

Bird remains from the Mesolithic and Neolithic Site Dudka, Masuria, NE Poland

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Abstract. 230 bird bones representing at least 36 taxa were found among the 129 300 remains accumulated in the fishing camp Dudka between the years BP 11,200 and 3,800. Most of the birds belonged to water-and-marsh species. *Mergus albellus*, *Tadorna tadorna* and cf. *Nycticorax nycticorax* are species new to the subfossil fauna of Poland. Most of the bird bones are dated to the Paraneolithic Zedmar culture and the Neolithic of the late Atlantic and the early Subboreal period (5,600 – 3,800 BP). Bones of the pectoral girdle made up 76% of the identified remains. The archaeological context indicates that the birds were hunted by people inhabiting the island; most of the species belong to game. The absence of *Lagopus* remains is noteworthy. Ten bones were recovered from graves and two were found as polished beads, this indicating that birds were used not only for food.

Key words: bird bones, *Mergus albellus*, *Nycticorax nycticorax*, *Tadorna tadorna*, Mesolithic, Neolithic, Zedmar culture, Dudka, Masuria, NE-Poland.

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I. INTRODUCTION

The material analysed comes from archaeological excavations on the island of Dudka, Masurian Lakeland, Poland. The site is well known in terms of the vegetation succession (on the island and in the littoral zone), sedimentation, water level fluctuations, as well as human activities including nature of settlement, seasonality, and economy (GUMIŃSKI 1995, 1999, in press, GUMIŃSKI & MICHNIEWICZ 2002, NALEPKA 1995). Bone remains of fish and mammals (including a small number of domesticated animals) were also analysed and partly published (GUMIŃSKI 1995, 1997, 1998). With the exception of several papers on avian remains from the Middle Ages (KRYSIK 1956, WALUSZEWSKA-BUBIEŃ 1977, NOGALSKI & KOSIŃSKA 1991, 1993) and one bone from the Iron Age (KRYSIK 1958), nothing is known on the birds living in the north-eastern part of Poland in the past (BOCHEŃSKI 1993). Similarly, little is known on avian remains from nearby Lithuania (DAUGNORA et al. 2002) or Stone Age sites from northern Poland dated to the Late Atlantic chrono-

zone (BOGUCKI 1981, ILKIEWICZ 1989). Contrary to archaeological sites in southern Poland, in 15,200 BP Dudka was still situated within the range of the last advance of the ice-sheet (MOJSKI 1993). The present paper provides data on the origin of the avifauna in northern Poland after the retreat of the ice sheet, and enriches our knowledge of the people inhabiting the island at those times.

II. LOCALITY

Dudka is situated in an extensive peat-bog called Staświńskie Łąki (Staświny Meadows), which are the remains of a dried-up and overgrown lake, in the centre of the Masurian Lakeland of Poland (Fig. 1). Formerly (during the Stone Age), this was one of the largest lakes in that district. The lake covered about 25 sq. km but was relatively shallow (mean depth 2.5-4.0 m), with a maximum depth of 9 m. The archaeological site is situated on a flat island; the nearest shore being about 500 m away. The island was about 15 hectares, and its height did not exceed 2 m above the peat bog. The assemblages under study began accumulating after the period of a rapid retreat of the glacial ice sheet, which had receded from the Masurian region about 4000 years earlier. The glacial reached the mid Baltic Sea during the Allerød (Fig. 1). The lake surrounding the island was certainly of post-glacial origin. As the ice retreated, vegetation appeared and developed, and various animals, including birds, inhabited the area.

The island interior was covered by forest from the Late Preboreal, but some woods already occurred there during Allerød. The western, and particularly the north-eastern, shores were sparsely overgrown while the south-eastern shore was heavily overgrown with reeds from the beginning of the Atlantic and had already changed to marshy woodland by the end of the period. Human activity in the island interior is dated to the Early Subboreal, i.e. during the Middle and Late Neolithic. The island was periodically settled as a seasonal, mainly fishing, campsite in spring and (except during the Late Neolithic) early autumn and probably also in summer (GUMIŃSKI 1999, GUMIŃSKI & MICHNIEWICZ 2002).

