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Fulica atra pontica subsp. n. from the Middle Holocene on the South Black Sea Coast, Bulgaria

Zlatozar BOEV, Elena KARAIVANOVA

Introduction

The coot is represented in the recent avifauna of Bulgaria by the nominate subspecies *Fulica atra atra* Linnaeus, 1758, spread in the Palearctic up to the Hindustan Peninsula.

Eleven recent species have been included in the genus *Fulica* Linnaeus, 1758. America is considered the center of speciation, where 9 species are distributed, 6 of them endemic for the southern and western regions of South America (TAYLOR, 1996).

Description of the site

The site (UTM code NG 59) is a submerged prehistoric settlement in the Sozopol Bay (the Bulgarian Black Sea Coast), NE of the town of Sozopol, now submerged at 12 m depth.

The site is dated back to the end of the Eneolithic period (end of 7th - early 6th millenium B.P.) - Early Bronze Age (4800-4400 B.P.) (SPASSOV & ILIEV, 1995). It was studied in the underwater excavations, organized by Dr Mihail Lazarov (1987-1990) and the archaeologists Dr Vesselin Draganov and Dr Hristina Angelova. We received the avian material from Dr Lazar Ninov, Dr Georgi Ribarov, Dr Nikolay Spassov and Nikolay Iliev. N. Spassov has studied all the mammalian bone remains of the site.

Associated fauna. *Gavia arctica, Podiceps cristatus, Phalacrocorax carbo, Ardea cinerea, Anas querquedula, Anas platyrhynchos, Aythya nyroca, Fulica atra* (the last species was the most numerous game and it constituted over 52 % of the gamefowl after BOEV, 1995a); *Lepus capensis, Bos primigenius, Cervus elaphus, C. dama, Capreolus capreolus, Sus scrofa, Felis silvestris, Vulpes vulpes, Meles meles, Equus gmelini, Panthera leo, Tursiops truncatus, Delphinus delphis, Phocaena phocaena, Monachus monachus, Thunnus thunnus, Scomber* *scombrus*, *Cyprinus carpio*, *Testudo graeca* and *Emys orbicularis*. Among the domestic animals are: *Bos taurus*, *Ovis aries*, *Capra hircus*, *Sus scrofa domestica*, *Canus familiaris* and *Equus caballus* (RIBAROV, 1991; SPASSOV & ILIEV, 1995; G. Ribarov - unpubl. data).

Climatic data: The climate of the region is temperate. The average annual temperature is 13,3^{0} C and the average annual amplitude of temperature is 20,6^{0} C. The precipitation maximum is in autumn, while the precipitation minimum is in summer. The winter in the region is the warmest one for the country and the January average temperature is + 3,2^{0} C (MISHEV et al., 1989).

Ecobiogeographical characterization of *Fulica atra*

Fulica atra is a partly resident, partly migratory species. It nests from the boreal to the subtropical zone in larger water bodies, avoiding freezing waters. It winters in open parts of the sea shore (HARRISON, 1982). The coot is the most aquatic of all West-Palearctic rails. It prefers shallow water for diving and sufficient space giving the opportunity for running on the water surface in the taking off. It tolerates the wind and the waves in the sea. It is considered a lowland species, but nevertheless it inhabits suitable habitats up to 1100 m a.s.l. in the Alps (CRAMP & SIMMONS, 1980). An ancient species of Miocene (i.e. of Pliocene, following more recent views) origin. It has spread northward and northeastward from the southern coastal regions of Eurasia after the Pleistocene (VOINSTVENSKIY, 1960).

A common and numerous resident (in South Bulgaria), breeding migratory species. Inhabits both salt and fresh wetlands in the lowlands and plains throughout the country. The Balkan population prefers water basins with dense aquatic vegetation. Before the drastic destruction of the suitable habitats along the Danube River banks and the Black Sea shore it was still numerous and widely used as gamefowl (MICHEV, 1990).

Fossil and subfossil record of *Fulica atra*

Several dozens of quaternary localities of the species are known from the world literature. They were summarized for the first time by BRODKORB (1967), who reported on the Pleistocene-Holocene distribution of *F. atra* in Ireland, England, Wales, Italy, Switzerland, and Azerbaijan.

Many data for the Quaternary finds of the species may be drawn from the more recent literature:

Pleistocene: the middle and lower streches of the rivers Dniepr, Don and Ural (VOINSTVENSKIY, 1960); from the interstadial Wurm 2-3 to the Atlantic period -

