the crown is 6 mm. in diameter, measured from anterior to posterior edge. Greatest diameter of root is  $7\frac{2}{3}$  mm. The crown is short, pointedly conical, very little compressed, covered by a thin enamel, with numerous longer or shorter, elevated, in part slightly winding, longitudinal striae, with a rather sharp, smooth edge following the anterior margin and a similar one along the posterior margin. The limit towards the root slopes highly backward. Nothing of the crown is covered by cementum. The root is very long and slender, tapering gradually downwards, slightly bent forwards, almost circular in diameter."

To this description I may add, that almost at the bottom of the crown there is an extremely shallow, circular furrow, which, however, is interrupted in front of the tooth, where, as described by WINGE, the limit between crown and root is situated more upwards.

The two other teeth from Branden (Pl. I, Figs. 2 and 3) differ somewhat from the tooth described above. They lack most of the root, whereas their crown is very well preserved, only the uttermost point of one of them being broken off. The

---

<sup>1</sup> H. WINGE: Om *Pleociocetus* etc. P. 30.

crown is very highly compressed; thus, a sharper edge is produced both along the anterior and posterior edges; here and there on these edges extremely fine serrations are indicated, which, at least in the smaller tooth, appear to be connected with an extremely fine wrinkling of the enamel; yet real serrations are wanting. The crown of the larger tooth is bent rather strongly backwards, and in both teeth it is bent somewhat inwards. The surface of the enamel resembles that of the tooth first described, yet the longitudinal striae are somewhat slighter, especially in the smaller tooth. The limit towards the root slopes rather highly backwards. The root, which is, as already mentioned, only partly preserved, seems to be almost circular in section. Only one of the teeth (the smaller one) exhibits traces of the circular furrow mentioned above. In the larger tooth (Pl. I, Fig. 2) the length of the crown is 17 mm., and the diameter (at the limit towards the root) respectively 6.5 and 5.5 mm. The crown of the smaller tooth (Pl. I, Fig. 3) has been about 14 mm. in length and respectively about 5 and 4 mm. in diameter.

Of course it is difficult to indicate the positions, which the teeth assumed in the skull or in the mandible, and such a determination cannot, I think, be made with certainty. WINGE advanced the supposition, that the tooth examined by him is one of the foremost incisors of the lower jaw, and very probably, this supposition is right. According to their shape the two new teeth appear to be the hindmost incisors of the upper jaw, a determination of position, which I, however, give under correction.

As mentioned above, 8 teeth were found in the clay-pit of Skive. Two of them (Pl. I, Figs. 4 and 5) are conical as are the teeth from Branden; but, unfortunately, neither their crown nor their root are completely preserved. They are rather strongly compressed with sharp anterior and posterior edges, and evidently they have been a little bigger than the teeth from Branden. The circular furrow at the base of the crown is more distinct and appears to be produced by the fact, that the tooth suddenly increases in thickness downward towards the root. In both specimens the furrow is seen all round the

tooth and in one of the specimens it is still situated somewhat above the limit between crown and root. For the rest, this limit is in that case very irregular. At the limit the diameter is 7.5 and 6.5 mm. in both specimens. It has been suggested that these teeth may be two of the foremost premolars; perhaps one of them is rather a canine.

A third tooth (Fig. 6) lacks the root entirely and the very tip of the crown. In a side-view the crown is almost completely symmetrical, shaped as a high triangle; it is rather incurved and much compressed; one of its edges (the posterior one?) shows a rather small accessory cusp together with some slight indications of several others; on the other hand, the other edge is almost completely smooth. The length of the crown has been about 16 mm., its greatest thickness 5 mm.; as in all the teeth mentioned here the surface of the crown is glistening and apparently smooth, but under the lens a slight, as if somewhat worn off wrinkling is observed; the colour too is like that of the other teeth: dark brownish-grey with some lighter, irregular, longitudinal striae, which accompany quite shallow furrows or fissures. The root seems to have been simple. This tooth may, I think, be a premolar; it forms the transition to the teeth, which will be described below.

Without doubt, the five other teeth are jaw-teeth. Four of them (Pl. I, Figs. 7—10) belong to one and the same type. Three are rather completely preserved; yet, they all lack some part of the root and most of them a little of the crown too. They are highly compressed. In side-view the crown is almost entirely symmetrical and is shaped as a high triangle the base of which, however, is of a considerably greater breadth than in the third tooth described above. Two of these teeth (Figs. 7 and 8) are curved somewhat inwards, while the two others (Figs. 9 and 10) are almost quite straight. Their outside is rather flat, while their inside is strongly arched horizontally. Both anterior and posterior edges are provided with some accessory cusps, which are more numerous and smaller on the posterior edge than on the anterior. Only one tooth (Fig. 10) has the crown completely

preserved; here five nearly equal cusps are seen on the posterior edge together with a smaller one near the base; the middlemost of the five cusps bears a couple of secondary cusps, and also the two cusps situated closer to the root show indications of such; on the anterior edge four cusps somewhat larger than those of the posterior edge are seen; they bear very slight secondary cusps. The very tip of the tooth is but a little larger than the side-cusps. Height of crown of that tooth is 19 mm., greatest breadth 14 mm. and greatest thickness (at base of crown) 7 mm. All four teeth have been two-rooted, and the roots were connected at their base and bent backward; the posterior root is stronger than the anterior one. These teeth probably represent premolars situated behind the above-mentioned.

