

# Strandings of killer whales *Orcinus orca* in the Netherlands between 1783 and 1995 with some remarks on skeletal and dental pathology (Mammalia, Cetacea, Odontoceti)

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This article presents an annotated list of all known strandings of killer whales *Orcinus orca* Linnaeus, 1758 on the Dutch coast between 1783 and 1995. 26 cases are recorded. Most of the cases are documented by skeletons and/or skulls kept in natural history museums. All material was examined by the author. Special attention was given to the amount of wear and infection of the teeth, fractures of the ribs, and vertebral anomalies. Pathological changes in the skeletons and teeth are also described.

*Strandingen van orca's Orcinus orca in Nederland tussen 1783 en 1995 met opmerkingen over pathologische afwijkingen aan het skelet en het gebit* - Dit artikel geeft een beredeneerde lijst van alle bekende strandingen van orca's op de Nederlandse kust. Het gaat om 26 gevallen, waarvan de meesten met (in natuurhistorische musea geconserveerd) skelet en/of schedel materiaal gedocumenteerd zijn. Al het materiaal werd door de auteur aan een nader onderzoek onderworpen. Met name werd naar de mate van slijtage en infecties van de tanden, al dan niet geheelde ribfracturen en afwijkingen aan de wervels gekeken. Pathologische veranderingen die bij dit onderzoek aan het skelet en de gebitten werden aangetroffen worden eveneens in dit artikel beschreven en commentariseerd.

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## INTRODUCTION

The killer whale *Orcinus orca* Linnaeus, 1758 is the largest member of the family Delphinidae. It is a cosmopolitan species, but most common in polar waters. In some areas they occur seasonally, but in others they are year-round residents. They are rather common in the Northeast Atlantic and northernmost part of the North Sea, north of western Norway, the Norwegian Sea and around Iceland. An average of nine sightings per year occur in the northernmost part of the North Sea since 1977 (Evans 1988). In the North Sea they occur as far south as the Farnes Islands, but are rare or absent south of that location.

Heyning & Dahlheim (1988) do not mention any occurrence in the southern North Sea. Sigurjonsen (1994) refers to 62 strandings of killer whales on the west-coast of Great Britain and Northern Ireland between 1913 and 1978. From the German North Sea coast are at least seven strandings known (1921, 1943, 1956, 1958, 1963, 1965, 1967, 1967), (Schultz 1967; Hammond & Lockyer 1988). At least 26 strandings of killer whales took place on the Dutch coast between 1783 and 1995. No killer whales are found on the Dutch coast after 1963.

This article gives a complete list of strandings of killer whales on the Dutch coast between 1783 and 1995; where appropriate remarks on dental and skeletal pathology are given.

## EXAMINED MATERIAL

### *Orcinus orca*

List of catalog numbers of specimens examined:

RMNH 31219; RMNH 31220; RMNH 169; RMNH 1487; RMNH 1982; RMNH 2300; RMNH 2559; RMNH 3222; RMNH 6974; RMNH 7514; RMNH 17711; RMNH 31221; ZMA 13.492; ZMA 13.491; ZMA 13.492; ZMA 4211; NMR 998900039; NMSZ 1956.36.57; NMSZ 1876.11; NMSZ 1990.84.2; NMSZ 1995.9; NMSZ 1956.36.56; ECOMARE B2.9; NMG no catalogue number.

Museum acronyms are as follows: RMNH = Nationaal Natuurhistorisch Museum (= National Museum of Natural History, formerly Rijksmuseum van Natuurlijke Historie), Leiden, the Netherlands; ZMA = Zoologisch Museum, Universiteit van Amsterdam, the Netherlands; NMR = Natuurmuseum Rotterdam (= Natural History Museum Rotterdam), the Netherlands; NMSZ = National Museum of Scotland, Edinburgh, Scotland; ECOMARE = Ecomare, De Koog, Texel, The Netherlands; NMG = Natuurmuseum Groningen, the Netherlands.

Figure 1 [case 1] Stuffed foetus of *Orcinus orca* from the female stranded 4-XII-1783 between Domburg and Oostkapelle [photogr. C. Henning, Archives Nationaal Natuurhistorisch Museum, Leiden]

## CHRONOLOGICAL LIST OF KNOWN STRANDINGS

### case 1: 4 December 1783

A pregnant killer whale washed ashore on the 4th of December 1783 between Domburg and Oostkapelle, province of Zeeland. The foetus measured 1.40 m long and weighted 56 kg. This foetus was prepared as a stuffed whole mount. It is nowadays, still in pretty good condition, in the museum of 'het Zeeuws genootschap' Middelburg (Fig. 1). A painting of the foetus, made by P. van Sorge and Jan & Adriaan de Buk is in the town-hall of Domburg (Fig. 2). Not a single part of the adult whale was collected. An water-colour of the adult animal is in the museum of 'het Zeeuws genootschap' Middelburg. In 1917, Van Deinse copied this painting twice for the National Museum of Natural History, Leiden and for himself (one copy found in RMNH collection, Leiden). Zappey (1992) gives a photograph of the painting of the foetus made by W.C. van Heurn in 1916 (see also Fig. 2). Van Deinse made also an additional copy in 1924 (I couldn't trace this copy in the archives in Leiden). The adult whale had 48 teeth in the four jaws.

