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Inventory of whaling objects on the Admiralty Bay shores (King George Island, South Shetland Islands) in the years 1996–1998

ABSTRACT: Objects that have come within the inventory are the effect of whaling activity carried out in the region of South Shetland Islands in the first half of the twentieth century. They include mainly bones of hunted animals, rarely wooden or metal objects, part of which may be related to the whaling industry. In this paper the areas of particular accumulation of these objects have been determined, and the attempts to explain the reasons for such accumulations have been made. In addition, certain suggestions for further investigations into whaling activity in the South Shetland Islands region have been put forward. During the work 158 large fragments of whale skulls, among others, have been inventoried. The total number of individuals whose preserved relics have been explored within the surveyed sections of the Admiralty Bay shores has been estimated to be 210–230.

Key words: Antarctica, King George Island, Admiralty Bay, whaling, archaeology.

Introduction

Archaeology is a field of science dealing with material traces of human activity hidden under ground and providing evidence for reconstructing the activity in question. Apart from the excavation method, in archaeology also the surface survey method is employed, usually preceding the former one. It is the very method by means of which the inventory exploration of whaling objects within the Admiralty

Bay region on the King George Island was carried out in the summer season of 1996/97 with complementary works in the summer of 1997/98.

The present inventory of whaling objects accumulated on the Admiralty Bay shores on King George Island is probably the first archaeological exploration of whaling objects on such a wide scale.

However, certain explorations of this kind have been already carried out in different parts of the world, for example, also in polar regions, and on quite a broad scale on the Spitsbergen archipelago (Chochorowski 1991). Hacquebord (1982) conducted in Antarctic a detailed exploration of relics of the whaling station Hector on Deception Island, also situated in the South Shetland Islands.

Moreover, work in the field of the industrial archaeology was conducted within the area of whaling stations in Grytviken, Husvik Harbour and Stromness Harbour on South Georgia (Basberg *et al.* 1996). Port Jeanne d'Arc on the Kerguelen Island was the site of the survey by Le Mouël (1994). In addition, archaeological works were carried out in the area of the Norwegian whaling station established on the west-Australian shore in the first half of the twentieth century (Stanbury 1985). Furthermore, Olech (1996) studied flora (especially lichens) growing on whale bones accumulated on the Admiralty Bay shores.

The main catch of whalers hunting in the Antarctic waters in the first half of the twentieth century were humpbacks (*Megaptera novaeangliae*) and from about 1914 fin whales (*Balaenoptera physalus*) and blue whales (*Balaenoptera musculus*); to a lesser extent sei whales (*Balaenoptera borealis*) (Teresiński 1947, Tønnessen and Johnsen 1982, Kock 1995). Rakusa-Suszczewski (1998), according to the data obtained from the International Whaling Statistics (1931), reports a capture of 183, 791, 930 and 1743 whales in the South Shetland Islands region for the years 1906, 1907, 1908 and 1909, respectively.

Methods

The inventory of whaling objects consisted in penetrating the Admiralty Bay shores and examining objects and items of different kind, connected or presumably connected with whaling activity within the area in question.

Among the objects identified on the beaches, bones from almost every part of a whale's skeleton have been explored, besides a wide variety of wooden elements such as planks and balks of different sizes and state of preservation have been found. Besides, in fewer numbers, metal parts (mainly fragments of barrel hoops) were identified. Not infrequently did they occur on former marine terraces, nowadays not affected by waves. The fact that these items are found along with the bones of hunted whales proves that there is a relationship between those remains and whaling activity. Therefore, in order to assess a potential for preservation of remains on the surface accessible for examination, it seems important to make an at-

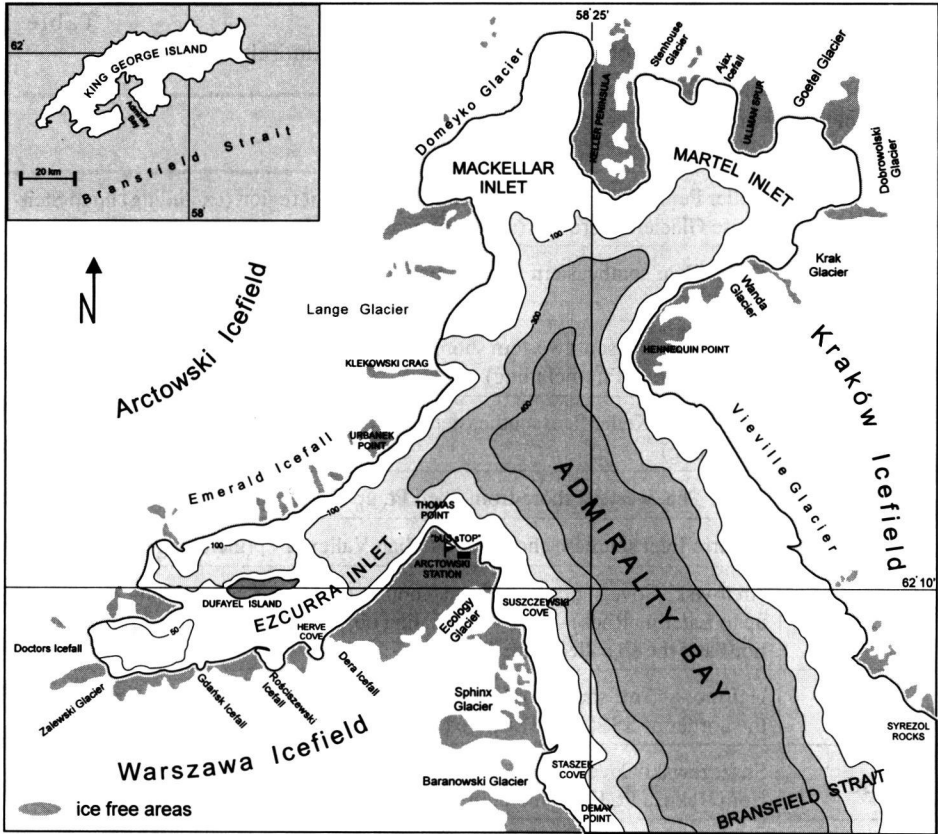


Fig. 1. Admiralty Bay.

tempt to define, at least roughly, the nature and morphology of this area, and in particular, to identify its abraded and built-up parts. Obviously, the inventory was reasonably limited to those parts of the coast that are free of glaciers.

In the summer season of 1996/97 and partly in 1997/98 a detailed penetration of a major part of the ice free Admiralty Bay shores (Fig. 1) was performed. The remaining area of the coast could only be observed from the sea. The coastline of Admiralty Bay is 83.4 km long, 46.6% of which is occupied by ice. The length of the sandy-stony shore accounts for 42.7 km (Rakusa-Suszczewski 1995). Surface surveys can be carried out only in the summer (December – March) although snow and ice impose difficulties even in this season. Remains of whales were visible from the sea on the Warkocz shore and between Herve Cove and Monsimet Cove. For the purpose of the research the coast of the bay was divided into smaller sectors, taking into account their natural division first by glaciers, then by land promontories and other specific topographical features (*e.g.* station buildings). For reference also smaller parts of the bay – inlets and coves – were used and the accumulation of the inventoried objects was determined. Each section of the coastline did

Table 1

Localisation of selected shore sectors of Admiralty Bay

Symbol of shore sector	Localisation
MI	Keller Peninsula eastern shore from British Point region (excluding) up to Stenhouse Glacier – here CO (skeleton reconstructed by group of J. Cousteau)
FS	Keller Pen. southeastern shore from British Pt. [BP*] (including) up to Plaza Point.
PH	fragment of the southwestern shore of the Keller Pen. from Plaza Pt. (including) up to Harpoon Pt. (including)
HS	fragment of Keller Pen. southeastern shore from Harpoon Pt. up to Speil Pt. [SP] (including)
MC	Keller Pen. western shore from Speil Pt. up to Domeyko Gl.
EV	Ezcurra Inlet southern shore up to Italian Valley [IV] (including)
AC	Arctowski Cove shore from Point Thomas (“Jedyńska”) up to Shag Pt. (exactly up to Latarnia Rock) – here AS (whaling objects collected on the <i>Arctowski</i> Station) and the so called “Bus Stop”
HC	Halfmoon Cove shore from Shag Pt. (including) up to Rakusa Pt. (exactly up to the border of SSSI No. 8) – here Latarnia Rock [LR]
SC	Suszczewski Cove shore (also fragment of the Halfmoon Cove southern shore) from Rakusa Pt. [RP] (including) up to Llano Pt.
LS	fragment of the Admiralty Bay western shore from Llano Pt. (including) up to Sphinx Hill region (exactly up to moraine south from Sphinx)
SA	fragment of the Admiralty Bay western shore from the moraine neighbouring Sphinx Hill up to Agat Pt. (including)
BD	Staszek Cove southern shore from Block Pt. (including) up to Demay Pt. northern slope
PC	Paradise Cove shore from Demay Pt.** southern slope up to Uchatka Pt. [UP] (including)
UB	fragment of the Bransfield Strait shore from Uchatka Pt. up to Blue Dyke cliff
HP	fragment of the Admiralty Bay eastern shore in the Hennequin Pt. region from moraine north of Ecuadorian Refuge up to Vieville Gl.
MP	MacKellar Inlet southern shore from Domeyko Gl. up to Znosko Gl. – here Peruvian <i>Machu Picchu</i> Station
PD	fragment of the Ezcurra Inlet western shore from Blue Icefall up to Doctors Icefall (below Pond Hill slopes)

* the shortest shore sectors were included in the description of adjacent sectors.