Finally, the last of the eight teeth (Fig. 11) remains to be discussed. It differs somewhat from the others; the crown is very low; the accessory cusps are stouter, but less numerous, the anterior margin bearing only four and the posterior three cusps. It, too, has been two-rooted, and the roots seem to diverge more rapidly than in the other teeth.

As all the six jaw-teeth originate from the same side of the jaw, it may be supposed that both the conical teeth mentioned above have had the same position. On the other hand it is more difficult to decide, whether they originate from an upper or from a lower jaw. However, their shape seems to me to agree particularly with the figures before me of the teeth from upper jaws, and that supposition agrees with the fact that among the numerous fragments of bones found together with the teeth remains of a lower jaw were not pointed out with certainty.

In examining the tooth first found, WINGE arrived at the conclusion, that as regards shape this tooth agrees very well with the first or the second incisor of *Squalodon antverpiensis*, but as it is only half as long it must belong to a different species. He emphasizes the fact that the teeth of forms previously described, as also the teeth of *Sq. antverpiensis*, are far bigger, and especially bigger than the Danish one, and that the specimens, which as regards size agree

fairly with the Danish tooth, are just those which differ as to shape; thence he is of opinion, that in this case we possibly have to do with a species hitherto unknown, which seems to be nearest allied to species generally typical for the genus, but differ from those in its smaller size and more particularly in its slenderness.

The far more abundant material now before us fully proves the correctness of WINGE's conclusion. All the new teeth are of so small a size, that they must originate from an individual proportionally small, and the fragments found of the skull indicate the same fact.

In his memoir of 1923 KELLOGG gives an account of all *Squalodonts* hitherto known<sup>1</sup>, which has been of great use to me in trying to determine the material in question. Most of the species mentioned by KELLOGG are far bigger in size, and their teeth differ as to size and shape from those of the Danish species. Only a few of the species resemble the Danish in these respects.

Thus the serrate teeth from Skive highly resemble the teeth of *Zeuglodon caucasicus* LYDEKKER<sup>2</sup>, a species rather imperfectly known, that was referred to a new genus *Microzeuglodon* by STROMER<sup>3</sup>. For this genus ABEL<sup>4</sup> created a new family *Microzeuglodontidae*. The Danish teeth are somewhat more pointed, and I think they must belong to a species different from *M. caucasicus*. Unfortunately, the anterior teeth of *Microzeuglodon* are unknown, and as these

<sup>1</sup> REMINGTON KELLOGG: Description of two *Squalodonts* recently discovered in the Calvert Cliffs, Maryland; and Notes on the shark-toothed Cetaceans. — Proceed. U. S. A. Nat. Mus. Vol. 62. Washington, 1923.

<sup>2</sup> R. LYDEKKER: On *Zeuglodon* and other Cetacean Remains from the Tertiary of the Caucasus. — Proceed. of the Zool. Soc. of London. 1892. P. 558, pl. 36, fig. 1.

<sup>3</sup> E. VON STROMER: *Zeuglodon*-Reste aus dem oberen Mitteleocän des Fajüm. — Beitr. zur Pal. und Geol. Österreich-Ungarns und des Orients. Bd. 15. 1903. P. 89.

<sup>4</sup> O. ABEL: Die Vorfahren der Bartenwale. — Denkschr. der k. Akad. der Wissensch., math.-naturw. Classe. Bd. 90. Wien, 1914. P. 220.



teeth of our species agree in all respects with those of the genus *Squalodon*, I refer our species to that genus.

Teeth similar to those from Skive occur also in the species which was described by PEDRONI<sup>1</sup> by the name of *Delphinoides Gratelupi*, but these teeth are smaller and perhaps a little more unsymmetrical and the number of cusps on their edges is smaller.

I have also compared our species with the remains of *Agorophius pygmaeus* MÜLL. sp. The tooth of that species, figured by TRUE<sup>2</sup>, highly resembles some of the teeth from Skive (especially the one in our Fig. 10), but it is almost perfectly straight and its edges show a smaller number of cusps; also the exoccipital seems to differ as to shape.

Of course, it is impossible to decide with any certainty, whether the present form may be referable to some species or other the teeth of which are unknown, but nevertheless, I think it convenient to name it provisionally, and I propose to call it *Squalodon (Microzeuglodon?) Wingei*; its distinctive characters being its small size together with the symmetrical shape and the numerous cusps of its teeth.

*Postscript.* In the autumn of 1926 remains (including two squamosals) of a *Squalodon* were sent in to the Museum from the brick-field at Branden. They seem to agree with the fragments previously sent.

<sup>1</sup> P. M. PEDRONI (jun.): Ossements fossiles de la Gironde. — Actes de la Soc. Linnéenne de Bordeaux. Tome 14. 1845. Pp. 105—107.

<sup>2</sup> FREDERICK W. TRUE: Remarks on the type of the fossil Cetacean *Agorophius pygmaeus* (MÜLLER). — Smithsonian Inst., Publ. No. 1694. Washington, 1907. Pl. 6, figs. 4—6.

Explanation of Plate.

*Squalodon* (*Microzeuglodon*?) *Wingei* nov. sp.

---

- Figs. 1—3. Incisors. Branden.  
— 4—5. Two of the foremost premolars? Skive.  
— 6—10. Premolars? Skive.  
— 11. Molar. Skive.  
— 12. Tympanic. Branden.

The figures are of the natural size.

All the specimens figured are preserved in the Mineralogical and Geological Museum of the University of Copenhagen.

---

---

