

Zygmunt BOCHEŃSKI

Subfossil remnants of Black Guillemot from Western Spitsbergen

[with 3 text-figs]

Kopalne szczątki nurzyka podbielonego z Zachodniego Spitsbergenu

Abstract. Two subfossil bones of auk (complete humerus and incomplete ulna), dated back to Late Holocene, were found in moraine gravel in Western Spitsbergen in 1975. Both of them belonged to young bird and have been determined as Black Guillemot. Proportions of the humerus and especially the sizes of the bone shaft cross-section in the middle-length are nearly identical as in the birds living now in the Spitsbergen Archipelago, belonging to the subspecies *Cephus grylle mandti* (MANDT 1822).

Two bones of subfossil auk were found in 1975 in the region of Hornsund fiord in Western Spitsbergen. They were found among the gravel in the surface level of the lateral moraine of removing glacier. They are: complete right humerus and right ulna broken in distal part. Not complete ossification of their articular endings suggests that both bones belonged to a young bird. It is very difficult to determine exactly the geological age of the bones, however the com-

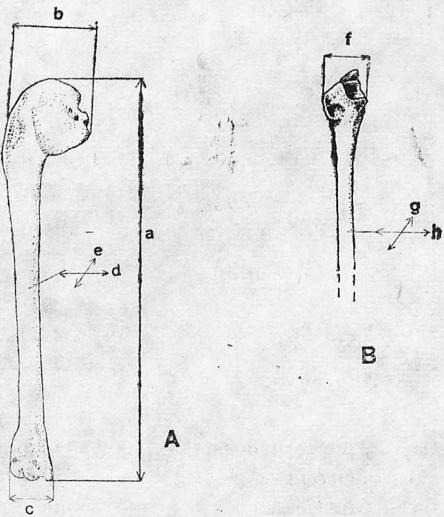


Fig. 1. The manner of measuring of the humerus (A) and ulna (B) in auks (ref. to Tables 1 and 2). Humerus: a — length of bone, b — width of proximal portion, c — width of distal portion, d — width of bone shaft, e — thickness of bone shaft, ulna: f — width of proximal articular portion, g — width of bone shaft, h — thickness of bone shaft

Table I

Comparison of the measurements (in mm) of the humerus of subfossil Black Guillemet from Spitsbergen with those of recent auks. The manner of measuring is shown in Fig. 1A