25 340 to 10 830 B.P. in the Shandaja Cave in Croatia (MALEZ-BACIC, 1979); Epipaleolithic (Natufian) of Mallaha in Palestine (PICHON, 1987); Middle Pleistocene in Prezletice in Czechia (JANOSSY, 1983a); Lower Pleistocene in the Velika Pecina Cave in Croatia (MALEZ-BACIC, 1975); Middle-Late Villafranchian in the Sandalija 1 Cave and of Late Pleistocene (Wurm 2) in the Sandalija 2 Cave in Croatia (MALEZ-BACIC, 1979); La Fage in France, Grimaldi in Italy and Istallosko in Hungary (MALEZ-BACIC, 1979); Late Pleistocene and Eneolithic in the Velika Pecina Cave in Croatia (MALEZ, 1975); Pleistocene of Crete (WEESIE, 1988); Early Pleistocene in Norfolk in England (HARRISON, 1985); Wurm 3 (28 000 B.P.) to Postglacial (ca. 4000 B.P.) in a number of sites in S France and Catalonia in Spain (VILETTE, 1983); Late Paleolithic (14 570 - 11 380 B.P.) in Cueva de Nerja in Spain (HERNANDEZ, 1995); Late Pleniglacial ca. 33 000 B.P. in the Oblazowej Cave in Poland (TOMEK & BOCHENSKI, 1995); Middle and Late Pleistocene of Corsica and Crete (ALCOVER et al., 1992); final of Wurm 3 (20 000 B.P. - middle of Wurm 4 (12 500 B.P.) in Arene Candide in S Italy (CASSOLI, 1980); Late Pleistocene in Grotta di Cala Genovesi, Levanzo (CASSOLI & TAGLIACOZZO, 1982) and Grotta della Madonna, Calabria in Italy (CASSOLI, 1992) and Paleolithic in the Alimovskiy Naves Cave in Crimea (BARYSHNIKOV & POTAPOVA, 1992).

Holocene: Holocene of middle and lower streches of the rivers Dniepr, Don and Ural (VOINSTVENSKIY, 1960); the Russian town of Voin' in the Middle Ages in Poltava Region (SERGEEV, 1965); the settlement of Russeshti from the 4th millenium B.C. (GANYA, 1972); Subatlantic period in Baile 1 Mai in Romania (KESSLER, 1985); Late Pleistocene in the lower Nil Valley in Egypt (GAUTIER, 1988); Early Paleolithic of Grotta dei Fanciulli in Balzi Rossi in Italy (CAMPANA, 1946); Late Pleistocene in Torre in Pietra in Italy (CASSOLI, 1978); 1350-1520 A.D. in London (BRAMWELL, 1975);

Quaternary finds of *Fulica atra* in Bulgaria

Besides the locality of Sozopol, 6 other Quaternary sites (Fig. 1) of *Fulica atra* are known in Bulgaria (BOEV, 1996 a, b; 1997). All finds originate from the Holocene deposits and are kept at the National Museum of Natural History in Sofia (NMNHS):

- Urdoviza near the village of Kiten, Burgas Region. Early Bronze Age (3000-2000 B.C.): humerus dex., NMNHS 1099; humerus dex. - NMNHS 4416 (BOEV & RIBAROV, 1990);

- Yayla near Albena Resort, Dobrich Region. ? Middle Holocene: ulna sin. prox., NMNHS 631;

- Topchii Village, Razgrad Region. Early Holocene: carpometacarpus sin., NMNHS 1083; tibiotarsus dex. dist., NMNHS 1087; tbt dex. dist., NMNHS 3123; cmc dex. dist., NMNHS 3125.

- Durankulak, Dobrich Region. Late Holocene (1-4 century A.D.): humerus sin.,

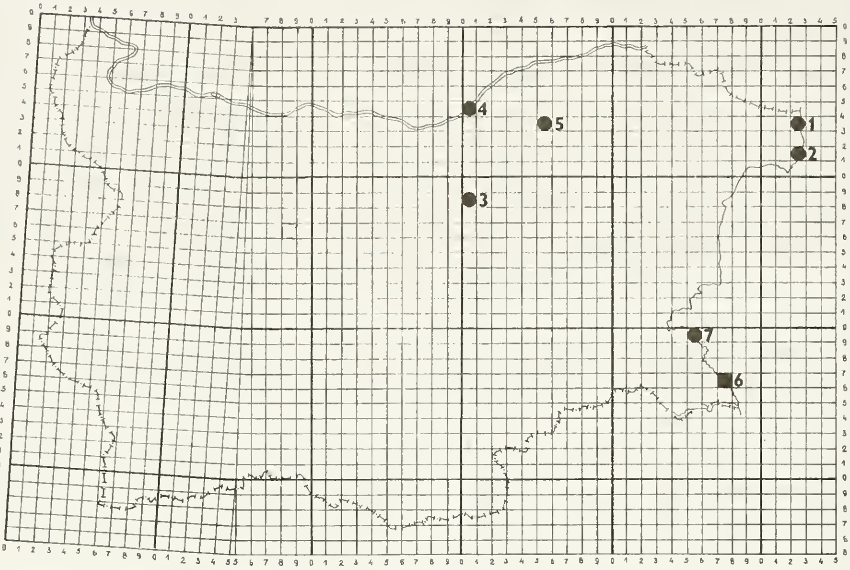

Fig. 1. Geographical location of Quaternary records of *Fulica atra* in Bulgaria: 1 - Durankulak; 2 - Yayla; 3 - Topchii; 4 - Ruse; 5 - Madara; 6 - Urdoviza; 7 - Sozopol

NMNHS 1426.

- Madara, Varna Region. Early Holocene: cmc dex., NMNHS 3927;
- Ruse, Late Holocene: cmc sin., NMNHS 2869; cmc dex. NMNHS 2870; ulna dex. dist., NMNHS 2871.

Material and methods

A total of 159 bones and bone fragments of Eneolithic coots have been studied.

