

Middle Villafranchian birds from Varshets (Western Balkan Range - Bulgaria)

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Abstract

The site of Middle Villafranchian birds in the vicinity of Varshets is one of the six Tertiary avian sites in Bulgaria. It represents a karst cavern (ponor), over 1.90 m deep, filled with terra-rossa, containing fossils. Partly it has become hard rusty bone breccia. A total of 407 bones and bone fragments was collected. Eighty-three of them (20.54%) are unidentifiable remains, 17 bones (4.2%) are undetermined. Bone finds of 5 orders of Birds: Galliformes (237; 58.66%), Apodiformes and Piciformes (2; 0.5% each), Passeriformes (49; 12.12%) and Falconiformes (14; 3.46%), were collected by 2-mm mesh sieves. The NMNH-Sofia comparative skeleton collection of birds allowed us to establish 1 species, 11 genera, 3 subfamilies and 12 families of birds. Unfortunately, the scanty comparative material made it possible for us to indentify only 13 bones up to species level (*Lagopus balcanicus* n. sp.). 29 others are identified to the genus level: *Pyrrhocorax* (12), *Falco* (4), *Turdus* (3), *Coturnix*, *Apus* and *Aquila* (2 each), *Corvus*, *Sturnus*, *Fringilla* and *Lullula* (1 each). Other representatives of the families/subfamilies Phasianidae (221 bones), Turdidae (9), Gypaetinae (4), Aquilinae and Passerinae (4 each), Corvidae (3), Picidae (2), Tetraonidae, Alaudidae and Oriolidae (1 each) were also established. Twelve bones of Passeriform birds remained undetermined further. With few exceptions all bones were discovered unarticulated. We believe that the deposition of fossils occurred over a relatively short period of time, because of the absence of any biostratigraphical differences between the various layers. A small Phasianid bird is an absolute dominant in the avi-taphocenosis. It is represented by 194 bones (48.02%) in the collected material, belonging to at least 13 specimens. Approximate lengths (in mm): coracoid - 28.5, humerus - 40, ulna - 37, carpometacarpus - 21.5, femur - 41.

Key words: Pleistocene avifauna; Villafranchian; Fossil birds; Balkans; Bulgaria.

Kurzfassung

Der Fundort von Fossilien des mittleren Villafranchiums in der Umgebung von Vârșec ist einer der sechs Fundorte tertiärer Vögel in Bulgarien. Er besteht aus einer Karst-Kaverne (Ponor), über 1.90 m tief, ausgefüllt mit Roterde, untermischt mit Fossilien, manchmal eine Knochenbreckzie bildend. Es wurden insgesamt 407 Knochen und Knochenfragmente von Vögeln gesammelt. 83 (20,54%) davon sind unbestimmbare Reste (Knochensplinter), und 17 (4,2%) sind noch nicht bestimmt. Mit einem Sieb von 2 mm Maschengröße wurden Reste von 5 Vogel-Ordnungen gesammelt: Galliformes (237; 58.66%), Passeriformes (49; 12.12%), Falconiformes (14; 3.46%), Apodiformes und Piciformes (je 2; 0.5%). Vergleiche mit der Vogelskelett-Sammlung des NMNH in Sofia ermöglichten die Bestimmung von 1 Art, 11 Gattungen, 3 Unterfamilien und 12 Familien. Das spärliche Vergleichsmaterial ließ leider die Bestimmung bis zur Art-Ebene von nur 13 Knochen (*Lagopus balcanicus* n. sp.) zu. Weitere 29 Knochen wurden bis zur Gattungs-Ebene bestimmt: *Pyrrhocorax* (12), *Falco* (4), *Turdus* (3)

(3), *Coturnix*, *Apus* und *Aquila* (je 2), *Corvus*, *Sturnus*, *Fringilla* und *Lullula* (je 1). Es wurden auch weitere Vertreter der Familien/Unterfamilien Phasianidae (221 Knochen), Turdidae (9), Gypaetinae, Aquilinae und Passerinae (je 4), Corvidae (3), Picidae (2), Tetraonidae, Alaudidae und Oriolidae (je 1), festgestellt. Bei 12 Knochen von Singvögeln ist auch die Familie unbestimmt. Bis auf einige Ausnahmen wurden alle Knochen disartikulierte aufgefunden. Da sich keinerlei biostratigraphische Gliederung erkennen läßt, ist anzunehmen, daß die Ablagerung in relativ kurzer Zeit erfolgte. Der Nachweis von *Lagopus lagopus* zählt zu den südlichsten und ältesten dieser Art in Europa. Ein kleiner Phasianidae ist die absolute Dominante der untersuchten Ornito-Taphozönose. Er ist vertreten durch 194 Knochenreste (48,02% des Materials), die wenigstens zu 13 Individuen gehören. Annähernde Länge in mm: Coracoid - 28.5; Humerus - 40; Ulna 37; Carpometacarpus - 21.5 und Femur - 41.

Schlagwörter: Pleistozäne Avifauna; Villafranchium; fossile Vögel; Balkan; Bulgarien.

Introduction

In spite of the wide diversity of recent Bulgarian fauna, due to a complex geological history, great variety in relief and landscape, and a unique geographical position on the crossroads between the three continents - Europe, Asia and Africa, very little is known about the fossil birds of the country. Only six (five) Tertiary avian localities [five (four) Pliocene and one Miocene] are known as yet (BOEV, in press). With the exception of the site near Varshets, they have not been studied, because of the absence of specialists and comparative collections in the past. Quaternary avian sites in Bulgaria are better known (BOEV, 1992).

