

# THE ECONOMY AND ENVIRONMENT OF A ROMAN, LATE-ROMAN AND EARLY BYZANTINE TOWN IN NORTH-CENTRAL BULGARIA: THE MAMMALIAN FAUNA FROM NICOPOLIS-AD-ISTRUM

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## Summary

This paper discusses the large domestic and wild mammal fauna recovered from the Roman, late-Roman and early Byzantine town of Nicopolis-ad-Istrum, located in north-central Bulgaria. More than 20,000 bone fragments were analysed, of which more than 8000 were identifiable to the level of species. The major domestic species predominate, wild species only occurring in relatively small numbers. The relative proportions of the major species appear to fluctuate between the different occupation periods at the site. During the mid-Roman (175-250 AD), late-Roman (250-450 AD) and early Byzantine (450-600 AD) periods, the proportion of pigs generally increases through time whilst that of cattle decreases. Various suggestions are put forward to explain the phenomenon of increased pig-keeping. The presence of camel (*Camelus* sp.) at the site is discussed, as well as an interesting find of a complete carapace of a spur-thighed tortoise (*Testudo graeca*) with a hole drilled through its supracaudal plate. A comparison is made with other faunal assemblages in the surrounding region, which suggests that Nicopolis-ad-Istrum is somewhat unique in character.

## Résumé

*Économie et environnement d'une ville de l'époque romaine au début de la période byzantine dans le centre-nord de la Bulgarie : la faune mammalienne de Nicopolis-ad-Istrum.*

Cet article présente la grande faune domestique et la faune mammalienne sauvage découvertes dans la ville romaine, romaine tardive et byzantine de Nicopolis-ad-Istrum, dans le centre-nord de la Bulgarie. Plus de 20 000 restes osseux ont été analysés, dont plus de 8000 ont été identifiés au niveau spécifique. Les espèces domestiques principales dominent, les espèces sauvages ne figurant qu'en petit nombre. Il apparaît que les proportions relatives des principales espèces fluctuent entre les différentes périodes d'occupation du site. Pendant le milieu de la période romaine (175-250 ap. J.-C.), la fin de la période romaine (250-450 ap. J.-C.) et le début de l'époque byzantine (450-600 ap. J.-C.), les proportions de cochon augmentent au cours du temps alors que celles des bovins diminuent. Plusieurs hypothèses sont proposées pour expliquer ce phénomène d'accroissement de l'élevage du cochon. La présence du chameau (*Camelus* sp.) dans le site est discutée, de même qu'une découverte intéressante de carapace de tortue mauresque (*Testudo graeca*) présentant un trou dans la plaque supracaudale. Une comparaison est faite avec d'autres assemblages fauniques de la région et suggère le caractère unique de Nicopolis-ad-Istrum.

## Zusammenfassung

*Umwelt und Wirtschaft einer römischen, spätrömischen und frühbyzantinischen Stadt in Bulgarien: Die Säugetierfauna aus Nicopolis-ad-Istrum.*

Dieser Beitrag befaßt sich mit der umfangreichen Haus- und Wildsäugerfauna, die in Nicopolis-ad-Istrum (Bulgarien) ausgegraben wurde. Die Stadt war in römischer, spätrömischer und byzantinischer Zeit besiedelt. Es wurden über 20.000 Knochenfragmente untersucht, von denen wiederum mehr als 8.000 bis zur Tierart bestimmt werden konnten. Die Haustiere überwiegen, während die Wildtiere nur einen relativ geringen Anteil ausmachen. Die Anteile der wichtigsten Tierarten scheinen zwischen den verschiedenen Belegungsphasen zu schwanken. Während der mittell-römischen (175-250 n. Chr.), spätrömischen (250-450 Chr.) und frühbyzantinischen (450-600 n. Chr.) Periode nimmt der Anteil der Schweine generell zu, während der Anteil der Rinder rückläufig ist. Für das Phänomen der zunehmenden Schweinehaltung werden Erklärungsansätze erläutert. Das Vorkommen des Kamels (*Camelus spec.*) wird ebenso diskutiert wie der Fund eines kompletten Panzers der Maurischen Landschildkröte (*Testudo graeca*) mit einer Bohrung im supracaudalen Bereich. Vergleiche mit anderen Fundkomplexen der Region zeigen, daß die Befunde von Nicopolis-ad-Istrum in ihrem Charakter offenbar einzigartig sind.

## Key Words

Bulgaria, Late-Roman, Early Byzantine, Fauna, Economy, Pigs.

## Mots clés

Bulgarie, Fin de l'époque romaine, Début de la période byzantine, Faune, Économie, Porc.

## Schlüsselworte

Bulgarien, Späte Römische Kaiserzeit, Frühbyzantinische Zeit, Fauna, Landwirtschaft, Schweine.

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## Introduction

This paper discusses the large domestic and wild mammal fauna recovered from the Roman, late-Roman and early Byzantine town of Nicopolis-ad-Istrum. The site is located in north central Bulgaria near the modern day village of Nikiup, on the northern bank of the river Rositsa, which joins the Yantra (a tributary of the Danube; fig. 1). Between 1985-1991 a team of British archaeologists, led by Dr. Andrew Poulter of the Department of Archaeology, University of Nottingham, carried out extensive excavations at the site, in conjunction with the Institute of Archaeology of the Bulgarian Academy of Sciences, and Veliko Turnovo Museum (Poulter, 1988, 1990, 1995).