Species and proveniention	Collection number*	Measurements as in Fig. 1A					Index e × 100 d
		a	b	c	d	e	
<i>Cephus grylle</i> subfossil		57.8	13.0	7.8	4.1	3.2	78.0
Recent North Atlantic auks:							
<i>Cephus g. grylle</i> (Baltic)	A/2054/69	60.5	14.7	8.8	4.5	3.3	73.3
	A/2055/69	62.7	14.6	9.0	4.9	4.0	81.6
	A/2164/70	62.4	15.4	9.2	4.8	3.7	77.1
	A/2181/70	63.0	15.3	9.5	4.9	3.7	75.5
	A/2214/70	62.9	14.8	9.2	4.5	3.4	75.5
	A/2418/71	63.7	15.1	9.0	4.8	3.5	72.9
	A/2434/71	61.8	14.8	9.2	4.6	3.3	71.7
	A/2435/71	62.9	15.0	9.3	4.5	3.6	80.0
	A/2436/71	62.0	15.2	8.8	4.6	3.5	76.1
	A/2437/71	62.1	15.0	9.2	4.8	3.6	75.0
	A/2780/73	62.0	14.7	9.0	4.8	3.4	70.8
<i>Cephus g. mandti</i>	BM. 1895.3.2.3	57.2	14.3	9.0	4.2	3.2	76.2
(Spitsbergen)	BM. 1895.3.2.4	57.6	14.7	9.1	4.3	3.3	76.7
<i>Cephus g. arcticus</i>	Cop. 1098	62.6	14.7	7.2	4.8	3.4	70.8
(W. Greenland)	Cop. 1100	62.2	14.5	7.2	4.7	3.3	70.2
	Cop. 437	59.3	14.6	7.0	4.8	3.4	70.8
	Cop. 447	61.9	14.2	7.0	4.4	3.3	75.0
<i>Cephus g. atlantis</i>	IP. 886—1	63.6	15.2	9.4	4.9	3.5	71.4
(Kola Pen.)	A/4178/85	65.0	15.3	9.7	5.0	4.0	80.0
<i>Cephus g. islandicus</i>	Cop. 347	58.0	14.6	6.5	4.9	3.4	69.4
(Iceland)	Cop. 400	58.4	14.7	7.2	4.4	3.1	70.4
	Cop. 383	59.0	13.3	6.9	4.4	3.2	72.3
	Cop. 385	60.4	14.6	7.0	4.8	3.3	68.7
<i>Plautus alle</i> (Spitsbergen)	A/3766/80	43.4	10.8	6.9	3.5	2.3	65.7
	A/3995/83	44.4	10.9	6.8	3.4	2.2	64.7
	A/ — 1	44.3	10.3	6.8	3.6	2.3	63.8
	A/ — 2	42.4	10.5	6.9	3.2	2.4	75.0
	A/ — 3	43.1	10.3	6.3	3.3	2.2	66.6
	A/ — 4	43.4	10.3	6.9	3.4	2.4	70.6
	A/ — 5	42.5	10.3	6.8	3.2	2.3	71.9
<i>Fratercula arctica</i> (France)	A/2775/73	58.8	13.5	8.7	4.9	3.2	65.3
(British Is.)	BM. 1911.6.2.3	58.5	14.5	8.4	4.3	2.7	62.8
	BM.S/1973.66.92	69.1	15.8	10.1	5.5	3.2	58.2
<i>Alca torda</i> (Baltic)	A/2180/70	80.1	17.6	11.2	7.3	3.8	52.0
	A/2919/74	79.4	17.6	11.2	7.2	3.7	51.4
<i>Uria aalgae</i> (Baltic)	A/2426/71	85.0	18.0	12.1	8.4	4.0	47.6
	A/3058/75	79.5	17.3	11.8	8.4	3.6	42.8
	A/3059/75	79.1	17.3	11.5	7.8	3.7	47.4
	A/3373/77	82.0	18.4	12.0	8.5	3.8	44.7
(N. American coast)	A/3650/79	87.0	17.9	12.1	8.3	4.2	50.6
<i>Uria lomvia</i>							
(N. American coast)	A/3022/75	86.9	17.4	11.5	7.8	3.7	47.4

Table I cont.

Species and proveniention	Collection number *	Measurements as in Fig. 1A					Index: h × 100 g
		a	b	c	d	e	
Recent North Pacific auks:							
<i>Cephus columba snowi</i> (Kuriles)	IP. 886—2	63.2	15.1	9.4	4.9	3.5	71.4
<i>Cephus carbo</i> (Kuriles)	IP. 887—1	69.7	16.4	10.5	5.1	3.7	72.5
<i>Fratercula corniculata</i>	BM. S/1952.2.335	68.4	16.8	10.6	5.4	4.1	75.9
<i>Aethia pygmaea</i> (Kuriles)	IP. 893—1	40.2	9.6	6.2	3.1	2.1	67.7
<i>Aethia cristatella</i> (Kamchatka)	BM. 1848.7.28.13	52.0	12.8	8.3	3.8	2.7	71.0
<i>Cyclorrhynchus psittacula</i> (Kamchatka)	BM. 1848.7.28.4	56.2	13.1	9.1	4.3	3.1	72.0
<i>Cerorhinca monocerata</i> (Kuriles)	IP. 896—1	71.8	16.9	10.7	6.2	3.3	53.2
(California)	BM. S/1983.73.1	68.2	14.8	10.0	5.4	3.2	59.2
<i>Lunda cirrhata</i> (Kuriles)	IP. 898—1	77.9	18.6	11.5	6.8	4.1	60.3
(Kamchatka)	BM. 1848.7.28.9	75.6	17.5	11.1	6.0	3.7	61.6
<i>Ptychoramphus aleutica</i> (N. America)	IP. 900—1	43.6	—	7.2	3.5	2.2	62.8
(N. American coast)	A/3790/80	46.0	11.1	7.7	3.7	2.3	62.2

* Numbers beginning with A — collection of the Institute of Syst. and Exp. Zoology, Pol. Ac. Sci. Kraków; IP. — Institute of Paleontology, Ac. Sci. USSR, Moscow, BM. — British Museum (Nat. Hist.), Sub-dept. of Ornithology, Tring, Cop — Zoological Museum in Copenhagen.

plete lack of fossilisation as well as the general status of preservation point to the Holocene, most probably the younger one.