Literature: Kesteloo 1913: 34-35; Van Oort 1918: 56; Van Deinse 1918: 23; 1924: 299; 1931: 241-242; Schultz 1967: 98; Zappey 1992: 98

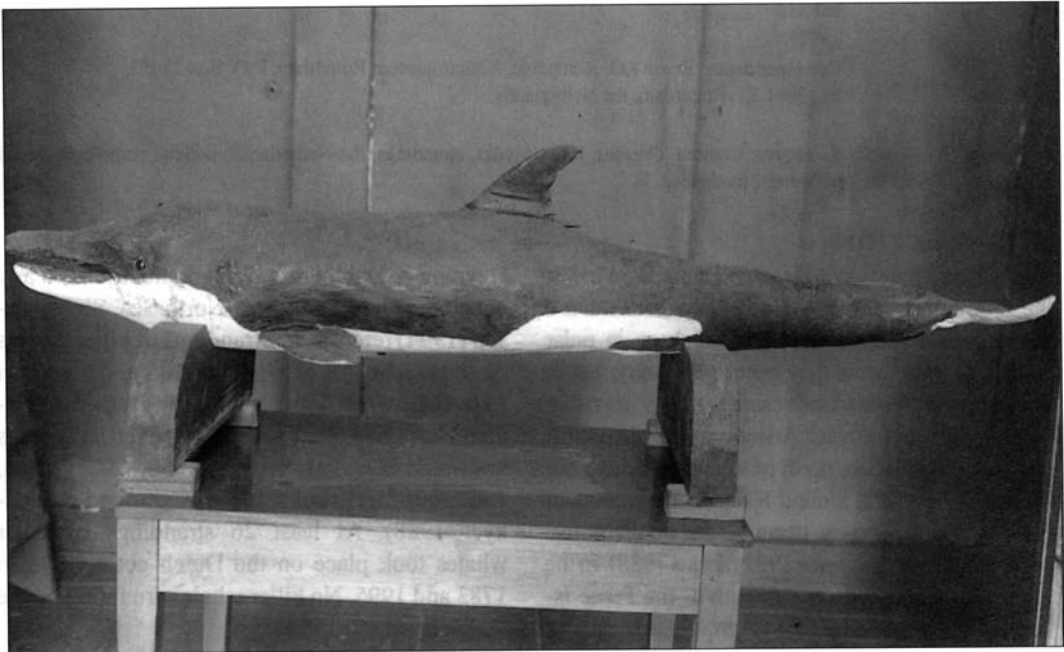




Figure 2 [case 1] Painting of foetus of *Orcinus orca*, same data as Fig. 1 [photogr. W.C. van Heurn, Archives Nationaal Natuurhistorisch Museum, Leiden]

**case 2: 1811**

In that year a killer whale of unknown sex got stranded on the ‘Engelse plaat’ nearby the Island of Ameland, province of Friesland. This stranding is known from Mulder (1836) who mentioned the sale of the skull and 12 vertebrae of this whale from the private collection of Dr. Quaestius, Leeuwarden. Schultz (1967) refers to a male sex (?) for this whale.

Literature: Mulder 1836: 469; Herklots 1866: 249; Van Beneden 1882: 21; Van Deinse 1931: 243; Schultz 1967: 98

**case 3: 15 April 1832**

On 15 April 1832 a living killer whale was seen in the Wadden Sea south of Hollum, Ameland, province of Friesland. The animal was killed and brought ashore. Mulder collected the skeleton and some other samples (Mulder 1836). What happened with the skeleton is unknown.

Literature: Mulder 1836: 470–471; Herklots 1866: 249; Van Beneden 1882: 21; Van Deinse 1931: 243; Schultz 1967: 98

**case 4: 30 November 1841**

A female killer whale stranded alive on 30 November 1841 by the Velser dunes nearby Wijk aan Zee, province of Zuid-Holland (Herklots 1866). According to Schlegel (1843) the killer whale was found ‘eine kleine Stunde unterhalb des Dorfes Wijk aan Zee’. The skeleton was collected and mounted. It is, lacking the bones of both pectoral fins, in the National Museum of Natural History, Leiden (RMNH 31219). The dead whale was 5.80 m long. A week after the stranding the cadaver was sold to the museum for DFL 140. The skeleton is mounted and in good condition. Only the epiphysis of the last 9 caudal vertebrae are fused with the vertebral bodies. The teeth are worn. In both upper jaws 12 teeth are found, in the lower jaws 11.

The skeleton shows no pathological changes except for one smoothly healed fracture of the 11th rib on the right side. In the archives of the National Museum of Natural History, Leiden are two paintings of the dead whale in fresh state made by Van Deinse after Schlegel. Schlegel illustrated this whale in his book about the mammals of the Netherlands (1870: plate XIV).

Literature: Schlegel 1843: 4; 1870: 88; Herklots 1866: 249; Jentink 1887: 175; Van Beneden 1882: 21; Van Oort 1918: 56; Van Deinse 1931: 243-244; Slijper 1931: 159, 173; Slijper 1936: 478; Schultz 1967: 98

#### case 5: 1887

In the National Museum of Natural History, Leiden is the skull of an adult (male?) killer whale, collected before 1887 (RMNH 31220). Jentink (1887) and Van Deinse (1931) both give as place of stranding Katwijk aan Zee, province of Zuid-Holland. The skull is severely damaged (fractured neuro-cranium). In the right upper jaw 11 teeth are found, in the left upper jaw 12. Both lower jaws contains 12 teeth. The teeth are slightly worn. This stranding fails from the list of Schultz (1967).

Literature: Jentink 1887: 175; Van Oort 1918: 56; Van Deinse 1931: 247

#### case 6: 1895

This stranding is represented by a citation of Van Deinse only after a personal communication with the finder. South of Wassenaarse Slag, province of Zuid-Holland a 5 m long dead killer whale was found. Sex unknown. The skull was buried by the finder, but a year later he was not able to trace it again.

Literature: Van Deinse 1946b: 160

#### case 7: 7 September 1909

A young male killer whale of 4.50 m was found on 7 September 1909 near Noordwijk aan Zee, province of Zuid-Holland (Fig. 3). The complete skeleton was collected and mounted in the National Museum of Natural History, Leiden (RMNH 169). The 6th, 7th and 8th ribs on the right side and the 8th, 9th and 11th ribs on the left side show healed fractures with callus and periostitis. The teeth are conical and not worn. The skeleton includes one pelvic bone. All epiphyses are separated from the vertebral bodies, indicating an immature animal. In both lower jaws 12 teeth are found. The rostrum is fractured.