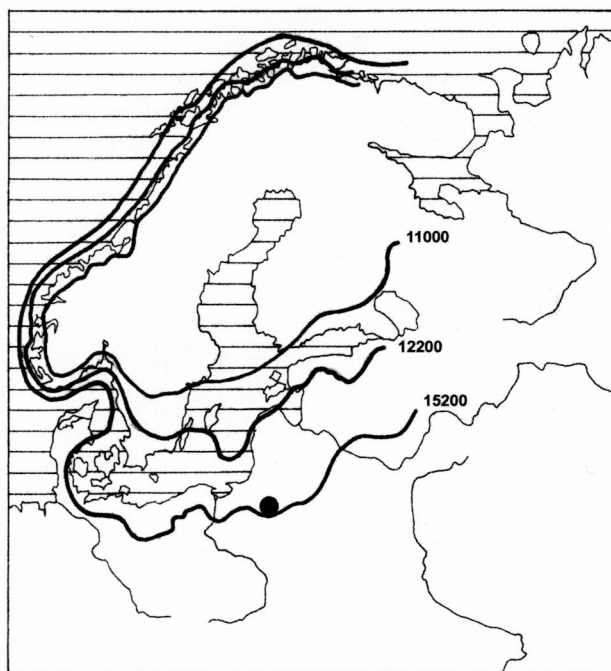


Fig 1. Localization of Dudka. Black dot – Dudka; heavy line – extend of the Scandinavian icecap.

III. MATERIAL AND METHODS

Bone remains were collected from twelve archaeological trenches covering a total area of 771 sq. meters in the period 1985-2000. Each layer was attributed to a particular climatic period from the Allerød up to the Middle Subboreal and to particular archaeological periods from the Late Palaeolithic until the end of the Neolithic (GUMIŃSKI 1995; 1999).

Animal bones were collected from each trench, level and layer separately by picking visible bones and sieving all excavated soil. Sieves had a 3 or 4 mm mesh. 129,300 animal bones and their fragments were recovered, including 91,300 game (and some domestic) large mammals, 34,770 fishes, 1,100 tortoises, 1,900 microfauna (small rodents, insectivores, amphibians, reptiles and unidentified small remains) and 230 birds. Bones, like the archaeological artefacts, occurred very irregularly. There were almost no bones in trenches in the island interior (covering more than 100 sq. m).

III. RESULTS

Of the 230 bird remains identified at Dudka, 12 were definitely connected with human activities because they were recovered from graves or were modified by man. The total number of bird bones was probably somewhat larger because small fragments with no diagnostic characters were excluded from further analysis (they could have belonged to birds or other vertebrates). The material accumulated at various rates, depending on the period. Layers dated to the years 12,000 – 5,600 BP yielded only 32 (about 14%) remains. Most bird bones were recovered from assemblages dated to 5,600 – 3,800 BP, i.e. from the Paraneolithic Zedmar culture and later Neolithic that lasted from the late Atlantic to the beginning of the middle Subboreal (Table I). The remains included at least 36 avian taxa, mostly of the order Anseriformes (Tables I and II).

Table I

Distribution of bird taxa in particular climatic periods and corresponding archaeological periods of Dudka. Archaeological periods: Neol – Neolithic, Zed – Zedmar. Climatic periods: AL – Allerød, PB – Preboreal, BO – Boreal, AT – Atlantic, SB – Subboreal; e. – early, m. – middle, l. – late. The first number in a column refers to the number of identified specimens (NISP), the second refers to the minimum number of individuals (MNI) in a given layer. * – Remains may belong to individuals identified to species level; Shaded background – at least one bone belonged to a young individual