According to their preservation, the bones were measured for a total of 65 osteometric features (Table 1): height of crista sterni from sulcus articulationis sternocoracoideae (1); height of crista sterni from manubrium sterni (2); length of coracoid to angulus medialis (3); minimum width of coracoid diaphysis (4); thickness of the minimum width of the coracoid diaphysis (5); length of the sternocoracoidal articular face from angulus medialis to angulus lateralis (6); diagonal length between angulus medialis and processus lateralis (7); acrocoracoid thickness (8); bow height of the sternocoracoidal articular face (9); minimum width of the articular face of the scapula (10); maximum width of the articular face of the scapula (11); length of the articular face of the scapula (12); humerus total length (13); width in the middle of the humerus diaphysis (14); minimum width of the humerus diaphysis (15); anterior height of the condylus ulnaris (16); height of the condylus ulnaris (17); width of the humerus distal epiphysis (18);

Table 1

Measurements of the skeleton of recent (R) and fossil (F) *Fulica atra* from SE Bulgaria

N of the feature	R/ F	N	x̄	SD	min	max
1	R	10	22.62	1.29	20.8	24.7
	F	4	21.65	0.34	21.2	22.0
2	R	10	19.53	1.22	17.9	21.8
	F	4	18.98	0.68	18.2	19.8
3	R	15	34.13	1.43	31.4	36.2
	F	7	34.37	1.74	31.4	37.3
4	R	19	3.99	0.46	3.2	5.0
	F	7	4.43	0.36	4.0	5.0
5	R	19	2.79	0.24	2.4	3.2
	F	7	2.96	0.45	2.5	3.9
6	R	18	10.72	0.67	9.2	11.9
	F	7	10.83	0.92	9.8	12.0
7	R	12	14.89	0.71	13.9	15.9
	F	3	15.60	1.75	13.8	17.3
8	R	24	4.13	0.39	3.4	4.9
	F	7	4.27	0.17	4.0	4.5
9	R	20	2.41	0.40	1.8	3.0
	F	7	2.81	0.23	2.4	3.0
10	R	17	2.24	0.33	1.3	2.8
	F	5	2.22	0.16	2.0	2.4
11	R	19	3.45	0.42	2.4	4.1
	F	6	3.68	0.88	1.9	4.3
12	R	18	9.48	0.65	8.8	10.5
	F	6	9.72	0.23	9.3	9.9
13	R	11	72.40	3.68	71.9	81.9
	F	6	76.83	1.72	74.0	79.0
14	R	11	4.59	0.28	4.2	5.0
	F	6	4.68	0.26	4.3	5.0
15	R	11	4.24	0.25	3.9	4.6
	F	8	4.36	0.18	4.1	4.6
16	R	18	2.68	0.30	2.2	3.0
	F	8	2.60	0.23	2.3	2.9
17	R	17	5.01	0.30	4.4	5.6
	F	8	5.14	0.31	5.5	4.5
18	R	18	9.72	0.30	9.1	10.0
	F	8	10.20	0.17	9.0	11.6
19	R	28	4.54	0.51	3.4	5.7
	F	7	4.53	0.20	4.2	4.8
20	R	22	13.84	0.85	12.7	15.2
	F	6	13.63	0.82	12.4	14.4
21	R	17	3.15	0.57	2.3	4.7
	F	8	3.21	0.06	3.1	3.3
22	R	13	67.48	3.44	63.0	74.0
	F	8	66.09	2.85	62.2	70.5
23	R	13	3.90	0.24	3.3	4.1

Table 1 (continuation)

N of the feature	R/ F	N	$\bar{x}$	SD	min	max
	F	8	4.00	0.17	3.9	4.4
24	R	16	8.16	0.55	7.0	9.0
	F	8	8.15	0.68	7.0	9.0
25	R	16	7.04	0.48	6.0	7.8
	F	8	7.11	0.51	6.2	7.9
26	R	33	5.87	0.60	4.9	7.9
	F	12	5.76	0.45	5.0	6.4
27	R	33	6.00	0.60	5.0	7.9
	F	12	5.72	0.40	5.0	6.0
28	R	33	6.65	0.39	6.0	7.9
	F	12	6.61	0.54	6.2	7.0
29	R	12	64.12	3.02	60.0	70.0
	F	5	62.38	2.90	59.0	66.1
30	R	12	2.14	0.22	2.0	2.6
	F	5	2.32	0.26	2.0	2.7
31	R	20	3.88	0.49	3.1	5.2
	F	8	3.74	0.47	3.0	4.6
32	R	20	3.21	0.37	2.9	4.0
	F	8	3.31	0.54	3.0	4.3
33	R	13	4.56	0.30	4.2	5.1
	F	6	4.68	0.35	4.1	5.0
34	R	13	2.78	0.21	2.5	3.2
	F	5	2.84	0.89	1.9	4.3
35	R	13	55.06	4.31	43.2	59.2
	F	3	58.40	1.25	57.0	59.4
36	R	13	4.27	0.66	3.2	5.4
	F	3	4.63	0.40	4.2	5.0
37	R	18	8.37	1.31	4.6	9.6
	F	4	8.80	0.91	7.5	9.6
38	R	21	4.07	0.52	3.0	4.8
	F	4	4.43	0.46	4.1	5.0
39	R	21	4.57	0.55	3.2	5.3
	F	4	5.07	0.29	4.9	5.5
40	R	19	10.40	1.30	7.8	12.0
	F	4	11.45	0.81	10.6	12.4
41	R	32	6.55	0.62	5.2	7.6
	F	4	7.32	0.13	7.2	7.5
42	R	32	9.81	0.91	7.4	11.3
	F	4	10.77	0.56	10.4	11.6
43	R	31	7.27	1.04	5.0	8.9
	F	4	8.47	0.62	8.0	9.3
44	R	32	6.71	0.68	5.2	7.9
	F	4	7.30	0.18	7.1	7.5
45	R	10	104.26	3.79	101.9	110.1
	F	5	106.00	0.84	104.9	106.7
46	R	10	4.71	0.26	4.5	5.0
	F	5	4.92	0.24	4.5	5.1

