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Remains of subfossil birds from King George Island (South Shetland Islands)

[with Plate XI and 3 text-figs]

Szczątki kopalnych ptaków z Wyspy Króla Jerzego (Szetlandy Południowe)

Abstract. Fifty-two bones and their fragments of subfossil birds were found in 1981 at Low Head on King George Island (South Shetland Islands). They are determined as *Pygoscelis antarctica* and *Stercorarius skua* and dated back to Younger Holocene.

Bird bones described in the present paper were found on 2. II. 1981 on King George Island (South Shetland Islands) by the members of Polish Antarctic Expedition, Prof. Dr K. BIRKENMAJER and Dr B. JABŁOŃSKI, and collected by the latter. The bony material was found at Low Head, the locality pointed at the sketch map (Fig. 1). Some of the bones were scattered on the moraine surface, but those under study were covered by about 10 cm stratum of moraine gravel, the surface of which was hardened by clumps of moss and overgrown by lichen *Usnea antarctica*. According to Prof. BIRKENMAJER (personal communication) the bones come from the time of Younger Holocene as they had lain on the sea terrace, covered by moraine, 25 to 40 m above the sea level. This terrace originates from Early to Middle Holocene and is homologous to the terrace of the same level from the Penguin Island, described by BIRKENMAJER (1982b). On the other hand the degree of covering of bony material lying on moraine surface by lichens suggests that it has lain intact for at least several hundred years. These two premises limit the time the bones are coming from.

Penguin bones

All the material collected consists of 51 bones or bony fragments. There were found among them: 11 specimens of humerus (6 complete), 1 coracoid, 12 femora (of them 5 complete or nearly complete), 7 tibiotarsi, 1 ulna, 1 fragmentary sacrum and 1 vertebra. Other bony pieces coming most probably of young birds are so fragmentary and damaged that it is impossible to recognize them. The greater part of remnants is strongly damaged, and on the other hand coming from young birds, have not completely ossified articular parts. That is the reason why only sixteen specimens can be studied in details and determined.