Literature: Van Oort 1918: 56; Van Deinse 1931: 244; Slijper 1931: 159, 173; Slijper 1936: 202, 326, 327, 416, 417, 478, 202; Schultz 1967: 98



Figure 3 [case 7] *Orcinus orca*, 7-X-1909, Noordwijk aan Zee (RMNH 169) [photo Archives Nationaal Natuurhistorisch Museum, Leiden]

#### case 8: 1918

The Zoological Museum Amsterdam houses the skeleton of an immature (female?) killer whale (ZMA 13.492), found near Egmond aan Zee, province of Noord-Holland in 1918. Most of the epiphyses are not fused with the vertebral bodies. The right radius is severely deformed. All spongiosa is lost and large cloacae are seen (Fig. 4). This is the result of a chronic pyogenic osteomyelitis. The humerus and ulna are also affected by the infection. These pathological changes are very similar with those described by Van Beneden (1870) in a *Balaenoptera acutorostrata*.

Literature: Van Deinse 1931: 244; Schultz 1967: 98

#### case 9: November 1918

The decomposed remains of an killer whale of unknown sex were found on the beach nearby Zandvoort, province of Noord-Holland. A student, who found the cadaver, determined the whale on its teeth. Nothing further is known about this stranding.

Literature: Van Deinse 1931: 244; Schultz 1967: 98

#### case 10: August 1921

A 5 m long killer whale was found at the Vliehros on the Island of Vlieland, province of Friesland in August 1921. One photograph and one tooth are the only evidence of this stranding, both kept in the Zoological Museum of Amsterdam (ZMA 13.491). The finder, Mr. M. Hoedemaker, collected some teeth, the longest being 9 cm.

Literature: Van Deinse 1931: 245; Schultz 1967: 98

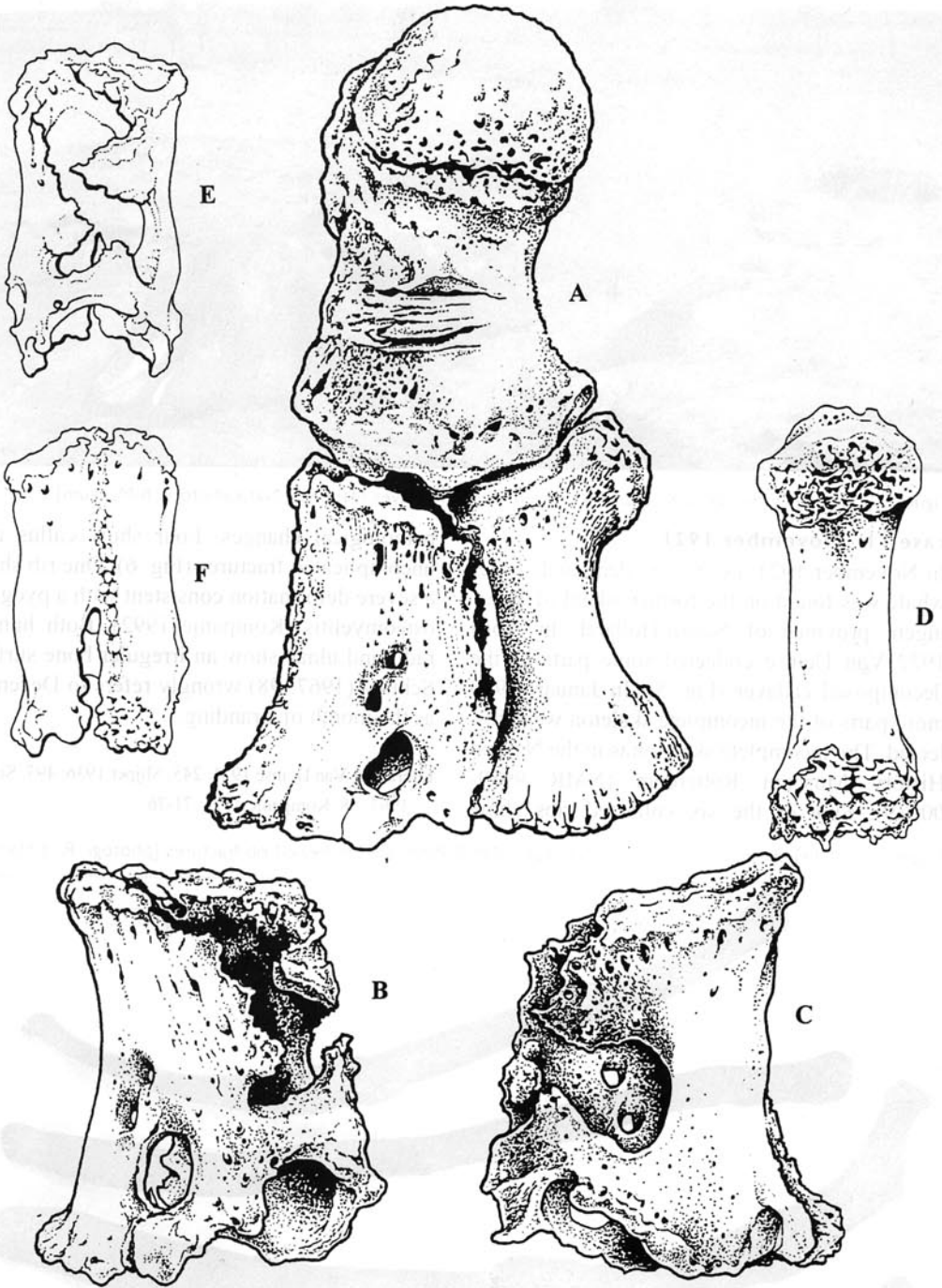


Figure 4 [case 8] *Orcinus orca* immature (female?) (ZMA 13.492), right humerus, radius and ulna [drawings L.A. Man in 't Veld]. **A** right humerus, radius and ulna (ventral side), radius showing severe deformations consistent with chronic pyogenic osteomyelitis. **B** right radius (ventral side) showing the destruction of the medial part of the bone; large cloacae and new bone formation are seen, the whole bone is hollow. **C** right radius (dorsal side) showing the destruction of the medio-dorsal side; few of the normal bone structure is left. **D** right ulna, medial view, showing destruction of the articulation-points with the radius; irregular new bone formation. **E** right radius, medial view, showing the large cloaca. **F** Right radius, lateral view, showing a distal slitform cloaca.