** lack of whaling objects on the inaccessible shores of Demay Pt.

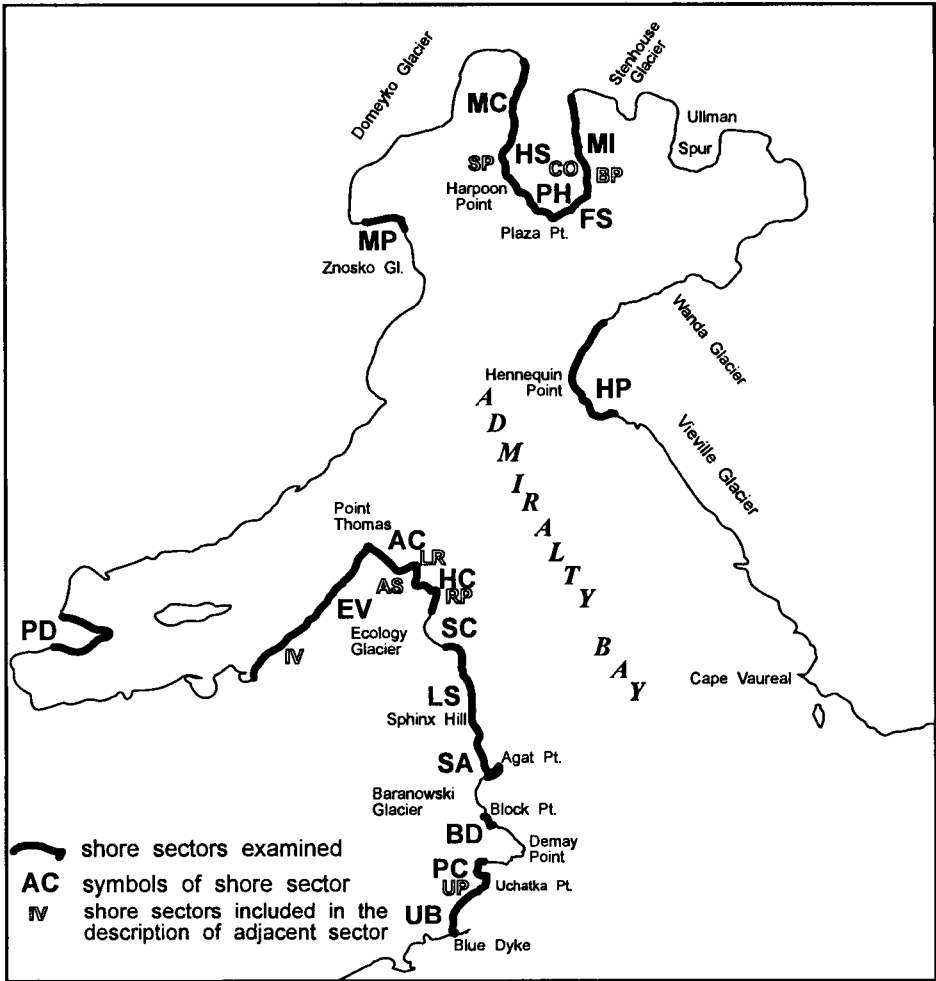


Fig. 2. Examined sectors of Admiralty Bay shores.

not exceed 3 km in length. All the shore sectors were described by double-letter symbols derived from typographical names (*i.e.* SC – Suszczewski Cove, HS – from Harpoon Point to Speil Point, *etc.*) (Fig. 2, Tab. 1).

However, certain sections of the coast such as Martel Inlet (in particular Ullman Spur and Stenhouse Bluff) or Emerald Point and Cape Vauréal, quite large and important from the whaling activity viewpoint, could not be explored.

During the penetration of respective sectors of the coast, particular attention was paid to the occurrence of whale bones estimating and describing their number (*i.e.* “quite numerous bones”, “scarce bones”) as well as, in certain cases, distinguishing sites of their major accumulation.

An attempt to determine which fragments of bones within respective shore sectors were found in their original position is a key part of the research. Besides,

other parts of skeleton to which those fragments of bones would belong were identified. Their distribution, according to types and number, was also determined and described. Basically, during the coast penetration, only the presence of such fragments was recorded, and their state of preservation evaluated. In several cases the discovered fragments were difficult, even impossible to identify. It is likely, that certain bones might have been counted more than once when they appeared in several fragments, which mainly refers to bones large in size such as intermaxillary and jawbones.

Special attention was devoted to skulls or their fragments as particularly large objects, that were difficult to be moved from their original site of deposition. Not only their original position, but also the degree of accumulation of these fragments of bones have significant meaning in the attempt to estimate the number of whales hunted and flensed in the Admiralty Bay. Therefore, the skulls explored within the region in question were numbered and marked with special symbols. Such symbols and numbers were given only to skulls and their fragments with occipital condyles. Moreover, for the purpose of the research only those skulls were considered whose state of preservation was satisfactory enough, in which there was a possibility to define orientation and to determine at least one dimension. The data obtained in measurements could be useful in defining species on the basis of the explored fragments of bones. The symbols, derived from the geographical names of the shore, were attributed to the skulls along with a consecutive number (*e.g.*: RP-1 – Rakusa Pt., skull No. 1). The orientation of skulls was determined by describing the position of a front-rear line of the skull in relation to four cardinal points and twelve intermediate points of the compass. This allowed the author to document the change of the position of skull during the investigation period. Further description referred to: the state of preservation, position to the coast; it also included remarks on whether the objects were buried or not under rock material layers, colonised by plants or lichens, whether there are traces of mechanic traumas, or whether other bones or relics connected with whaling activity were deposited in the surrounding area. All the numbered skulls have been marked on a map. The skulls, numbered and described with symbols, were photographed. Some of them were marked with special symbols for future reference, in case of changes in their position.

In some cases a liaison may be found between small fragments and whale skulls with symbols, as they were explored within a very short distance from each other. When a bone fragment of a particular part of a whale skull was spotted in its anatomical arrangement close to the very skull and there was no doubt as for their prior connection, then such a fragment was included into the skull description and was not separately considered.

The fact that wooden or/and metal elements have also been found among the bones, may imply that at least some of them were connected with whaling activity.

The terminology of shores was used according to Marks (1992, Fig. 18.22) and Birkenmajer (1997).

The names of bones was used according to illustrations presented in Doflein (1914, Abb. 173) and Boas (1920, Figs. 664, 666).

Results

Bone relicts

As it has been stated above bone relics from different parts of a whale skeleton are the most common traces of whaling activity in the Admiralty Bay region.

Skulls (*i.e.* their fragments preserved until present) are the objects of the most significant value in estimating the number of hunted whales in the region in question, not only for the size (especially those preserved in whole), but also due to their direct relation to the number of animal killed. Eventually, in summer seasons of 1996/1997 and 1997/98 symbols and numbers were attributed to 158 pieces of whale skulls (Tab. 2). The skulls: HP-4 (Pl. I, Phot. 1) and AC-22 were in the most complete state of preservation, the latter one because it was buried to a great extent under marine sediments. Only in these two cases maxilla bones were preserved in an anatomical position (in AC-22 probably also both mandibles). These two skulls must have been deposited quite early out of the reach of waves. Furthermore, the above mentioned and primarily estimated number of skulls may be increased up to 175 because another 17 small fragments of well preserved occipital condyle were found (all skulls marked with symbols have occipital condyles – see Methods). Besides, considering other fragments of bones explored at site the assumption can be made that they could be attributed to another 8 animals. However, their state of preservation was poor, in some cases they were almost completely buried in sediment and more detailed examination was impossible (Tab. 2).