Table 1 (continuation)

N of the feature	R/ F	N	x̄	SD	min	max
47	R	11	3.95	0.24	3.5	4.1
	F	22	4.42	0.35	3.9	5.6
48	R	17	8.75	0.55	7.8	9.0
	F	25	9.20	0.56	7.3	9.9
49	R	25	7.42	0.64	5.8	8.2
	F	7	7.79	0.35	7.1	8.0
50	R	25	8.78	0.86	6.9	9.8
	F	7	9.09	0.33	8.5	9.4
51	R	25	10.89	1.42	7.9	12.7
	F	6	11.52	0.92	9.9	12.7
52	R	17	8.80	0.52	7.7	10.0
	F	28	8.84	0.57	7.8	9.9
53	R	17	8.15	0.46	7.2	9.0
	F	28	8.24	0.54	7.3	9.0
54	R	17	5.81	0.35	5.0	6.3
	F	28	6.17	0.40	5.5	7.5
55	R	17	8.74	0.69	7.0	10.0
	F	28	9.08	0.57	7.5	10.0
56	R	15	57.98	3.70	55.0	62.2
	F	7	61.24	1.50	59.0	62.5
57	R	15	3.67	0.32	3.2	4.2
	F	7	3.99	0.13	3.7	4.1
58	R	15	3.59	0.33	3.1	4.0
	F	13	3.78	0.26	3.2	4.1
59	R	16	9.10	0.84	7.2	10.0
	F	8	9.72	0.23	9.3	10.0
60	R	15	3.12	0.45	2.2	3.8
	F	11	3.37	0.35	3.0	3.9
61	R	17	8.69	1.08	6.2	10.0
	F	8	9.61	0.42	8.9	10.0
62	R	17	8.91	1.03	6.7	9.9
	F	9	9.30	0.47	8.5	10.0
63	R	17	4.28	0.59	2.7	5.0
	F	8	4.64	0.40	3.9	5.2
64	R	19	4.88	0.46	3.7	5.6
	F	11	5.16	0.28	4.8	5.6
65	R	16	5.31	0.66	4.2	6.3
	F	8	5.66	0.38	5.2	6.2

height of the caput humeri (19); width of the humerus proximal epiphysis (20); caudal height of the condylus ulnaris (21); total length of the ulna (22); width in the middle of the ulna diaphysis (23); width of the ulna proximal epiphysis (24); diagonal from the olecranon ulnae to the dorsal edge of the proximal epiphysis articular face (25); height of the distal ulna epiphysis (26); condylus height of the distal ulna epiphysis (27); diagonal of the ulna distal epiphysis (28); total length of the radius (29); width in the middle of the radius diaphysis (30); larger diameter of the radius proximal epiphysis (31); smaller diameter of the radius proximal epiphysis (32); width of the distal radius epiphysis (33); height of the distal radius epiphysis (34); total length of the femur (35); width in the middle of the femur diaphysis (36); trochanter major diameter (37); minimum width of the collum femoris (38); diameter of the caput femori (39); width of the femur proximal epiphysis (40); diameter of the condylus fibularis (41); maximum width of the distal femur epiphysis (42); diameter of the femur condylus medialis (43); diameter of the femur condylus lateralis (44); total length of the tibiotarsus (45); width in the middle of the tibiotarsus diaphysis (46); minimum width of the tibiotarsus diaphysis (47); width of the distal tibiotarsus epiphysis (48); minimum width of the proximal tibiotarsus epiphysis (49); maximum width of the proximal tibiotarsus epiphysis (50); length of the proximal tibiotarsus epiphysis (51); diameter of the tibiotarsus condylus medialis (52); diameter of the tibiotarsus condylus lateralis (53); minimum width of the trochlea tibiotarsi (54); maximum width of the tibiotarsus distal epiphysis (55); total length of the tarsometatarsus (56); width in the middle of the tarsometatarsus diaphysis (57); minimum width of the tarsometatarsus diaphysis (58); width of the tarsometatarsus distal epiphysis (59); width of the trochlea 3 of the tarsometatarsus distal epiphysis (60); width of the tarsometatarsus proximal epiphysis (61); height of the tarsometatarsus proximal epiphysis (62); height of the tarsometatarsus fovea medialis (63); diameter of the tarsometatarsus trochlea 3 (64); diameter of the tarsometatarsus trochlea IV (65).

