4.3 **Assessment of amphibian bones** by Chris Gleed-Owen

Introduction

Locations in the vicinity of Danebury Hillfort, Hampshire, were excavated as part of the Danebury Environs Roman Project between 1994 and 2004, led by Barry Cunliffe (Institute of Archaeology, University of Oxford). The excavations are reported elsewhere (Vol. 2 *passim*). This assessment was carried out in order to evaluate the significance of amphibian remains from the Danebury sites. A series of bags of sorted amphibian bones were selected and provided (by Andy Hammon, English Heritage Centre for Archaeology), mostly from the 2002 excavations at Thruxton Villa and 2003 excavations at Rowbury Farm. It is unusual for amphibian or reptile remains from archaeological excavations to be investigated in any detail, but herpetofauna can be used as palaeoenvironmental indicators (Gleed-Owen 1998, 1999), and even for historical and conservation purposes (Beebee *et al.* 2005; Gleed-Owen 2000). They potentially also have archaeological significance as a human food resource (Bailon 1999), although this has not unequivocably been demonstrated in Britain (Gleed-Owen 2006).

Aim

This assessment aimed to examine sorted amphibian bones from a range of samples, to identify the taxa represented and count the number of identifiable specimens (NISP) and minimum number of individuals (MNI). Agents of accumulation would be considered (predator, pitfall, natural death in hibernation, etc.) and any signs of digestion (as opposed to weathering) would be noted. Comparison between phases and deposits, e.g. relative abundance, modes of accumulation, were not attempted. Sex, age and demography of the assemblages could be usefully considered in the context of accumulation mechanisms and season.

Methodology

Bulk sample sieving and flotation produced the 80 bags of sorted amphibian bones upon which this study was based. These comprised 56 bags from Rowbury Farm (RF03), 20 bags from Thruxton Villa (TH02), two bags from Flint Farm (FF04), and one bag each from Grateley South (GR99) and Houghton Down (HD97). It was assumed that the sorting had been accurate, and that the bags contained all or nearly all the amphibian remains from the samples. No reptile remains were seen and it is assumed that none were recovered. The remains were identified using a binocular microscope at x6-x40 magnification, and separated according to taxon to the highest level possible. Remains from each sample were sub-bagged according to taxon. Specific identification is normally possible for most toad skeletal elements, even in poor condition. It is possible for some frog elements, but many frog elements can only reliably be identified to genus *(Rana*). For newts (and reptiles), vertebrae are the most useful for specific identification, although cranial elements can be identified to species. Even where species cannot be identified, it is normally possible to identify the genus, and almost certainly the family. Some of the flots samples studied here had an unusually high incidence of certain newt cranial elements that was evidently due to their containing trapped air. Whilst this might be fortuitous, it highlights the loss of most other newt bones through the wet sieving programme (i.e. they do not appear in any of the residue sorts).

Results

Table 1 (at the end of this report) summarizes the results for each sample and fraction, showing MNI and NISP for each taxon. Of the 80 samples seen, 78 contained amphibian remains (only those from Grateley South and Houghton Down did not). The abundance and condition of remains varies greatly. Table 1 gives MNI and NISP values for each sample, and describes the patterns of predatory and non-predatory damage seen. Taxonomic identification is generally possible to generic level, even with poorly preserved frog and toad remains, and this assemblage is fairly typical in this respect.

Figure 1 (at the end of this report) shows that, as might be expected, MNI is roughly proportional to NISP whatever the taxonomic level. For example, three male common toad right humeri give the same MNI as three indeterminate frog/toad urostyles. Some bones are more readily useful for MNI counts, such as paired elements that are easy to side (e.g. humeri), and readily recognizable axial elements (e.g. sacra). Femora and tibiofibulae are not easy to side when incomplete, and I have typically divided totals by two.