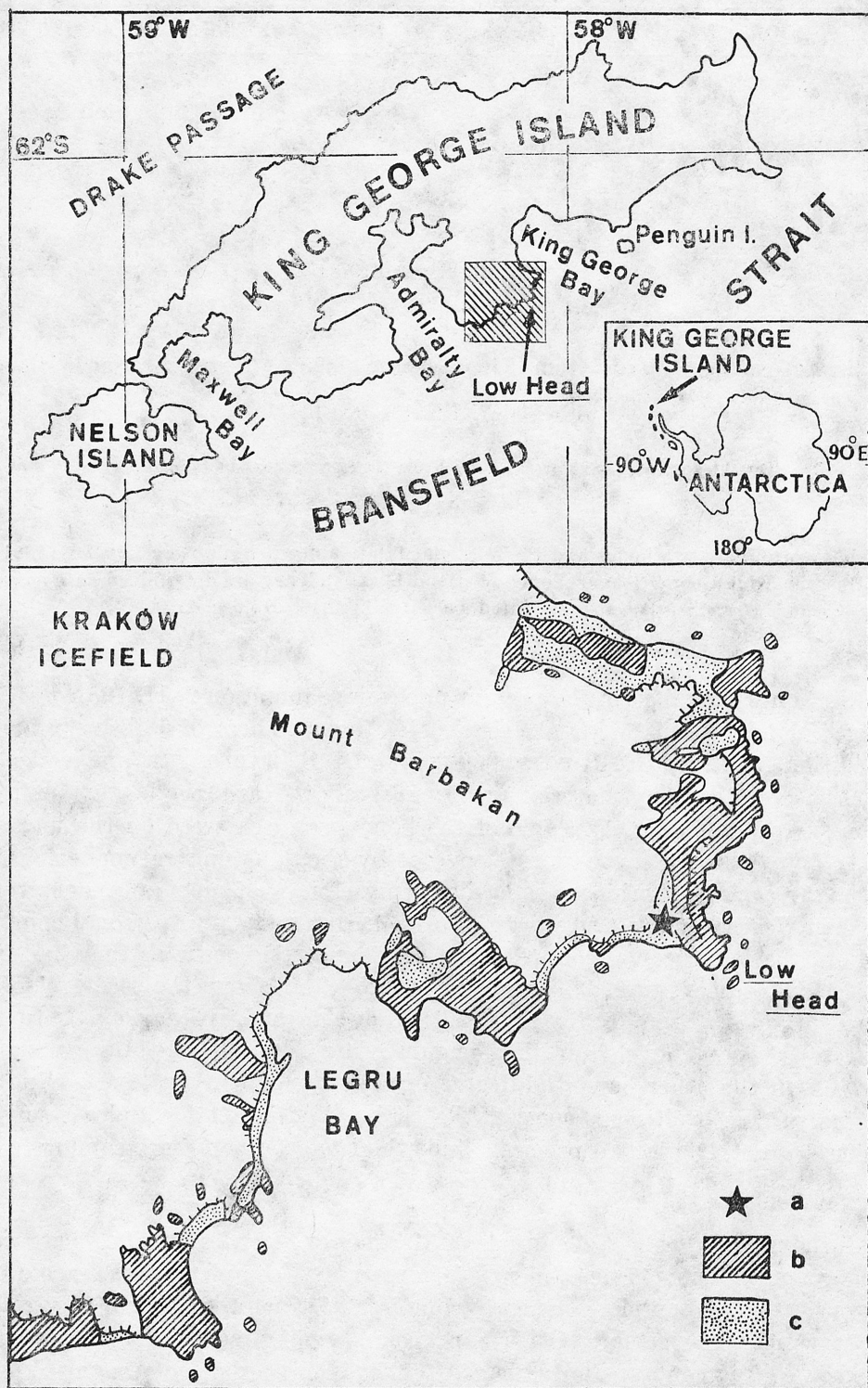


Fig. 1. Location of the Low Head at King George Island and of the finding place of bird bones (from BIRKENMAJER, 1982a). a — finding place of the bones, b — solid rocks, c — Quaternary deposits

They are: 6 complete and 1 proximal fragment of humerus, ulna, 6 femora, distal part of tibiotarsus and coracoid. Some of these bones and their damage are shown at the Plate XI.

The most characteristic of above mentioned bones are humera. All of them are so similar to one another that it is no doubt that they belong to the same species. Their shape and general sizes compared with the data of STEPHAN (1977) and especially with Fig. 37 in his paper indicate that they are typical for genus *Pygoscelis*. The other bones also do not differ from those of this penguin genus. The measurements of all studied bones compared with those of bones of 3 recent members of the genus *Pygoscelis* are shown in Table I. The manner of measuring is shown in Fig. 2.

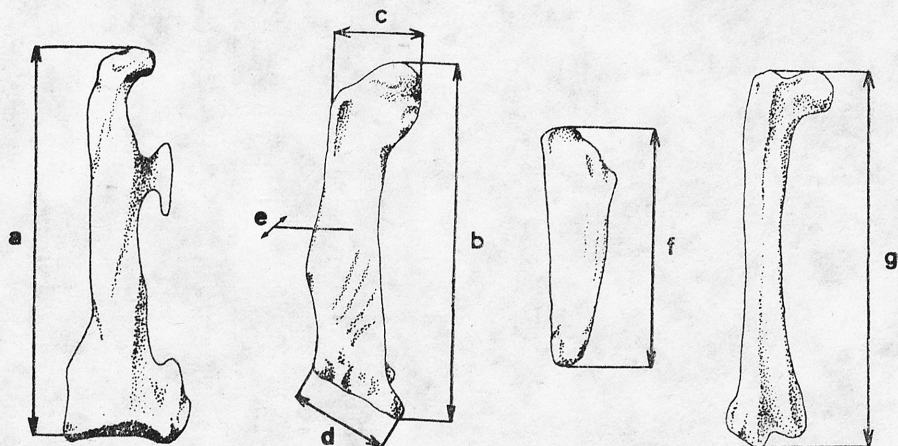


Fig. 2. The manner of measuring of the penguin bones (ref. to Table I). Coracoideum: a — total length; humerus: b — total length, c — width of proximal articular part, d — width of distal articular part, e — thickness of the bone shaft in middle part; ulna: f — total length; femur: g — total length

It seems to be clear that the dimensions of all measured subfossil bones lie in the limits of the smallest species of the genus *Pygoscelis* i. e. Chinstrap *Pygoscelis antarctica* (FORSTER, 1781). All morphological features of subfossil bones do not also extend out of limits of individual variation of Chinstrap-penguin.