Figure 5 [case 11] *Orcinus orca*, XI-1921, Wieringen [photo Archives Nationaal Natuurhistorisch Museum]

#### case 11: November 1921

In November 1921 a 6 m long dead male killer whale was found on the former island of Wieringen, province of Noord-Holland. In April 1922 Van Deirse collected some parts of the decomposed cadaver (Fig. 5). In Januari 1930 more parts of the incomplete skeleton were collected. The incomplete skeleton is in the Natural History Museum Rotterdam (NMR 9989-00039). Five of the six collected ribs show

pathological changes. Four show callus after uncomplicated fractures (Fig. 6). One rib shows a severe deformation consistent with a pyogenic osteomyelitis (Kompanje 1992). Both humeri, radii and ulnae show an irregular bone surface. Schultz (1967: 98) wrongly refers to December as the month of stranding.

Literature: Van Deirse 1931: 245; Slijper 1936: 493; Schultz 1967: 98; Kompanje 1992: 71-76

Figure 6 [case 11] *Orcinus orca*, XI-1921, Wieringen (NMR 9989-00039); healed rib fractures [photogr. R. 't Hart]

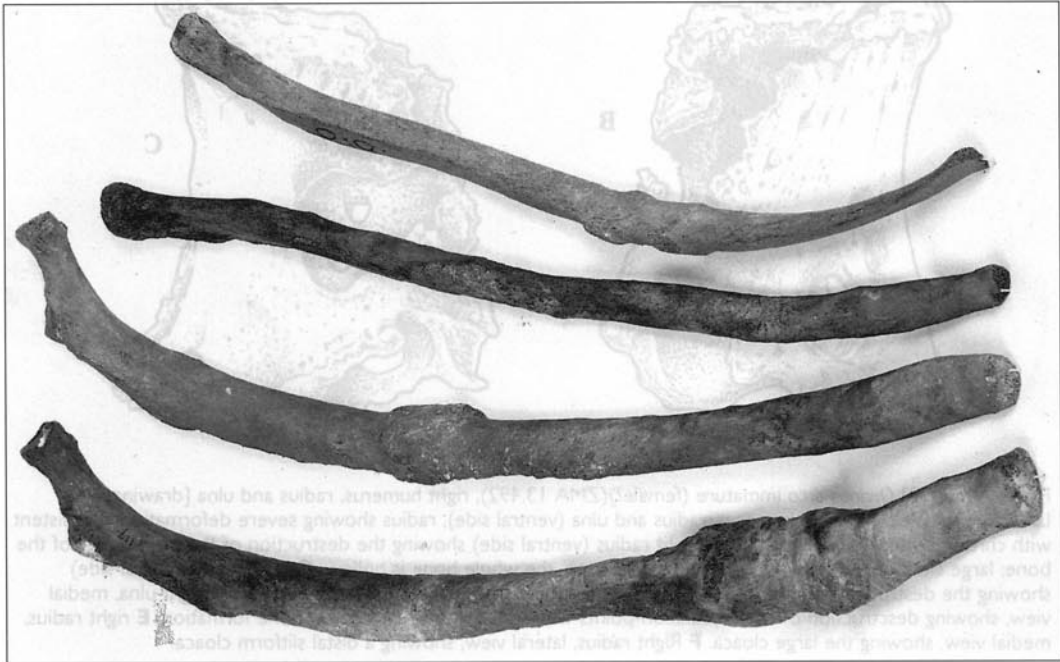




Figure 7 [case 12] *Orcinus orca*, IV-1926, North Sea (RMNH 1487) ; photograph taken Vlaardingen 7-V-1926, with notes by A.B. van Deirse [photo Archives Nationaal Natuurhistorisch Museum, Leiden]

**case 12: April 1926**

A dead male killer whale was found floating 15 miles from the light-ship 'Haaks' in the North Sea. It was brought to Vlaardingen, province of Zuid-Holland (Fig. 7) and sold to the National Museum of Natural History, Leiden. The skeleton is mounted in this museum (RMNH 1487). It shows no pathological changes. Schultz (1967: 98) refers, in addition to this whale, to another stranding of a killer whale in 1926 (number 11 in his list). I could not trace any other reliable reference to it.

Literature: Harmer 1927: 35; Van Deirse 1931: 246-247; Slijper 1931: 170, 173, 175; Schultz 1967: 98

**case 13: 20 July 1931**

The cadaver of an adult male killer whale was found west of beach-marker 10 on the North Sea coast of the island of Terschelling, province of Friesland. It was in good condition and probably only died a few days before it beached (Fig. 8). The length of the whale was 5.75 m and its weight was estimated to be 3000 kg. The dissection took place on the 22nd of July. The complete skeleton was collected for the National Museum of Natural His-

tory, Leiden (RMNH 1982). The stomach contents consisted of remains of two pregnant harbour porpoises *Phocoena phocoena*. The skeleton shows several pathological deformations. Van Dieren (1931) noticed during dissection that two large old wounds were seen on the right pectoral fin. The base of the fin was swollen and the fin was deformed. The effects of one of these wounds can be seen on the cleaned skeleton. In the right scapula a small abscess-cavity is seen. This is the result of a direct infection through an open wound, with secondary pyogenic osteomyelitis of the scapula. Both humeri, radii and ulnae show an irregular bone surface. The last lumbar vertebra and the 7th caudal vertebrae show also osteomyelitis (probably primary spondylo-discitis) without effect on the adjoining vertebrae. The 7th and 10th right ribs were fractured and partly healed. Between the fractured ends a grotesque pseudo-arthritis is seen. On the left side the 8th and 9th ribs show healed fractures with smooth formation of callus. The teeth were severely worn. There are 12 teeth in the left upper jaw, 11 in the right upper jaw and 12 in both of the lower jaws. Schultz (1967) refers to another stranding of a dead killer whale on 11

*Orcinus orca*, 07, 6 m. Leng.  
 Dood gevonden op 7. 5. 1926. Lijk  
 "Haaks", omc. Apr. 1926. Huis Fig.  
 vend te Vlaardingen 7. 5. 26. S. d. Vlaan.  
 Kokerij v. C. v. d. Burg & zn. v. Deirse.



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*Orcinus orca*, 07, 6 m. Lang.  
 Dood gevonden op 7. 5. 1926. Haar bij  
 "Haaks", enkele. Apr. 1926. Haar bij  
 send te Vlaardingen 7. 5. 26. S. d. Vlaan.  
 Kokerij v. C. v. d. Burg & zn. v. Deirse.





