

ARCHEO-ORNITHOLOGY AND THE SYNANTHROPISATION OF BIRDS:
A CASE STUDY FOR BULGARIA

ZLATOVAR BOEV

National Museum of Natural History
Sofia 1000, blv. Tsar Osvoboditel 1, Bulgaria.

ABSTRACT: This work represents an attempt to analyze the synanthropisation process in Bulgarian avifaunas from the perspective of an ornithoarchaeological study which includes a review of 23 archaeological settlements with 555 bones from 64 wild species. From the analysis we believe that the first synanthropic/synurbanist birds in Bulgaria start appearing during the Bronze Age-Iron Age times and that this group of anthropic birds is a rather important component of the avian taxocenosis (close to 50% of the taxa retrieved). There is a correspondence between the degree of synanthropisation and the age of the earliest finds of a species in archaeological sites. The group of the most poorly synanthropised birds (seasonal synanthropes) is not only the one with the oldest finds but also the most abundant one in the assemblages, as also happens today in ornithocenosis.

KEYWORDS: BULGARIA, BIRDS, ARCHAEOZOOLOGY, SYNANTHROPISM, SYNURBANISM.

RESUMEN: Este estudio es un intento de analizar el proceso de sinantropización de la avifauna búlgara desde la perspectiva de un análisis ornitoarqueológico que incluye un repaso a 23 yacimientos arqueológicos con 555 restos de 64 especies de aves silvestres. El análisis indica que el proceso de sinantropización aviar en Bulgaria comienza entre las edades del Bronce y del Hierro y que el grupo de aves antrópicas representa un importante componente de la taxocenosis aviar, próximo al 50%. Existe una correspondencia entre el grado de sinantropización y la fecha de los primeros hallazgos de una especie en yacimientos arqueológicos. Así, el grupo menos sinantropizado, el de los sinantrópicos estacionales, es el de primera aparición en el registro pero también, como ocurre en la actualidad, el más abundantemente representado en las muestras.

PALABRAS CLAVE: BULGARIA, AVES, ARQUEOZOOLOGIA, SINANTROPISMO, SINURBANISMO.

INTRODUCTION

An increased human presence in natural habitats has led to an ever greater impoverishment of the wild fauna today. It has also been the main cause of synanthropisation and synurbanisation of more and more animal species. Birds, being among the fastest to adapt, have appeared in settlements and colonized them since prehistoric times. We support the hypothesis made by Iankov (1983 a, b) and Donchev & Iankov (1989) who consider synanthropisation as real causal contact of wild birds with human constructions. Synurbanisation represents the highest level of synanthropisation and the best criterion for it is the nesting of birds in towns and villages. Obviously, for each species and under the specific conditions of each settlement, a unique synanthropic situation has arisen. Hence, the rates and the ways of introduction of wild birds into towns and villages varies specifically. Synanthropisation rates not only depend on feeding and nesting conditions, or the presence (more often the absence) of refuges and enemies, but also are strongly determined by number of clutches during the year. It is not by chance that the house sparrow (*Passer domesticus*, L.) and the collared dove (*Streptopelia decaocto*, Friv.) are extreme synurbanists in present day Bulgarian towns and villages: they produce up to four clutches per year. The feral pigeon (*Columba livia* var. *domestica*) is also an extreme synurbanist, though with no fixed periods in its breeding cycle.

Where and when should we investigate the beginning of the process of synanthropisation and synurbanisation in birds?. Archaeozoological data can provide answers to this intriguing question. Though the coexistence of birds with humans dates back to paleolithic times, it is only after the

appearance of permanent settlements, during the so-called "Neolithic revolution", 5.000-6.000 years ago, that this coexistence takes a new dimension. An arbitrary criterion would be the beginning of plough-land-farming and the use of draughtpower associated with it. According to Todorova (1972), the incidence of the process could be drawn back to 6.000-7.000 years ago.

Kovachevo, on the Struma River, SW Bulgaria, is the oldest Neolithic settlement in the country. It has been dated 9.000 years B.P. Settlements such as these, have had by no means the design of bulky and massive buildings, and the capacity of altering the landscape was probably limited.