Bone of skua

An almost entire left ulna is the only bone found. Its olecranon process is broken and all more protruding parts of both articular endings as well as ulnar papillae are damaged (broken and polished) most probably by the moving gravel or so (compare Pl. XI).

The bone was compared with those of skuas and gulls living recently on South Shetland Islands and corresponding to it in size (i. e. Great Skua and Kelp Gull). Their measurements are presented in Table II. The dimensions of recent

Table I

A comparison of the measurements (in mm) of the coracoideum, humerus, ulna and femur of the subfossil penguins from King George Island with those of the recent members of the genus *Pygoscelis*. The manner of measuring is shown in Fig. 2

		Coraco- ideum	Humerus				Ulna	Fe- mur
		a	b	c	d	e	f	g
Subfossil:								
<i>Pygoscelis antarctica</i>	1	81.1						
	2	—	72.6	21.0	22.0	4.9		
	3	—	72.0	21.3	22.9	5.5		
	4	—	70.9	20.7	21.9	4.9		
	5	—	71.4	20.4	21.5	5.6		
	6	—	70.6	20.4	21.0	5.3		
	7	—	65.3	—	19.7	5.7		
	8	—	—	20.7	—	4.9		
	9	—	—	—	—	—	46.9	
	10	—	—	—	—	—	—	74.5
	11	—	—	—	—	—	—	74.2
	12	—	—	—	—	—	—	76.6
	13	—	—	—	—	—	—	75.5
	14	—	—	—	—	—	—	75.0
	15	—	—	—	—	—	—	64.7
Recent:								
<i>Pygoscelis antarctica</i>	1	80.0	72.5	21.8	23.6	5.4	50.0	78.8
	2	86.8	76.5	23.4	24.8	5.4	49.4	82.3
	3	76.8	68.0	20.7	22.5	4.8	46.0	72.9
	4	78.6	73.7	21.1	23.2	5.4	50.4	79.0
	5	78.9	71.7	20.6	23.2	5.7	48.4	76.9
<i>Pygoscelis adeliae</i>	1	86.3	76.4	22.4	24.1	5.3	50.1	83.3
	2	87.6	77.0	22.6	23.1	5.2	50.5	80.9
	3	88.3	78.1	23.3	24.6	5.5	51.6	86.2
	4	89.2	77.2	23.8	24.4	5.6	49.4	84.4
	5	88.4	76.2	23.5	23.8	5.1	50.6	84.0
	6	88.8	78.2	23.2	24.1	5.4	51.6	83.0
<i>Pygoscelis papua</i>	1	83.2	82.1	23.3	25.1	5.4	52.9	88.3
	2	89.1	82.6	25.0	26.9	6.4	55.1	88.4

bones of both species are similar to each other, but even so the measurements of subfossil bone are more similar to those of skuas. The osteological, morphological characters are however more important and they also point to the skua. They are: (1) general curvature of the bone shaft (the bone of gull is nearly stright), (2) the general shape of processus medialis, the distal margin of which is in gulls more convex, and (3) facies musculi brachialis, which in gulls is deeper. According to all these features it looks to be sure that the subfossil bone belongs to *Stercorarius skua* (BRÜNNICH, 1764).

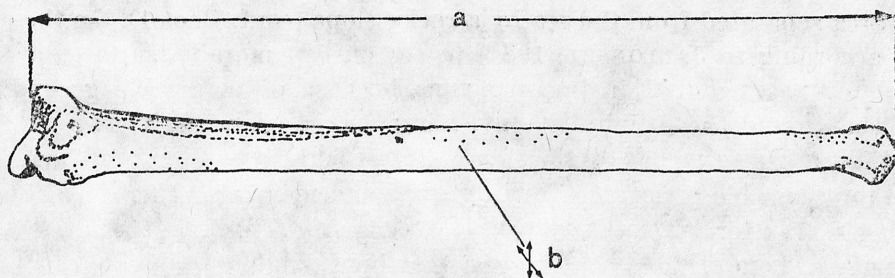


Fig. 3. The manner of measuring of the ulna of skua (ref. to Table II). a — length (from proximal margin of facies articularis dorsalis), b — bone shaft width and thickness (crosswise)