The sizes of humerus studied on the background of all 6 living species of auks from the North Atlantic and 8 available species from the North Pacific are listed in Table I. The flatness of the bone shaft is characteristic for the majority of the bones studied here. It finds expression in a low percentage index of the shaft thickness to its width. This index balances between 42.8% in the representative of the genus *Uria* and ca 80% in some specimens of the genus *Cephus*. The arithmetic mean of the indices of all the measured bones of Black Guillemot assumes 73,8%, but it is different in particular subspecies — the lowest mean, 70.3%, was found for 4 specimens of Iceland belonging to *C. grylle islandicus* HØRRING, 1937.

The relation of the bone length to the above mentioned index in the studied specimens of recent Atlantic auks is given in Fig. 2. It shows distinctly that the subfossil bone is the closest to the representatives of *Cephus grylle* (LINNAEUS 1758), and among them to 2 specimens of *C. grylle mandti* (MANDT 1822) of the Spitsbergen Archipelago. It is confirmed also by Fig. 3, showing the relation of the bone shaft thickness to its width in the genus *Cephus*. Slightly smaller

sizes of articular endings of subfossil bone (compare Table I) are most probably connected with the young age of the bird.

The general view of the preserved fragment of ulna corresponds with that one in auks and among them with Black Guillemot. The sizes of the studied

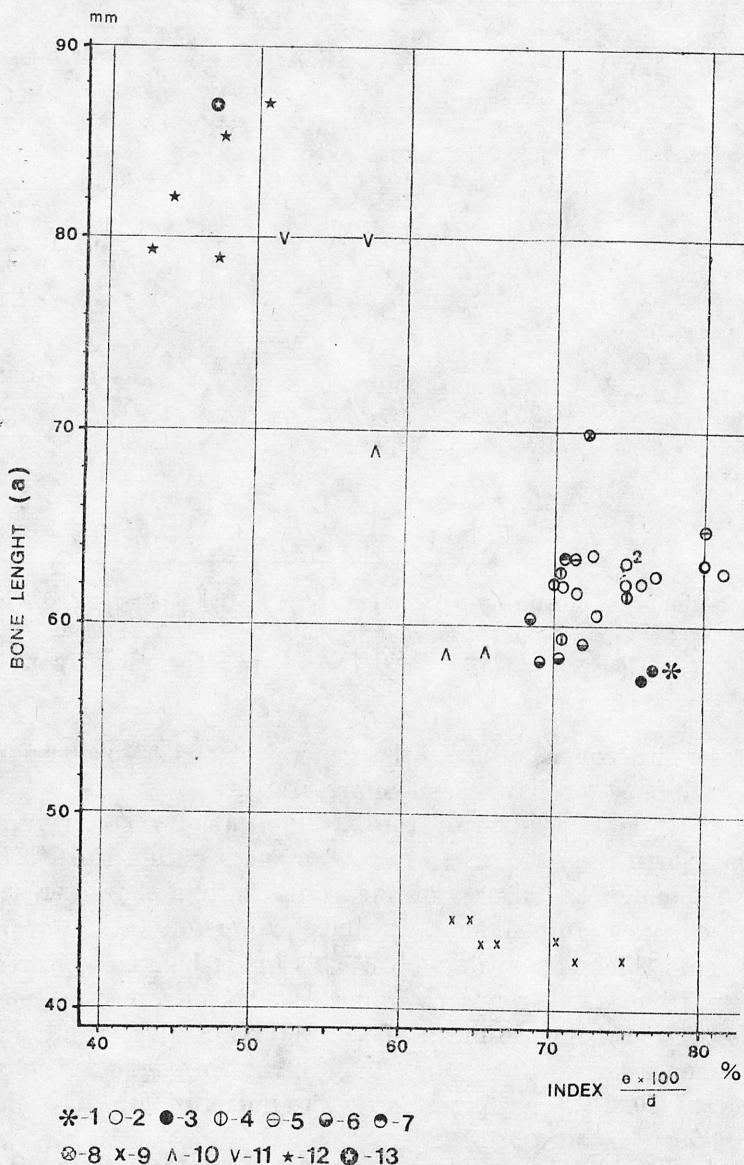


Fig. 2. The ratio of the length of the humerus (a) to the percentage index of bone shaft flatness $\frac{e \times 100}{d}$ in subfossil and recent auks: 1 — subfossil *C. grylle* from Spitsbergen, 2 — *C. g. grylle* (Baltic), 3 — *C. g. mandti* (Spitsbergen), 4 — *C. g. arcticus* (W. Greenland), 5 — *C. g. atlantis* (Kola Pen), 6 — *C. g. islandicus* (Iceland), 7 — *C. columba snowi* (Kuriles), 8 — *C. carbo*, 9 — *Plautus alle*, 10 — *Fratercula arctica*, 11 — *Alca torda*, 12 — *Uria aalge*, 13 — *Uria lomvia*