## Historical background

The “City of Victory on the Danube” (as is the meaning of the name - Nicopolis-ad-Istrum) was founded in the early 2<sup>nd</sup> century AD by the emperor Trajan to commemorate his

conquest of Dacia (modern day Romania). The city flourished during the 2<sup>nd</sup> century, as witnessed by its substantial roads and the remains of public buildings, some of which have survived up to the present day. Although many of these buildings were systematically destroyed through the course of time by stone robbers, the robber trenches, when seen from the air, provide an almost complete plan of the city as it might have appeared in the 4<sup>th</sup> century AD (fig. 2; note the second fortification attached to the southern side of the Roman defences, forming a “castellum”, c. 5.7 ha (14 acres) in size; this was the area of the British excavations). The prosperity of the city was dramatically interrupted during the 3<sup>rd</sup> century, however, by the invasions of the Goths (the city may have been ransacked in 251 and it was besieged in 270), although it appears to survive and exist into the 4<sup>th</sup> century. Christian Goths, under their leader Ulfilla, settled within the city’s territory in 347-8, the historian Ammianus Marcellinus reporting that Nicopolis was

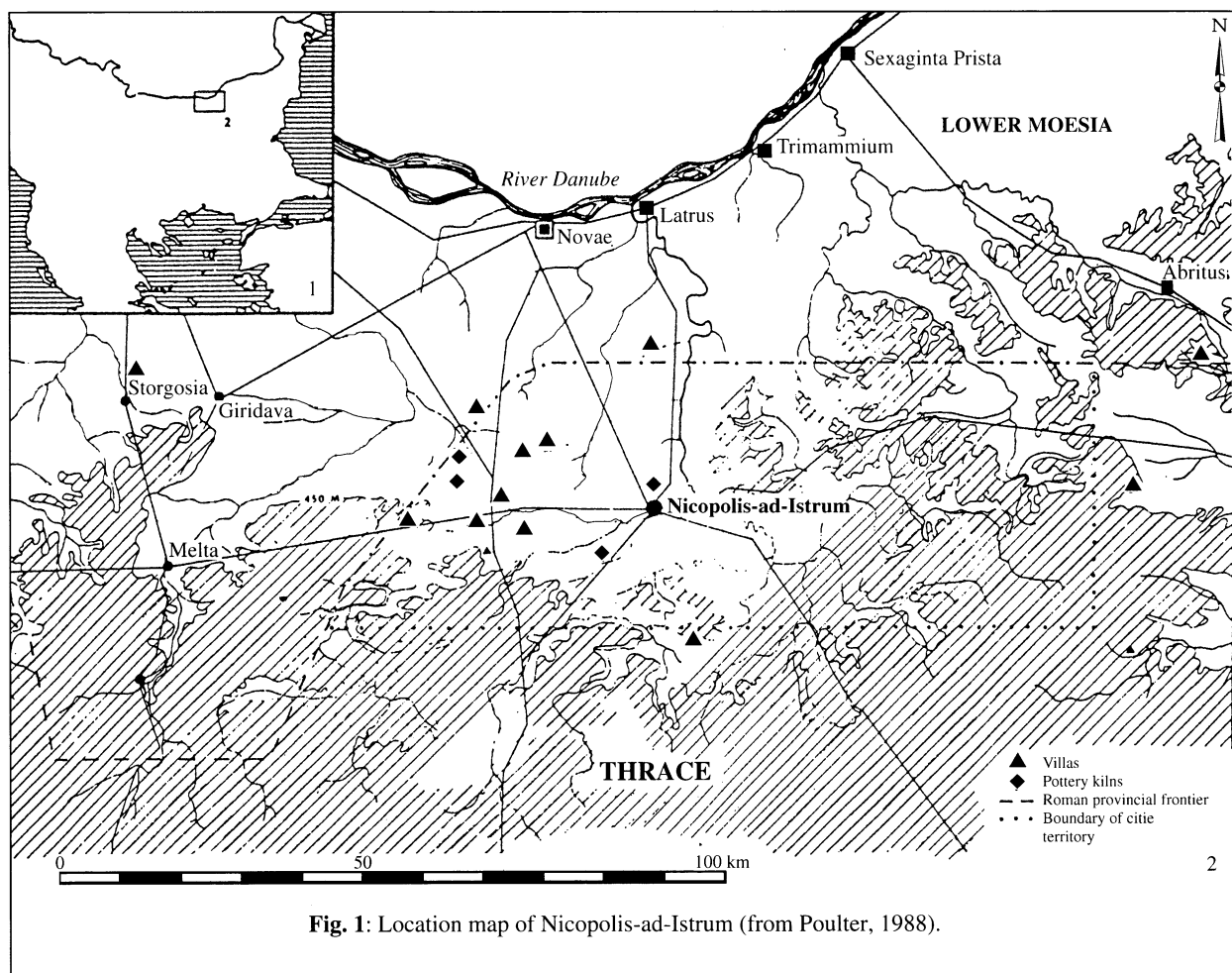
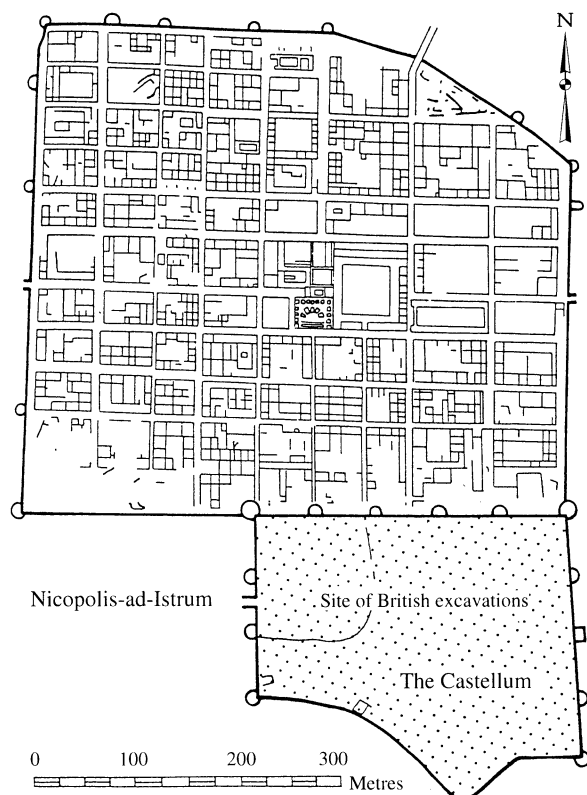


Fig. 1: Location map of Nicopolis-ad-Istrum (from Poulter, 1988).