Material and Methods

All bird bone finds were collected using sieves with 2-mm mesh. A total of 17 days was spent on the excavations in 1990-1992. The material collected consists of 407 avian remains - whole bones and bone fragments. They constitute about 9.8 % of all fossils in the site. We tried to identify these finds with the help of the comparative skeletal collection of birds of the National Museum of Natural History in Sofia, which numbers over 1200 skeletons of 301 recent European species. The most numerous among avian finds are ulnae, tibiotarsi, humeri, coracoids, tarsometatarsi and femora (tab. 1).

Part of Skeleton	Orders					
	Falconi- formes	Galli- formes	Apodi- formes	Pici- formes	Passeri- formes	Aves indet.
Cranium		2				
Quadratum		2				3
Mandibula		1			1	
Furcula		4				
Coracoideum	3	25			1	
Sternum	2	7				
Humerus		26		2	9	1
Scapula		18				1
Ulna		37	2		14	3
Radius		14			1	2
Carpometacarpus		17			4	
Phalanx II - 1 alae	2	9			2	
Ulnare		1				
Synsacrum	1	5				
Femur		24			5	2
Tibiotarsus	1	27			6	
Fibula		1				
Tarsometatarsus	2	24			10	
Phalanx dist. dig. 1 pedis	1					
Phalanx prox. hallucis		1				
Total	12	245	2	2	53	12

Tab. 1: Distribution of the avian bone finds according to anatomical units.

Description of the Site

The site was discovered accidentally in the spring of 1987 by an artist (Mr. M. MARKOV). It is situated about 6 km NNE of Varshets, a small town and spa. The site is positioned on a rocky hill 2 kilometers from the Botunya river at about 400 m above sea level (fig. 1). Its orientation is NW-SE and geologically it can be

referred to the Western Balkanids. It represents a synclinorium limited by the main structures - the Berkovitsa anticlinorium to the SW and the Belogradchik anticlinorium to the NE. Karst gorges and ponors are to be found in the limestones of the Lower Aptian. There are several cave systems in the rocky massifs around the site. The site is a ponor (clint) over 1.90 m deep (measured in June 1992). The

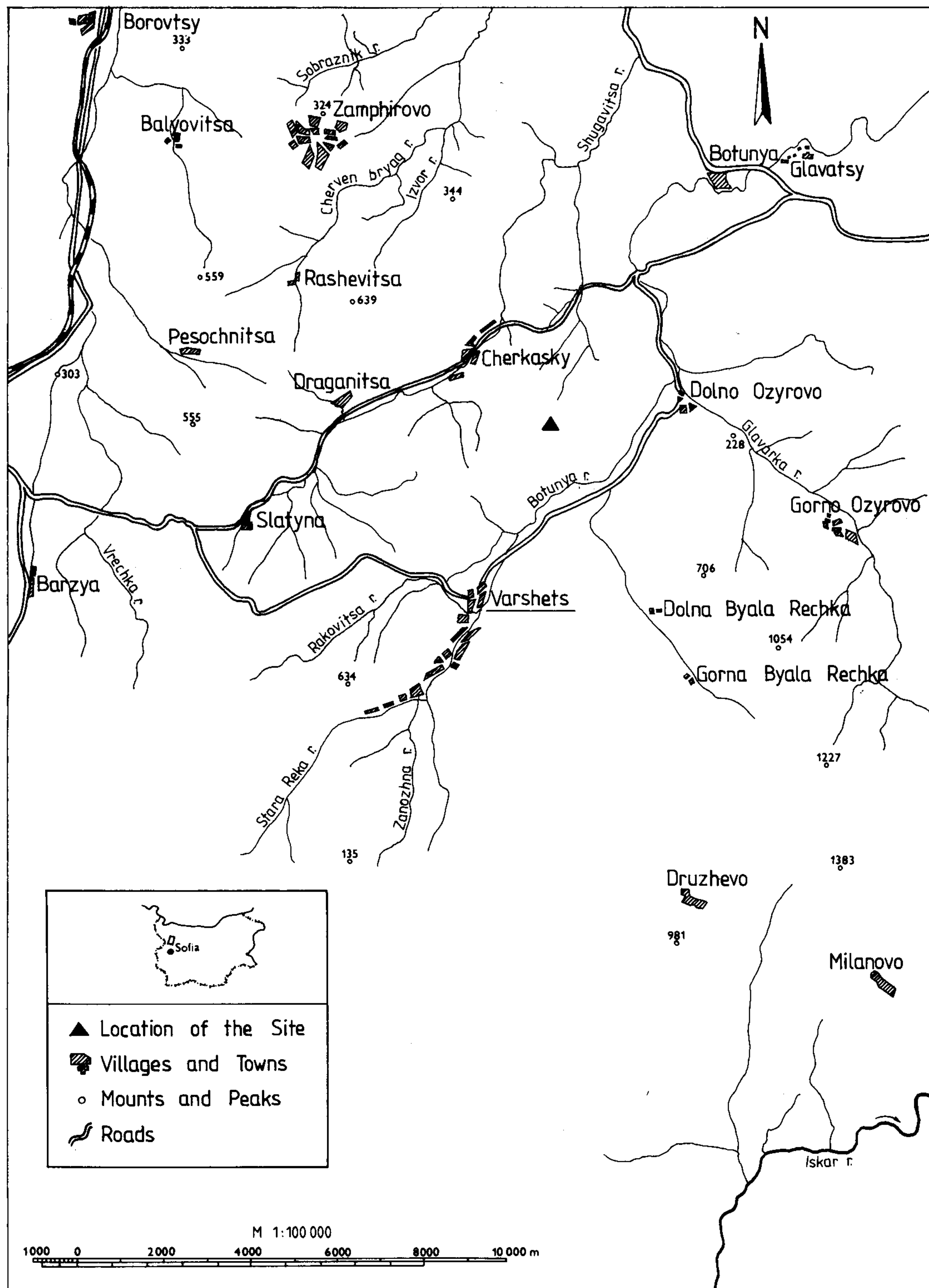


Fig. 1: Location of the Middle Villafranchian site near Varshets.