MATERIAL AND METHODS

In this paper we will discuss only avian analysis from the Bronze and Iron Ages, up until medieval times (i.e. a period ranging over 4.000 years)¹ (Table 1).

A total of 546 Eneolithic settlements were known in Bulgaria in 1977, concentrated in two main areas, the Ludogoriye Region (NE Bulgaria) and the Upper Thracian Plain (SE Bulgaria) (Todorova, 1979). Though only 63 of these sites have been studied, the scarce animal remains, together with other information, tentatively indicate that during the 5th millenium B.C., large areas of almost all plain and valley regions of the country had already been influenced by a permanent human presence and agricultural activity to a considerable extent. The bird faunas from these sites are still waiting for analysis.

On the other hand, we have a total of 4594 bone remains of birds collected from archaeological excavations of 23 towns in Bulgaria covering the period from the Bronze Age to the Late Middle Ages (Figure 1). Of these, a total of 555 remains come from 64 species of wild birds, the remaining finds belonging both to domestic birds (fowl, geese, duck, pigeon, turkey and peacock) and unidentifiable bone fragments (bone splinters). The bone remains of *Anser anser* (L.), *Anas platyrhynchos* L. and *Columba livia* L. have been excluded from the wild species samples because of their unreliable differentiation from the bones of domesticated forms of these species.

All remains have been identified with the help of the osteological collection at the Zoological Department of the National Museum of Natural History in Sofia. We divide the species listed by Donchev & Iankov (1989) in the following five categories: AI-Seasonal synanthropes; AII-Passive synanthropes; BI-Initial synurbanists; BII-Advanced synurbanists, and BIII-Extreme synurbanists. The taxonomical nomenclature follows Howard & Moore (1980). The chronology of settlements is shown on Table 1.

(1) - The sites of Bagachyna (n° 1 in Table 1) has been included in our study, despite unprecise dating, since some of the finds have been assigned to the 1st milenium B.C.

No	Settlement	Age
1	Bagachina	4000 - 1000 B.C.
2	Urdoviza	3000 - 2000 B.C.
3	Sozopol	3000 - 1000 B.C.
4	Kabyle	1st millenium B.C. - 6th century A.D.
5	Malak Preslavets	5th - 1st century B.C.
6	Yassa-Tepe	1st millenium B.C.
7	Arbanas	1st - 3rd century A.D.
8	Durankulak	?1st - 4th century A.D.
9	Ratiaria	2nd - 4th century A.D.
10	Nicopolis-ad-Istrum	2nd - 6th century A.D.
11	Armira	3rd century A.D.
12	Abritus	3rd - 4th century A.D.
13	Kostinbrod	First half of 4th century A.D.
14	Karanovo	6th to 14th century A.D.
15	Garvan	6th to 11th century A.D.
16	Karnobat	6th - 9th century A.D.
17	Baba Vida	8th - 17th century A.D.
18	Veliki Preslav	9th - 10th century A.D.
19	Krivnya	9th - 10th century A.D.
20	Pliska	10th century A.D.
21	Hissarluka	9th - 12th century A.D.
22	Dyadovo	11th - 12th century A.D.
23	Voden	10th - 14th century A.D.

TABLE 1 - Dates of the settlements

RESULTS AND DISCUSSION

A. Species composition

The 64 species of wild birds retrieved in Bulgarian sites represent almost one sixth of the recent avifauna of the country (i.e. 18'13%), where, according to Simeonov & Michev (1991) a total of 353 species live at present. We consider these numbers to be a low estimate since, according to our information, the Bulgarian avifauna by the end of march 1992 included no less that 367 species². The 23 archaeological sites included in this paper, on the other hand, represent 1'1% of the aproximately 2.000 sites known in the country in 1988.

(2) - The subfossil species belong to 13 orders of birds: Gaviiformes, Podicipediformes, Pelecaniformes, Ciconiiformes, Anseriformes, Falconiformes, Galliformes, Gruiformes, Caprimulgiformes, Strigiformes, Charadriiformes, Columbiformes and Passeriformes.