The Eneolithic population of *Fulica atra* from the Sozopol Bay

***Fulica atra pontica* subsp. n.**

Holotype: Complete tibiotarsus dex., collection of the NMNHS, No 6568, collected in 1987 by Dr Georgi Ribarov (Fig. 2).

Paratypes: Topotypes, NoNo 1147-1175; 6566-6567; 6569-6595; 6597-6628; 6630; 6632-6634; 6636-6637; 6641; 6642; 6644-6655; 6658-6701; 6704; 6706-6708; 6713, collected by Dr G. Ribarov in 1987-1990 and Dr Nikolay Spassov. See Table 1 (column „n") and the descriptions of the measurements in „Material and Methods" for the distribution of the paratypes in anatomical elements.

Locality: Submerged settlement at 12 m depth in the Sozopol Bay (Bulgarian S Black Sea Coast).

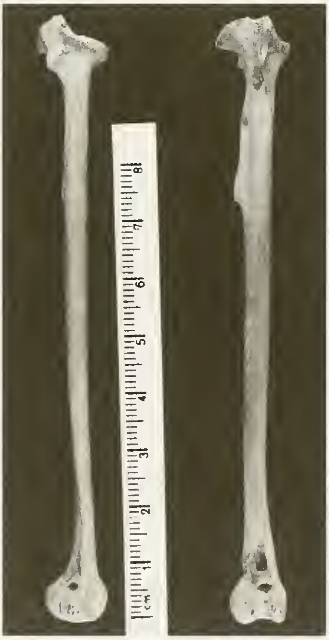

Fig. 2. *Fulica atra pontica* ssp. n. (holotype, NMNHS 6568): medial view (left) and cranial view (right) (Photographs: Boris Andreev)

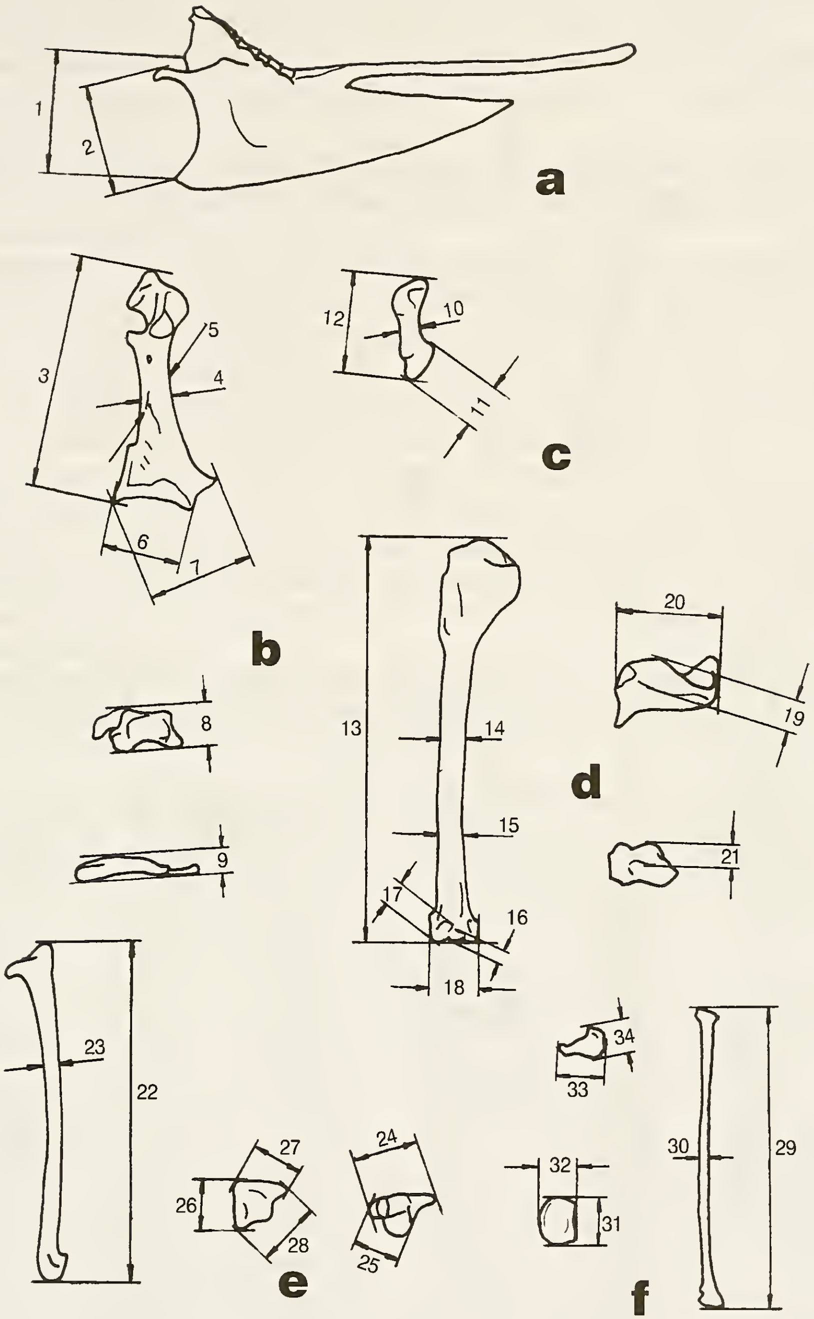

Fig. 3. The manner of measurings of the skeletal elements of *Fulica atra*: a - sternum, b - coracoid, c - scapula, d - humerus, e - ulna, f - radius (Drawings: Vera Hristova)