Column 'Pred?' shows the occurrence of observed predatory damage of four types: breakage, crunching, digestive corrosion, toothmarks. These forms of damage may be seen singly or in combination, and can be very variable in their frequency (I have observed them previously in archaeological material at frequencies ranging from nil to virtually 100 per cent of bones). The column 'Sex' shows which sexes were identifiable in each sample. It is possible to sex frogs and toads using the humerus which bears posterolateral crests in males associated with breeding amplexus. Male frogs and toads also have a distinctive metacarpal. The column 'Age' shows the lifestages present.

Discussion

Although amphibian remains appear to be moderately abundant within many of the samples seen, the herpetofaunal assemblage it represents is quite impoverished. Only two species (common frog and common toad) are found in the majority of samples; a third species (smooth newt) is only found in two samples. All sexable bones were noted: nine samples had both male and female bones, six had only male bones, and 14 had only female bones. This demonstrates a general bias towards females across the samples seen. Moreover, an unusually high proportion of female frogs and toads was visible in two samples, at a ratio of 5:1. This is an unusually skewed ratio (populations are normally fairly evenly balanced, or 2:1 at most), and may suggest selective factors biasing predation towards females, or may be related to different behaviours in the frogs/toads (e.g. male frogs hibernate at the bottom of ponds, females on land).

Across the samples seen, most remains were from adults or subadults. Some samples contained juveniles and/or metamorphs, suggesting summer/autumn death, but there are relatively few juvenile remains here compared to other sites where I have recorded large numbers of juveniles (Gleed-Owen 2003, 2006). Large accumulations of juvenile frogs and toads usually imply pitfall scenarios. The preponderance of adults and subadults seen here is consistent with other accumulative mechanisms such as predation.

The preponderance of common toad and common frog and the paucity of other herpetofaunal remains is not unusual, but rather frustrating. These are the most catholic amphibian species in Britain, and their presence here alongside smooth newt (the most catholic newt) provides limited environmental information. The presence of common toad in significant volume

implies a scrubby or deciduous wooded environment, typically more closed vegetation cover than the common frog prefers. Common toads require a still water-body in which to breed (usually within a few hundred metres but potentially several kilometres away); breeding ponds are usually clear, deep and relatively larger and deeper than ponds used by frogs. However, the common toad is a fairly ubiquitous species, and may inhabit a range of environments. The common frog is fairly catholic but more of an open country species, typically suggesting open grass and herb cover, rather than blanket woodland. It may breed in any permanent or ephemeral water-body, often small and shallow, such as a ditch or pit.

Whilst this impoverished fauna lacks elements with narrow tolerances that could build a more specific environmental picture, it doesn't mean that other amphibian and reptile species weren't present nearby. Taphonomic factors, such as the predator species responsible for accumulating microfaunal remains, can bias an assemblage. Various mustelids, insectivores, canids, felids, raptors, corvids, ardeids may predate frogs, toads, newts, lizards and snakes, and even passerines may feed on larval and juvenile lifestages. Reptiles are active during the daytime, rarely above ground at night, and therefore only available to diurnal predators. Hence, the absence of reptiles from an assemblage may reflect the absence of diurnal predators as accumulators, rather than the absence of reptiles locally. Amphibians are active in the daytime, too, particularly during the breeding season, but they are most active at night. Nocturnal (and crepuscular) predators such as owls will obviously be able to take amphibians readily at night, but will rarely come into contact with reptiles.

The behaviour of the amphibian species themselves can also account for patterns of accumulation in archaeological features. One post-hole at Puggetoften, Scania, Sweden (Gleed-Owen 2003) contained the remains of over 900 froglets, almost certainly pitfall victims in their summer/autumn diaspora.

Amphibians are most active in the spring breeding season; in modern times this is from January to March for frogs and March to May for common toads. This is the most likely time that predators find them in large numbers. Frogs do not have such an *en masse* peak migration as toads do. Toads embark on mass migrations during damp/wet nights in spring, heading for traditional breeding ponds. This is the most likely time that so many adult toads would have been predated. Toad skin is also very distasteful to many animals, and some may skin them before eating them. Scatterings of mutilated toads are sometimes found near breeding sites, although there is no agreement whether this is carried out by corvids, otters or other mustelids. It is quite possible that nocturnal raptors or mustelids predated the majority of the amphibians during breeding migrations.