Archaeological periods	Late Palaeolithic		Mesolithic						Neolithic				Total NISP/MNI
	Climatic periods		Early Mesolithic			Late Mesolithic			e. Zed	Zed	l. Zed	l. Neol	
	AL	e.PB	l.PB	e.BO	l.BO	e.AT	m.AT	~AT	l.AT	AT/SB	e.SB	e/mSB	
Years (BP)	12000-11000	10200-9700	9700-9000	9000-8500	8500-8000	8000-7000	7000-6000	8000-5000	5600-5100	5100-4700	4700-4200	4200-3800	
Taxa													
1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Gavia arctica</i> (LINNAEUS, 1758) Black-throated Diver									1/1		1/1		2/2
<i>Podiceps cristatus</i> (LINNAEUS, 1758) Great Crested Grebe										2/1			2/1
<i>Podiceps grisegena</i> (BODDAERT, 1783) Red-necked Grebe/ <i>Podiceps cristatus</i>												1/1	1/1

Table I cont.													
1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Phalacrocorax carbo</i> (LINNAEUS, 1758) Great Cormorant	3/1												3/1
<i>Ardea cinerea</i> LINNAEUS, 1758 Grey Heron						1/1				1/1			2/2
<i>Botaurus stellaris</i> (LINNAEUS, 1758) Eurasian Bittern								1/1		2/1			3/2
cf. <i>Nycticorax nycticorax</i> (LINNAEUS, 1758) Black-crowned Night Heron											2/2		2/2
<i>Anser anser</i> (LINNAEUS, 1758) Greylag Goose		3/2									1/1		4/3
<i>Anser</i> sp.		1*											1*
<i>Tadorna tadorna</i> (LINNAEUS, 1758) Common Shelduck											2/1		2/1
Anseriformes (<i>Tadorna/ Somateria</i> sp.)										2/1	2/1		4/2
<i>Anas platyrhynchos</i> LINNAEUS, 1758 Mallard									7/2	12/4	5/3	8/2	32/11
Anatinae indet (<i>Anas/Aythya/Bucephala</i> sp.)			2/2		1/1	1/1	1/1	1/1	2*	20*	10*	12*	50/6
<i>Anas querquedula</i> LINNAEUS, 1758 Garganey/ <i>Anas crecca</i> LINNAEUS, 1758 Teal						1/1				5/2	2/1	1/1	9/5
<i>Anas clypeata</i> LINNAEUS, 1758 Shoveller										3/1	1/1		4/2
<i>Aythya ferina</i> (LINNAEUS, 1758) Common Pochard										1/1			1/1
<i>Aythya ferina</i> / <i>Aythya marila</i> (LINNAEUS, 1761) Greater Scaup				1/1									1/1
<i>Mergus albellus</i> LINNAEUS, 1758 Smew			1/1							3/2	1/1	1/1	6/5
cf. <i>Mergus albellus</i>									1/1	3*	1/1		5/2*
cf. <i>Mergus merganser</i> LINNAEUS, 1758 Goosander										2/2			2/2
medium-size Falconiformes (<i>Buteo, Accipiter, Circus</i>)										1/1		1/1	2/2
<i>Pandion haliaetus</i> (LINNAEUS, 1758) Osprey						1/1							1/1
<i>Aquila</i> sp. unidentified Eagle											1/1		1/1
<i>Falco</i> sp. [Kestrel size]												2/1	2/1
<i>Tetrao tetrix</i> LINNAEUS, 1758 Black Grouse										1/1		1/1	2/2
<i>Tetrao urogallus</i> LINNAEUS, 1758 Capercaillie									1/1	2/1			3/2