The distribution of whale skulls discovered by the present author in the Admiralty Bay region is not uniform (Tab. 2, Fig. 3). There are sectors of the shore where fragments of bones or other whaling objects were not found. There are also such sectors where the accumulation of the skulls is particularly intensive as they lie in a distance of several meters from each other or even close together. It refers to the southern part of the MI as well as within FS and AC sectors. Moreover, there are large sectors of the shore where along with numerous fragments of bones from other parts of a whale skeleton only single remains of skulls can be found (mainly within the LS sector). The majority of skulls are deposited in the storm ridge area, sometimes below. The MI sector in which all numbered skulls (29 pieces) are deposited on the shore below the wave-abrasion cutting seems quite interesting.

Over a half (89 pieces) of the skulls discovered, inventoried and marked with symbols lies on the Keller Peninsula, mainly in its southeastern part with particular accumulation in the *Ferraz* Station surroundings. Similarly, a considerably great number of skulls can be found in *Arctowski* Station vicinity, mainly within the Thomas Point area (called “Jedyńska”).

Table 2
Number of bones of whale skulls preserved within the inventoried shore sectors of Admiralty Bay and estimated number of skulls originally deposited.

Shore sector	Skulls marked with symbol	Occipital condyles	Large fragments of skulls	Temporal bones	Maxilla bones	Inter-maxillary bones	Mandibles	Estimated original number of skulls
MI	29 + CO-1	2	0	20	3	1	0	35–40
FS	35 + BP-2	0	0	12	7	7	2	40–45
PH	8	0	0	2	2	0	1	10
HS	8 + SP-1	0	0	0	3	0	0	10
MC	5	2	0	4	1	1	4	8–10
EV	2	0	0	4	0	0	0	2
AC	27 + AS-3	3	5	11	10	10	24	40–45
HC	4 + LR-1	1	0	4	2	4	6	10
SC	3 + RP-1	2	0	4	1	1	1	10
LS	0	0	0	0	2	4	0	5
SA	2	0	0	0	5	2	0	5
BD	3	2	1	0	3	3	1	5–6
PC	4	0	0	0	3	0	1	4
UB	10	0	1	3	5	1	2	11
HP	9	4	1	4	7	4	7	13–14
MP	0	1	0	0	0	2	0	1
PD	0	0	0	1	0	0	0	1
Total	158	17	8	69	54	40	49	210–229

Generally, 118 (75%) (except CO and AS translocated recently by humans from their original site of deposition) of the skulls lie on their dorsal side; 100 pieces (63%) rest with their rear end turned towards the coastline. Actually 58% (89 pieces) of skulls bearing symbols lies on the dorsal side with their rear ends turned towards the coastline. Such orientation seems to be the most typical. The present author assumes that these skulls rest in their original position that probably has not been essentially changed for years.

The skull fragments most frequently found on the Admiralty Bay beaches were: temporal bones (often right-side), numerous maxilla bones (sometimes found in pairs – FS, SA, HP sectors), intermaxilla bones and mandible bones, frequently only partially preserved. Sometimes their decomposition was so deep that they could not be identified. Numerous fragments of skulls were spread comparatively uniformly over ice-free sectors of the shore. However, also in this case their

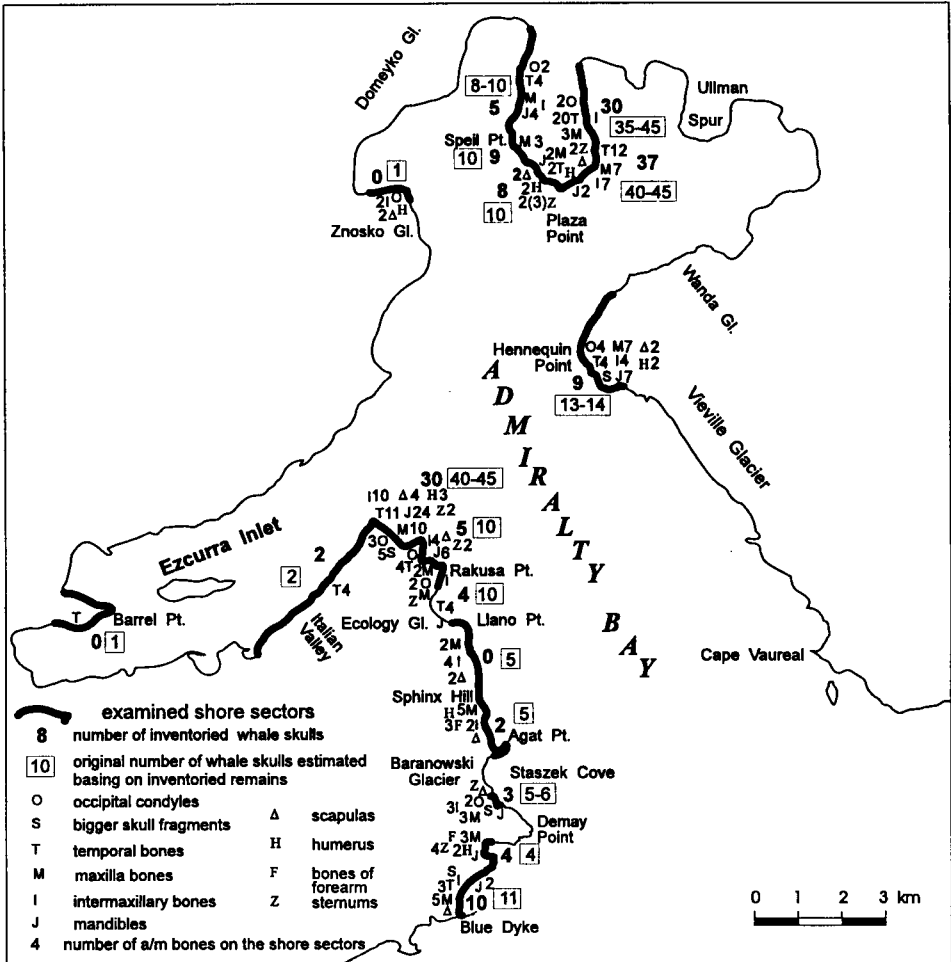


Fig. 3. Inventoried whale bones on Admiralty Bay shores.

accumulation was observed in the surroundings of *Arctowski* Station, in particular (AC and HC). Moreover, a lot of fragments of skull bones can be found in the southeast area of the Keller Peninsula (around the *Ferraz* Station).

Somewhat more randomly spread skull bones, when compared to the aforementioned sectors, could be found on the Hennequin Point. A quite interesting situation was observed within the MI sector where the predominance of temporal bones over other fragments of whale skulls is clearly visible (20 – temporal bones, 2 – maxilla bones, 1 – intermaxillary bone). Such phenomenon can be the effect of an evidently abraded character of the coast where only heavy and streamline shaped temporal bones were able to resist the force of waves. There are certain sectors of the shore, such as LS or SA, where it is possible to speak on the original deposition of skulls on the surface basing only on the discovery of their small frag-

ments in the above-mentioned sectors (nowadays washed away by waves or buried in sediment).

Worth mentioning is here a pair of temporal bones almost completely buried under sediments in the northern part of the SA sector (in the Sphinx Hill region), because the right-side bone bore traces of skin in a deeply degraded condition.

Altogether the present inventory allows to estimate the number of 210–230 whale skulls fragments preserved until present on penetrated areas of the Admiralty Bay shores (Tab. 2).

In the Admiralty Bay numerous postcranial skeleton bones, mainly vertebrae and ribs, were found. These smaller bones are more easily translocated because a man is able to carry them, which could be the case especially in the surroundings of research stations. Undoubtedly bones are also translocated, crushed and spread by sea waves.

The largest accumulation of whale bones on the surface, mainly vertebrae, ribs and small fragments of bones, occur on the following shore sectors: Hennequin Pt. – on the very point and slightly farther to the south (HP sector), on the Keller Peninsula – mostly in its southern and western parts (FS, PH, HS, southern part of MC); in *Arctowski* Station surroundings area (between the Station, “Jedynka” and HC), and, to a lesser extent, to the south of Llano Point (northern part of LS), to the south from Sphinx Hill (northern part of SA), to the north from Demay Point (BD), on the Blue Dyke (southern part of UB).

Along with vertebrae and ribs also bones of limbs were found on the Admiralty Bay shores namely: scapulas, humerus and forearm bones; usually only their large fragments can be found. There were also bones that may be identified as parts of sternums. These elements of postcranial whale skeletons were not numerous. They occurred within those sectors where intensive accumulation of bones in general was discovered. Presumably it is due to their shape that they are easily washed away by waves (Tab. 3).