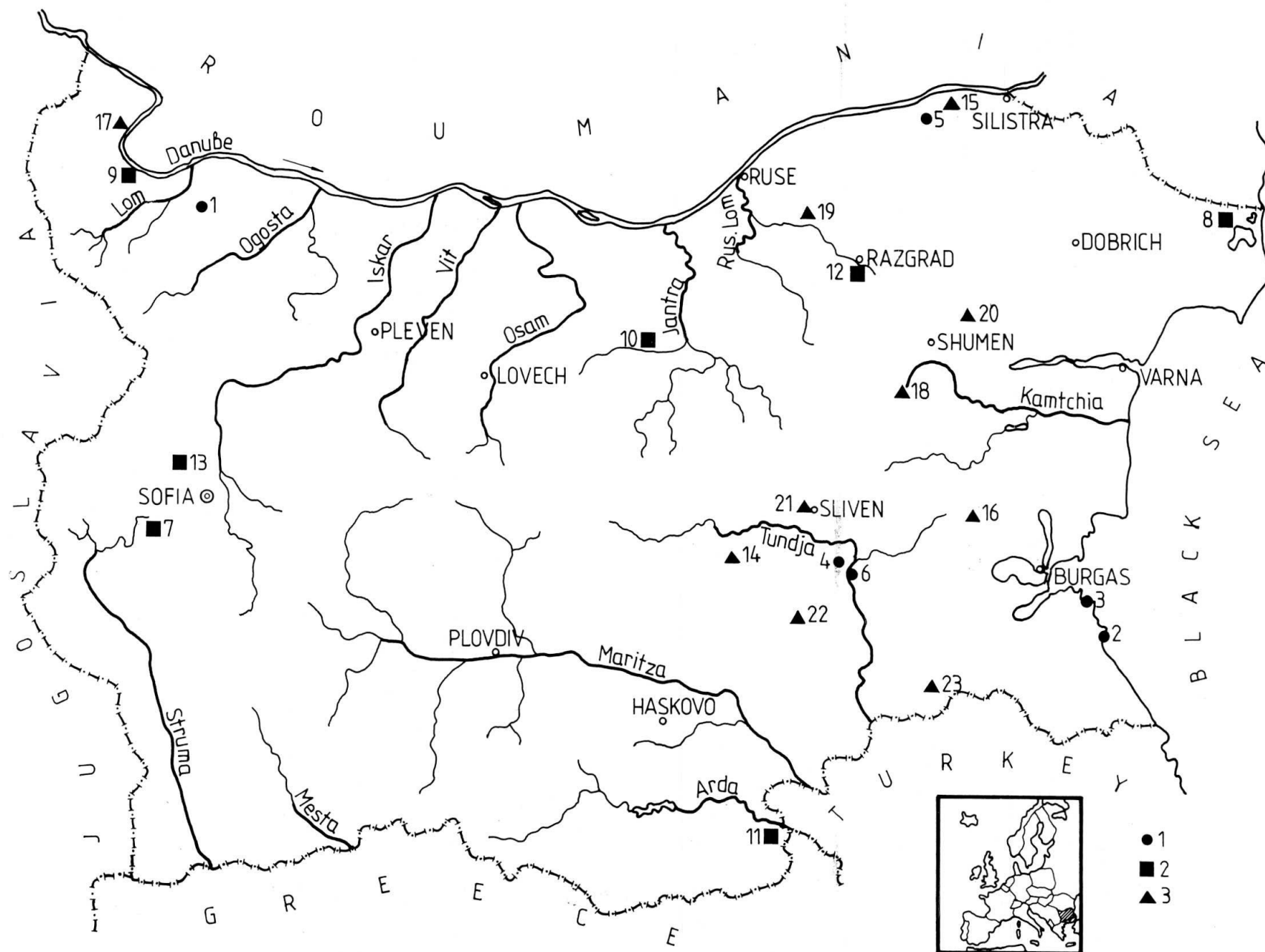


FIGURE 1 - Location of the ancient settlements studied in Bulgaria: 1. 4,000 years to 1st century B.C.; 2. 1st century A.D. to 4th century A.D.; 3. 5th to 14th century A.D.

B. Game birds versus synanthropic/synurbanistic birds

When no complementary information on the importance of a particular species in the life of the inhabitants of the ancient city is available (i.e. traces of processing; cutmarks, burning, etc...), the archaeornithologist is unable to determine whether the bird was intentionally brought to the site or represents an accidental occurrence.