Table I cont.														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
<i>Grus grus</i> (LINNAEUS, 1758) Common Crane											1/1		1/1	
<i>Fulica atra</i> LINNAEUS, 1758 Coot								2/1		2/1	2/1		6/3	
<i>Crex crex</i> (LINNAEUS, 1758) Corncrake									3/1	1/1			4/2	
<i>Vanellus vanellus</i> (LINNAEUS, 1758) Lapwing												1/1	1/1	
<i>Scolopax rusticola</i> LINNAEUS, 1758 Woodcock										3/1	2/1		5/2	
cf. <i>Scolopax rusticola</i>										1*			1*	
<i>Pluvialis squatarola</i> (LINNAEUS, 1758) Grey Plover										1/1			1/1	
<i>Tringa</i> sp. size of <i>T. nebularia</i> (GUNNERUS, 1767) Greenshank									1/1				1/1	
cf. <i>Columba oenas</i> LINNAEUS, 1758 Stock Pigeon											1/1		1/1	
<i>Strix aluco</i> LINNAEUS, 1758 Tawny Owl										1/1			1/1	
<i>Strix uralensis</i> PALLAS, 1771 Ural Owl				1/1			1/1				1/1		3/3	
<i>Asio flammeus</i> (PONTOPIDDAN, 1763) Short-eared Owl/ <i>Asio otus</i> (LINNAEUS, 1758) Long-eared Owl									1/1				1/1	
<i>Dendrocopos major</i> (LINNAEUS, 1758) Great Spotted Woodpecker											2/1		2/1	
<i>Corvus corone</i> LINNAEUS, 1758 Carrion Crow				1/1						1/1	2/1		4/3	
<i>Garrulus glandarius</i> (LINNAEUS, 1758) Jay										2/1	1/1		3/2	
<i>Turdus iliacus</i> LINNAEUS, 1766 Redwing / <i>T. philomelos</i> C.L.BREHM, 1831 Song Thrush										2/1	1/1		3/2	
<i>Turdus viscivorus</i> LINNAEUS, 1758 Mistle Thrush								1/1					1/1	
<i>Turdus viscivorus</i> / <i>T. pilaris</i> LINNAEUS, 1758 Fieldfare										1/1			1/1	
Aves indet		1*		3*			3*		2*	16* ¹	12*	7*	44*	
Total	NISP	3	5	3	6	1	4	5	5	19	90	54	35	230
	MNI	1	2	3	3	1	4	2	4	7	28	23	9	87

¹Two bones (one of a large bird, the other of a medium-size bird) were polished beads.

Table II

Number of identified specimens (NISP) collected in Dudka (remains from graves as well as beads not included)

Taxa	Scapula	Coracoid	Humerus	Ulna	Radius	Carpometacarpus	Femur	Tibiotarsus	Tarsometatarsus	others ²	Total
Gaviiformes/Podicipediformes/ <i>Phalacrocorax</i>		1		1	1	1			1	3	8
Ciconiiformes/Gruiformes/ Charadriiformes		7	2	1		2	1	4	3	3	23
Anseriformes	9	30	16	15	15	19	1	6	2	4	117
Falconiformes/ Strigiformes	1			2		1	1	1	2	3	11
Galliformes		1		1					2		4
<i>Columba/Dendrocopos</i> / Passeriformes		3	2	7		2		1			15
Aves indet.			3	2	1	1		5	2	8	22
	Unidentifiable fragments of long bones										18
Total	10	42	23	29	17	26	3	17	12	21	200+18 ³
	Elements of axial skeleton 52+14 (see: Footnote 2)		Wing elements 95 + 1 (wing phalanx of the category „others”)				Leg elements 32 + 6 (phalanges of the category „others”)				200+18 ³

²2 rostra, 1 skull, 1 mandible, 1 quadratum, 2 furculae, 6 vertebrae, 1 pelvis, 1 wing phalanx, 2 leg phalanges, 4 ungual phalanges

³unidentifiable fragments of long bones

Several bones were not fully ossified, and therefore belonged to young individuals. They represented the order Anseriformes (4 bones), Coot (1), Ural Owl (1), and an-unidentified species of medium size (1).

Although the remains represent various parts of the skeleton, most of them came from the pectoral girdle (76%); leg elements made up only 15-20% of the material (Table II). Of the limb bones 71% were wing elements (humeri, ulnae, carpometacarpi) compared with 29% leg elements (femora, tibiotarsi, tarsometatarsi).

Two unidentified fragments of long bones from which beads were made, and 10 bones buried in graves represent remains associated directly with human activities. These remains represent at least 6 taxa (Table III). Also, traces of burning were found on a few bones.

IV. REMARKS

Most species identified are connected with water or marshy habitats, reed-beds and wet meadows. They include diving birds and those feeding on open waters (*Gavia arctica*, *Podiceps cristatus/grisegena*, ducks of the genus *Aythya* and *Mergus albellus*). They may have been caught on the nest (it is easy to catch a bird sitting on eggs and defending the nest) or netted. Netting was confirmed at Dudka from the middle Atlantic period and was intensively used during the Zedmar culture (GUMIŃSKI 1995, 1998, 1999).