A groups of a couple of vertebrae lying on the ventral side in an anatomic sequence found in the Admiralty Bay region have a definitely significant meaning for the survey. Such groups of vertebrae were found in certain sectors, and they consisted of the following number of vertebrae: LS – 5 and 6; BD – 5, 4 and 2; UB – 2; HS – 8 (Pl. I, Phot. 2), 3 and 3; HC – 9 vertebrae. In all these cases their configuration could be easily seen as the vertebrae were partly covered with rock material. In several other cases it is likely that some vertebrae (7 on PC) could have appeared earlier in an anatomic arrangement, then their original position was changed. The remnants of whale skeleton documented in 1978 by W. Kittel (Pl. II, Phot. 3) included more than 17 vertabrae in anatomic sequence. A group of vertebrae discovered within the HC sector was found inland, far from the coastline, in a moss bog area deeply grown into it; there were also other individual bones of backbone in the surrounding area. The fact, that the vertebrae in question were discov-

Table 3
Number of inventoried limb bones (or their fragments), and probably sternums of whales
on the examined Admiralty Bay shore sectors.

Bone	Scapulas	Humerus	Bones of forearms	Sternums (?)
Shore sector				
FS	1	1		2
PH	2	2		2 (3?)
AC	2* (+ 1 close to AS)	3		2
HC	1			2
SC				1
LS	2**			
SA	1	1	3***	
BD	1			1
PC		2	1 (?)	4
UB	1			
HP	2	2		
MP	2	1		
Total	16	12	3 (4?)	14 (15?)

* one of them transferred close to Geophysics buildings (*Arctowski St.*).

** one of them transferred close to *Peter Lenie Station* ("*Copacabana*").

*** one of them jointed with mentioned humerus.

ered in an anatomical sequence proves that originally they must have been deposited in the same state on the shore, at least the very segments of back bone.

A whale skeleton resting on the moss bog surface in the MI sector, composed of 43 vertebrae (atlas among others), 24 ribs and a skull with mandibles in anatomic position has a different character. This is a not entirely complete whale skeleton reconstructed by a group of J. Cousteau in December 1972. Presumably bones from the nearest vicinity were used for the reconstruction and so their number in other sites was quite limited.

During the present inventory works several groups of whale bones were distinguished. Two of them – situated at the moss bog on the Halfmoon Cove shore were particularly evident: group A composed of 12 vertebrae, approximately 20 ribs and left mandible fragments, a left temporal bone and an intermaxillary bone, and group B composed of a skull (HC-3) occipital condyle section, an intermaxillary bone fragment and left mandible bone. On the Paradise Cove shore, above the storm ridge, there is another group of bones comprised of vertebrae, two humera, sternum, forearm (?) bone, and a maxilla bone fragment. This group is situated near two wooden balks. It should be noted that within every sector of the coast where whale bones appeared in large numbers, there were sites of their accumula-

tion. Especially intensive accumulation of bones was observed in the middle part of the HP sector (Hennequin Point). This accumulation can be recognised as a "natural" one, *i.e.* not displaced by humans. A different character have the groups of bones discovered within *Arctowski* Station (a group on the Thomas Point and a group consisting of fewer fragments around the station buildings – at the so called "Bus Stop") and *Ferraz* Station surrounding area. These accumulations are the effect of these stations activities; the bones were probably translocated in order to allow for heavy equipment operations.

Whale bones were discovered within all distinguished sectors of the coast (Fig. 3). Generally, the most numerous bones were found on the Keller Peninsula, in particular in its southern part, on the western shores of the main basin of Admiralty Bay (*i.e.* between Thomas Point and Blue Dyke, however, except for the Demay Point and the shores occupied by glaciers: Ecology and Baranowski Glaciers) and also on Hennequin Point (Pl. II, Phot 4).

The number of bones resting on the surface of the western coast of the Admiralty Bay varies. The largest number of bones were found in the AC sector, they are also numerous in the HC sector and around Llano Point, to the south of Sphinx Hill (beneath the Sphinx Glacier), between the Block Point and Demay Point, also on the Blue Dyke. The least number of bones were discovered in the EV and PD sectors. They neither appear within the northern parts of the MI and MC sectors nor in the sectors situated in the immediate neighbourhood of the glaciers – these areas were probably occupied by these glaciers not long ago. The lack of bones on the Demay Point is due to a steep, cliff coast devoid of beaches.

In general whale bones mainly appeared around the storm ridge; frequently above and on the storm ridge itself, *i.e.* within the region that temporarily is no longer affected by waves. In close surrounding of the storm ridge they were discovered in the following sectors: AC (lack of ancient storm ridge), SA (especially on the Agat Point), BD (lack of ancient storm ridge). Often they lie in ditches or debasements between the existing storm ridge and the ancient (II) storm ridge, on marine terrace. The ditches between the recent and the second storm ridges are periodically filled with water (mainly melt water) or are colonised by moss bog. Bones were also found, although in fewer numbers, as far as the third storm ridge (if one exists) – especially within the following sectors: FS (levelled coast around *Ferraz* Station), PH, HS, MC, HC, the northern part of SC, LS (coastal terrace ledges are evidently outlined), PC (coastal terrace ledges evidently outlined, especially on the UP), UB, HP (coastal terrace ledges and storm ridge ranges are evidently outlined), MP (here coastal terrace ledges are evidently outlined).

Fragments of bones lying on the coast, as well as other whaling objects, are to lesser or greater extent buried under rock material layers of different type and genesis, such as marine sediments (mainly pebbles), as it happens in the AC, HC sectors where the bones are buried in a storm ridge. Frequently the relics are covered with sediments (sand and gravel) of creeks, usually periodical (proglacial and

pronival) flowing into the bay – mainly in LS, SA, and UB sectors. Moreover, they may be covered with rocky pieces from weathering and degradation of rocks from the immediate vicinity. (e.g. – PH). Therefore, one should bear in mind that many bones, including large fragments of skulls, cannot be currently found on the surface.

Another issue are moss and lichens growing on large fragments of bones, nowadays deposited in sites not accessible to waves. The fact that they grow on a bone fragment should be considered as a proof that such a fragment has been resting there for quite a long period of time

Besides bones and possible skin pieces also whalebone plates may be found on the Admiralty Bay shores. They were inventoried within LS, SA (intensive accumulation) and BD sectors. It is also worth mentioning that several intermaxillary bones bearing cuts were discovered. These cuts may be the result of whale flensing. Numerous bones resting in the *Arctowski* (especially on the Thomas Point) as well as *Ferraz* Stations surroundings, show apparent traces of mechanical traumas, which are the evidence of the use of heavy equipment

Approximately 150 meters from the moss bog borderline (*Jasnorzewski* Gardens) near *Arctowski* Station, just behind its aerial field, there are fragments – probably of a jaw and intermaxillary bones – resting within a certain distance from each other. Their state of preservation is far worse when compared to the bones lying on the shore and discussed so far. These fragments in question appeared probably some time earlier (may be even five hundred years ago). It would be worth determining their age by means of the ^{14}C method.

Wooden and metal objects

Along with bones, also wooden and metal objects deposited on the Admiralty Bay shores (Fig. 4) are the evidence of the whaling activity in the region in question. The fact that they are found along with skeleton remains may indicate their common origin, although both the former and the latter might have appeared in certain sectors of the shore due to the secondary drifting activity of the sea.