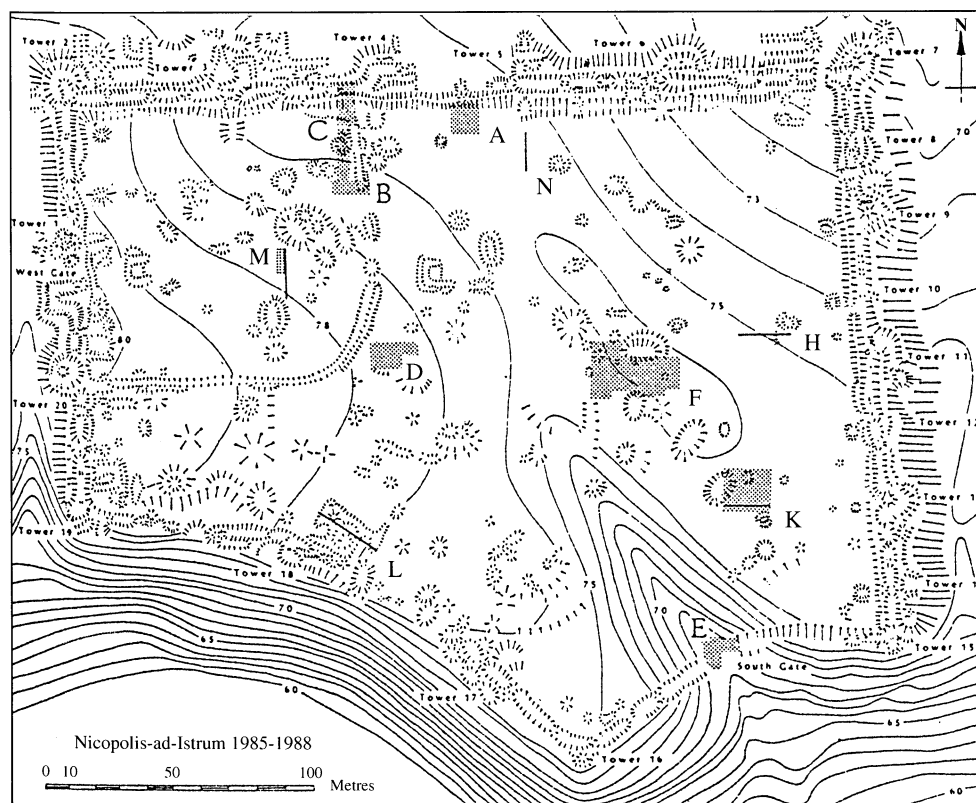


encircled by hostile Goths just before the Eastern Roman emperor Valens was defeated at the battle of Adrianople in 378. Despite this, the city seems to have not been destroyed or abandoned until after 430, and probably not until the invasion of Attila in 447 when the nearby city of Marcianopolis was sacked by the Huns. The name of the city, however, continues to appear in various documents, e.g. one source naming its bishops in 458 and 518, suggesting that Nicopolis was still regarded as being amongst the most important cities on the Lower Danube during the 6<sup>th</sup> century. The name of the city is mentioned for the last time in 598 during the final attempts to maintain Byzantine control over northern Bulgaria prior to the Slav invasions of the 7<sup>th</sup> century.

### Methodology

After a detailed topographical and geophysical survey had been carried out of the entire castellum area, a number of areas were selected for excavation (fig. 3). These identified a number of important buildings, including a Christian

**Fig. 2:** Nicopolis-ad-Istrum, showing the city and the castellum (from Poulter, 1988).



**Fig. 3:** Nicopolis-ad-Istrum: the castellum, showing the excavated areas (main areas include:

- C - early Roman gate/barracks,
  - D and M - work-shops,
  - E - south gate,
  - F - basilica,
  - K - smaller church)
- (from Poulter, 1988).

**Table 1:** Diagnostic zone fragment (DZF) quantification data.

PERIOD	EARLY ROMAN		MID ROMAN		LATE ROMAN		EARLY BYZANTINE	
PHASE DATE (A.D.)	1 100-175		2 175-250		3 250-450		4 450-600	
<b>1. Mammalia, Domestic:</b>	DZF	%	DZF	%	DZF	%	DZF	%
Camel ( <i>Camelus</i> sp.)	—		—		1	+	1	+
Horse ( <i>Equus caballus</i> L.)	9	2.5	5	1.5	98	2.0	53	2.4
Ass ( <i>Equus asinus</i> L.)	1	+	—		4	+	1	+
Cattle ( <i>Bos taurus</i> L.)	94	25.7	53	16.1	1090	22.5	394	18.0
Pig ( <i>Sus domesticus</i> Erxl.)	130	35.5	165	50.1	2008	41.4	896	40.9
Sheep/Goat (Caprinae)	115	34.7	87	28.9	1385	30.8	678	34.6
Sheep ( <i>Ovis aries</i> L.)	10		6		90		71	
Goat ( <i>Capra hircus</i> L.)	2		2		20		9	
Dog ( <i>Canis familiaris</i> L.)	1	+	3	+	48	+	44	2.0
Cat ( <i>Felis domestica</i> Schreb.)	—		1	+	17*	+	6	+
TOTAL (1)	362		322		4761		2153	
<b>2. Mammalia, Wild:</b>								
Red deer ( <i>Cervus elaphus</i> L.)	2	+	2	+	8	+	19	+
Roe deer ( <i>C. capreolus</i> L.)	—		—		—		2	+
Brown bear ( <i>Ursus arctos</i> L.)	—		—		1	+	1	+
Wild boar ( <i>Sus scrofa</i> L.)	—		1	+	9	+	4	+
Badger ( <i>Meles meles</i> L.)	—		—		1	+	—	
Fox ( <i>Vulpes vulpes</i> L.)	—		—		1	+	—	
Beaver ( <i>Castor fiber</i> L.)	—		—		1	+	2	+
? Polecat (? <i>Putorius</i> sp.)	—		—		5	+	—	
Hare ( <i>Lepus europaeus</i> Pall.)	2	+	4	1.2	58	1.2	12	+
<b>3. Reptilia</b>								
Tortoise ( <i>Testudo graeca</i> L.)	—		—		2	+	—	
TOTAL (2)	4		7		86		40	
<b>GRAND TOTAL</b>	<b>366</b>		<b>329</b>		<b>4847</b>		<b>2193</b>	
+ = less than 1%								
* = includes partial skeleton (N = 7)								

basilica (F), a smaller church (K), two workshop buildings (DM) and an early Roman gate and later barracks (C). The majority of the occupation material within the castellum area appeared to date to the 5<sup>th</sup> and 6<sup>th</sup> centuries, when the walls of the castellum protected the headquarters of the imperial and ecclesiastical administration (Poulter 1988, 1990, 1995).