Table III

Bones recovered from graves, and those modified by man (Abbreviations as in Table I)

No	Number of grave	Period	Taxa	Element	Comments
1	VI-6	AT/SB Zedmar ?	<i>Tetrao urogallus</i>	Carpometacarpus left dist	female size of <i>Anas platyrhynchos</i>
2			cf. <i>Mergus albellus</i>	Coracoid left prox	
3			Avis indet.	Humerus shaft	
4	VI-7	~ AT Mesolithic ?	<i>Botaurus stellaris</i>	Tibiotarsus left, shaft	
5			<i>Fulica atra</i>	Leg phalanx, whole	
6			<i>Fulica atra</i>	Leg phalanx, whole	
7	VI-10	AT/SB, Zedmar?	<i>Anas/Aythya/Bucephala</i>	Ulna, right, shaft	
8	VI-13	AT/SB, Zedmar	<i>Fulica atra</i>	Tarsometatarsus left, distal	subadult (porous)
9			Avis indet.	Fragment of long bone	deformed; bird larger than <i>Fulica atra</i>
10	VI-16	e.SB, l. Zed.mar?	<i>Strix uralensis</i>	Tibiotarsus left, distal	
11		AT/SB, Zedmar	Avis indet.	Fragment of long bone	bead length 21.7, ø 13.6 mm
12		AT/SB, Zedmar	Avis indet.	Tibiotarsus dext	bead length 9.0, ø 6.7 mm

Birds of prey, owls, passerines and pigeons need trees (but not necessarily large woodlands) for living, and trees were present on the island throughout the period of bone accumulation (GUMIŃSKI 1995, GUMIŃSKI & MICHNIEWICZ 2002). A wooded island surrounded by peat bog provides good lek sites and breeding habitat for the Black Grouse. Capercaillie, whose remains are present in the material, need larger areas for breeding than the whole island. Therefore it did not belong to the breeding fauna of Dudka and either occurred on the island beyond the breeding period or were hunted on the mainland and then transported to the island. The presence of incompletely ossified remains of *Anas platyrhynchos*, *Fulica atra* and *Strix uralensis* indicates that the birds died in summer or autumn.

The majority of the species identified at Dudka (Table I) belong to the breeding modern avifauna of NE Poland (TISCHLER 1941, TOMIAŁOJĆ 1990). The breeding areas of the two species do not reach Poland – that of *Pluvialis squatarola* is situated in northern Russia. *Mergus albellus*, however, reduced its wide distribution in east Europe as late as in last centuries (DEMENTEV & GLADKOV 1952) and there is still remnant breeding population in Belarus (HAGEMEIJER & BLAIR 1997). Both species are regularly recorded in the Masurian district during migrations (TOMIAŁOJĆ 1990) and they could have nested there in the Holocene.

With the exception of *Mergus albellus*, *Tadorna tadorna*, and cf. *Nycticorax nycticorax*, the remaining species are known from other archaeological sites in Poland (BOCHEŃSKI 1993, BOCHEŃSKI & TOMEK 2000). Thus, *Mergus albellus*, *Tadorna tadorna* and probably also *Nycticorax nycticorax* (uncertain identification) are new species for the fossil fauna of Poland. Most species recorded from Dudka have been recorded from older sites in Poland (the late Palaeolithic or older periods of the Pleistocene); species recorded from younger sites include only *Phalacrocorax carbo*, *Podiceps cristatus*, *Ardea cinerea* and *Columba oenas*, known so far only from the Late Holocene or Middle Ages (BOCHEŃSKI 1993).