Figure 8 [case 13] *Orcinus orca*, 20-VII-1931, Terschelling (RMNH 1982) [photo Collection E.J.O. Kompanje]

march 1931 in addition to this whale (number 13 in his list). No reference or physical evidence was found of this stranding.

Literature: Van Dieren 1931; Slijper 1936: 105, 426, 478, 485, 492, 494; Van Deinse 1946b: 159-160; Schultz 1967: 98.

#### case 14: 5 January 1935

On the beach bordering the Jacobapolder near Wissekerke, province of Zeeland a young killer whale was found on the 5th of January 1935 (Fig. 9). Its length was 3.90 m. The complete mounted skeleton of this animal is stored in the National Museum of Natural History (RMNH 2300). According to

Gelderman (1935) this find concerns a female whale; Van Deinse (1946b) attributed the male sex to this specimen. Schultz (1967) also mentioned a male sex, following Van Deinse. The pelvic bones of this immature animal were not collected. The appearance of the small skull and the small dorsal fin appears to be more diagnostic for a female than a male animal. Neither the skeleton nor the skull and teeth show abnormalities. There are 12 teeth in both upper jaws and 11 in both lower jaws. The teeth show no sign of wear.

Literature: Gelderman 1935: 199; Slijper 1936: 9; Van Deinse 1946b: 160; Schultz 1967: 98



Figure 9 [case 14] *Orcinus orca*, 5-I-1935, Wissekerke (RMNH 2300) [photo Collection E.J.O. Kompanje]



Figure 10 [case 15] *Orcinus orca*, 21-X-1936, Noordwijk aan Zee (RMNH 2559); photograph taken 23-X-1936, second person from the left is dr. G.C.A. Junge (1905-1962), curator RMNH [photogr. J.P. Strijbosch, Collection E.J.O. Kompanje]

**case 15: 21/22 October 1936**

An adult female killer whale was washed ashore on the beach 7 km north of Noordwijk aan Zee, province of Zuid-Holland. The cadaver was partly decomposed. The length of this animal was 5.20 m. The whale was dissected on the 23rd of October 1936 (Fig. 10). The complete mounted skeleton is housed at the National Museum of Natural History, Leiden (RMNH 2559). On the ribs some old healed and some more recent fractures were found. The 7th left rib shows a healed fracture, on the 10th rib on the right side two healed fractures were found. On the 9th, 10th and 11th ribs on the left side more recent fractures with pseudo-arthrosis were found. On the 3th, 4th and 5th caudal vertebrae irregular new bone-formation was found at the left transversal processes. The teeth are worn. There are 13 teeth in the left upper jaw and 14 in the right upper jaw and 13 teeth in both lower jaws.

Literature: Van Deirse 1946b: 161

**case 16: 10 July 1937**

A 5 m long female killer whale was found on the North Sea beach on the island of Texel, province of Noord-Holland at beach-marker 16. The cadaver was decomposed and in bad condition. One tooth is nowadays at Ecomare, de Koog, Texel. The skull is in the collection of the Zoological Museum Amsterdam (ZMA 13.492),

the post-cranial remains were buried on the beach by beach-marker 17, and have not been recovere. (but see case 22).

Literature: Van Deirse 1946b: 161; Schultz 1967: 98

**case 17: 22 September 1937/14 October 1937**

On 14 October 1937 a male killer whale with a length of 6.50 m was found on the North Sea beach of the island of Ameland, province of Friesland. The skull and hyoid were collected for the collection of the National Museum of Natural History, Leiden (RMNH 3222). The skull shows an irregular bone-surface, which is typical for an old animal. There are 12 alveoles in both upper jaws and the left lower jaw. The right lower jawbone is severely fractured (after or during death), clearly seen on the photograph



Figure 11 [case 17] *Orcinus orca*, 14-X-1937, Ameland (RMNH 3222) [photogr. v.d. Peijl, Archives Nationaal Natuurhistorisch Museum, Leiden]

of the dead whale on the beach (Fig. 11). Only seven teeth are in the right lower jaw, all other teeth are missing. The first two teeth in this jaw are severely worn. This is most probably the same animal that was stranded on the 22rd of September on the 'Robbekop' near West-Terschelling, province of Friesland. By the coming tide the cadaver then disappeared. Schultz (1967) refers to the two strandings of this whale as two different cases (numbers 17 & 18 of his list).

Literature: Van Deinse 1946b: 162; Schultz 1967: 98.

#### case 18: 8 July 1943

A pregnant killer whale stranded alive on the North Sea beach of the island of Terschelling, province of Friesland by beach-marker 18. Length 5.35 m (Fig. 12). Length of the foetus of unknown sex 1.25 m. The whale was killed by German soldiers. The meat was eaten by soldiers and locals, which was very welcome in a time of war with shortage on fresh meat. Neither the skull nor the skeleton or the foetus were collected for a museum collection. This case is only known from correspondence between A.B. van Deinse and P.S. Zorgdrager and between A.B. van Deinse and E. van Dieren and by two drawings by Zorgdrager and Van Dieren (in archives National Museum of Natural History, Leiden).

Literature: Van Deinse 1944: 21; 1946b: 162

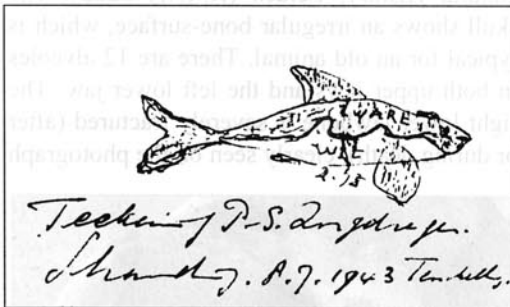


Figure 12 [case 18] *Orcinus orca*, 8-VII-1943, Terschelling [drawing P.S. Zorgdrager, Archives Nationaal Natuurhistorisch Museum, Leiden]

#### case 19: 20 July 1943

A killer whale of unknown sex and length stranded on the beach of the island of Terschelling, province of Friesland at beach-marker 19.