Of considerable interest to the specialists in synanthropisation are these so-called "accidental" bird remains in ancient settlements. This fact should be always stressed since "birds of undetermined importance to man" usually include a variety of synanthropic and synurbanistic species, attracted both today as well as in the past by the advantages of "settled" habitats: abundance of food throughout the year, abundance of refuges, restricted number of predators, suitable nesting sites, etc... In this way, the abundant finds of *Corvus corax* L. from the Middle Ages sites of Skeldergate and Walmgate in England, have been explained by Allison (1984) as trophic concentrations around the "dung-hills" of towns, where food of their interest would have been abundant. In this way, a settlement could have become a daily feeding ground for the species. *Corvus corax* is a seasonal synanthrope in the contemporary habitats in Bulgaria. Though breeding out of the range of anthropogenetic landscapes, isolated specimens or small flocks regularly visit villages and towns during certain periods (Donchev & Iankov, 1989). The remains of the raven have been found in two Medieval settlements in Bulgaria -Karanovo and Pliska (one of the medieval capitals of Bulgaria) (Table 2).

The situation of two other corvid species, *Pyrrhocorax graculus* L. and *Nucifraga caryocatactes* (L.), is similar to that of *C. corax*. At present they both inhabit high mountain areas in Bulgaria, and both species were established in the Roman town of Nicopolis-ad-Istum (Boev, 1991a). Today they are regular visitors of valleys and towns during the winter period. The raven, alpine chough and nutcracker belong to the first group of seasonal synanthropes according to the classification listed above. The trophic link of some carrion-feeders to archaeological settlements very often stands as the only explanation for the presence of their remains in the samples. The Griffon vulture (*Gyps fulvus* Hbl.) is the most abundant subfossil Falconiform, having been retrieved at 4 sites (ancient towns), while the Lammergeier (*Gypaetus barbatus* L.) was recorded at two settlements. It is interesting that the wing bones of the two specimens found in Pliska (10th century A.D.) bore marks of sharp edge cuts, indicating that they have been processed for some reason (Boev, in press, a, b).

C. AI - Seasonal synanthropes

Seasonal synanthropes breed only out of range of the synanthropic (i.e., urban) landscapes, though visiting towns and villages during certain periods of the year mostly because of trophic and microclimatic reasons. This group is the most numerous one both in recent Bulgarian avifaunas from towns and villages, as well as in bird remains from archaeological settlements. A total of 12 species belonging to 6 orders (21.06% of the seasonal synanthropes of recent Bulgarian bird fauna), have been retrieved in subfossil samples. Among these species *Buteo buteo* (L.) and *Accipiter gentilis* (L.), have been both retrieved in 3 sites. Other species in this group include *Phalacrocorax carbo* (L.), *Ardea cinerea* L., *Carduelis cannabina* (L.) and *Caprimulgus europaeus* L. (Table 2). The presence of 3 Anseriform birds (*Anas querquedula* L., *Aythya ferina* (L.) and *Cygnus olor* (Gm.)) can be