fragment on the background of 3 recent species of North Atlantic auks of the similar size are given in Table II. The studied fragment is larger than the bones of Little Auk and a little smaller than the bones of Black Guillemot and Puffin. It differs however distinctly from the latter having a higher percentage index of the bone shaft thickness to its width (analogous to that calculated for humerus) — in Puffins the bones are more flat. Slightly smaller sizes and especially the width of the articular part of subfossil bone fragment than in recent Black Guillemots may be connected, like in the case of humerus, with the young age of the bird.

The systematics of *Cephus grylle* is a subject of many controversies. First of all, Pacific forms (*columba*, *kajurka* and *snowi*) encountered by Russian authors (DEMENTEV et al., 1951; KARTASCHEW, 1960) as the subspecies of *Cephus grylle*, are by VAURIE (1965) and then by GLUTZ AND BAUER (1982) recognized as separate species *Cephus columba* PALLAS 1811. Besides the nominate form *C. g. grylle* (LINNAEUS 1758) from the Baltic and *C. g. islandicus* HERRING 1937 from Iceland, the numbers and systematics of the other subspecies in the North Atlantic vary in works of the above mentioned ornithologists. The series of bones measured, presented in this paper are too small for statistical studies. Looking at Fig. 2. we see that the humera of birds from Spitsbergen (*C. g. mandti*) are so different from those of birds inhabiting Western Greenland

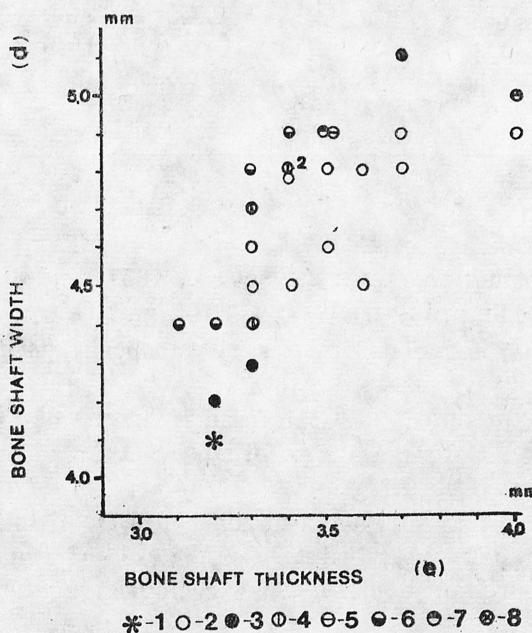


Fig. 3. The ratio of the width (d) to the thickness (e) of the humerus shaft in different subspecies of the genus *Cephus*: 1 — subfossil *C. grylle* from Spitsbergen, 2 — *C. g. grylle* (Baltic), 3 — *C. g. mandti* (Spitsbergen), 4 — *C. g. arcticus* (W. Greenland), 5 — *C. g. atlantis* (Kola Pen.), 6 — *C. g. islandicus* (Iceland), 7 — *C. columba snowi* (Kuriles), 8 — *C. carbo*

Table II

Comparison of the measurements (in mm) of the ulna of subfossil Black Guillemot from Spitsbergen with those of recent Atlantic auks corresponding to it generally in size. The manner of measuring is shown in Fig. 1B