The cadaver was not dissected, and the skeleton has not been collected. This case is only known from personal communication (see case nr. 18), (archives National Museum of Natural History, Leiden). In August 1943 a dead killer-whale was found on the German wadden-island of Juist. The whales from 8 July, 20 July and August 1943 are probably from the same pod.

Literature: Van Deinse 1944: 21; 1946b: 162

#### case 20: 8 July 1945

A killer whale of unknown sex washed ashore on the beach north of Noordwijk aan Zee, province of Zuid-Holland. The length of the specimen was circa 6 m. The left mandible, a lumbar vertebra and one *Bulla tympanica* were collected for the National Museum of Natural History, Leiden (RMNH 6974). In the left lower jaw 12 alveoles are visible. According to Van Deinse (1946a) there were 12 teeth in all jaws. The vertebra appears to be from a fully grown adult animal. This stranding is missing from the list of Schultz (1967).

Literature: Van Deinse 1946a: 19

#### case 21: 28 December 1947

This animal was found on the North Sea beach (beach-marker 12) of the island of Schiermonnikoog, province of Groningen. It was an old male with a length of 5.78 m. The complete skeleton was collected by the National Museum of Natural History, Leiden (RMNH 7514). The humeri show an irregular bone surface, resembling the humeri of the killer whale of Wieringen (case 11) and Terschelling (case 13). I observed the same condition in skeletons of old killer whales from the Scottish coast in the National Museum of Scotland, Edinburgh, Scotland. This is most probably related with old age, and not a pathological condition like periostitis ossificans. On the vertebrae and scapulae nothing unusual is seen. The second rib on the right side shows some new bone-formation on its distal end. On the 7th left rib a healed fracture with regular callus is found. There are 13 teeth in all jaws. The teeth are very worn. This stranding is also missing from in the list of Schultz (1967).

Literature: Van Deinse 1948: 23

**case 22: 25 July 1953**

The incomplete skeleton of a killer whale was found on the beach between beach-marker 16 and 17, south of De Koog on the island of Texel, province of Noord-Holland. The skeleton measured circa 5 m. The skull was missing. All vertebrae with the exception of caudals 5 or 6 were present. Both radii and ulnae, both pelvic bones, all carpalia and metacarpalia and most of the phalanxes were missing. This incomplete skeleton was for some years stored at Ecomare, De Koog, Texel. Unfortunately, a few years ago it was thrown away. This case almost certainly concerns the post-cranial remains of case 16 that were buried in 1937. This explains the missing skull.

Literature: Van Deirse 1954:49; Schultz 1967:99; Hammond & Lockyer 1988: 39

**case 23: 1958?**

This case is an obscure one. In the summer of 1958 a stranded dead killer whale was reported from the island of Terschelling, province of Friesland. But because the technical staff of the National Museum of Natural History was not able to collect the whale, there is no physical proof of this case. All evidence is one letter to Van Deirse by the director of the National Museum of Natural History, Leiden, dated 12 January 1959 in the RMNH archives.

**case 24: 10 July 1959 / 15 August 1959**

On 10 July 1959 a dead killer whale of unknown sex (female?) stranded near Zoutkamp, Lauwerszee, province of Groningen. The cadaver was washed away with the tide and it finally stranded a second time on the 15 August 1959 on the Island of Schiermonnikoog, province of Groningen (Fig. 13). The length was almost 6 m. The cadaver was not dissected or collected. According to Van Deirse (1960) there were 42 teeth in the jaws. This case is documented by three photographs. In May 1961 a skull of *Orcinus* was dredged 4 miles north of Norderney, Germany. Van Deirse (1962: 36) mentioned that this could be the skull of this killer whale. The skull was at that time part of the private collection of Mr. C. Bosker, Delfzijl, and is nowadays in the collection of the Natuurmuseum Groningen, Groningen (NMG, no catalogue number), the Netherlands. We do not believe that this skull belongs to the same animal. The skull is well preserved, contains no fat and is dark brown. So the skull must be at least sub-fossil. In each of the upper jaws there are 13 alveoles. Schultz (1967) gave an incorrect year of stranding (10 July 1954) for the first stranding, and mentioned the second stranding of this whale as a different case. Hammond & Lockyer (1988) only mentioned the first date of stranding and Groningen as place of stranding.

Literature: Van Deirse 1960: 43; 1962: 36; Schultz 1967: 99; Hammond & Lockyer 1988: 39

Figure 13 [case 24] *Orcinus orca*, 15-VIII-1959, Schiermonnikoog (NMG no cat.nr.) [photo Archives Nationaal Natuurhistorisch Museum, Leiden]

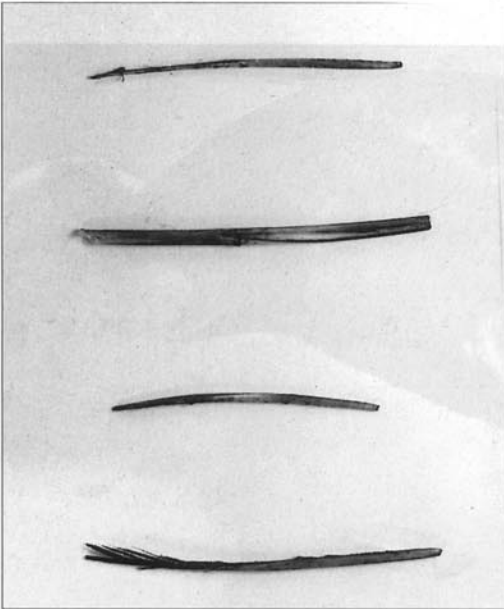




Figure 14 [case 25] *Orcinus orca*, 20-VII-1961, Goedereede (ZMA 4211) [photo Archives Zoological Museum, University of Amsterdam]