As there is definite evidence of digestion and other predatory damage in many of the amphibian remains, it implies accumulation by diurnal predator(s) such as the kestrel and small mustelids such as weasels. Breakage consistent with predation was noted in at least five samples. Damage due to crunching was observed in at least 18 samples (with a high degree noted in six of them). Crunching that obviously occurred at death is recognizable as crushing and contortion of bone whilst it was still pliable, which has then hardened post-mortem. Digestive corrosion was also seen in at least 18 samples, and follows typical patterns of thinned ends and exposed cancellous bone on articular surfaces. Toothmarks were seen in at least nine samples (probably more), and were prevalent in three samples. Small toothmarks can be inflicted by snakes, but in this case are consistent with small mustelids such as weasels, or possibly insectivores such as hedgehogs. Little experimental research has been carried out to satisfactorily characterize the effects of British predator species on herpetofauna remains.

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Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Flint Farm	FF04		F1340	6			No obvious digestion; covered in marly deposit. Bb/Bsp - adult, subadult. Rt/Rsp - subadult.			I					3	1	2	1	1	1	1	1	2	2
Flint Farm	FF04		F1340	6			Broken bits of tibiofibula (small).														4	1		
Grately South	GR99		F812	7 "Hand coll"			(No herpetofauna - only mammal innominate).																	
Houghton Down	HD97		F609	1			(No herpetofauna - only mammal/bird, digested).																	
Rowbury Farm	RFO3	1	F1197/8	1	19		Adult. Very worn (PM?), possibly root damage.			A					4	1								
Rowbury Farm	RF03	1	P405	4F		4206	Adult female, good condition, no digestion.		F	A					1	1								
Rowbury Farm	RFO3	1	P405	6A	1		Some moderate damage, but no apparent digestion. Both sexes present.		MF						16	2	3	1					2	1
Rowbury Farm	RFO3	1	P405	6A		4207	Bb - 1yr (crunched?) and <1yr old (1st autumn).	?C									2	1						
Rowbury Farm	RFO3	1	P405	6C			Rsp - 1 femur and tribiofibula with possible predation crunching of ends, tibiale with possible toothhole.	C?T											1	1	7	2		
Rowbury Farm	RF03	1	P406	5F		4200	Subadult, very broken/worn ends, probably digested.	BD		I											1	1		
Rowbury Farm	RF03	1	P407	3F		4201	Subadult,broken, possibly digested.	BD		I											1	1		
Rowbury Farm	RFO3	?	P408	1		4229	Young adult.			A					2	1								
Rowbury Farm	RFO3	?	P408	12	2		All bones with dusty/marly sediment coating. No obvious predation, just usual PM wear/damage. Rt/Rsp - most are 1yr old or less (8/13 ilia, 10/15 femora, 23/27 tibiofibulae), others are adult, includes both sexes. Bb - c.40% adult, 40% subadult (1-2yrs), 20% juvs (metamorphs). Some Bb long bones from recent metamorph (mid to late summer). Bb humeri include both sexes (9 female:1 male).		MF	AIJ					111	8			13	8	51	14	31	13
Rowbury Farm	RFO3	1	P408	16		4236	Bb - adult/subadult. Rt is male humerus. Rsp includes a few definitely crunched bones, MNI from size differences, all juvs <1yr or metamorhps (early-mid summer).	C	M	AIJ							4	1	1	1	16	7	5	1

Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Rowbury Farm	RF03	1	P408	16		4233	Most in perfect condition (occasional crunching and some digestion observable in the mammal bones, e.g. rodent mandible). Bb - c.1yr old. Bsp - immature to adult. Rsp - metamorphs and juveniles to c.1yr old. Anu - metamorphs, juveniles and immatures (mostly phalanges/metapodials). Tv - 30L and 26R prootic-exoccipitals, 7 trunk vertebrae, 11 caudal vertebrae, all efts/juveniles. Tsp (Tv/h) - 5L and 4R ischia, and various long bones, all efts/juvs/immatures. Prootic-exoccipitals obviously float very well, hence bias towards their recovery in flots. Only tin (juvenile) vertebrae; adult vertebrae would presumably be recovered in the sieve residues.	CD		AIJ	74	3	2	5	1	1	26	2			33	2	85	3
Rowbury Farm	RF03	1	P408	16F		4236	Most in perfect condition (no sign of predation). Bb - juvenile femora, <1yr old (autumn). Bsp - c.1yr old, subadult and adult. Rsp - all metamorphs (died in summer) or juveniles <1yr old (died in autumn), with 3 size classes of coracoid giving MNI. Anu - 10 bones from metamorphs (early to mid-summer), others are juveniles and subadults (probably Rt). Tv - 7L and 10 R prootic-exoccipitals (all juv/imm), 8 trunk vertebrae and 1 caudal vertebra (all efts/juvs). Tsp (Tv/h) - various elements, all juv/imm (MNI from humeri).			AIJ	26	1	16	3	2	1	6	2			28	3	29	1
Rowbury Farm	RFO3	1	P408 "Special deposit"	16	2		All good condition, no predation, just worn PM. Bb - all ad females (humeri), except subad L and R ilia and 2 femora (same individual?), MNI from ilia sizes. Rsp - 1 L ilium, 2 tibiofibulae and 1 femur are c.1yr old, others are ad/subad (some c.2yrs, others older). Rt/Rsp humeri = 5 female:1 male.		MF	AI					4	4	1	1	7	4	48	7	7	5
Rowbury Farm	RF03	1	P410	2F		4197	Digested, subadult.	D		I											1	1		
Rowbury Farm	RFO3	1	P411	2	4		Slight damage, not predation. Bb is female.		F						1	1					1	1		
Rowbury Farm	RFO3	1	P411	3	6		Rt - 2 tibiofibulae with severe puncture/digestion, both sexes present. Bb - all ad/subad, R ilium with severe punctures, lots bones badly damaged ends (not sure if digested), both sexes present. Bsp - 1 tibiofibula subadult, others adult.	DT	MF	AI					47	7	13	2	11	6	41	8	15	9
Rowbury Farm	RFO3	1	P411	3	5		Bb adults (different sizes), includes both sexes (5 females:1 male) some excellent condition, some v. worn, possibly rootmarks, lots of etching. Rt/Rsp - ad/subad (c.3yrs), includes male. Anu - 1 urostyle with severe etching (rootmarks?).		MF	AI					43	5			4	2	3	2	13	5

Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Rowbury Farm	RFO3	1	P411	1 (1st bag)	4		Bb - quite a few with flaking damage, including various probable toothholes. Bsp - 1 subad femur, others adult. Bb and Rsp include females.	?T	F	AI					2	3	6	1			4	1	3	1
Rowbury Farm	RFO3	1	P411	1 (2nd bag)	4		All adult. Quite a few in poor condition, seems to be PM though. Bb includes both sexes.		MF	A					21	3	2	1			5	1	2	1
Rowbury Farm	RF03	1	P411	2F		4230	Bb/Bsp - some breakage and possible toothmarks, but no unequivocal digestion/predation (MNI of 3 ad/subad, 1 juv post-metamorph but <1yr old, late summer/autumn). Rt - no digestion. Rsp - end breakage/digestion.	?B?T		AIJ					14	4	18	2	1	1	2	1		
Rowbury Farm	RF03	1	P412	1F		4202	Very fragmentary, adult and subadult, lots of toothmarks.	TT		AI							19	3						
Rowbury Farm	RFO3	?	P413	3		4224	Rsp is 1yr or less, Bb is metamorph (<1yr, mid-late summer). Ends of both worn thin, possibly digested but can't confirm.	?D		IJ					1	1					1	1	2	1
Rowbury Farm	RFO3	?	P413	6		4226	c.1yr old or less.			I											1	1		
Rowbury Farm	RFO3	1	P414	4		4212	Bb is juv, 1yr maximum.			J					2	1							1	1
Rowbury Farm	RFO3	1	P414	6		4214	Young adult.			A											2	1	1	1
Rowbury Farm	RFO3	1	P414	6		4214	Subadult (c.2yr old).			I									4	1				
Rowbury Farm	RFO3	1	P414	7	7		Adult, v. good condition.			A					1	1								
Rowbury Farm	RFO3	1	P414	8	7		Adult, not damaged.			A					1	1								
Rowbury Farm	RFO3	1	P415	2	7		Adult, includes female.		F	A					3	1								
Rowbury Farm	RFO3	1	P415	3	7		Adult.			A					2	1								
Rowbury Farm	RFO3	1	P415	4	7		Partial skeleton of 1 adult female, in good condition. Small feature, sealed context?		F	A					11	1								
Rowbury Farm	RFO3	1	P419	3	7		All adults. No obvious predation. Bb remains represent 2 partial skeletons (male and female).		MF	A					29	2	6	2			2	1	3	1
Rowbury Farm	RFO3	1	P419	3	7		Adult.			A					1	1								
Rowbury Farm	RFO3	?	P419	4		4220	Adult.			A							1	1						
Rowbury Farm	RFO3	1	P419	4	7		Subadult.			I					1	1								
Rowbury Farm	RFO3	?	P419	6		4222	Bb/Bsp - no apparent digestion/predation; 5 ilia = 3 x <1yr olds, 1 x c.1yr old, 1 adult; includes both sexes (3 females:2 male). Rsp - c.1yr old or less, digested. Anu - metamorph.		MF	AIJ					2	5	7	1			1	1	4	2
Rowbury Farm	RFO3	1	P419	6	8		Mostly v. good condition, no pattern of damage. Both sexes present. MNI from size diffs in tibiofibulae and femora.		MF	AI					27	5	2	1						

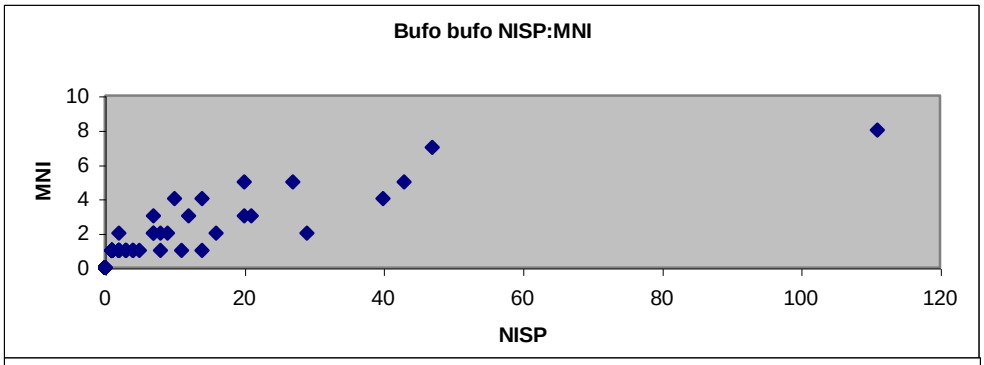
Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Rowbury Farm	RF03	1	P419	5F		4221	(Mammal).																	
Rowbury Farm	RFO3	1	P421	4	8		Adult. Clearly predated, ends very crunched, obviously contemporary with death, poss teethmarks too. (Worth photo)	C?T		A					1	1								
Rowbury Farm	RFO3	1	P421	5	8		Partial skeleton of subadult female (c.2-3yr old). No signs of predation, all fairly complete, good condition.		F	I									2	1	19	1		
Rowbury Farm	RFO3	1	P422	3	8		Adults. Bit of damage but not clear cause. Possible tooth graze on Bb tibiofibula. Rsp MNI from slight size diffs in tibiofibulae. Bb includes females, Rt includes male.	?T	M	A					4	1			2	1	4	1		
Rowbury Farm	RFO3	1	P425	4	9		Damaged. PM?														1	1		
Rowbury Farm	RFO3	1	P425	7		4249	Rsp tibiofibulae crunched (predated). Half Rsp ad/subad, half less than 1yr old.	C		AIJ							1	1			7	4	3	1
Rowbury Farm	RFO3	1	P425	7	9		Fairly complete skeleton of 1 adult female.		F	A					14	1	15	1						
Rowbury Farm	RFO3	1	P425	7	9		Adult. Ends worn PM.			A					1	1								
Rowbury Farm	RFO3	1	P425	9		4252	c.1yr old or less.			I									1	1				
Rowbury Farm	RFO3	1	P428	3	9		Adults. MNI from humeri, both adult males.		M	A					7	2								
Rowbury Farm	RFO3	1	P434	13	10		Bb adult. Rt - all 3 probably young male (2-3yrs), 1 ilium crunched mid-shaft at death.	C	M	AI					1	1			3	2	1	1		
Rowbury Farm	RFO3	1	P436	3	10		Adult. Bit worn (PM?).			A					1	1								
Rowbury Farm	RFO3	2	P438	9	22		Partial skeleton of 1 adult female. Dirty but good condition.		F	A					8	1	1	1						
Rowbury Farm	RFO3	2	P442	10	25		Adult, includes female. MNI from femora but also different radioulnae sizes.		F	A					7	2	2	1						
Rowbury Farm	RFO3	2	P442	11		4296	Rt includes male. Rsp - subad c.2yrs, some broken into pieces, prob predation crunching.	?B?C	M	I					1	1	2	1	3	1	17	2	22	1
Rowbury Farm	RFO3	2	P442 "Skulls special deposit B"		23		Adult. Very worn PM.			A					2	1							1	1
Rowbury Farm	RFO3	2	P442 "Special deposit A"	4	23		Partial skeleton of 1 adult female. All very worn PM.		F	A					5	1	4	1						
Rowbury Farm	RFO3	2	P442 "Special deposit C"	10C			Partial skeleton of 1 adult female. Quite smooth.		F	A					4	1								
Rowbury Farm	RFO3	2	P442 "Special deposit D"	10C			Adult. End broken (recent PM) into fragments.			A					1	1								
Thruxton Villa	TH02		729				Subadult; pathological; worn, broken, poor condition.			I											1	1		

Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Thruxton Villa	TH02		743				All adults. Bb - lots toothmarks. Bsp - toothmarks, crunched. Rsp - broken, digested.	CDTT		A					1	1	1	1			1	1		
Thruxton Villa	TH02		755				Bb - adult; intact. Bsp - adult; crunched, broken. Rsp - adult, subadult; worn, broken, digested.	BCD		AI					1	1	1	1			6	2		
Thruxton Villa	TH02		"?"				All very poor condition, lots of crunching, breakage, possible digestive corrosion. Lots of anuran fragments are continuing to break in bag. Bb - 2 males. Rt - 2 males.	BCC?D	MF	AI					9	2	25	3	2	2	6	1	26	1
Thruxton Villa	TH02		F1064	1			All adults and subadults; lots of crunching in particular, but also toothmarks, digestion. Possibly more anuran fragments in 'non-herp' bag (difficult to separate/identify due to poor condition). Rt - 1 male.	CCDT	M	AI					8	2	7	2	5	3	12	3	5	2
Thruxton Villa	TH02		F1066/2	1			Some digestion, worn, broken, crunching. Bb - predatory crunching, toothmarks, breakage, digestion. Bb/Bsp - adult. Rsp - adult, subadult.	BCDT		AI					3	1	3	1			4	2		
Thruxton Villa	TH02		F1066/3	1			Bb - adult female; badly corroded, possible toothmarks. Rsp - adult, subadult; toothmarks, crunching.	D?T	F	AI					1	1					7	3		
Thruxton Villa	TH02		F1066/3	1		4069	Adults, subadults. Lots crunched, with toothmarks.	CT		AI									3	3	8	3		
Thruxton Villa	TH02		F1066/4	1			Crunching, digestion, toothmarks. Bsp - ilial ala very crunched (Worth photo).	CCDT							1	1	1	1	1	1	5	2	9	1
Thruxton Villa	TH02		F1078	1			Rt/Rsp - some toothmarks, crunching, some end digestion; adults, subadults. Bb/Bsp - lots crunching, breakage; adults, subadults.	CCDT		AI					7	3	5	1	6	3	19	5	3	1
Thruxton Villa	TH02		F1112	5			All good condition, no sign of predation. Bb - large adult. Rsp - young adult.			A					3	1					3	2		
Thruxton Villa	TH02		F1112	6			All very good condition, no sign of digestion. Bb - adult, large adult.			A					12	3	5	3	3	2	18	5		
Thruxton Villa	TH02		F1112	8		4071	Bb/Bsp - adult, good condition. Rsp - 3 adult bones, 8 subadult (1-2yrs); some definite digestion, but most in good intact condition. Bb - 1 female.	D	F	AI					2	1	3	2			11	3		
Thruxton Villa	TH02		F1112	8			Virtually intact, no crunching/digestion								1	1								
Thruxton Villa	TH02		F1112	9		4073	Pathogenically fused adult sacrum and urostyle; left transverse process crooked and directed posteriorly.								1	1								