maximum width is 0.8 m. The walls of the cavern are covered by aragonite and calcite sinter limestones - scale deposits with a typical layer structure. Besides fossils, the filling (matrix) contains stony soil and clay terra-rossa. Sometimes small fragments (up to 15 cm) of Urgon limestones may also occur. Very often the fossils have a surface phosphate cover of fluor-apatite. The uppermost layer, about 15 cm thick contains no fossils. Traces of the action of running water (smooth stones, bones or teeth) are not established. Periodical rains, or a water outflow from a cave above, washed off the bones and teeth from the neighbouring feeding places of Carnivora together with the weathering residues in the cavern. Apparently, the deposition of the fossils happened in a relatively short period of time, since there are no biostratigraphical differences between the lower and the upper layers of the deposits. The age of the ponor of the site may be determined as Middle Sarmatian to Lower Villafranchian (ERWIN BEHME, unpubl. data). The first data of this site were published by BOEV (1992), where the age is mentioned wrongly - "Upper Pleistocene" instead of "Upper Pliocene" (p. 460).

The Fossil Fauna of Varshets

The fossils collected so far belong chiefly to Artiodactyla, Perissodactyla, Carnivora, Rodentia, Insectivora, Chiroptera and Lagomorpha. A sample of 2357 fossil remains contains: Artiodactyla phalanges: 20; other bones of large mammals: 114; unidentifiable bones of large mammals (fragments of vertebrae and ribs and long bone splinters): 203; bones of birds: 232; amphibian bones: about 20 and reptilian bones: about 30. The micromammalian bones represent the great majority of the fossils. In the sample cited they number over 1700 fossil remains. Their list includes 14 paleo-species at least and determines the age of the site as Middle Villafranchian (VASSIL POPOV, unpubl. data).

Among the preliminarily determined large mammals are: *Equus* cf. *stenonis* COCCHI, *Polyhyaena perrieri* CROIZET & JOBERT, *Martes* cf. *wenzensis* STACH, *Nyctereutes* cf. *megamastoides* POMEL, *Acinonyx pardinensis* CROIZET & JOBERT, *Vormela peteneyii* KRETZOI, and cf. *Eucladoceros sinesensis* (NICOLAI SPASSOV, unpubl. data).

All the bones are disarticulated and most of them broken, forming a kind of bone breccia. We suppose the finds of Micromammalia, Aves, Amphibia and Reptilia may be considered as food remains of some birds (diurnal and nocturnal raptors - Falconiformes and Strigiformes), while the bones of large mammals originate from a nearby feeding place of Carnivora.

The Bird Bone Finds

In spite of its incomplete determination so far, the composition of the avifauna of this site is rich. A total of 32 taxa of 5 orders of birds (Falconiformes, Galliformes, Apodiformes, Piciformes and Passeriformes) is established (fig. 2). The scanty comparative material allows us to identify some of the remains to the genus/species level. The ten determined genera are: *Aquila* (2 species), *Falco*, *Coturnix*, *Apus*, *Lullula*, *Sturnus*, *Turdus*, *Fringilla*, *Pyrrhocorax* and *Corvus* (tab. 2).