Animal bones were retrieved by hand during the excavation, an extensive programme of dry sieving also being carried out (using 0.5 cm mesh sieves) to improve the

retrieval procedure. In addition, between 1985-1991, a total of 581 bulk soil samples were taken from the excavation, representing more than 6,100 litres of sediment. All samples were subjected to water flotation, primarily in order to recover archaeobotanical remains (using a 500 micron mesh sieve to recover the flot), the residues subsequently being wet sieved in order to recover mammal, bird, fish and small mammal bones (also using a 500 micron mesh sieve). This represented a considerable amount of work which had to be completed within each field season. Such a large and exten-

sive sampling program was made possible through the cooperation of all the staff involved in the excavation, along with numerous excavation volunteers who assisted with the day-to-day processing and sorting of samples.

A total of more than 20,000 large mammal bones, nearly 2000 bird bones (Boev, in prep.), more than 1,500 fish bones (Irving, in prep.) and more than 700 small mammal bones (Parfitt, in prep.) were recovered as a result of this work. This paper aims to present the overall results of this research, with particular reference to the author's study of the large mammalian fauna.

Quantification of the large mammalian remains was carried out using a diagnostic zone fragment (DZF) method (after Watson, 1979), to eliminate the possibility of the same bone being counted twice. A more detailed description of this method is provided in Beech (in prep.). The minimum number of individuals (MNI) was also calculated, based on the most numerous non-reproducible element with no reconstruction for pairs.

### Mammalian fauna

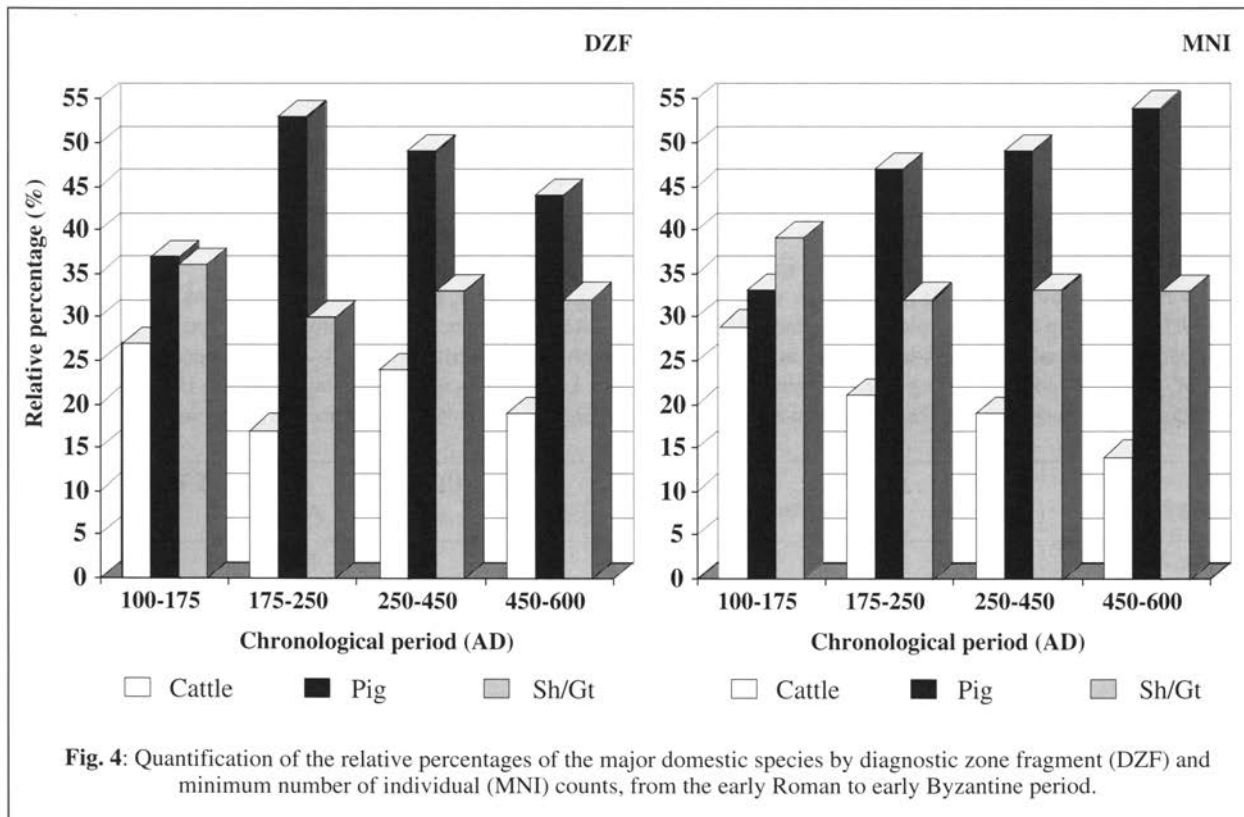
More than 20,000 large mammal bone fragments were analysed of which a total of 8022 were diagnostic fragments identifiable to the level of species. The majority of

these (N = 7040, 88%) belonged to the main occupation periods on the site: late-Roman (phase 3, 250-450 AD) and early Byzantine (phase 4, 450-600 AD; tab. 1).

The major domestic species - cattle, pig and sheep/goat - dominate the assemblage within all chronological phases, and the hunting of wild animals appears to have been of little importance. The overall representation of species was quite similar throughout the site (i.e. within the aforementioned different excavation areas), so further discussion in this paper will principally concentrate on the overall characteristics of the Nicopolis faunal assemblage and its economic and environmental significance.

### Pig husbandry at Nicopolis-ad-Istrum

During the early Roman period (100-175 AD) pig and sheep/goat were represented in broadly similar amounts followed by cattle, but from the mid-Roman period (175-250 AD) through until the early Byzantine period (450-600 AD), pigs appeared to dominate, followed by sheep/goat and then cattle. Pig-keeping appears to increase through time with sheep/goat staying at roughly the same proportions, whilst the relative number of cattle decreases through time. This can be seen even more clearly in the case of MNI (fig. 4).



**Table 2:** Pig anatomical representation.

Note that the figures are obtained from counts of non-reproducible elements, and do not necessarily correspond with total DZF counts in table 1. The totals of all third and fourth metapodials have been divided by two, and phalanges have been divided by four, to allow comparisons with other anatomical units.