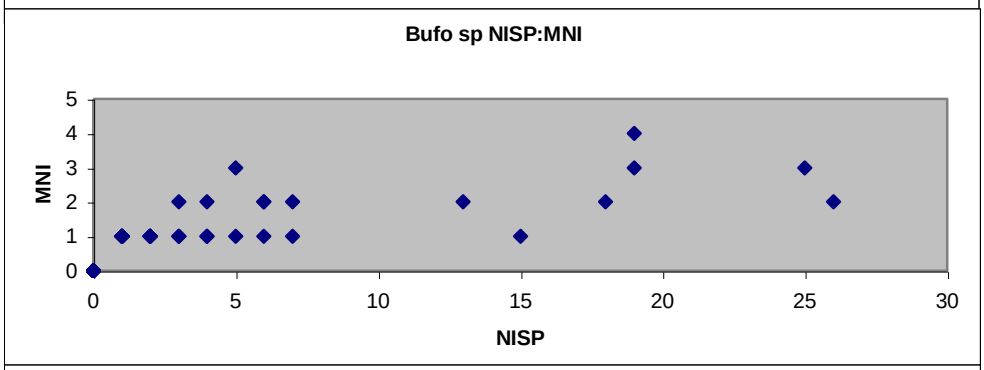
Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Thruxton Villa	TH02		F1124	2			Lots of crunching and toothmarks, some digestion; poor condition. Tiny anuran fragments.	CCDTT							1	4	19	4	1	1	2	1	15	1
Thruxton Villa	TH02		F1125	1			Bb - adult female, possible predation breakage/toothmarks.	?B?T	F	A					1	1								
Thruxton Villa	TH02		F1125	2			Definite crunching & digestion. Rt/Rsp - adults and subadult (<2yr). Bb/Bsp - adults.	CD		AI					2	2	4	2	3	2	7	2	2	1
Thruxton Villa	TH02		F1146	1			Crunched and definitely digested.	CD															1	1
Thruxton Villa	TH02		PH1225	1			Rt - 2 adults, 1 less than 1yr. Rsp - strong toothmarks & digestion in tibiofibulae. Bsp - very crunched (worth photo); adults.	CCDT		AJ					1	1	1	1	3	3	5	1		

Table 1. Amphibian and reptile remains from selected samples from Longstone Edge. Species abbreviations: Tv = *Triturus vulgaris* (smooth newt), Tv/h = *Triturus* sp *(vulgaris* or *helveticus)* (smooth or palmate newt), Bb = *Bufo bufo* (common toad), Bsp = *Bufo* sp (toad), Rt = *Rana temporaria* (common frog), Rsp = *Rana* sp (frog), Anu = Anura indet. (frog or toad). Lifestages: Ad = adults, subad = subadult, imm = immature, juv = juvenile. L = left, R = right. PM = post-mortem. B = predatory breakage, C = crunching, D = digestive corrosion, T = toothmarks (doubled if lots); query '?' preceding a letter denotes uncertainty. M = male, F = female, A = adult, I = immature, J = juvenile.