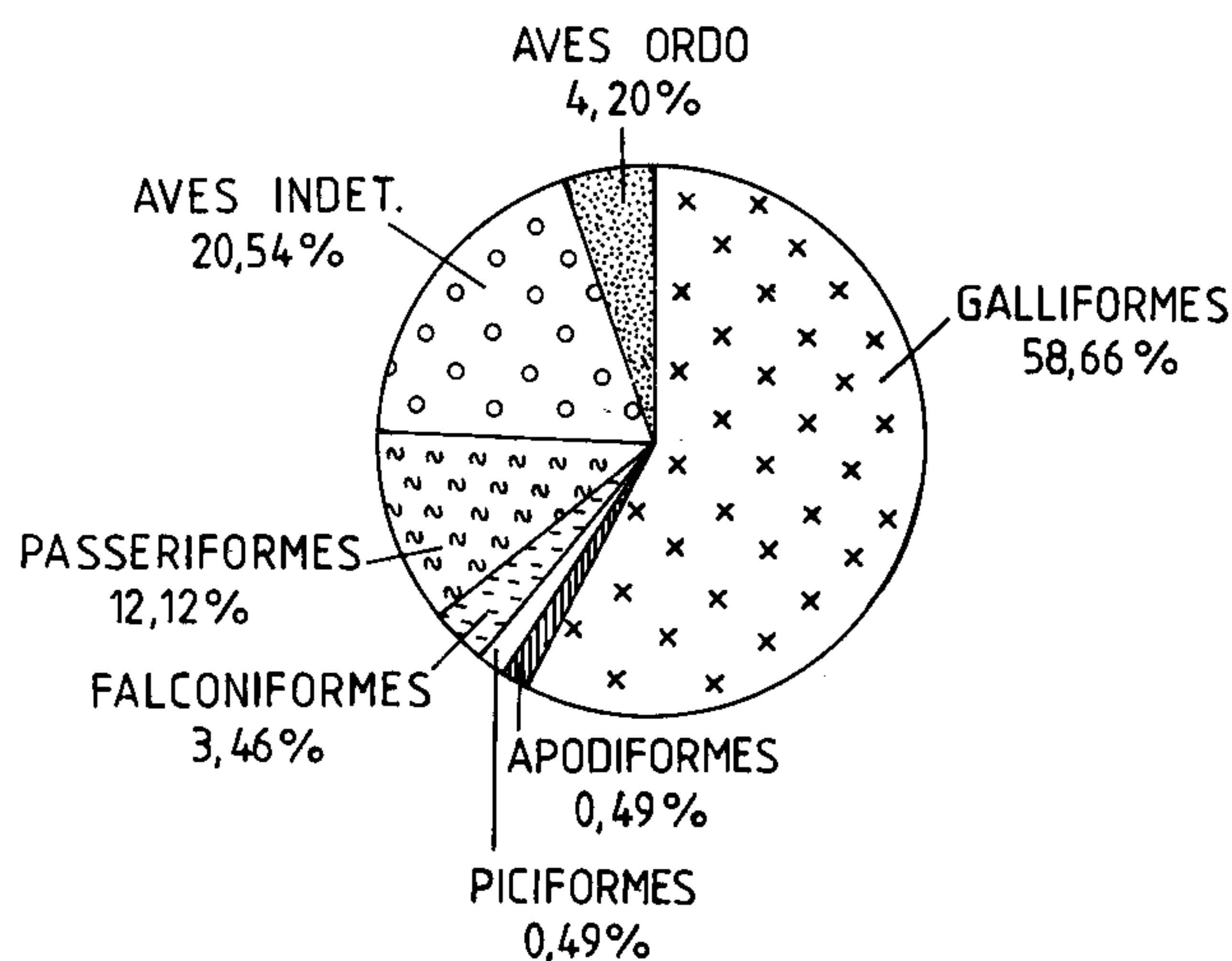


Fig. 2: Order composition of the Middle Villafranchian bird fauna of Varshets.

The established families/subfamilies are: Gypaetinae, Tetraonidae, Phasianidae (5 species), Picidae (2 species), Alaudidae, Oriolidae, Turdidae (2 species), Corvidae (2 species) and Passerinae (2 species). Seventeen other bones remain undetermined and 83 bone fragments of birds (bone splinters) are unidentifiable.

Owing to the limited volume of this paper, we will describe more completely only the finds of the genus *Lagopus*.

Tab. 2: Taxa composition and distribution of the avian bone finds

Taxa	Number of finds
Order Falconiformes	
1. Gypaetinae gen.	4
2. Aquilinae gen.	4
3. <i>Aquila</i> sp. - I	1
4. <i>Aquila</i> sp. - II	1
5. <i>Falco</i> sp.	4

Order Galliformes		
6.	<i>Lagopus balcanicus</i> n.sp.	13
7.	Tetraonidae gen.	1
8.	<i>Coturnix</i> sp.	2
9.	Phasianidae gen. - I	194
10.	Phasianidae gen. - II	2
11.	Phasianidae gen. - III	8
12.	Phasianidae gen. - IV	8
13.	Phasianidae gen. - V	9
Order Apodiformes		
14.	<i>Apus</i> sp.	2
Order Piciformes		
15.	Picidae gen. - I	1
16.	Picidae gen. - II	1
Order Passeriformes		
17.	<i>Lullula</i> sp.	2
18.	Alaudidae gen.	1
19.	Oriolidae gen.	1
20.	<i>Sturnus</i> sp.	1
21.	<i>Turdus</i> sp.	3
22.	Turdidae gen. - I	3
23.	Turdidae gen. - II	6
24.	<i>Fringilla</i> sp.	1
25.	<i>Pyrrhocorax</i> sp.	12
26.	<i>Corvus</i> sp.	1
27.	Corvidae gen. - I	1
28.	Corvidae gen. - II	1
29.	Corvidae gen. - III	3
30.	Passerinae gen. - I	1
31.	Passerinae gen. - II	3
32.	Passeriformes indet.	12
	Aves ordo	17
	Aves indet.	83
Total		407

Lagopus balcanicus, new species
(fig. 3).

Holotype: Complete ulna sinistra; collections of the Zoological Department of the National Museum of Natural History, Bulgarian Academy of Sciences, cat. No F 1-1993. Collected in July 1991 by ZLATOZAR BOEV.

Locality: A ponor in a rocky hill, 6 km NNE of Varshets (43°13'N, 23°17'E).

Horizon: Unconsolidated, unstratified sediments accumulated in the filling of clay terra-rossa. The fossil bones are broken, sometimes making a kind of bone breccia.

Chronology: Middle Villafranchian. The associated fauna of large mammals attributes the site to the MN 17 zone, i.e. about 2,5 million years B.P.

Etymology: The name "balcanicus" is given after the "Balkan Range" - the main mountain chain of the Balkan peninsula.