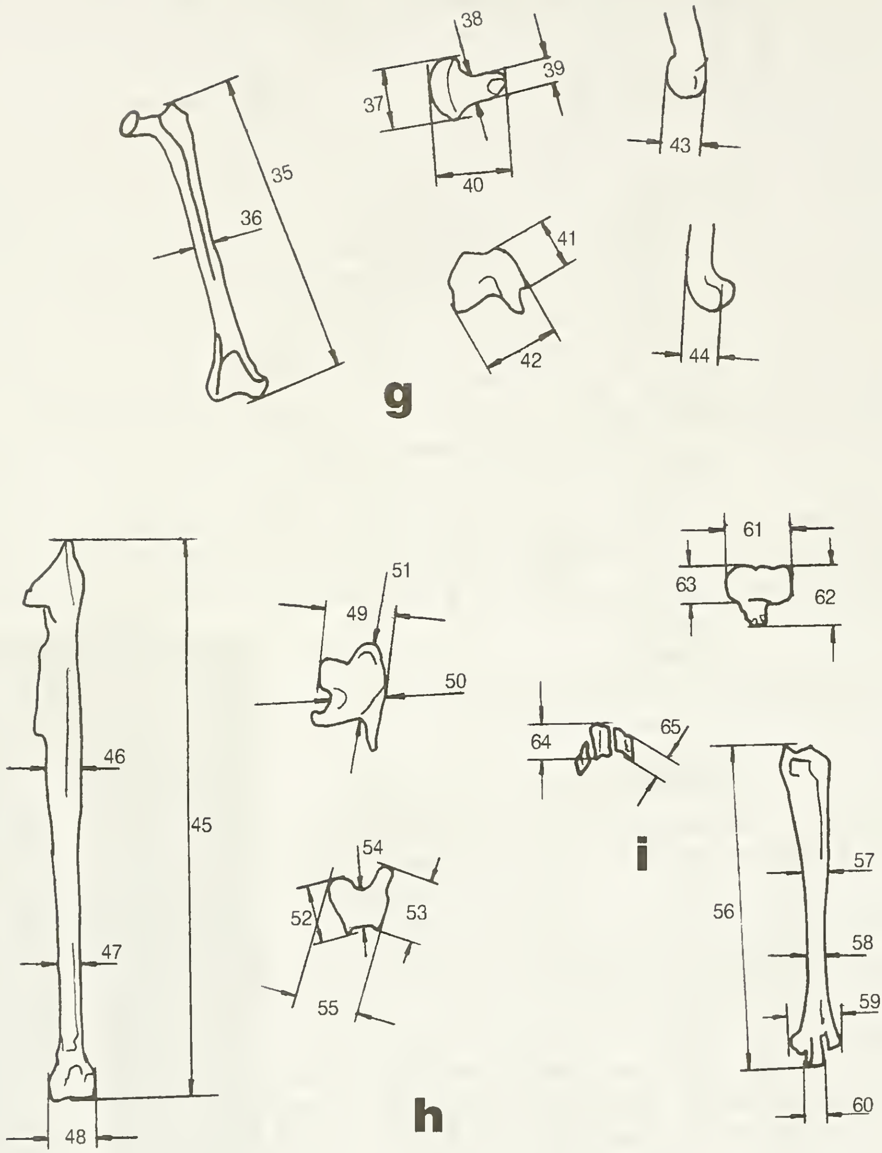

Fig. 3. The manner of measurings of the skeletal elements of *Fulica atra*: g - femur, h - tibiotarsus, i - tarsometatarsus (Drawings: Vera Hristova)

Horizon: Middle Holocene stratified sandy sediments, containing fossils of hunted animals and tools of the ancient inhabitants of the settlement.

Chronology: Middle Holocene (end of the Atlantic period and the Subboreal period): final of Eneolithic (end of 5th - early 4th millenium B.C.) to Early Bronze Age (2800-2400 B.C.).

Etymology: The name *pontica* is given for the ancient Greek name of the Black Sea - Pontos, whitch SW coast the subspecies remains originated from.

Measurements: See Table 1, Fig. 3.

Comparison: The general shape of all skeletal elements unambiguously relates the finds to the family Rallidae and more exactly to its larger recent representatives. Metrically and morphologically *Fulica atra pontica* ssp. n. is very close to the recent Palearctic nominant subspecies *F. a. atra. Porzana*, *Rallus*, *Crex*, *Gallinula* and *Porphyrula* are much smaller, while *Porphyrio* has larger dimensions and shows considerable differences in the bone structures.

Over one fourth of the osteometrical features (27,7 %), i.e. 18 of all the 65 studied features show significant statistical differences between the sizes of fossil and recent coots. Four features show a very high and significant degree of guarantee of the differences. In two of them it is 0,99, and in two others - 0,98 (Table 2). Eight features are statistically different with guarantee of 0,95, and two others - in 0,9.