Nº	Species	Nº settlement/nº of bone finds
1	<i>Columba palumbus</i>	10/4
2	<i>Columba oenas</i>	10/3
3	<i>Streptopelia turtur</i>	10/7, 4/11, 22/1, 21/1
4	<i>Pyrhocorax graculus</i>	10/2
5	<i>Corvus monedula</i>	10/7
6	<i>Corvus frugilegus</i>	10/4, 5/2
7	<i>Corvus corone</i>	10/1, 6/1, 18/3
8	<i>Corvus corax</i>	20/1, 14/3
9	<i>Pica pica</i>	10/2, 23/1
10	<i>Sturnus vulgaris</i>	10/1
11	<i>Carduelis cf. cannabina</i>	10/1
12	<i>Passer domesticus</i>	10/2
13	<i>Phasianus colchicus</i>	10/16, 20/1, 8/1, 18/8, 9/3, 23/2, 16/1, 15/1, 19/5, 20/2, 21/17, 4/8
14	<i>Perdix perdix</i>	10/81, 7/4, 8/4, 18/2, 11/1
15	<i>Coturnix coturnix</i>	10/20
16	<i>Alectoris graeca</i>	10/3, 21/1
17	<i>Fringilla coelebs</i>	10/2
18	<i>Buteo buteo</i>	10/1, 4/1, 21/2
19	<i>Accipiter nisus</i>	10/1, 18/1
20	<i>Accipiter gentilis</i>	21/4, 5/1, 10/2
21	<i>Garrulus glandarius</i>	10/1
22	<i>Gyps fulvus</i>	4/1, 18/1, 9/1
23	<i>Gypaetus barbatus</i>	10/1, 20/3
24	<i>Aquila cf. heliaca</i>	8/1
25	<i>Aquila pomarina</i>	14/1
26	<i>Hieraetus fasciatus</i>	18/2, 21/1
27	<i>Falco cherrug</i>	4/1
28	<i>Ciconia ciconia</i>	4/3, 11/1
29	<i>Cygnus olor</i>	10/1, 2/28, 8/3, 19/1
30	<i>Anas crecca</i>	10/4, 2/1
31	<i>Anas querquedula</i>	10/1, 3/2, 4/1
32	<i>Anas strepera</i>	4/1
33	<i>Anas penelope</i>	18/1
34	<i>Anser fabalis</i>	10/2, 18/2
35	<i>Anser albifrons</i>	10/2, 2/2, 19/1
36	<i>Anser erythropus</i>	18/1, 2/1
37	<i>Tadorna tadorna</i>	10/1, 2/1, 18/1
38	<i>Aythya ferina</i>	10/1, 2/4
39	<i>Aythya nyroca</i>	3/2, 2/3
40	<i>Caprimulgus europaeus</i>	10/1
41	<i>Cygnus cygnus</i>	2/4
42	<i>Pelecanus onocrotalus</i>	2/3, 13/1, 19/1
43	<i>Phalacrocorax carbo</i>	3/2, 2/12, 10/1
44	<i>Phalacrocorax aristotelis</i>	2/2
45	<i>Gavia stellata</i>	2/1
46	<i>Gavia immer</i>	2/1
47	<i>Gavia arctica</i>	3/1
48	<i>Podiceps cristatus</i>	2/5, 10/1, 3/2
49	<i>Podiceps griseigena</i>	2/2
50	<i>Podiceps nigricollis</i>	2/2
51	<i>Athene noctua</i>	10/1
52	<i>Strix aluco</i>	10/1, 18/1
53	<i>Bubo bubo</i>	7/1
54	<i>Otis tetrax</i>	10/1, 5/1
55	<i>Otis tarda</i>	10/2, 4/2, 6/6, 21/4, 16/1
56	<i>Fulica atra</i>	2/2, 3/119, 8/1
57	<i>Grus grus</i>	2/1, 8/1, 4/1, 17/1, 6/1
58	<i>Crex crex</i>	4/1
59	<i>Nucifraga caryocatactes</i>	10/1
60	<i>Ardea cinerea</i>	3/1, 17/1
61	<i>Circus gallicus</i>	18/2, 12/1
62	<i>Aquila chrysaetos</i>	5/1
63	<i>Tetrao urogallus</i>	17/2, 21/1
64	<i>Tringa nebularia</i>	5/1

TABLE 2 - Distribution of wild birds in ancient bulgarian sites.

explained by their importance as gamebirds in the past. As a whole, waterfowl is the most abundant group in ancient towns and villages, and includes 15 species from Bulgarian archaeological sites (Boev, 1991b). The three corvid species (*C. corax*, *P. graculus* and *N. caryocatactes*) are also seasonal synanthropes.

D. AII - Passive Synanthropes

A total of 9 species (19,57% of recent passive synanthropes in Bulgaria) belong to this group. Passive synanthropes breed in natural habitats, though some pairs might occasionally nest within the settlements in habitats analogous to natural ones. *Columba palumbus* L., *Streptopelia turtur* (L.), *Phasianus colchicus* L., *Perdix perdix* (L.), *Coturnix coturnix* (L.), *Accipiter nisus* (L.), *Strix aluco* L., *Fulica atra* L. and *Crex crex* (L.) were established among passive synanthropes in the ancient settlements in Bulgaria. With the exception of *A. nisus* and *S. aluco*, the remaining species belong to the gamebird group. Their abundant bone remains in towns and villages in the past indicate that their appearance there most probably relates to their gamebird status. The Sparrowhawk and the Tawny owl may have invaded the settlements as wild synanthropes. The group as a whole probably invaded these urban habitats some 1.700-3.000 years ago (Table 3).