Paratypes: Topotypes from the same locality, collected in September 1990, July 1991 and September 1991: tibiotarsus dex. dist. cat. No F 2-1993, tibiotarsus sin. dist. F 3-1993, carpometacarpus sin. F 4-1993, humerus sin. F 5-1993, humerus sin. dist. F 6-1993, humerus dex. dist. F 7-1993, furcula - sternal part F 8-1993, tibiotarsus dex. prox. F 9-1993, ulna dex. prox. F 10-1993, phalanx prox. digiti majoris alae sin. F 11-1993, phalanx prox. digiti majoris alae dex. F 12-1993 and radius sin. dist. F 13-1993.

Measurements: see tab. 3 to 5.

Diagnosis: The skeletal elements are of larger size in comparison with those of all known species of the genus *Lagopus*, both recent and fossil (the nearctic *L. leucurus* was not compared, but this species is also smaller than *L. lagopus* and even smaller than *L. mutus*).

Lagopus balcanicus has in comparison with the closest species, *Lagopus lagopus*, a blunter and plumper olecranon ulnae; an almost twice wider condylus ventralis; a less prominent tuberculum retinaculi; a shallower sulcus intercondylaris; a better developed fossa tendinea, and a slantier depressio musculi tricipitalis.

Discussion: The *Lagopus* specimens from Varshets were larger than the recent *Lagopus lagopus* and *Lagopus mutus* (tab. 4) and larger than the contemporaneous Lower Villafranchian *Lagopus atavus* [measurements by JANOSSY (1974), BOCHENSKI (1991: tab. 5)]. The differences between *L. balcanicus* and *L. atavus* reach 18-32% (average: 26%). This is sufficient to exclude their taxonomical identity. The metrical differences between the specimens from Varshets and *L. lagopus* amount 4-14%, but we also should keep in mind that during the Quaternary the hind limb bones of *L. lagopus* shortened, while, on the contrary, the wing bones became longer (BOCHENSKI, 1985). According to this author, some measurements increase by up to 3.30 mm, and the reduction of others is about 4.70 mm. The carpometacarpus length changes from (?) 39.0 mm in "Lower Pleniglacial" to 34.29 mm in "recent" individuals, and the length of phalanx 1 dig. majoris alae changes from 15.85 mm to 14.89 mm. The analogous measurements of the *L. balcanicus* are 32.0 and 13.2 mm, respectively (tab. 3). Unfortunately, no metatarsal remains are represented in our fossil material to be compared with the homologous bones of *Lagopus lagopus noaillensis* MOURER-CHAUVIRÉ 1975 from the Middle Pleistocene of France.

Lagopus atavus is known by the following parts of the skeleton: mandibula, coracoideum, humerus, ulna, carpometacarpus, digitus alae major, femur prox. tibiotarsus dist. and tarsometatarsus dist. (BOCHENSKI, 1991). This author places *L. atavus* as "...intermediate

Species	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
<i>L. balcanicus</i>	12.9	2.95	7.5	5.0	65.8	14.0										
<i>L. balcanicus</i>	12.9	2.85	7.15	4.9												
<i>L. balcanicus</i>	13.7	3.10	7.5	5.05												
<i>L. balcanicus</i>							11.85	7.65	60.0	8.75						
<i>L. balcanicus</i>								7.65								
<i>L. balcanicus</i>											4.35	4.9				
<i>L. balcanicus</i>													32.0	8.2	3.3	10.9
<i>L. lagopus</i>	12.7	2.60	7.10	4.35	62.2	14.0	11.7	7.6	59.1	8.45	4.15	4.65	32.25	8.35	3.35	10.75
NMNH-Sofia, No 605 (Recent)																
<i>L. mutus</i>							10.25	7.1	57.2	7.65	3.5	4.2	31.8	8.15	2.6	9.8
NMNH-Sofia, No 605 (Recent)																

Species	q	r	s	t	u	v	w	x	y	z	a'	b'	c'	d'	e'	f'
<i>L. balcanicus</i>	8.6	5.4														
<i>L. balcanicus</i>			13.2	6.1	4.8	2.85										
<i>L. balcanicus</i>					4.75											
<i>L. balcanicus</i>							2.2	3.75								
<i>L. balcanicus</i>									9.6	11.4	14.0	12.6	10.1			
<i>L. balcanicus</i>														9.2	8.8	4.0
<i>L. balcanicus</i>														9.0	8.7	3.9
<i>L. lagopus</i>	9.05	4.9	12.7	5.8	4.6	2.9	1.8	3.35	7.9	9.6	10.95	10.6	9.0	8.45	8.0	3.9
NMNH-Sofia, No 605 (Recent)																
<i>L. mutus</i>	8.15	4.4	12.8	5.0	4.8	2.8			6.8	8.0	10.8	9.0	7.7	7.15	6.7	3.0
NMNH-Sofia, No 605 (Recent)																

Tab. 3: Measurements (in mm) of bones of fossil and recent species of *Lagopus*. (For a,b....f' see Fig. 4)

between *L. mutus* and continental forms of *L. lagopus*." (p. 568).

The great majority of fossils of the genus *Lagopus* comes from Quaternary (fig. 5) (BRODKORB, 1964; OLSON, 1985). *Lagopus lagopus* is established in a wide range of many Pleistocene and Holocene sites out of its recent breeding range, including Malta. BOCHENSKI (1991) concludes that the history of the genus *Lagopus* begins in Europe in the Early Pliocene, while the recent species *Lagopus lagopus* only appears in the Lower Pleistocene, a statement shared also by JANOSSY (1990).