The small number of remains (230) and long period of their accumulation (about 7500 years – Table I) does not allow any far-reaching taphonomic conclusions. On the one hand, the predomi-

nance of wing elements over the leg bones (Table II) is similar to results interpreted by ERICSON (1987) and MOURER-CHAUVIRÉ (1983) as being from assemblages accumulated without human influence, i.e. in the natural way or by predators. In particular, the small share of the femur (1.3%) in the present material suggests that the bird remains might be of non-human origin because the femur is usually much better represented in human food remains (MOURER-CHAUVIRÉ 1983, MAKOWIECKI & GOTTFREDSSEN 2002). On the other hand, the archaeological context (GUMIŃSKI 1999) suggests that the bones are remains of food or other human activities. Some of the bones have traces of burning, and judging by their size and musculature, most of the species were good enough for hunting and eating. Birds of similar size, often representing the same species, were hunted by man in the Netherlands and Finland during the Mesolithic (WIJNGAARDEN-BAKKER 2002, MANNERMAA 2002), and the oldest written sources count the species noted in Dudka among the game birds of Poland (CYGAŃSKI 1841, KUROWSKI 1865, TACZANOWSKI 1882). The absence of small birds (i.e. passerines) supports the assumption that the remains were left at Dudka by hunters. In mosaic habitats, such as that present on the island during the accumulation of the bird remains (GUMIŃSKI 1999), passerines must have been common and numerous. At sites of similar age from southern Poland, where the material was deposited as owl pellets (Nad Mosurem Starym Duża Cave – NADACHOWSKI et al. 1989; Duża Sowa Cave – BOCHEŃSKI & TOMEK 1991; Obłazowa Cave – TOMEK & BOCHEŃSKI 1995; Krucza Cave, Komarowa Cave – unpublished materials), passerines are numerous – in terms of the number of bones and species. The lack of passerines' remains can be interpreted as the result of using sieves with too large a mesh, but on the other hand numerous small fragments of fish, amphibians, and mammals were collected at Dudka (GUMIŃSKI 1995, 1998).

Interestingly, the remains contain few galliform bones, and what is even more noteworthy, there are no representatives of the genus *Lagopus*. The latter remains belong among the most numerous at archaeological sites from the late Pleistocene of Europe (TYRBERG 1995). The absence of *Lagopus* remains may indicate that the people camping on the island were little interested in hunting birds (the number of bird remains was drastically smaller than that of mammals and fish). Alternatively, it could be due to the absence of *Lagopus* in the region. Fossil and subfossil birds of north-east Poland, Belarus and Lithuania are poorly studied (BOCHEŃSKI 1993; TYRBERG 1995, 1998, DAUGNORA et al. 2002) which may explain that *Lagopus* remains from the late Pleistocene and early Holocene are not known from there. However, according to TYRBERG (1995), the absence of the *Lagopus* species in north-east Europe during that period may be due to the changes of habitat that followed the retreating ice-sheet.

Besides birds that were probably eaten by people, Dudka yielded also the remains of traditionally non-hunted species (CYGAŃSKI 1841, KUROWSKI 1865, TACZANOWSKI 1882). They include birds of non-tasty meat such as owls (*Strix, Asio*), *Fulica atra* and *Botaurus stellaris*. Remains of the latter two species were found in graves (Table III) which may indicate a symbolic meaning. Black plumage (*Fulica atra*) and birds with loud voices calling at night (*Botaurus stellaris, Nycticorax nycticorax* and *Strix uralensis*) may also point to a symbolic meaning. Similarly black *Phalacrocorax carbo* was found in a grave from Middle Neolithic Pitted Ware Culture at Ajvide, Gotland (GUSTAFSSON 1992). Black colour and animals of the night, have been associated with the world of the dead and the death in many cultures (COOPER 1992).

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Errata

”Bird remains from the Mesolithic and Neolithic Site Dudka, Masuria, NE Poland” by T. TOMEK and W. GUMIŃSKI (2003). *Acta zoologica cracoviensia* **46**(1): 9-18.

The data concerning three taxa in Table I (page 13) should be corrected as follows:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Fulica atra</i> LINNAEUS, 1758 Coot								2/1		2/1	2/1		6/3
<i>Strix uralensis</i> PALLAS, 1771 Ural Owl				1/1			1/1				1/1		3/3
Aves indet		1*		3*			3*		2*	16* ¹	12*	7*	44*

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