PERIOD	EARLY ROMAN	MID ROMAN	LATE ROMAN	EARLY BYZANTINE
PHASE DATE (AD)	1 100-175	2 175-250	3 250-450	4 450-600
Skull, occip. cond.	4	—	23	10
Maxilla	1	8	93	77
Mandible	10	13	180	109
Atlas	—	1	25	22
Axis	—	—	6	1
Scapula, dist.	5	13	123	65
Humerus, prox.	5	6	47	28
Humerus, dist.	4	15	158	72
Radius, prox.	5	4	65	24
Radius, dist.	3	1	36	17
Ulna, prox.	6	18	98	44
Metacarpals 3+4, prox.	5	11	61	44
Metacarpals 3+4, dist.	3	9	46	32
Pelvis acetabulum	5	18	106	43
Femur, prox.	—	6	59	18
Femur, dist.	—	6	75	36
Tibia, prox.	3	13	57	27
Tibia, dist.	6	6	74	33
Metatarsals 3+4, prox.	4	4	41	28
Metatarsals 3+4, dist.	3	4	24	16
Astragalus	1	1	45	14
Calcaneum	1	10	70	36
Phalanx 1	1	2	26	12
Phalanx 2	1	1	13	7
Phalanx 3	—	1	5	4

**Table 3:** Pig dental data. Definition of age periods (AP):

Neo. = Neonatal; Juv. = Juvenile (LM1 not in wear) ; Immature = LM1 in wear, LM2 not in wear: A - LM2 present in crypt; B - LM2 erupting up to occlusal plane; Subadult = LM2 in wear, LM3 not in wear: A - LM3 present in crypt; B - LM3 erupting from bone to occlusal surface; Adult = LM3 in wear: A - LM3 with enamel attrition only; B - LM3 minor dentine exposure; C - LM3 dentine exposure merging on mesial cusps; Eld. (Elderly) = LM3 heavily worn, post stage-j (Grant, 1982).

(Note that the following data are based on the quantification of mandible fragments with at least one recordable molar or premolar).

AP / Period (AD)	NEO.	JUV.	IMMATURE		SUBADULT		ADULT			ELD.
			A	B	A	B	A	B	C	
EARLY ROMAN (100-175)	—	—	1	—	—	1	1	1	—	—
MID ROMAN (175-250)	—	1	1	3	1	1	1	—	—	—
LATE ROMAN (250-450)	4	15	22	11	29	7	27	23	2	1
EARLY BYZANTINE (450-600)	2	9	11	2	12	6	5	19	1	1

The presence of several neonatal and juvenile partial skeletons in both late-Roman and early Byzantine contexts suggests that pig breeding may have been carried out at or near the site. The presence of articulated limbs may indicate that joints of ham were being salted or smoked. If one considers the anatomical representation data (tab. 2), then several points can be made. The high numbers of mandibles reflects the disposal of waste from the primary butchery of carcasses. The relatively low number of maxillae to mandibles can be explained as a result of butchery practices, which generally split and smashed open the skulls. The disproportionate amounts of scapula, distal humeri and pelvis in the late-Roman period can perhaps be explained as further proof of the preference for shoulders and joints of ham.

Pigs generally appear to have been killed over a broad age range varying from juveniles to mature adults (tab. 3). Most animals however were slaughtered before attaining adulthood. During the late-Roman period, the majority of pigs were killed at the following age periods: 'juvenile' (M1

not in wear) to 'immature' (M2 not in wear), 'sub-adult A' (LM3 present in crypt) and 'adult A/B' (LM3 with enamel attrition only/minor dentine exposure). In the early Byzantine period, a similar slaughter pattern was present, animals also being killed when juvenile/immature and at a sub-adult A stage; however, the adult animals appear to have been mostly killed at adult B stage with fewer pigs killed at adult A stage (only 7.4% as compared to 19.1% of mandibles in the late-Roman period). If we accept the published data for late maturing modern domestic pigs (Habermehl, 1975; Bull and Payne, 1982), then the animals killed at the youngest age groups (M1 and M2 still not in wear) may represent animals killed somewhere during the first year to fifteen months of age. Those killed at sub-adult A stage may represent pigs killed during their second year, between fifteen to eighteen months of age, whilst the adult group can be attributed to individuals aged about two-and-a-half years.

It is worth remarking on the apparent shift in the peak adult distribution between the late-Roman to early Byzantine periods, towards the killing of older pigs during the latter

**Table 4:** Pig epiphyseal fusion. Key to pig fusion periods.

EARLY: distal scapula, distal humerus, proximal radius, pelvis; INTERMEDIATE I: distal metacarpal, distal tibia; INTERMEDIATE II: distal metatarsal, proximal calcaneum; LATE: proximal humerus, distal radius, proximal ulna, proximal and distal femur, proximal tibia.

<b>EARLY ROMAN (100-175 AD):</b>				
	Unknown	Unfused	Fused	% Fused
Early	6	4	6	60.0
Intermediate I	3	5	4	52.6
Intermediate II	4	2	-	47.6
Late	13	3	1	44.0
<b>MID-ROMAN (175-250 AD):</b>				
	Unknown	Unfused	Fused	% Fused
Early	14	7	20	74.1
Intermediate I	2	16	6	53.1
Intermediate II	3	11	3	46.0
Late	32	4	4	40.7
<b>LATE-ROMAN (250-450 AD):</b>				
	Unknown	Unfused	Fused	% Fused
Early	134	62	192	75.6
Intermediate I	20	88	57	62.4
Intermediate II	39	65	20	55.6
Late	194	123	47	48.3
<b>EARLY BYZANTINE (450-600 AD):</b>				
	Unknown	Unfused	Fused	% Fused
Early	54	25	62	71.3
Intermediate I	18	57	20	50.0
Intermediate II	13	43	12	42.9
Late	94	60	17	37.5

period, 30.9% of all mandibles being of 'adult B' to 'elderly' stage, as compared to only 18.4% in the late-Roman period. This may perhaps suggest a strategy towards optimisation of meat production in the later phase, with an increased number of animals being killed at two-and-a-half years or older. Certainly the available data seem to indicate intensive pig production with animals regularly being slaughtered at apparently regular age intervals. This in turn would suggest a certain degree of organisation in production.