The finds from Varshets can be referred to the MN 17 biozone, i.e. its *Lagopus* remains are of the same age like those of *Lagopus atavus*, placed by BOCHENSKI (1991) in MN 16 and MN 17. The recent species *L. lagopus* only appears in the Lower Pleistocene in the MN Q 20 zone (Les Valerots, Central France, CHALINE et al., 1985). It is clear, that the *Lagopus* remains from Varshets are among the earliest and southernmost of that genus (fig. 5). (The other nearctic species, *Lagopus mutus*, is recorded in Bulgaria in the Paleolithic cave Bacho Kiro by BOCHENSKI, 1982).



Fig. 3: *Lagopus balcanicus* n. sp. First row (left to right): ulna sin. F1-1993 (holotype), ulna dex. prox. F10-1993, carpometacarpus sin. F4-1993, humerus sin. F5-1993 (the calcification of the proximal half is not removed), humerus dex. dist. F7-1993, humerus sin. dist. F6-1993 (paratypes). Second row (left to right): furcula - sternal part F8-1993, phalanx prox. dig. majoris alae sin. F12-1993, phalanx prox. dig. majoris alae dex. F11-1993, radius sin. prox. F13-1993, tibiotarsus dex. dist. F2-1993, tibiotarsus sin. dist. F3-1993 and tibiotarsus dex. prox. F9-1993 (paratypes). (photo by PASKAL ATANASSOV.)

Comparative Material Examined: Fossils were compared with skeletons of the following species (all specimens are from the collection of the National Museum of Natural History, Bulgarian Academy of Sciences, Sofia):

Tetraonidae: *Lagopus lagopus* No 605, *L. mutus* No 606, *Tetrao tetrix* NoNo 989, 990, *Tetrao urogallus* NoNo 991, 992, 993, 994.

Phasianidae: *Phasianus colchicus* NoNo 820, 821, 824, 826-830, *Gallus gallus* NoNo 534, 535, 542, 1111, 1112.

Bone	<i>Lagopus lagopus</i>				<i>Lagopus mutus</i>				<i>Lagopus balcanicus</i>	
	n	min	max	x	n	min	max	x		
humerus (e)	17 m	56.5	64.5	61.2	11+	52.9	59.9	56.5	65.8	
	17 f	56.2	63.1	58.4	17-	54.3	59.8	56.6		
ulna (i)	17 m	53.9	61.3	58.1	11+	51.9	60.0	56.2	60.0	
	17 f	53.9	61.2	56.1	16-	53.3	57.6	54.9		
ulna (g)	17 m	9.8	11.1	10.5	11+	9.1	10.9	9.9	11.85	
	17 f	9.6	10.7	10.1	16-	9.4	10.3	9.8		
tibiotarsus (c')	17 m	8.2	9.2	8.6	10+	6.9	8.0	7.6	10.1	
	18 f	7.8	9.0	8.2	16-	7.2	7.9	7.6		
tibiotarsus (f')	16 m	3.3	3.8	3.5	11+	2.8	3.3	3.0	4.0	
	18 f	3.1	3.5	3.3	14-	2.9	3.3	3.0		

Tab. 4: The measurements of recent *Lagopus lagopus* and *Lagopus mutus* according to KRAFT (1972) compared with *L. balcanicus* from Varshets. (For e, i... see fig. 4, m = male, f = female).

Bone	<i>Lagopus lagopus</i>				<i>Lagopus mutus</i>				<i>Lagopus atavus</i>	<i>Lagopus balcanicus</i>		
	n	min	max	x	n	min	max	x				
humerus (a)	66	10.2	13.1	-	-	-	-	-	10.1	12.9	12.9	13.7
humerus (c)	66	5.5	7.2	-	-	-	-	-	5.6	7.2	7.5	7.5
tibiotarsus (d')	9	6.8	8.6	7.7	5	6.3	7.4	6.9	7.7	9.0	9.2	
tibiotarsus (e')	9	6.8	8.4	7.5	5	6.3	7.5	6.7	7.0	7.0	8.7	8.8

Tab. 5: The measurements of *Lagopus lagopus* (Würmian - a, c; recent - d', e'). *Lagopus mutus* (recent) and *Lagopus atavus* (Upper Pliocene) compared with *L. balcanicus* from Varshets. [The humeral measurements of *L. lagopus* and *L. atavus* are given after JANOSSY (1976), fig. 1, p. 536, while the tibiotarsal measurements follow BOCHENSKI (1991), tabl. III, p. 573. See also fig. 4].

The Finds of Other Bird Taxa

The remaining bird taxa are represented by a total of 311 bone finds (Tab. 1, 2). A small galliform bird is the absolute dominant in this avian fossil material. The small phasianid species (mentioned in Table 2 as "Phasianidae gen. - I") numbers 194 bones and bone fragments - a very good sample for detailed osteological characterization. (This will be the subject of another paper.) The species is larger than and differs clearly from *Coturnix coturnix* (L.). It is different and slightly larger than *Plioperdix ponticus* (TUGAR.) from the Upper Pliocene of Ukraine, Moldova and

Transbaikalia (BOCHENSKI & KUROCHKIN, 1987), but smaller than *Perdix perdix* (L.).

The remaining four phasianids are also smaller than recent *Phasianus colchicus* L., but two of them are larger than recent *Alectoris* species. About 30 species of phasianids are described from various Tertiary sites of Europe and it seems that the European fossil Phasianidae are of great evolutionary and zoogeographical interest (OLSON, 1985). The francolins are not represented in the recent European avifauna, but it is quite possible that some species have lived in the foothills of the Western Stara Planina Mountain (Western Balkan) up to the beginning of Pleistocene.