Wooden objects are often found on the Admiralty Bay shores in large numbers, while metal elements appear less frequently. Definitely not all of them were used by whalers. Wooden elements found among bones and deposited in the same areas of the shore are mainly fragments of balks, rarely entire balks, wooden rods, planks, barrel staves of different sizes, shapes and state of preservation, even pieces of cork. Particularly numerous wooden elements can be found between the Llano Point and Agat Point (their rich accumulation was spotted among rock outcrops in the central part of the LS sector), on the Hennequin Point shore, in the BD sector, and also in the northern part of the UB sector. Wooden elements had often rounded edges, indicating that they have been carried by seawater and then, already on the shore, exposed to wave action (objects of drifting origin). No wooden elements were inventoried in the HS, MC, EV, HC and MP sectors, whereas they

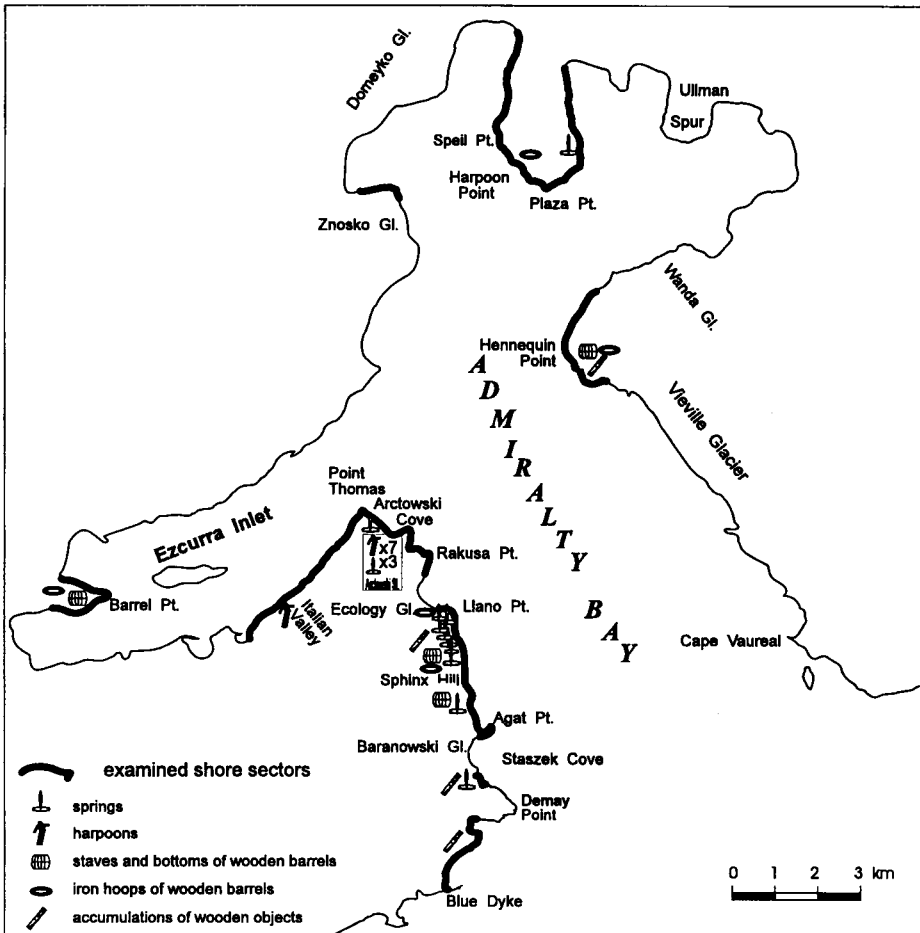


Fig. 4. Inventoried wooden and metal whaling objects on Admiralty Bay shores.

appeared in small numbers in the FS, PH and AC sectors of the shore. It is difficult to draw decisive conclusions about their original function. This issue requires further examination and more comprehensive analysis of the preserved relics.

Undoubtedly so-called “spring” is one of the whaling devices. It is a piece of round-shape wooden balk narrowed towards its ends, provided with steel wire nooses, serving to strip fat tissue from a whale body. Within penetrated sectors of the coast fourteen “springs” were discovered and documented – 4 of them were found at *Arctowski* Station: three along with AS skulls, one near the so called “Bus Stop”. The largest number of these devices were found in the LS sector. The documented “springs” were 73 to 82 centimetres long. Their diameters varied from 16 to 20 centimetres. Some of them were provided with steel wire nooses 100 – 120 cm long, fixed in the middle. Presumably, all the “springs” were originally provided with such nooses (Tab. 4).

Table 4
Basic dimensions of springs inventoried on the examined Admiralty Bay shore sectors [cm].

Shore sector	Length	Maximal diameter	Diameter on the ends
FS	80	20	12
AC	80	19	11
AS	81	20	12
AS	73	18	11
AS	82	20	12
LS	74	17	13
LS	70	17	11
LS	74	17	11
LS	74	17	14
LS	73	17	13
LS	fragment		
LS	80	17	11
SA	77	16	11
BD	80	17	14

A typical specimen of such "spring" is in collection of the Department of Antarctic Biology Polish Academy of Sciences in Warsaw.

Possibly at least a part of the staves and barrel bottoms discovered in the Admiralty Bay area may be connected with whaling activity. Stave fragments and pieces of barrel bottoms were spotted in the following sectors: LS, SA, HP and PD. Fragments of staves found on the Hennequin Point were better preserved (Pl. III, Phot. 5); their length varied from 83 to 85 cm and width from 8 to 10 cm. Also a barrel bottom discovered on the Hennequin Point was better preserved. Its original diameter, after reconstruction, was estimated to be 43 cm and thickness 1.5 cm. Stave barrels were probably bound with iron hoops, several pieces of which were spotted upon the penetration of the PH, SC (2 fragments in the southern part of the sector), LS (3 or 4 fragments), HP (2 fragments), PD (several fragments).

Of particular interest was a group of three or four hoops piled on top of each other, among rock outcrops in the central part of the LS sector; additionally, a piece of a barrel bottom resting nearby should be mentioned here. Hence, those fragments may be the remains of a stave barrel standing there in the past for a longer period of time. Barrel hoops found have curved trapezoidal cross-section; and their original diameter was estimated to be 70–80 cm, width 4–4.5 cm, and their thickness 0.5–0.7 cm.

An interesting large accumulation of the aforementioned fragments of staves, barrel bottoms and hoops of presumably a dozen or so barrels was observed on the Pond Hill, precisely on the Barrel (!) Point terrace (Pl. III, Phot. 6). In their close surrounding, only one whale rib was found, possibly of drifting origin. The relics

deposited at the Barrel Point are worth further detailed examination and description.

Double-tee shaped iron hoops were also inventoried, however those were apparently fragments of recently used metal drums.

Generally it should be stated that within the surveyed sectors of the shore metal elements appeared less frequently when compared to the number of wooden fragments or to numerous relics of whale skeletons. These metal objects are mostly fragments of hoops of wooden barrels which were possibly connected with whaling activity in the Admiralty Bay.

Several whaling harpoons found in the Admiralty Bay region were inventoried. One harpoon was discovered during the inventory exploration works at the mouth of the Italian Valley (Pl. IV, Phot. 7). It strongly resembles another 7 harpoons found at the *Arctowski* Station and the two kept in the Department of Antarctic Biology, Polish Academy of Sciences in Warsaw and in the Department of Polar Biology and Oceanobiology, University of Łódź however, only the two latter have barbs preserved on their heads. Nonetheless, they bear traces of other serious damages, probably due to which they were abandoned by whalers. A whale harpoon consists of two main parts linked by an articulated joint. The rear part (shaft) placed in a barrel of a whaling gun is built of two semi-cylindrical rods linked at both ends. The rear end is flat, the front end is equipped with a link of articulated joint. The shafts of eight harpoons inventoried in the Admiralty Bay region (found in the AS and IV sectors) were 120 to 126 centimetres long; the width of their rods was approximately 4 cm. The front part (head) is provided with two pairs of movable barbs fixed in two perpendicular planes. At the rear end of the harpoon head there is another link used for joining it with the shaft and in the front part there is a small threaded tip intended for fixing a grenade with an explosive charge.

The length of a harpoon head varied from 40 to 42.5 cm. Grenades 30 cm long had a four-angular ending. Along with skulls and harpoons found in the AS sector there was also a large fragment of a grenade tip stuck in a temporal bone. A tip of another grenade was also, by chance, discovered at the foot of Thomas Point slope facing the Ezcurra Inlet (Fig. 5).

It is possible that a small object found on the Hennequin Point shore is also a grenade fragment. From some oral information it is known that at least two harpoons and the before mentioned fragment of a grenade had been brought to the *Arctowski* Station from the Italian Valley (IV) and another one from the Ezcurra Inlet shores located at the foot of Thomas Point (EV). The harpoon in the collection of the Department of Polar Biology and Oceanobiology, University of Łódź is said to have been found on the shore of Halfmoon Cove (HC). Birkenmajer (1997) reports another one collected on the beach at the foot of the lateral moraines of the Ecology Glacier, to the South from the Rakusa Point.