The pig epiphyseal fusion data appeared to broadly match the dental data, indicating that most animals were killed at an immature age (tab. 4). If we consider the early fusion group (distal scapula, distal humerus, proximal radius and pelvis), 75% of counted epiphyses were fused in the late-Roman period and 71% in the early Byzantine period, suggesting that around 25% and 29% of pigs were killed at less than one year old in the respective periods. This fusion group corresponds approximately with the dental periods "neonatal" - "immature" which appear to confirm this picture containing broadly similar proportions of mandibles. Considering the pig epiphyseal data through time, a higher percentage of young pigs killed at less than one year of age seems to be indicated during the early Roman period (phase 1, 100-175 AD) in comparison to later periods. This would appear to contradict the dental data and may suggest that during this period young pig carcasses were supplied to the site without their heads, thereby artificially increasing the counts of the early fusion period elements. Some caution should be taken however as the sample size is not great. The epiphyseal data from the mid-Roman and early Byzantine periods appear to be broadly similar to each other suggesting similar slaughtering patterns in both periods. The situation during the late-Roman period however appears to be somewhat different. Whilst a similar proportion of pigs were killed by the early fusion stage (i.e. less than one year) during the mid-Roman and early Byzantine periods, there appear to be slightly higher proportions of older animals for the intermediate and late fusion period groups. These differences were relatively minor though, and may simply be spurious as they appear to contradict the dental data which suggested that more pigs were killed during their second year in the late-Roman than in the early Byzantine periods (52.5% of mandibles were between "immature B" to "adult A" stage as opposed to only 36.8% in the latter period).

## Other species

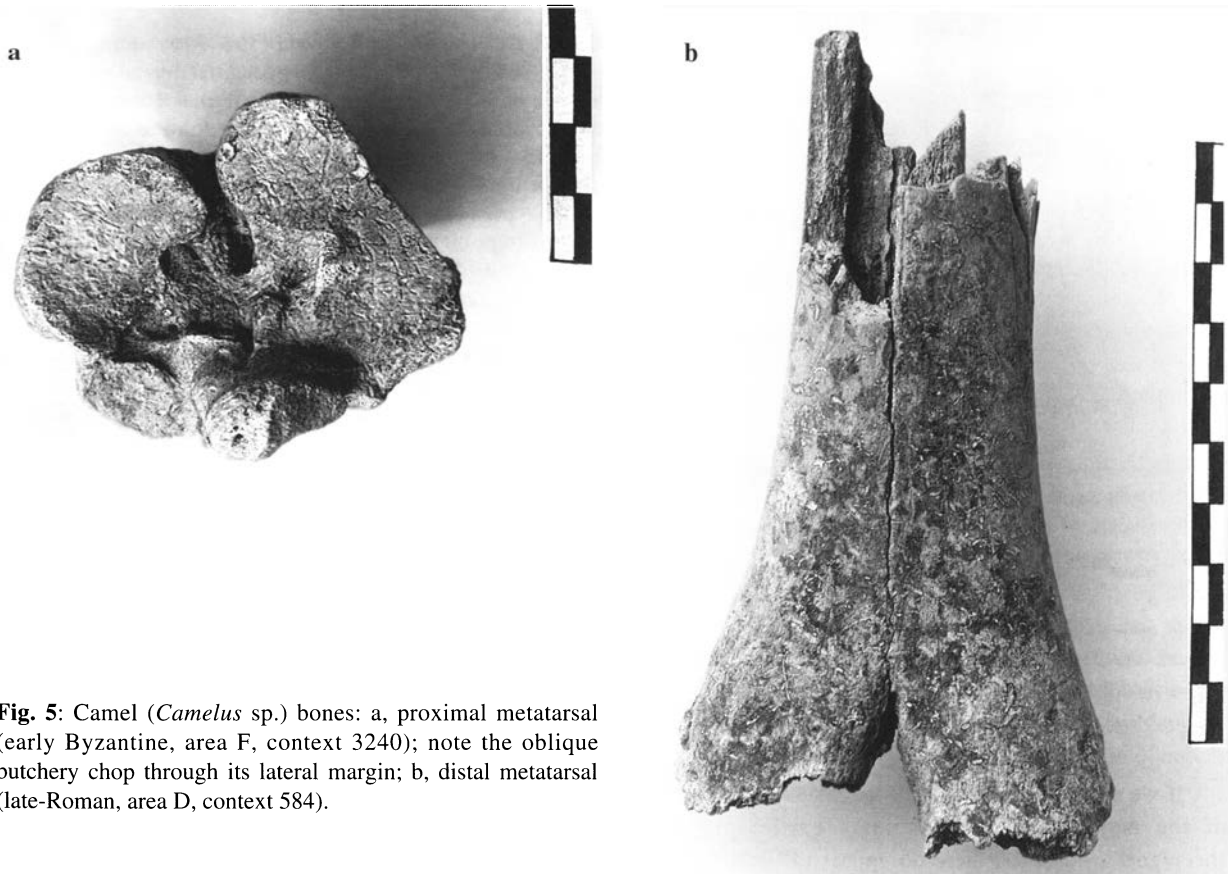
Sheep appear to have been mostly utilised for their wool (and perhaps also for their milk), with meat perhaps being of secondary importance. Cattle were mostly kept as

dairy animals or for use as traction animals, although they would have also contributed meat. There is some evidence to suggest that horse meat may occasionally have been eaten between the mid-Roman to early Byzantine periods. Of particular interest within the assemblage was the presence of camel and spur-thighed tortoise.

Two camel (*Camelus* sp.) metatarsal fragments were identified, one dating to the late-Roman period, the other to the early Byzantine period (fig. 5). Their identification was confirmed by Nikolai Spassov (Curator of mammals, National Natural History Museum, Sofia, Bulgaria), the two specimens comparing favourably, with regards to their general size and morphology, with the bactrian camel (*Camelus bactrianus* L.) skeleton in the National Natural History Museum's comparative collection. Whether in actual fact they represent bactrians or dromedaries is, however, somewhat of a problem. Schramm (1975: 232) claimed to have identified bactrian camel bones at Novae in the late-Roman western gate and forum deposits, although no criteria was given for their supposed identification as bactrians rather than dromedaries. It has also been reported by Bökönyi (1974) that camel bones have been identified from other Roman localities in Central and Eastern Europe, their presence being explained by the transfer of military units from Western Asia or North Africa. Some of these have been liberally identified as bactrians, although in a later article Bökönyi (1989) appears to have changed his opinion, suggesting that the central European camels are more likely to be dromedaries, whilst those found within southern Russia and adjacent to the Black Sea are bactrians. Another possibility is that they may represent the remains of camels used by visiting traders. The site of Nicopolis-ad-Istrum is known to have had trade contacts with the eastern provinces of the empire, as witnessed by both epigraphic evidence and the presence of coins (Poulter, pers. comm.). More recently Albarella (1993) has reviewed the occurrence of camel bones in relation to a newly discovered camelid bone from a late-Roman site in central Adriatic Italy. As he quite rightly points out, until more clear diagnostic criteria are established for the separation of these two species, the matter will remain largely unresolved. Certainly camels have been present in the Balkans since early times and most authors seem to accept that their introduction to the region came mostly from the west coast of the Black Sea.