Diagnosis: An extinct Middle Holocene subspecies of coot, which has statistically significant differences (larger dimensions) in comparison with *F. a. atra* in

Table 2

Means of the osteometrical features of recent (r) and fossil (f) *Fulica atra* from SE Bulgaria

N of the feature	$\bar{x}_r$	$\bar{x}_f$	k	t	p
1	22.62	21.65	12	1.44799	
2	19.53	18.98	12	0.84392	
3	34.13	34.37	20	-0.33929	
4	3.99	4.43	24	-2.27037	0.05
5	2.79	2.96	24	-1.14271	
6	10.72	10.83	23	-0.33809	
7	14.89	15.60	13	-1.16789	
8	4.13	4.27	29	-0.93686	
9	2.41	2.81	24	-2.42558	0.05
10	2.24	2.22	18	0.35408	
11	3.45	3.68	22	-3.05487	0.05
12	9.48	9.72	21	-0.73897	
13	72.40	76.83	15	0.3526	
14	4.59	4.68	14	-0.66722	
15	4.24	4.36	17	-1.20398	
16	2.68	2.60	24	0.69247	
17	5.01	5.14	23	-1.01397	
18	9.72	10.20	24	-2.41302	0.05

Table 2 (continuation)

N of the feature	$\bar{x}_r$	$\bar{x}_f$	k	t	p
19	4.54	4.53	33	0.03624	
20	13.84	13.63	26	0.52282	
21	3.15	3.21	21	0.21738	
22	67.48	66.09	19	0.95601	
23	3.90	4.00	19	-1.0225	
24	8.16	8.15	22	0.0483	
25	7.04	7.11	22	0.32384	
26	5.87	5.76	43	0.5693	
27	6.00	5.72	43	1.47448	
28	6.65	6.61	43	0.252	
29	64.12	62.38	13	0.74018	
30	2.14	2.32	13	-2.35279	0.05
31	3.88	3.74	22	0.3885	
32	3.21	3.31	23	-0.63714	
33	4.56	4.68	16	-0.45975	
34	2.78	2.84	15	-1.22353	
35	55.06	58.40	14	-1.297	
36	4.27	4.63	11	-0.25324	
37	8.37	8.80	17	0.16913	
38	4.07	4.43	21	-1.06859	
39	4.57	5.07	20	-1.5815	
40	10.40	11.45	19	-1.38598	
41	6.55	7.32	34	-2.45676	0.02
42	9.81	10.77	34	-2.0673	0.05
43	7.27	8.47	31	-2.2239	0.05
44	6.71	7.30	34	-1.72885	0.01
45	104.26	106.00	13	-0.99693	
46	4.71	4.92	13	-1.52939	
47	3.95	4.42	31	-4.01904	0.001
48	8.75	9.20	39	-2.55808	0.02
49	7.42	7.79	30	-1.42478	
50	8.78	9.09	30	-0.89699	
51	10.89	11.52	28	-0.88108	
52	8.80	8.84	43	-0.25342	
53	8.15	8.24	43	-0.60642	
54	5.81	6.17	43	-3.10276	0.01
55	8.74	9.08	43	-1.81414	0.1
56	57.98	61.24	20	-2.22474	0.05
57	3.67	3.99	20	-2.4772	0.05
58	3.59	3.78	20	-1.74343	0.1
59	9.10	9.72	22	-2.05483	0.1
60	3.12	3.37	22	-0.89862	
61	8.96	9.61	21	-1.4529	
62	8.91	9.30	24	-1.06303	
63	4.28	4.64	21	-1.18732	
64	4.88	5.16	28	-1.85046	0.1
65	5.31	5.66	22	-1.39903	

relation to the minimum width of the tibiotarsus diaphysis (t = -4.01904), the minimum diameter of the distal epiphysys of the tibiotarsus (t = -3.10276), the maximum width of the articular end of the scapula (t = -3.05487), and the diameter of the condylus fibularis of the femur (t = -2.45676).

Comparative Material Examined: The find was compared with analogous skeletal elements of the following species of the collection of NMNHS: *Gallinula chloropus* - 4/1983, 3/1983, 10/1990, 11/1990; *Fulica atra* - 4/1986; 5/1986; 6/1986; 7/1986; 8/1986; 9/1986; 10/1986; 11/1986; 12/1986; 14/1987; 15/1989, 16/1989, 17/1990; 21/1996; *Porphyrio porphyrio* - 1/1989, *Rallus aquaticus* - 1/1990, 2/1990, 3/1993, 4/1994; *Crex crex* - 1/1986, *Porzana porzana* - 1/1989.

Discussion: OLSON (1977) reported about 2 fossil subspecies of *Fulica*: *F. chathamensis chathamensis* Forbes, 1892 and *F. ch. prisca* Hamilton, 1893 from the Quaternary on the Chatham Island and the South Island of New Zealand. *F. hestera* is considered as a synonym of *F. americana*. No fossil subspecies have been described for *F. atra*.