SPECIES	GROUP	5000 BC	1000 BC	5th BC	0	3th AD	5th AD	8th AD	10th AD	13th AD
<i>P. graculus</i>	AI									
<i>C. corax</i>	AI									
<i>C. cannabina</i>	AI									
<i>B. buteo</i>	AI									
<i>A. gentilis</i>	AI									
<i>C. olor</i>	AI									
<i>A. querquedula</i>	AI									
<i>A. ferina</i>	AI									
<i>C. europaeus</i>	AI									
<i>Ph. carbo</i>	AI									
<i>N. caryocatactes</i>	AI									
<i>A. cinerea</i>	AI									
<i>C. palumbus</i>	AII									
<i>Str. turtur</i>	AII									
<i>Ph. colchicus</i>	AII									
<i>P. perdix</i>	AII									
<i>C. coturnix</i>	AII									
<i>Acc. nisus</i>	AII									
<i>S. aluco</i>	AII									
<i>F. atra</i>	AII									
<i>C. crex</i>	AII									
<i>C. corone</i>	BI									
<i>C. glandarius</i>	BI									
<i>C. monedula</i>	BII									
<i>C. frungilegus</i>	BII									
<i>P. pica</i>	BII									
<i>Fr. coelebs</i>	BII									
<i>St. vulgaris</i>	BII									
<i>A. noctua</i>	BII									
<i>P. domesticus</i>	BIII									
<i>C. ciconia</i>	BIII									

TABLE 3 - Temporal distribution of synantropic/synurbanistic birds in Bulgaria.

E. BI - Initial Synurbanists

This is the most poorly represented group of the whole bird assemblage. It includes only two species (*Corvus corone* L. and *Garrulus glandarius* (L.)) and comprises 7'69% of the recent initial synurbanists (a group which, at present, includes 26 bulgarian species). The ecological requirements of these birds are such that even though most of the populations nest outside urban habitats, certain individuals, occasionally up to a quarter of the populations, invade villages, towns and cities including their most urbanized sections. According to data from Bulgaria (Table 3) initial synurbanists began to make use of settlements as nesting grounds 2.000-3.000 years ago.

F. BII - Advanced Synurbanists

This group includes species which, by systematically breeding around settled areas, establish separate populations from the wild (i.e., non-urban) ones (Donchev & Iankov, 1989). This group includes 18 species from the recent Bulgarian avifauna. Only six of them (33'33% of the recent advanced synurbanists) have been recognized in the archaeozoological samples: *Corvus monedula* L., *Corvus frugilegus* L., *Pica pica* L., *Fringilla coelebs* L., *Sturnus vulgaris* L., and *Athene noctua* (Scop.). All of them have been detected in the large Roman town of Nicopolis-ad-Istum (2nd-4th century A.D.), the capital of the Roman province of Moesia Inferior (Boev, 1991a). The magpie has also been found at the Medieval settlement of Voden (Table 2; Boev, in press, b), while the rook appears in the Roman settlement of Malak Preslavets as well. Because of the absence of specimens from this group of advanced synurbanists in the remaining 20 sites, we can rather confidently postulate that the first advanced bulgarian synurbanists appeared during the initial centuries A.D. (i.e., 1.800-2.000 years ago).

G. BIII - Extreme Synurbanists

Extreme synurbanists are species whose populations breed mainly, if not exclusively, in settled areas, including highly urbanized ones. Only 8 bird species have reached this stage of synurbanisation in Bulgaria at present. Two of them (25% of the present day taxa within the group) have been identified in the archaeozoological samples: *Passer domesticus* L. and *Ciconia ciconia* L.. The House sparrow has been only recorded at Nicopolis-ad-Istrum, while the White stork was found at 2 sites -the large Hellenic and Roman town of Kabyle and in Armira (Table 2, 3).