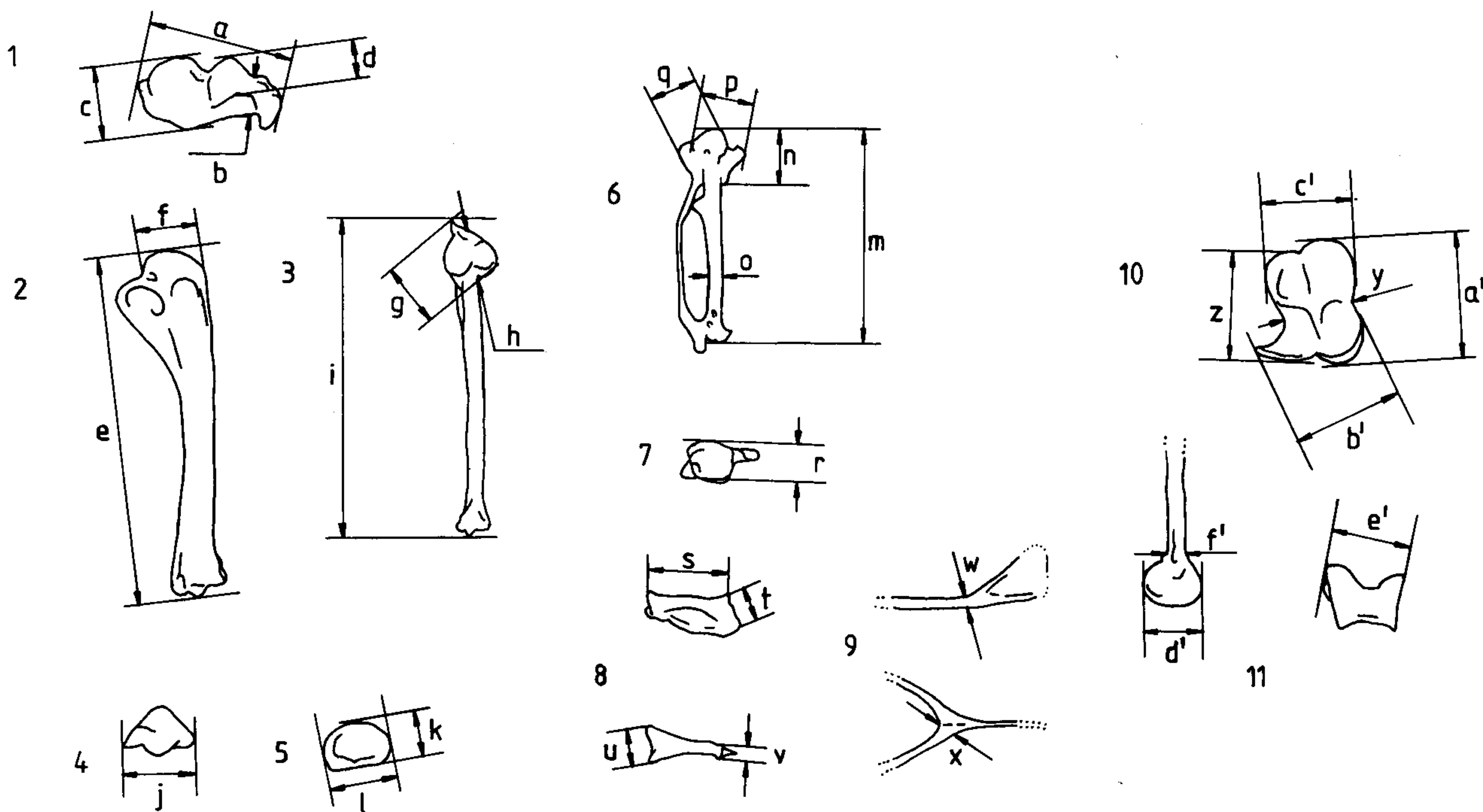


Fig. 4: How the bones were measured: distal humerus (1), humerus (2), ulna (3), distal ulna (4), proximal radius (5), carpometacarpus (6), proximal carpometacarpus (7), phalanx prox. dig. majoris - lateral and dorsal views (8), furcula - lateral and caudal views (9), proximal tibiotarsus (10), distal tibiotarsus - lateral and ventral view (11) (ref. to table 3).

The vulture is represented by four bones - 2 coracoids and 2 phalanges (of the foot and the wing). Morphologically it differs from recent European vultures and its dimensions are larger than those of the Black Vulture, *Aegypius monachus* (L.). The four bone fragments of *Falco* sp. indicate a small kestrel-like falcon, very close to *Falco tinnunculus* L.

Both ulnae of swifts indicate a very small species, whose size is up to two thirds of that of the recent *Apus apus* (L.). Both humeri of woodpeckers belong to juvenile specimens and, perhaps, to two different species, dimensionally similar to *Dendrocopos major* (L.).

Both finds of fossil lark are very close to *Lullula arborea* (L.).

According to BRODKORB's catalogue (1978) no paleo-species of the genus *Pyrrhocorax* are described. All known finds originate from various sites of the Pleistocene and Holocene of Europe and South-West Asia. After the species, mentioned as "Phasianidae gen. - I" and *Lagopus balcanicus*, the Chough of Varshets was the most numerous in the surroundings of the site.