The bone system is the most conservative structure (except the teeth) of the living body. In vertebrates it reflects more completely the influence of the environmental factors. Thus, the presence of 17 features of statistically significant differences in the size dimensions in both samples (recent and fossil), allows to conclude that the established differences show a taxonomical difference. Therefore, the diferentiation of the fossil population of the submerged settlement in the Sozopol Bay is completely reasonable.

The description of new taxa (subspecies and species) from the Quaternary deposits in paleornithology is made on the base of small, scarcely perceptible, but stable differences in the skeletal morphology (JANOSSY, 1987). MOURER-CHAUVIRÉ (1975a), for example, described *Aquila chrysaetos binifacti* on the basis of 18 features (from a total of 89) of statistically significant differences from the Middle Pleistocene in France. The reasons for the description of *Buteo rufinus jansoni* (MOURER-CHAUVIRÉ, 1975b) are similar.

As seen from Table 2 the dimensions of fossil specimens are statistically larger for 18 features: P = 0,001 (feature No 47); P = 0,01 (No 44, 54); P = 0,02 (No 41, 48); P = 0,05 (No 4, 9, 11, 18, 30, 42, 43, 56, 57), and P = 0,1 (No 55, 58, 59, 64).

The metrical differences which speak to the advantage of fossil population concern the elements of the fore girdle (scapula, coracoid and humerus), and the main three long bones of the hind girdle (femur, tarsometatarsus and tibiotarsus), of the other hand. They may reflect some (possibly very small), differences in the relative loading of the fore and hind limbs in the locomotion activity of the birds. The more strongly developed articular surface of the scapula may be related to the necessity of shorthening of the take-off way on the water surface. This morphological adaptation correlates with the stronger development of the femur and the tibiotarsus bones. It is quite possible to explane these morphological differences by the ecological conditions, as for example by the presence of the more densely vegetated water bodies, the longer stay and locomotion in the water, as compared to these on the hard ground, etc.

The Pontian (the Black Sea) Coot possibly survived up to the Middle Holocene, since when the proportional modification of the skeleton had been taking place simultaneously with the emergence of the modern climate, gradually transforming it into the recent subspecies. It is possible that the Sozopol fossil population belonged to the winter migrants from the northeast, where the last influences of the glaciation disappeared much later than on the southern parts of the Balkan Peninsula. Part of the recent Baltic population at present winters in the Balkans. On the other hand, the major winter concentrations in the Black Sea are supposed to have originated from the birds of the western regions of the former USSR (Cramp & Simmons, 1980). The hypothesis of a relict migration of a northern population of coots in the Middle Holocene should not be rejected as a whole. Unfortunately, we have not any comparative osteological material from the northern parts of the species' range to evaluate such suppositions.

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Author's address:
Dr Zlatozar Boev
National Museum of Natural History
1, Tzar Osvoboditel Blvd
1000 Sofia, Bulgaria

Elena Karaivanova
Institute of Zoology
1, Tzar Osvoboditel Blvd
1000 Sofia, Bulgaria

Fulica atra pontica subsp. n. от средния холоцен на южното черноморско крайбрежие, България

Златозар БОЕВ, Елена КАРАИВАНОВА

(Резюме)

От средния холоцен (края на атлантическия период и суббореалния период): финала на енеолита (края на 5 - началото на 4 хил. пр.н.е.) до ранно-бронзовата епоха (2800-2400 г. пр.н.е.) произлизат 159 костни находки от лиска.

Над една четвърт от остеометричните признаци (27,7 %), т.е. 18 признака от общо 65 изследвани, показват статистически значими разлики между размерите на субфосилните и рецентните лиски. Пет признака показват много висока гаранционна вероятност на разликите (0,999 до 0,98) - 1 при 0,999, 2 при 0,99 и други 2 при 0,98. Стойностите на 9 признака са статистически различни при гаранционна вероятност 0,95 и 4 - при 0,90.

Диагноза на *Fulica atra pontica* ssp. n.: Изчезнал среднохолоценски подвид на лиската, който в сравнение с *F. a. atra* има статистически значими разлики (по-големи размери) по отношение на минималната ширина на диафизата на тибиотарзуса (t = -4.01904), минималния диаметър на дисталната епифиза на тибиотарзуса (t = -3.10276), максималния диаметър на condylus fibularis на фемура (t = -2.45676) и ширината на дисталната епифиза на тибиотарзуса (t = -2.55808).

Вероятно *F. a. pontica* ssp. n. е просъществувала до средния холоцен, откогато с установяването на съвременния климат настъпили слаби промени в пропорциите на скелета, и постепенно се трансформирала в рецентния подвид. Възможно е съществуването на созополската фосилна популация да бъде обяснено и с извършването на някаква реликтна сезонна миграция, т.е. тя да е била съставена от зимни прелетници от североизток, където последните въздействия на заледяванията изчезнали много по-късно, отколкото на Балканския полуостров. Значителните ѝ морфологични особености показват еволюционната динамика на белезите, „пулсацията" на белезите (в случая размерите) във времето. С това се доказва, че въпреки относителната краткотрайност на изследвания период (последните 6000 г.), са настъпили значителни морфологични изменения, маркиращи темповете на еволюцията на *Fulica atra*. Установените статистически значими разлики в морфометрията на лиската допринасят за изясняването на късноkватернерната еволюция на вида в Европа.