The bones from Kabyle are not precisely dated, so we can loosely adscribe them to the 1st millenium B.C.

CONCLUSIONS

Though the recent Bulgarian avifauna exhibits a rather marked anthropogenetic influence (155 species = 41'9% of the country's bird fauna are synanthropic/synurbanistic species), the results from our analysis demonstrate that this character is by no means a feature of recent or even sub-recent times, since no less than 31 species from archaeological sites (48'8% of the 64 identified) might have also been synanthropic/synurbanistic. The higher percentage of these birds in the past is an artifact partly due to the fact that we assign to this category all specimens of species such as the Coot, Mute swan, Woodpigeon, Pheasant and Grey partridge which in the past might have not been part of this

anthropogenous sector. In spite of that, we can not exclude them from the group of synanthropic/synurbanistic species. Compared to the recent composition of Bulgarian avifauna, the "subfossil synanthropes/synurbanists" comprise 8'75%. As a whole, archeo-ornithological material confirms the grouping of recent synanthropic/synurbanistic birds in this part of the european subcontinent. The group of the most poorly synanthropised birds (seasonal synanthropes) is the most numerous one. This is logical for its representatives tend to be present in the oldest settlements, as has been confirmed by our research. As each of the groups represents a stage in an increasing synanthropisation sequence, the earliest finds of a species tend to be younger in time the more anthropic a taxon is and viceversa.

The amount of material studied thus far is not sufficient either to guarantee a complete picture of the invasions of wild birds into ancient towns and villages in the Bulgarian lands, nor to outline the development of an "urban avifauna". In spite of that, it provides us with an approximate idea about the bird species composition sharing human settlements over the past 4.000 years in the country.

ACKNOWLEDGEMENTS

Arturo Morales has critically reviewed the scientific and literary aspects of this paper.

BIBLIOGRAPHY

- Allison, E.P. (1984) - The bird bones. In: *Selected Groups of Bones from Skeldergate and Walmgate. The Archaeology of York*. Vol. 15(1): 47-48.
- Boev, Z.N. (1991a) - The birds of the roman town Nicopolis-ad-Istrum (2nd-6th century) at Nikjup, Lovech region. *Hist. nat. bulgarica* 3: 92-102. (In Bulg., Engl. summ.).
- Boev, Z.N. (1991b)- Waterfowl in Ancient Bulgaria. In: Queiroga, F. & A.P. Dinis (eds.): *Paleoecologia e Arqueologia II. Vila Nova de Famalicao* 1991: 111-120.
- Boev, Z.N. (in press a) - The birds of the medieval settlements in Bulgaria. *Hist. nat. bulgarica*. (In Bulg., Engl. summ.).
- Boev, Z.N. (in press b) - The raptors and owls (Falconiformes and Strigiformes - Aves) from the archaeological excavations in Bulgaria. *Hist. nat. bulgarica*.
- Doncev, St. & P. Iankov (1989) - State and tendencies of synanthropisation of birds in Bulgaria. *Ecologia, BAS* 22: 35-42. (In Russian, Engl. summ.).
- Howard, R. & A. Moore (1980) - *A complete checklist of the birds of the World*. Oxford University Press, Oxford.
- Iankov, P. (1983a) - On the stages and criteria of synanthropisation of birds. In: *Biologicheskie osnovy osvoenija, rekonstruktsii i ochrany zhivotnogo mira Belorusii. Minsk, Nauka i tehnica publ. house*: 133-134. (In Russian).
- Iankov, P. (1983b) - The Avifauna of Sofia -its peculiarities and origin. Ph. D. thesis, Minsk. (In Russian).
- Simeonov, S. & T. Michev (1991) - *The birds of the Balkan Peninsula*. Sofia, Petar Beron Publ. House. (In Bulg.).
- Todorova, H. (1972) - Some problems of the earliest land-farming in Bulgaria according the archaeological data. *Archive na selskostopanskija muzei* 1: 44-53. (In Bulg.).
- Todorova, H. (1979) - Hunting and fishing. In: *Eneolit Bolgarii.*, Sofia. Sofia Press Publ. House: 39-40. (In Russian).