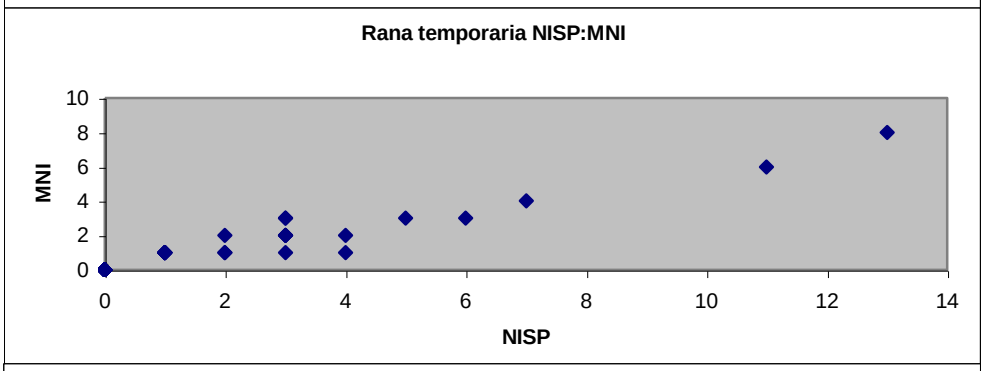
a)



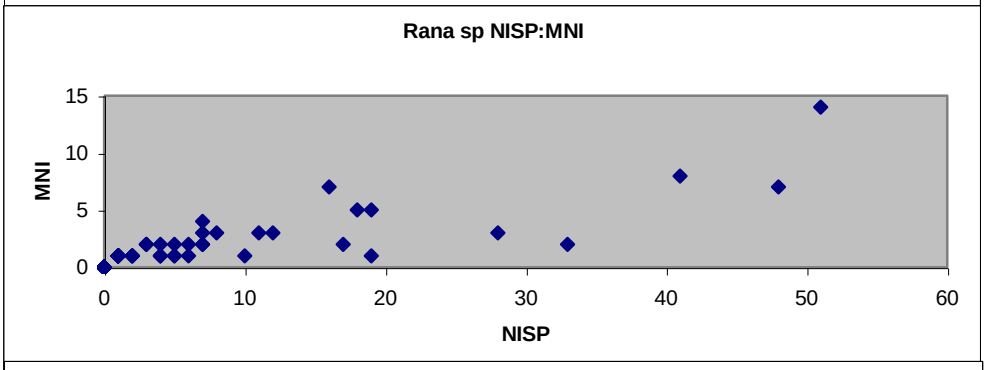
b)



c)



d)



e)

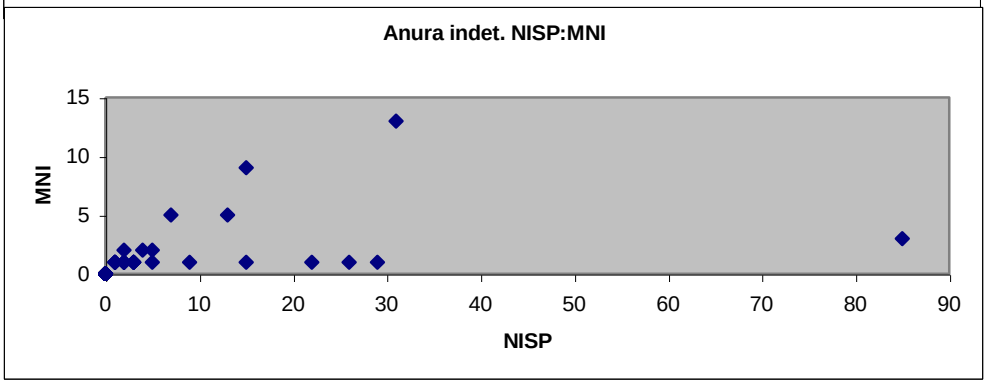


Figure 1a-e. Scatterplots showing ratio of NISP:MNI for a) common toad, b) indet. toad, c) common frog, d) indet. frog, e) indet frog/toad.