Altogether at *Arctowski* Station there were collected: 3 skulls (AS-1, AS-2, AS-3), 4 jawbones, a temporal bone (with a grenade tip stuck into it), a scapula, 3

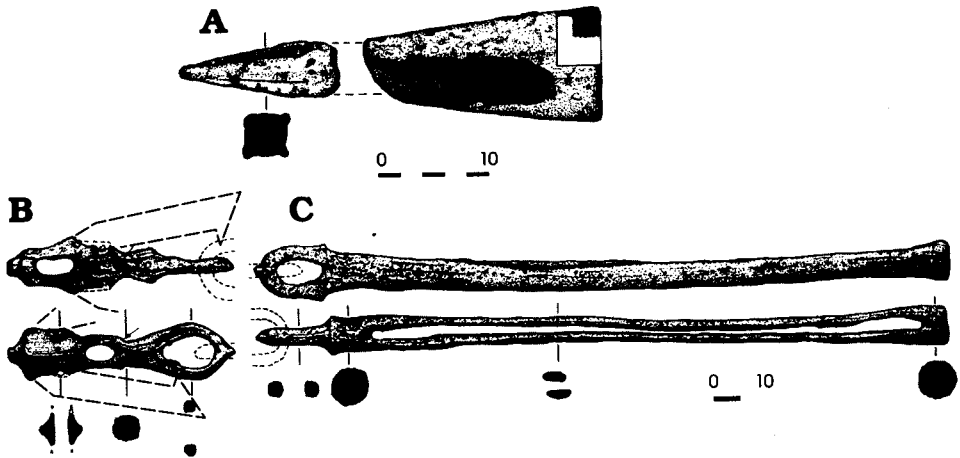


Fig. 5. Whaling harpoon – *Arctowski* Station: A – explosive head (grenade), B – head (barbs reconstructed), C – shaft.

vertebrae, several ribs, 3 “springs”, 7 harpoons, fragments of a harpoon grenade – all relicts undoubtedly connected with whaling activity (Pl. IV, Phot. 8). Along with them there was also one element whose function is not clear for the author. It is a wooden rod with wearing-iron at the end, approximately 150 cm long and 18 cm in diameter, provided with a steel wire noose with a thimble at one end.

Discussion

The present survey carried out in the Admiralty Bay area has a preliminary character, and many aspects could not be conclusively explained, a lot of them require further thorough analysis.

An initial investigation carried out by employing the surface survey method already allows to acquire inside knowledge of the character, type and degree of preservation of whaling objects discovered in the Admiralty Bay area, also their number and distribution. Some sectors of the Admiralty Bay shore were not visited in the present survey.

Another reason for the limited range of the data collected is the method employed. It was only a surface survey that does not allow for bringing to light either objects fully buried under sediment layers or those resting under water surface.

A good example are skulls deposited within the AC sector which are to a great extent covered with storm ridge material, several others may be buried deeply under the surface. AC-25 skull was partly buried under rock material, whereas skulls AC-26 or AC-27 were discovered after washing out rock material during strong storms of the 1997 winter season. In addition, one should not exclude the possibil-

ity that there are also skulls buried under creek sediments, mainly within the LS and SA sectors of the shore. Fragments of bones are more quickly covered with rock material in those sectors where such a process takes place.

Obviously, also underwater penetration of the coastal zone may provide additional information, as it is out of question that the sea waves washed away fragments or even entire skulls (*e.g.* LR-1). Furthermore, redeposition of skulls by the sea waves should be considered (EV-1 and EV-2). During the XXII Polish Antarctic Expedition held in the summer season 1998/1999 a whale skull was deposited by the storm on the sea shore in the vicinity of Latarnia Rock (T. Janecki, *pers. comm.*). It was probably LR-1, already inventoried by the author and washed away by sea waves.

One should bear in mind also that the deposition of some objects might be secondary. Whaling objects appear in a still changing environment of the coastal zone where they are exposed to waves; hence, they may be periodically washed away and nestled inland again – especially small fragments of bones not only vertebrae or ribs. It is possible that waves washed inland the remains of bones, which eventually came to rest in the EV and PD sectors.

The secondary deposition due to the drifting concerns especially those fragments of bones that bear traces of an abrasion effect. It should be considered that the station's activity had a special impact upon the scattering of skulls and spreading bones. Fragments of skulls might have been translocated easier from their original sites as a result of human interference, mainly around the station. Therefore, all conclusions concerning their original site determination should be drawn more carefully in comparison with more complete skulls.

Admiralty Bay area is one of many regions in the Antarctic where whale bones can be found. Whaling activity was also conducted on other islands of South Shetlands and South Orkney archipelagos, on the Antarctic continent but first and foremost on South Georgia. During present inventory works a brief survey was made also in the King George Bay of King George Island, and allowed for preliminary exploration whale remains there, deposited mainly in the Lions Rump area.

Fragments of whale skeletons appear in the area of particularly intensive whaling activity near ancient shore whaling stations, especially those co-operating with floating factories. Numerous whale bones were inventoried within station surrounding area of the "Hector" on the Deception Island where also wooden barrels and metal drums for oil storage were discovered (Hacquebord 1992).

Whale hunting carried out on a large scale in the southern seas dates back to the beginning of the twentieth century. Hunting for rorquals became possible on large scale after Swend Foyn had developed a gun that launched huge harpoons equipped with grenades with an explosive charge installed on speedy steam powered steel whale catchers, and after the method for pumping compressed air into dead bodies of rorquals (*fam.* Balaenopteridae) had been worked out, which prevented killed animals from drowning after death (Teresiński 1947, Campbell 1992).

Right whales (fam. Balaenidae) had become scarce also in the southern hemisphere in the second half of the nineteenth century and hunting for rorquals began to dominate in the Southern Oceans. Caught by small steam powered catchers equipped with harpoon guns installed on prows the animals were hauled to a shore whaling station or floating factory waiting in quiet waters of bays. Once hauled to a floating factory they were strapped to the side of the factory vessel and flensed. Their carcasses were abandoned immediately afterwards. Taken by water, they drifted in the sea (Hardy 1967, Campbell, 1992) and after a certain period of time could have been washed inland by waves. Animals killed during the Antarctic whaling activities were not dragged onto the shore for further processing. Certainly it would be not possible without special facilities mounted on the shore. Therefore, further processing was possible only in whaling shore stations. Any traces of such station were found on the Admiralty Bay shores and no historical references have been found in the literature on the subject. However Admiralty Bay was undoubtedly an ideal natural base ("harbour") for floating factories (Tønnessen and Johnsen 1982).

Most likely the first floating factory ship operating in the Admiralty Bay was the steamer *Admiralen* sent there in the summer season 1905/1906 by Christen Christensen (Campbell 1992, Hacquebord 1992). The *Admiralen* accompanied by two other catchers appeared in Admiralty Bay on January 27, 1906 (Rakusa-Suszczewski 1998). This very moment should be considered as the turning point in whaling activity in Admiralty Bay of King George Island, and since this very moment traces connected with whaling could have appeared on the shores of the bay in question (Kittel 2000). The 20-ties of the twentieth century was a period when new hunting technique was developed. It was aimed at making it possible to drag the whole hunted animal onboard of a floating factory ship equipped with slips. Since then full processing of a whale body in the open sea was feasible. That is why such factory vessels were sometimes called "pelagic factories". This new technique was adopted for common use in the 30-ties of the twentieth century (Tereśniński 1947, Campbell 1992, Hacquebord 1992, Kock 1995). Possibly since that time whale remains have been no longer deposited on Admiralty Bay shores. It appears that whale bones, nowadays discovered on the shores in question come from those animals that were hunted starting from the season of 1905/1906 up to the 30-ties of the twentieth century, *i.e.* within the period of 20–30 years.

At the present stage of investigation it seems impossible to establish the chronological sequence of the relics deposited on the Admiralty Bay shores. The ^{14}C method cannot be applied to materials of such a young age. Possibly some knowledge may be gained from the analysis of the degree to which the remains deposited on the Admiralty Bay shores are colonised by the shore flora, as well as the degree of weathering. According to the author's belief all the inventoried bones (except for those explored on the borderline of Jasnorzewski Gardens) should be considered as remains of animals killed in the open sea and then washed inland by waves,

for their sites of deposition are closely related to some particular morphological features of the shore.

All the remains occurred on the shore within a quite short period of time of the shore development history. It is rather unlikely that the relics found on the shore might have been remnants after natural death of whales of the family Balaenopteridae – their bodies sink immediately after the animals' death. The autor has not found any bones that might be attributed to a right whale (*Balaena*). All remnants came from whales from the rorqual family (Balaenopteridae). Further studies of these relics aiming at the species identification on the basis of the preserved bones remains, especially skulls, are therefore recommended.

Bones of hunted whales have occurred on the shore mainly due to the drifting activity of the sea, and they are the remains of animals killed, flensed and abandoned in the water. This is the probable answer to the question why the bones have occurred in such a close distance from the coast line, and why they have been distributed by waves along modern and ancient parts of the shore, mainly contemporary or ancient storm ridges. It is also a rational explanation for the reason why the skulls (nowadays their fragments) were deposited closer to the coastline. They are able to resist the wave action more effectively than smaller bones. Also the fact that skulls of whales can be found among the rock outcrops proves their drifting origin. Most probably they appeared on the site in question shortly after whales had been killed, at a time when their carcasses were fresh enough to be easily carried by water. It seems unlikely that they might have been secondarily deposited on the very point, for they would have been earlier broken by waves against its rocks.