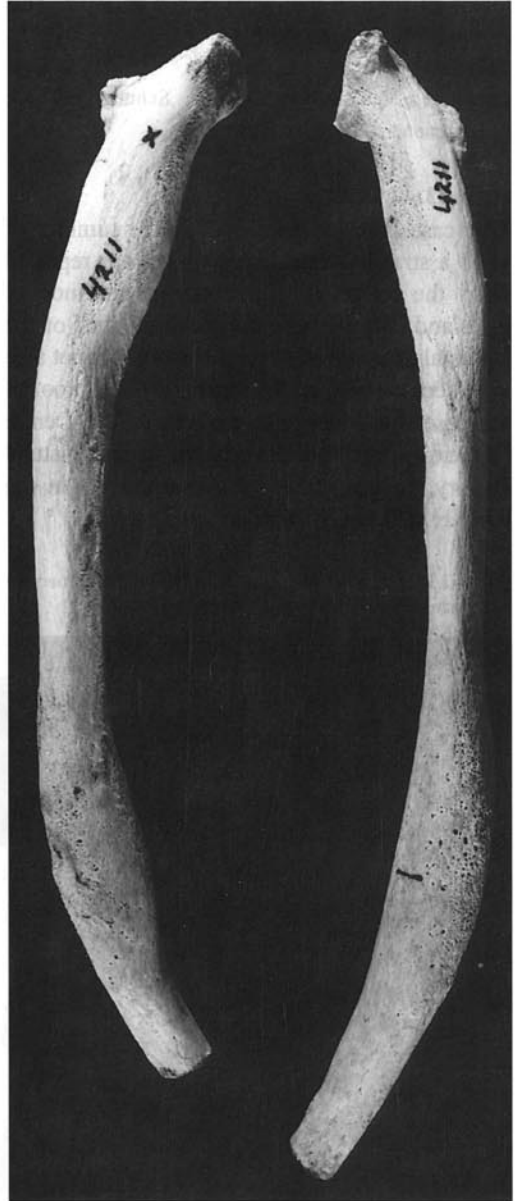
Figure 16 [case 25] *Orcinus orca*, same data as Fig. 14; pelvic bones [photo Archives Zoological Museum, University of Amsterdam]

Figure 15 [case 25] *Orcinus orca*, same data as Fig. 14; feathers taken from the airways [photo C. Beukelman, Archives Zoological Museum, University of Amsterdam]



#### case 25: 20 July 1961

A very interesting case is the female killer-whale that was found on the beach near Goedereede-Harbour (Goeree-Overflakkee), province of Zuid-Holland. The length of the animal was 5.50 m. On 21 July the whale was dissected by the staff of the Zoological Museum Amsterdam (Fig. 14). The mounted skeleton is housed in the Zoological Museum Amsterdam (ZMA 4211). This case is an interesting one because during the dissection hundreds of parts of birdfeathers were found in the airways (trachea, bronchii) of this whale (Van Bree 1974), (Fig. 15). It is known



that killer whales sometimes catch and eat seabirds (Bloch & Lockyer 1988). In this case the feathers probably were aspirated during vomiting. The skeleton is completely normal. Fig. 16 depicts the pelvic bones. Hammond & Lockyer (1988) gave Zuid-Holland as place of stranding.

Literature: Van Deirse 1962: 34-36; Schultz 1967: 99; Van Bree 1974: 46; Hammond & Lockyer 1988: 39

#### case 26: 10 October 1963

Between beach-markers 23 and 24 on the island of Texel, province of Noord-Holland, the cadaver of a male whale was found. It was in good condition (Fig. 17). Its length was 5.50 m. The mounted skeleton is in Ecomare, De Koog, Texel (ECOMARE B2.9). Spondylo-osteomyelitis is found between the 6th and 7th caudal vertebrae. Both upper jaws contain 13 teeth, the left lower jaw 14 and the right lower jaw 13 teeth. All teeth show some degree of abrasion.

Literature: Van Laar 1963; Van Deirse 1964: 62; Schultz 1967: 99; Hammond & Lockyer 1988: 39

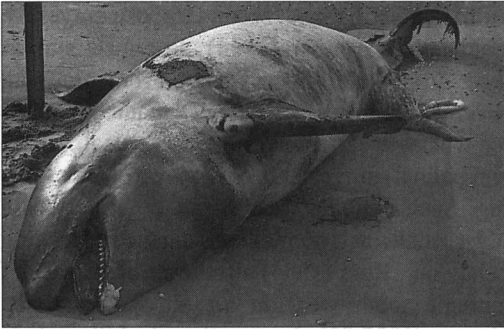


Figure 17 [case 26] *Orcinus orca*, 10-X-1963, Texel (ECOMARE B2.9) [photo J.P. Reydon, Archives Nationaal Natuurhistorisch Museum, Leiden]

#### case 27: 18 October 1963

The last known killer whale from the Dutch coast up till the present time (August 1995) was found on the beach of Noordwijk aan Zee, province of Zuid-Holland. It was a female animal of 5.00 m length. The complete skeleton was collected for the National Museum of Natural History, Leiden (RMNH 17711). The 2nd and 3rd right ribs show a strange deformation which is most likely an anatomical variation. In the distal ends slits are seen with

lateral openings. The rest of the skeleton appears to be normal. There are 13 teeth in both upper jaws and 12 in both lower jaws. The teeth are severely worn, some leading to severe pulpal infection. Hammond & Lockyer (1988) give as date of stranding 17 October 1963 and place of stranding Zuid-Holland. Schultz (1967) only refers to the month of stranding.

Literature: Van Deirse 1964: 62; Schultz 1967: 99; Hammond & Lockyer 1988: 39

#### OBSCURE CASES

Skulls of killer whales were kept in some old Dutch collections or naturalist-cabinets. This could be traced from old descriptions of those collections. The skulls are of killer whales that were probably found on the Dutch coast.

##### obscure case 1: The 'Edeling' skull

An obscure object in the collection of the National Museum of Natural History, Leiden was, till recently, the 'Edeling-skull' (RMNH 31221). Nothing more was known of this skull than that it was collected by Mr. Edeling. Jentink (1887) mentions the skull on page 175: 'crâne présenté par M. Edeling'. Van Oort (1918) and Van Deirse (1931) did not mention this skull in their lists. Gijzen (1938) gave the date on which Mr. Edeling donated the skull to the Leiden museum (17 June 1826). In the National Archive in The Hague two letters are found concerning this *Orcinus* skull. In the first letter, dated 17 June 1826, the secretary of the King donated the skull to the museum, after Lt. A.C. Edeling, Lieutenant First Class with the Royal Navy from Amsterdam, had donated the skull to the King. The other letter, dated 29 June 1826 is from the director of the Leiden museum who sends his gratitude to Mr. Edeling for donating the *Orcinus* skull.