Table II

A comparison of the measurements (in mm) of the ulna of subfossil skua from King George Island with those of the recent Great Skuas and Kelp Gull. The manner of measuring is shown in Fig. 3

Species	a	b
Subfossil:		
<i>Stercorarius skua</i>	144.8	7.6 × 6.1
Recent:		
<i>Stercorarius skua</i> 1	147.6	7.6 × 6.2
2	148.4	8.0 × 6.4
3	145.3	7.3 × 5.9
<i>Larus dominicanus</i> 1	149.5	7.3 × 6.2

Comments

According to SIMPSON (1975) the oldest remains of the genus *Pygoscelis* are known from Late Pliocene of New Zealand, where on South Island the fossil species *Pygoscelis tyreei* SIMPSON, 1972, was found. Three recent species of this genus are distributed on Antarctica and Antarctic and Subantarctic Islands, but neither BRODKORB (1963) nor SIMPSON (1975, 1976) mentioned them as found among fossil Quaternary remains.

It is widely known that each of three pygoscelid penguins has different nest-site preferences and the Chinstrap-penguin has been known as "slope"-nesting (CONROY et al., 1975; MÜLLER-SCHWARZE, MÜLLER-SCHWARZE, 1975; VOLKMAN, TRIVELPIECE, 1981; WHITE, CONROY, 1975 and others). The MÜLLER-SCHWARZES (1975) emphasize also that this bird prefers higher elevations and its locomotion is well adapted to the terrain. The statistical data of VOLKMAN and TRIVELPIECE (1981) from two rookeries at King George Island shows more precisely that the majority of Chinstrap-penguins nested on elevation between 21 and 30 m, and on the most steeply sloped areas (9.3° in average). The above mentioned characters correspond to topography of locality at Low Head as it is a sloped

stony area separated from the sea by a rocky slope (conf. Phot 1). On the other hand, according to JABŁOŃSKI (1984) places on dry moraine surfaces are not typical for nesting of Chinstrap-penguins because of permeable ground. He found that round the Admiralty Bay, King George Island, Chinstrap-penguins nest of flat areas as well as on the slopes, but in both cases their nests are situated on unpermeable rocks and stones, gravels and moraines being characteristic breeding places for two other pygoscelid penguins. This fact and the degree of damage of bone surface may suggest that bones under study could be transported together with moraine gravel from some higher lying places.

The fossil or subfossil remnants of *Stercorarius skua* has not been known so far, as they were mentioned neither by BRODKORB (1967) nor later on by any other author.

I am grateful to Dr. B. JABŁOŃSKI who charged me all the bony material and explained details concerning its finding place. I owe also many thanks to Prof. Dr K. BIRKENMAJER for his kind help and advice especially concerning the maps and datation of material.

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STRESZCZENIE

2 lutego 1981 zostały znalezione w żwirze moreny (fot. 1), pokrywającej morską terasę na Low Head, na Wyspie króla Jerzego (Szetlandy Południowe), szczątki ptaków w postaci 52 kości, fragmentów i wiórów kostnych. Ich wiek określony na młodszy holocen jest ograniczony z jednej strony przez wiek terasy (starszy lub środkowy holocen), a z drugiej strony przez porosty, które rosły na morenie nietknięte przynajmniej przez kilkaset lat. Większość szczątków należy do pingwinów. Pomiaru lepiej zachowanych 16 kości pingwinów (tab. I), a także morfologia (fot. 2—7), szczególnie kości ramieniowych, wskazują bezspornie, że szczątki należały do gatunku *Pygoscelis antarctica*.

W opisywanym materiale została także znaleziona pojedyncza kość ramieniowa (fot. 8, tab. II), oznaczona jako *Stercorarius skua*.

Żaden z obu wymienionych gatunków nie był dotychczas podawany ze stanowisk kopalnych.

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Plate XI

Phot 1. The general view of the moraine at Low Head and Chopin Ridge in the background.
The bones were found in the upper part of the moraine (see arrow)

Phot. B. JABŁOŃSKI

Photos. 2—7. Some of subfossil bones of *Pygoscelis antarctica* excavated at the Low Head. The strong damage of their surface can be seen (natural size)

Phot. 8. Subfossil left ulna of *Stercorarius skua* from the Low Head (0.75 of natural size)



Phot. 1