The present author recognizes the orientation of skulls as quite meaningful. The most commonly observed skull position was on the dorsal side with their rear ends turned towards the sea. It is possible that there is a relationship between such a position and the one in which the carcasses of flensed animals were deposited on the shore by waves. They might have drifted with their ventral side up and their heads directed to the course of movement. Then, at the seashore, after heads had been anchored, carcasses were still tossed by waves trying to wash them inland. Hence, it is possible that such orientation was established some time later due to the long-lasting action of waves and the tendency of the skulls to assume the position in which they were the least subjected to the displacement activity of waves. One can suppose also that prior flensing of the whale facilitated the detaching of the rest of the body from the skull.

Skeletons or their fragments might have been washed inland and deposited in sites out of reach of waves, more likely parallelly to the coastline. Some of them were discovered in such a position, with groups of vertebrae in an anatomic sequence. Maximal number of vertebrae found in anatomic sequence in the present study was 9. Originally such column sections were longer. Archive photos, taken in "Jedynka" surroundings at the beginning of *Arctowski* Station activity in 1977 (Pl. II, Phot. 3), reveal the presence of long segments of whale backbone preserved

in an anatomic arrangement (ventral position) on the shore. Unfortunately, later, due to the station activities, these relics were disintegrated and widely spread.

The fact that the AC-22 skull was found with its mandible bones in an anatomical configuration may prove that entire whale skulls, still coated with tissues were washed inland by waves.

Remains of flensed whale bodies deposited on the shores under the influence of cold climate were exposed to gradual degradation and to geomorphological processes. The bones are still subjected to these processes, here the skull deposited at Latarnia Rock (probably LR-1) may serve as a good example.

The possibility of whale flensing on land, *i.e.* on Admiralty Bay shores should be also considered. However, no information on such a practice in the available literature on the subject have been found, there were no whaling stations operating on the shore. No relics that may prove on-shore flensing were discovered; nonetheless, certain accumulations of bones may prove that such activity was conducted (especially in the HC sector). Also bones lying within a farther distance from the coast line (on a moss bog in the HC sector) may be the evidence of whaling operations on the shore as they could not have been deposited there by waves. Possibly, groups of bones in an anatomical sequence could be the evidence for whale flensing on the shore. Otherwise, it seems that the bones (mainly skulls) are nestled too close to the coastline. On one hand, from the position of the majority of whale skulls one should assume that flensing must have been carried out, at least to some extent, on the sea. On the other hand, had all hunted whales been dragged onto the shore, larger number of bones should have been expected (see statistics of killed whales presented in the introduction herein). Probably the majority of drifting whale remains have been carried by water in different directions. Bones are frequently found within shore sectors poorly accessible from the sea. In such circumstances it is difficult to imagine a killed whale being dragged by man onto the shore.

It can be supposed that bones being lighter (especially when "fresh") when compared to rock material were deposited farther from the then existing coast line; they might have been even left behind the storm ridge, whereas skulls, heavier and larger, with more difficulty, were also transported by waves and deposited on the storm ridge or at its foot, and afterwards gradually buried by sediments but also they might be translocated along the beach surface or washed away by the sea again. Possibly bones may be discovered in older storm ridge sediments (*i.e.* ancient storm ridges).

Whale bones as well as other objects of whaling activity on one hand might have been nestled on the shore due to the raise of the coast level, and the sea recession on the other. The bones found in these days on the coast were washed inland probably mainly during high tide.

Because of an erosive nature of the coast with evident wave cutting the MI and EV sectors, also the southern part of SC sector should be considered as special

cases. The relics of bones are deposited below the wave-abrasion cutting within direct reach of waves. In the EV sector, also in the southern part of the SC sector, they are scarce and they were probably secondarily deposited by waves. Beneath the wave cutting line of the MI sector numerous skulls and separate large fragments of skull bones were discovered. They are exposed to degradation by seawater, often washed away by waves.

First and foremost whale bones have been deposited on accumulated shores (the MI sector is an exceptional in these terms). On one hand, it is the effect of an increased delivery of sediments (with bones) within these areas. On the other hand, bone remains have been with time nestled in sites out of reach of waves due to the shore expansion, as for instance it has been the case on Hennequin Point. At the same time only few or even no bones were discovered in the areas situated in a close neighbourhood of glaciers, within the areas recently uncovered by retreating glaciers – *i.e.* the youngest sections of the shore. This proves the secondary translocation of bones due to wave action and a relatively short distance of such translocation. In the areas where the remains appear nowadays in large numbers, also originally they must have been numerous in the past. Slight traces of some bones are probably the effect of seawater impact, and the fact that they are nestled out of reach of waves stand for additional evidence here. Assuming the drifting origin of whale remains deposited on the Admiralty Bay shores one may attempt to reconstruct the regions in which whales might have been flensed *i.e.* sites where floating factories could have been anchored, and on boards of which oil rendering was carried out, *i.e.* the area from where the bones could be brought by waves. For the time being it seems that such regions are mainly Arctowski Cove and the western part of Martel Inlet, hence the regions also today used frequently as favourable sites for ship anchorage. To certain extent the coastal zone between Llano Point and Agat Point could have been used for anchoring of floating factories, as well as the area situated to the south of Demay Point and some regions on Hennequin Point where intensive accumulation of whale bones was observed

As it was mentioned above whale bones were deposited within a strictly defined period of time, and therefore they may be used as a quite reliable reference for reconstructing processes that have shaped particular sections of the shore for recent hundred of years. Marsz (1983) and Birkenmajer (1997) have already arrived to such conclusion; although Marsz (1983, p. 101) was of the opinion that whale bones appeared on Admiralty Bay shores during the years 1846–1910/11. Comments of this last author (Marsz 1983, pp. 103–104) concerning whale bones distribution on the Hennequin Point shores are not detailed enough. It seems that there is a clear relationship between the areas of important bones accumulation and elements of morphology of particular sections of the coast. On the basis of the position of whaling relics on the shore the coastline existing in the past may be reconstructed. A comprehensive survey of the shore and investigation of consecutive stages of its formation would provide potential for reliable reconstruction of the

original distribution of whale bones and their follow-up redistribution along the coastline.

Further studies should also consider the detailed analysis of sea currents (Robakiewicz and Rakusa-Suszczewski 1999) and their impact on the remains of whale bodies abandoned in water to determine the drifting of relics to particular areas, and consequently for establishing localities where floating factories were once operating.

Bones of whales that appeared in many sectors of the Admiralty Bay shores have become an important element of the shore. They have been involved, and still are, in its formation, and have become a factor shaping the coast with other rocky material. They constitute remarkable amount of matter translocated inland from the sea. Whale bones contain from 40 to 60 per cent of fat (Teresiński 1947). Along with bones also fragments of tissues, which later decomposed there, have been deposited on the shore. Bone remains are currently a basis for moss and lichens development; they are also used by penguins for nest building. Their resistance to external factors in the polar environment is proved by the fact that the whale bones are still present on Spitsbergen shores where they were deposited in the hunting period in the first half of the seventeenth century (Chochorowski, 1991)

As it has been mentioned above, inventory works were carried out over spacious area; but the survey itself had a preliminary character. Future investigations should be concentrated on those sectors of Admiralty Bay where accumulation of objects connected with whaling activities was particularly intensive, within which the greatest variety of objects can be found, and on those sectors showing the fewest traces of secondary changes, i. e. where the original state has been preserved to the largest extent.

An especially intensive accumulation of various whaling objects can be found on Hennequin Point shores. The original site of deposition of the objects discovered within this area has not been probably much changed. This is possibly a positive effect of limited contemporary human activity within the region. Whaling objects have not been exposed to the sea action for a long period of time either as there are no clear evidence of abrasion which in turn is due to an intensive built-up character of the shore. Furthermore, the quite interesting morphology of the Hennequin Point is another reason why further studies of the HP sector are recommended.

Originally, bone remains occurred undoubtedly in large numbers in surrounding areas of *Arctowski* and *Ferraz* Stations. However, the activity of these stations had an important impact upon considerable scattering, distribution and interference in the original state of those relics. These very areas had been once attractive also from the whaling activities perspective.