An almost complete tortoise carapace was discovered within a late-Roman context (P-5022). It was identified as belonging to a spur-thighed tortoise (*Testudo graeca*) on account of its single suprocaudal plate and the fact that its shell was less domed and lumpy than that of Hermann's tortoise (*Testudo hermanni*) (Arnold and Burton, 1978).





**Fig. 5:** Camel (*Camelus* sp.) bones: a, proximal metatarsal (early Byzantine, area F, context 3240); note the oblique butchery chop through its lateral margin; b, distal metatarsal (late-Roman, area D, context 584).

This specimen came from a layer dating immediately prior to the construction of the west castellum tower. Of particular interest with regard to this tortoise carapace was the fact that a small hole (4.5 mm in diameter) had been drilled through the centre of its supracaudal plate (fig. 6). The purpose for this hole is questionable; certainly it is known that tortoises were occasionally eaten. However the relative completeness of the shell and the presence of the intentional drilled hole suggests some other form of exploitation. The hole may have been to tether the animal to prevent it from escaping, perhaps suggesting that it represented a domestic pet. No clear traces of abrasion around the margins of the hole, however, confirm the presence of regular wear made by some form of string or cord. Another possibility is that the tortoise carapace was simply hung as a form of decoration or amulet. The precise interpretation of this find remains therefore largely enigmatic.

### Nicopolis-ad-Istrum within a regional context

Comparing Nicopolis-ad-Istrum with published faunal assemblages of a similar date elsewhere in Bulgaria, a certain number of parallels as well as dissimilarities can be

pointed out. The assemblage studied from Nicopolis is in actual fact fairly unique, representing one of the largest bone assemblages ever to be analysed from the Roman/late-Roman to early Byzantine period in Bulgaria. The only other published localities containing faunal reports are those of Iatrus, with a total of 2 184 bones identified to species (Bartosiewicz and Choyke, 1991), and Novae, situated some 20 km west of Iatrus, with a total of 2 803 bones identified to species (Schramm, 1975), both sites being situated to the north of Nicopolis on the river Danube. The only other published faunal locality of a similar date is a Byzantine villa situated near the river Strouma in the Béla Voda district, near Pernik (Iliev *et al.*, 1992), this site only having a total of 443 bones identified to species.

All these localities are similar to Nicopolis in that domestic animals predominate, wild species only being represented in low numbers. Horse, dog and cat were present on all sites in low numbers as at Nicopolis. Camel bones, as mentioned before, were also identified from Novae. Ass bones were also present in very small numbers at Novae (west gate) and at the Béla Voda Byzantine villa. Red deer and wild boar appear to be important hunted wild species on all sites.



**Fig. 6:** Spur-thighed tortoise (*Testudo graeca*) carapace. (late-Roman, area P, context 5022). Note the hole (c. 4.5 mm diameter) drilled through its supracaudal plate.

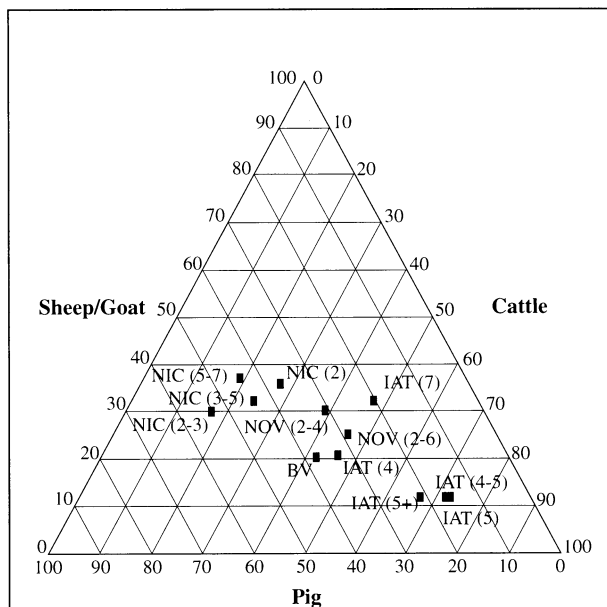
If we examine in more detail the relative proportions of the major domestic species - cattle, pig and sheep/goat - however, there do appear to be differences between these sites and Nicopolis. The triangular coordinate graph compares the ratios of these species on the aforementioned sites (fig. 7). Sites such as Iatrus (during its period B/C-D, late 4<sup>th</sup>-late 5<sup>th</sup> centuries) have high amounts of cattle (67-72%), with low amounts of pig (15-20%) and sheep/goat (13%). Other sites like Béla Voda, Novae and the earliest and latest phases at Iatrus (period A, early 4<sup>th</sup> century, and period MA, late 7<sup>th</sup> century) still have a predominance of cattle but in lower percentages (39-48%), with higher amounts of pig (20-38%) and sheep/goat (20-32%). Nicopolis-ad-Istrum, in contrast, has higher amounts of pig (37-53%) and sheep/goat (30-37%) and low amounts of cattle (17-27%).

Some of this variability can probably be explained as the result of different site functions, geographical location, and perhaps chronological differences; however, the marked contrast between the late 4<sup>th</sup> to late 5<sup>th</sup> century phases at Nicopolis and Iatrus is still rather striking. This either suggests that the two sites both functioned as particular production centres, specialising in the production of beef (Iatrus) or pork (Nicopolis), or that the inhabitants of both sites were specialised consumers with very different dietary tastes. Another explanation may be that the amount of cattle produced for the military reduced the supply to

the city. Certainly, as Bökönyi (1984: 16) points out in his survey of the rank order of species frequencies from well documented bone assemblages of the Roman period in Western and Central Europe, cattle dominate the majority of assemblages, followed by pig or sheep/goat in varying proportions. The site of Iatrus would therefore seem to be more typically Roman (and military?) in character, from this viewpoint being more similar to sites such as Tác-Gorsium in Pannonia and other sites in Western Europe, whilst the site of Nicopolis is more individual in character.