Species and proveniention	Collection number*	Measurements as in Fig. 1B			Index: $\frac{h \times 100}{g}$
		f	g	h	
<i>Cephus grylle</i> subfossil		5.6	3.8	2.8	73.7
Recent birds:					
<i>Cephus g. grylle</i> (Baltic)	A/2054/69	6.6	4.2	2.9	69.0
	A/2164/70	6.8	4.5	3.1	68.9
	A/2181/70	6.9	4.9	3.3	67.3
	A/2214/70	6.6	4.6	3.2	69.6
	A/2418/71	6.7	4.7	3.2	68.1
	A/2434/71	6.6	4.4	3.1	70.4
	A/2435/71	6.8	4.2	3.1	73.8
	A/2436/71	6.5	4.5	3.2	71.1
	A/2437/71	6.6	5.0	3.3	66.0
	A/2780/73	6.6	4.7	3.3	70.2
<i>Cephus g. mandti</i> (Spitsbergen)	BM. 1895.3.2.3	6.5	4.1	2.9	70.7
	BM. 1895.3.2.4	7.0	4.4	3.1	70.4
<i>Fratercula arctica</i> (France)	A/2775/73	6.3	4.6	2.9	63.0
(British Is.)	BM. 1911.6.2.3	6.2	4.5	2.7	60.0
	BM. S/1973.66.92	6.6	4.9	2.8	57.1
<i>Plautus alle</i> (Spitsbergen)	A/3766/80	4.6	2.8	2.0	71.4
	A/3995/83	4.6	3.3	2.1	63.6

* See foot-note below Table 1.

(*C. g. ultimus* according to DEMENTEV et al., 1951, and KARTASCHEW, 1960, or *C. g. arcticus* according to SALOMONSEN, 1944, and GLUTZ and BAUER, 1982) that they can not be included to the same subspecies as it was proposed by VAURIE (1965).

According to BRODKORB (1967) the fossil remnants of *Cephus grylle* come from two localities in Europe and two others in Canada. And so Hornsund in Western Spitsbergen is the fifth one.

There are not any relations between the bones from Spitsbergen and those ones by HOWARD (1982) described as *Cephus olsoni* from Late Miocene of California because of morphological and geological age differences as well.

I'd like to express my best thanks to Dr Lech STEMPNIEWICZ of Gdańsk University, for delivering the described bones to the collection of the Institute of Systematic and Experimental Zoology, Polish Academy of Sciences in Kraków as well as the recent comparative material of Little Auk. I also would like to

thank very much Dr. Knud ROSEN LUND of the Zoological Museum in Copenhagen for sending me the measurements of the bones of Black Guillemots from Iceland and Western Greenland.

Institute of Systematic and Exp. Zoology,
Polish Academy of Sciences,
31-016 Kraków, Sławkowska 17, Poland

REFERENCES

- BRODKORB P. 1967. Catalogue of fossil birds. Part 3 (*Ralliformes, Ichthyorniformes, Charadriiformes*). Bull. Florida State Mus., Gainesville, **11**: 99—220.
- DEMENTEV G. P. et al. 1951. Дементьев Г. П. и др. 1951. Птицы Советского Союза. Сов. Наука, Москва, **2**.
- GLUTZ von Blotzheim U. N., BAUER K. M. 1982. Handbuch der Vögel Mitteleuropas. Bd **8/II** *Charadriiformes* (3. Teil). Akademische Verlagsgesellschaft, Wiesbaden.
- HOWARD H. 1982. Fossil birds from Tertiary beds at Oceanside, San Diego County, California, with descriptions of two new species of the genera *Uria* and *Cephus* (*Aves: Alcidae*). Contr. in Science Los Angeles, **341**: 1—15.
- KARTASCHEW N. N. 1960. Die Alkenvögel des Nordatlantiks. Die Neue Brehm-Bücherei., A. Ziemsen Verlag, Wittenberg Lutherstadt, **257**.
- SALOMONSEN F. 1944. The Atlantic *Alcidae*. The seasonal and geographical variation of the Auks inhabiting the Atlantic Ocean and the adjacent waters. Sjätte följd. Goteborg, B, **3** (5): 1—138.
- VAURIE Ch. 1965. The birds of the Palearctic fauna. *Non-Passeriformes*. Witherby, London.

STRESZCZENIE

W roku 1975, w rejonie fiordu Hornsund na Zachodnim Spitsbergenie zostały znalezione w żwirze bocznej moreny cofającego się lodowca 2 kości alki (k. ramieniowa i łokciowa). Kości te należały do młodego ptaka, a ich wiek geologiczny należy określić na Młodszy Holocen. Wymiary kości (Tabela I, II) i ich wzajemne proporcje, a szczególnie wskaźnik stosunku szerokości trzonka do jego grubości (ryc. 2 i 3) wskazują, że należały one do nurzyka podbielałego *Cephus grylle mandti*, który również dzisiaj występuje na Spitsbergenie.