There is a potential for interesting discoveries in those sectors in which relics are still buried under sediment layers, mainly deposited by creeks. In these areas the excavation method typical in archaeological studies should be employed. It refers particularly to such sectors as: LS (especially to the south of Llano Point), SA

(particularly to the south of the Sphinx Hill), and to a lesser extent, BD and UB sector. Promising results may also be expected from research of the quite uniform, small, but clearly distinguished section of the shore, namely Paradise Cove, where several numbers of relics may be buried under sediment layers.

However, it is out of question that the main source of knowledge on the whaling activity will be written information, which should be the subject of research undertaken within the nearest future.

The current position of whale bones on the shore of Admiralty Bay depends on the former whaling activity, especially on the anchoring position of ships, on the subsequent geomorphological processes permanently shaping particular parts of the coast as well as recent human activity. Geomorphological processes in particular sectors of Admiralty Bay shores run differently causing different deposition of whale bones on the shores. Its particular sectors should be considered separately after their morphology and geomorphologic factors have been examined.

In summary, the inventory works initiated within the Admiralty Bay region should be indispensably continued and completed.

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Streszczenie

Inwentaryzacja obiektów wielorybniczych na wybrzeżach Zatoki Admiralicji miała charakter archeologicznych badań powierzchniowych. W sezonach 1996/97 i 1997/98 udało się spenetrować większą część wolnych od lodu wybrzeży zatoki. Zostały one podzielone na odcinki badawcze nie przekraczające 3 km długości. W trakcie prowadzenia prac szczególną uwagę zwracano na zalegające na brzegach czaszki wielorybów. Inwentaryzowano ponadto pozostałe kości szkieletów wielorybów oraz przedmioty metalowe i drewniane mogące mieć związek z działalnością wielorybniczą.

W toku prac zinwentaryzowano 158 egzemplarzy większych fragmentów czaszek (żadna nie zachowała się w całości). 58% z nich znajduje się obecnie w pozycji na stronie grzbietowej i jednocześnie tyłem w kierunku linii brzegowej – takie ułożenie wydaje się być najbardziej typowe i najbardziej zbliżone do pierwotnego. Na podstawie występujących fragmentów i luźnych kości czaszek pierwotną ilość wielorybów, których szczątki znalazły się na penetrowanych odcinkach wybrzeży, oszacowałem na 210–230 sztuk. Najliczniej spotykanymi elementami szkieletów wielorybów są żebra i kręgi oraz ich fragmenty. Wydaje się, że istotną rolę dla rekonstrukcji odgrywają zespoły kręgów znajdujących się w układzie anatomicznym. Występują ponadto kości kończyn oraz prawdopodobnie fragmenty mostków. W kilku miejscach odkryto płytki fiszbinów, a w jednym przypadku (przy kości szczękowej) zachowały się prawdopodobnie resztki skóry. Największe nagromadzenie kości wielorybów zarejestrowano na wybrzeżach południowej części Półwyspu Kellera, zachodniej części zasadniczego basenu zatoki (od Thomas Pt. po Blue Dyke) oraz na Hennequin Point. Kości występują obecnie przede wszystkim w okolicach wału burzowego i powyżej niego.

Pośród kości wielorybów i w podobnej sytuacji topograficznej zalegają przedmioty metalowe i znacznie częściej spotykane drewniane, z których przynajmniej część ma niewątpliwie związek z działalnością wielorybniczą. Szczególnie licznie występują na odcinku wybrzeża od Llano Pt. po Agat Pt. oraz na Hennequin Pt. i w okolicach Block Pt. Narzędziem wielorybniczym służącym do ściągania pasów skóry wraz z tuszczem z ciała zabitego wieloryba jest tzw. „klewant” (ang. „spring”) – w toku prac zinwentaryzowano 13 egzemplarzy. Z aktywnością wielorybników można zapewne łączyć przynajmniej część odkrywanych klepek i denek beczek oraz żelaznych obręczy. Duże nagromadzenie szczątków beczek klepkowych występuje na Barrel Pt. W toku prac natrafiono ponadto na jeden egzemplarz harpuna wielorybniczego, siedem analogicznych oraz ponadto duży fragment granatu harpuna zgromadzono na Stacji *Arctowskiego*.

Odkrywane na wybrzeżach Zatoki Admiralicji szczątki pochodzą z okresu ok 20–30 lat – tj. od sezonu 1905/06 (pierwszy statek-przetwórnia *Admiralen* na wodach zatoki) po lata 30-te (upowsze-

chnienie przetwórci pelagicznych). Stanowią je zapewne resztki szkieletów faldowców (gł.: humbików, finwali i płetwali błękitnych) upolowanych i oprawianych przez pracujące na wodach zatoki załogi statków-przetwórci. Obrane z tłuszczu i pozostawione w dryfie ciała mogły dostać się na brzeg i tu uległy dalszej redepozycji i rozkładowi. Niszczące i dryftowe działanie fal prowadzi do wtórnego rozprzestrzeniania szczątków. Stąd niezbędne jest określenie w toku prac morfologii i charakteru badanego odcinka wybrzeża.

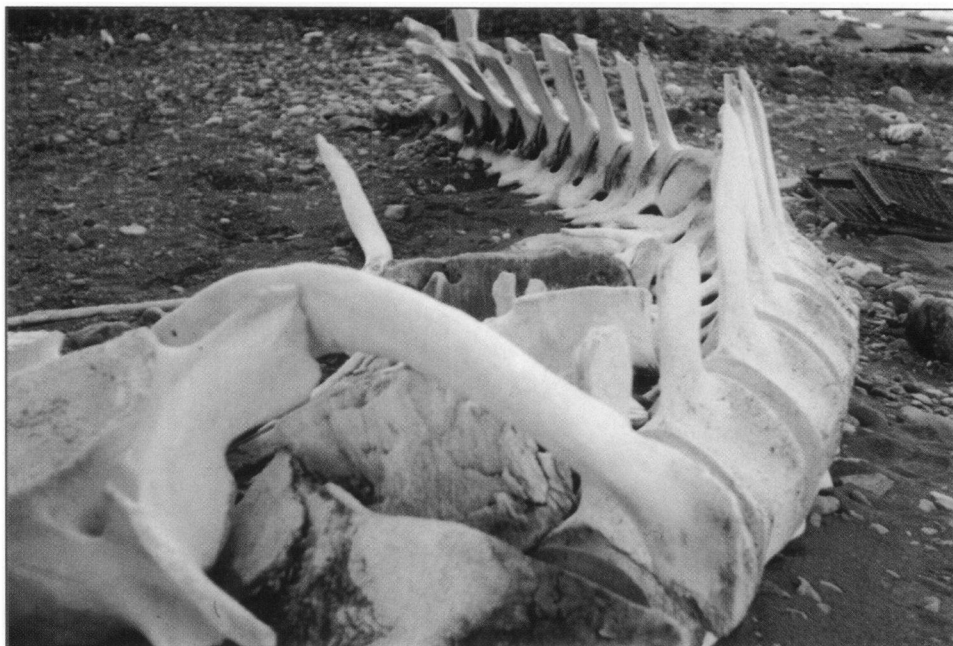
Przeprowadzone dotychczas prace inwentaryzacyjne nie zdołały objąć zasięgiem wszystkich wolnych od lodu wybrzeży Zatoki Admiralicji. Pewne ich ograniczenie, wynikające z przyjętej metody, stanowiła niemożność dotarcia do obiektów przykrytych osadami lub znajdujących się pod wodą. Niezbędne wydaje się zrekonstruowanie, przy użyciu różnych metod, pierwotnego (tj. jak najbliższego okresowi prowadzenia działalności) nagromadzenia i rozprzestrzenienia obiektów wielorybicznych. Całość ma pozwolić na możliwie pełne odtworzenie przebiegu aktywności wielorybicznej na wodach Zatoki Admiralicji.



1. HP-4 skull with preserved pair of maxilla bones and a pair of mandibles (Hennequin Pt.).
Photo by P. Kittel.



2. Group of whale vertebrae in an anatomical position on the ventral side (Keller Peninsula).
Photo by P. Kittel.



3. Fragment of whale columns (*Arctowski Station* – “*Jedynka*”, 1978).

Photo by W. Kittel.



4. Intensive accumulation of whale bones, *i. e.* HP-2 skull on the dorsal (*Hennequin Pt.*).

Photo by P. Kittel.



5. Staves and fragments of bottoms of wooden barrels and unidentified wooden and cork objects (Hennequin Pt.). *Photo by P. Kittel.*



6. Accumulation of wooden staves, bottoms of barrels (Barrel Point).
Photo by P. Kittel.



7. Whaling harpoon (Italian Valley). *Photo by P. Kittel.*



8. Whaling spring and harpoons collected on *Arctowski* Station. *Photo by P. Kittel.*