### Pig keeping as a social strategy?

The only visible change in the bone assemblage during the Roman to late-Roman transitional period appeared to be the increasing role of pig-keeping. Perhaps the trend towards increased pig-keeping was a deliberate economic strategy partly caused by various factors? As the threat of barbarian raids (the Goths and later the Huns) across the frontier increased, it would have become increasingly more dangerous to maintain large herds of cattle or flocks of sheep; animals pasturing outside the city could have been easily stolen. Surrounding pasture areas, on which the inhabitants of the city relied, could have also been



**Fig. 7:** Triangular coordinate graph comparing various Roman, late-Roman and Byzantine sites in Bulgaria. Axes indicate relative percentages of cattle, pig and sheep/goat using NISP figures (DZF figures in the case of Nicopolis-ad-Istrum). Key: BV, Béla Voda; IAT, Iatrus; NIC, Nicopolis-ad-Istrum; NOV, Novae. Numbers in brackets indicate dates, in centuries AD.

destroyed or occupied if the city was under siege. Pigs could easily have been bred and fattened in backyards or in pens within the area of the city, and would not have required pasturing to the extent of cattle and sheep. In addition, pigs are noted for their fecundity and ability to farrow at almost any time of year, thereby representing an ideal choice for optimising meat production. The material from the later 5<sup>th</sup> and 6<sup>th</sup> centuries appears to largely confirm this picture, suggesting that pig-keeping continued through the Byzantine occupation of the site. The castellum would perhaps have provided a focus for the surrounding civilian settlement, as there is some suggestion of an increasingly organised production of pigs, with possible hints that even specialised joints of meat might have been prepared, such as salted or smoked hams. Cattle and sheep appear for the most part to have been consumed within the settlement, suggesting that they were probably being produced within the region surrounding the city.

Another important factor to consider is that the changing role of the settlement from an early Roman town to a late-Roman/early Byzantine imperial/ecclesiastical centre also played an important role in the choice of food for the inhabitants. The emphasis on pork production and the increased exploitation of game and wildfowl (Boev, in prep.) may suggest a higher status for the later inhabitants of the site.

It is perhaps interesting to note that there is an apparent change in agricultural practices during the early Byzantine period towards spring-sown cereal crops and/or the garden cultivation of millet and legumes (Buyse, 1990, in prep.). This suggests a marked change from the earlier Roman period when large-scale organised cereal production seems to have been taking place within the hinterland of Nicopolis-ad-Istrum. This may also reflect the changing social and economic circumstances of the inhabitants of the town.

### Nicopolis and its hinterland

Unfortunately, we have comparatively little data available for bone assemblages from villa estates and rural sites in the region. The information that we do have about villa sites suggests that they vary in size and plan from large courtyard complexes (e.g. Montana villas 1, 2 and 3) to peristyle villas (e.g. Madara, Dolna Kremena and Gomets) to smaller more simple structures (e.g. Prisovo and Magilets; Poulter, 1983). It is reported that at Montana n° 2, in the first period of occupation towards the end of the 2<sup>nd</sup> century AD, sheep, pigs and cattle were kept at the villa (Poulter, *op. cit.*). Quern stones are relatively common finds on rural settlements and smaller vil-

las (e.g. Magilets), indicating that small land holders were also engaged in cereal production during the 2<sup>nd</sup> and early 3<sup>rd</sup> centuries AD. During the 4<sup>th</sup> century the villas around Montana were provided with “*horrea*” (granaries), perhaps suggesting that during the early 4<sup>th</sup> century they were engaged in large scale cereal production. Hunting activities may have also been carried out from some of the villas, as the site of Prisovo, situated in the foothills of the Stara Planina, produced bones of wild boar and red deer (Poulter, *op. cit.*). The only other source of evidence we have for activities carried out on the villa estates is a relief of C. Iulius Quadratus from Ulmetum, depicting the ploughing of fields and the tending of flocks of sheep, suggesting that a mixed agricultural and pastoral economy was operating on most 2<sup>nd</sup> and 3<sup>rd</sup> century villa estates (Poulter, *op. cit.*). This unfortunately still leaves us in the dark with regard to the precise nature of animal husbandry practices employed on the majority of rural sites, particularly in the later period. Only the excavation of new sites, with systematic recovery and detailed analysis of their faunal assemblages, can begin to shed some light on this particular problem, i.e. the precise nature of the relationship between Nicopolis and its surrounding rural territory.

### Conclusion

To conclude, analysis of the Nicopolis-ad-Istrum bone assemblage has provided a valuable insight into the economic practices and daily life of a Roman, late-Roman and early Byzantine town in Moesia Inferior. A tantalising glimpse of the development and changing economic fortunes of the inhabitants is witnessed by modifications not only to the use of domestic mammals, but also by changes in hunting, fishing and agriculture (Boev, in prep.; Irving in prep.; Buyse, 1990, in prep.). The general character of the late-Roman and early Byzantine towns appears to be far removed from the cities and towns of the early Roman empire. Indeed its layout more resembles that of mediaeval towns in Europe, its walls protecting the headquarters of an imperial/ecclesiastical administration (Poulter, 1990). The presence of organised pig production, as well as the diversification of exploitation of wild resources during the late-Roman and early Byzantine periods (e.g. increase in wildfowl exploitation, Boev *op. cit.*; increased diversity of fish species, Irving *op. cit.*), perhaps indicates that the inhabitants of the site were of high status.

It is hoped that future excavations will concentrate on some of the rural sites in the region, and that the systematic recovery of faunal material, and its subsequent detailed analysis, will shed further light on the relationship between

Nicopolis and its hinterland, particularly during the later Roman and Byzantine periods. The work carried out at Nicopolis-ad-Istrum represents the most detailed environmental investigation carried out on any archaeological excavation in Bulgaria. It is hoped that it will provide a stimulus for further such studies within the region. Full publication of the Nicopolis-ad-Istrum environmental research programme is currently being prepared. It is expected that it will form volume III of a three volume series on Nicopolis-ad-Istrum, to be published by the Soci-

ety for the Promotion of Roman Studies and the Society of Antiquaries, London.

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