Conclusion

The Middle Villafranchian paleontological site of Varshets is the richest one in Bulgaria not only for its bird paleofauna, but also with its vertebrate fauna in general. In spite of the incomplete determination of the avian fossils so far, most finds collected represent considerable ornithogeographical, evolutionary and paleoecological interest. The finds of *Lagopus balcanicus* confirm that the grouse were first of all steppe birds, which became cold-living species only after the beginning of the Pleistocene. Apparently, *L. balcanicus* may have spread widely in the large steppe plains and valleys along the continent up to 2-3 million years ago, and later as well. The remaining species of vultures, eagles, falcons, phasianids, tetraonids, swifts woodpeckers, orioles, larks, trushes, choughs etc., according to their general habitat preferences, may be classified into three main groups - petrophilous, wood and steppe. This is an indication for a mosaic mixed landscape, possibly, similar to present day forest-steppe. The habitats consisted of small or larger areas of woods alternating with openlands and grasslands

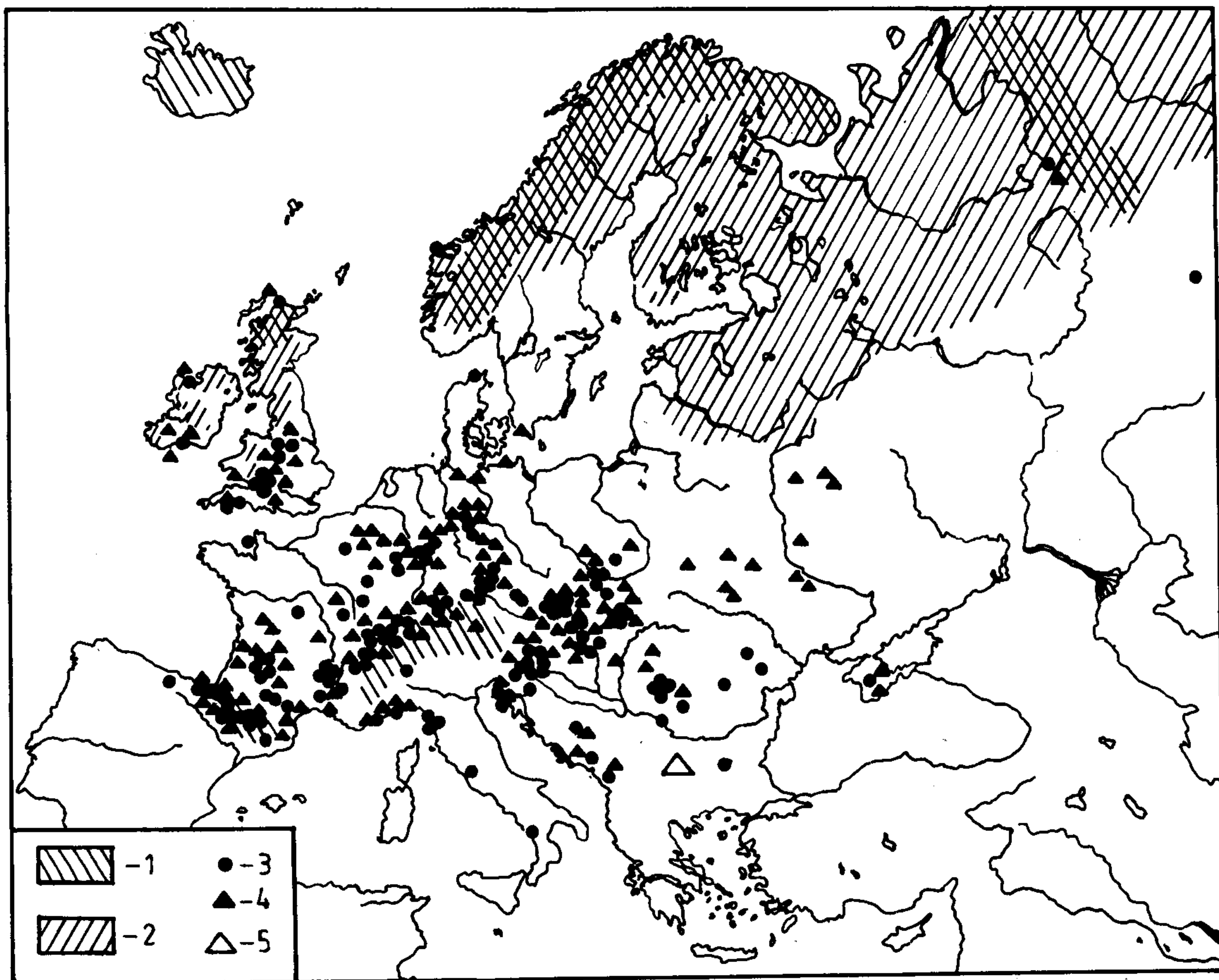


Fig. 5: Distribution of the genus *Lagopus* in Europe: 1 - present breeding range of *L. mutus*; 2 - present breeding range of *L. lagopus*; 3 - Würmian records of *L. mutus* (after TYRBERG, 1991); 4 - Würmian records of *L. lagopus* (after TYRBERG, 1991); 5 - the Lower Villafranchian record of *L. balcanicus* in Varshets.

around the rocky massifs. The taxa established in Varshets form the most diverse avian (and vertebrate as well) paleofauna reported from a Bulgarian paleontological site so far.

The finds of *Lagopus balcanicus* confirm the suggestions that the history of the genus *Lagopus* begins in Europe in the Pliocene. *Lagopus balcanicus* and *L. atavus* may have coexisted in Europe during the Villafranchian - the first species in the SE parts of the continent and the second one in Central Europe.

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