The skull is of a relatively young whale, according to the size it is a male. There are 13 teeth in all jaws. The relatively rare first teeth in the upper jaws are still present. A slight wear of the first four teeth in the lower jaws is visible. The teeth in the upper jaws are normal.

Literature: Jentink 1887: 175; Gijzen 1938: 308; Broekema 1983: 73

**obscure case 2: Camper (1811)**

On page 24 of the catalogue published by Camper (1811) a reference is found to a skull of a killer whale: 'La crâne du dauphin orgue. Sa longueur est d'onze décimètres; la plus grande largeur de six décimètres. La machoire supérieure et garnie d'onze dents de chaque côte',

**obscure case 3: Camper (1820)**

This probably concerns a reference to the same skull as in Camper (1811); Camper 1820: 127

**obscure case 4: Duseau (1865)**

In the catalogue of the Vrolijk collection reference is given to two skulls of killer whales. On page 162 : 'nr. 457 Crâne de l'Epaulard; nr. 458 Crâne de l'Epaulard, partagé longitudinalement en deux parties égales'. The first skull used to be in the collection of the Zoological Museum Amsterdam (ZMA 13.501), but is now in Muséum Océanographique in La Rochelle, France. The second is a more obscure one, and has not been traced.

**obscure case 5: Van Beneden 1882, 1889/ Maitland 1898**

Maitland (1898: 27) mentioned a killer whale from April 1874 that stranded on the coast of Zeeland, a province in the southern parts of Holland: 'En avril 1874 un individu échoua sur la côte de la Zélande. Son squelette se trouve au Musée de Liège'. He cites Van Beneden (1882). In the Musée de Zoologie, Université de Liège, Belgium, there is one skull of *Orcinus* collected in 1892 by J.F.G. Umlauff, a naturalist from Hamburg, Germany. The skeleton from the kil-

ler whale from April 1874 is not there. It is also not known in the Institut Royal des Sciences Naturelles in Brussels, Belgium. Van Beneden mentioned this case again in 1889. De Smet (1974: 59) could not trace the skeleton and any further information.

Literature: Van Beneden 1882; 1889; Maitland 1898: 27; De Smet 1974: 59

**TOOTHWEAR**

It is striking that extreme toothwear is found in a large number of the stranded killer whales. In young killer whales the teeth are conical, slightly curved backwards and sharp-pointed. Friction of the teeth of the upper jaw against the teeth of the lower jaw causes wear. This kind of wear is evident on many teeth in the studied skulls. In many cases the teeth in the distal part of the jaws were flattened (Fig. 18). These worn teeth are found in six of the adult animals. Wear of the apex of the teeth is very common and occurs even in immature whales (e.g. the 'Edeling-skull'). In many cases the abrasion of the apex will open the pulp cavity of the teeth causing pulp infection and secondary osteomyelitis. Caldwell & Brown (1964) described similar wear in an old killer whale. From studying several specimens they deduced that teeth of killer whales wear as a result of (vertical, lateral and palinal) movements of the jaws during feeding. Such extreme wear might be expected in older whales as a normal consequence of feeding behaviour. Ross (1984) also described a case of extreme tooth wear in an old killer whale. Harmer (1927:83) also mentioned a killer whale

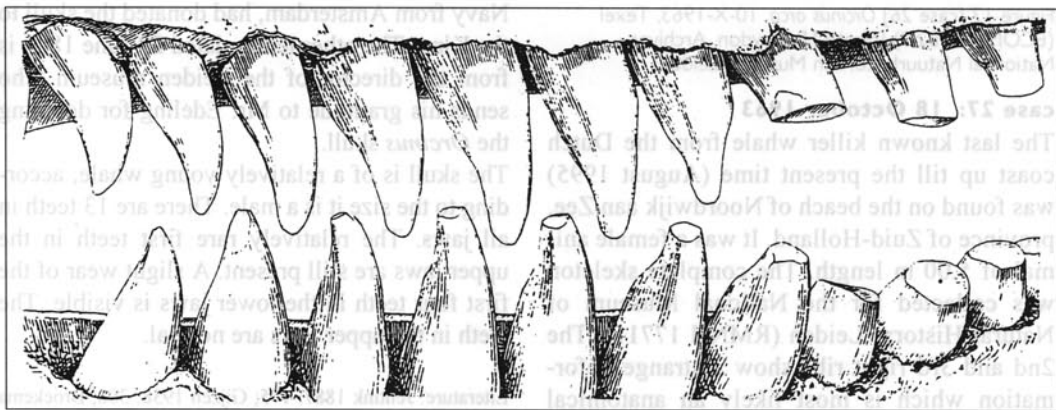


Figure 18 [case 12] *Orcinus orca*, IV-1926, North Sea (RMNH 1487); toothwear [Archives Nationaal Natuurhistorisch Museum, Leiden]

stranded at Lowestoft, Suffolk, Great Britain, with teeth that were worn down flat, almost to the gum. I found similar toothwear in four adult killer whales which had been stranded on the Scottish coast between 1871 and 1994: February 1871 (NMSZ 1956.36.57); 18 March 1876 (NMSZ 1876.11); 1907 (NMSZ 1990.84.2); 1994 (NMSZ 1995.9)) and in one skull from Newfoundland, 1877 (NMSZ 1956.36.56), (Herman 1992; Turner 1912).

### CONCLUDING REMARKS ON THE PATHOLOGY

Between 1783 and 1995, 26 killer whales were found on the Dutch coast (provided cases 16 and 22 concern the same specimen). Six of them were adult males, five adult females (2 pregnant), one immature male, four immature females and 11 of unknown sex. Bone infection (osteomyelitis) was found in several skeletons [radius (case 8); rib (case 11); scapula (case 13); caudal vertebrae (case 26)]. Rib fractures were found in six of the examined skeletons. No signs of spondylosis deformans could be traced on the vertebrae, despite the fact that this is a common condition in other Odontoceti (Kompanje 1995). Most obvious was the dental pathology, as described above.

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