Reports from the Environmental Archaeology Unit, York **95/30**, *6pp*

Technical report: Status of the pool frog *Rana lessonae* Camerano as a native British species, based on zooarchaeological evidence from the English fens

by

Brian Irving

Summary

Eight archaeological sites which formed part of the English Heritage Fenland Management Project are examined here. Bulk sediment samples from these sites which were sieved for small vertebrate remains produced a range of amphibian material. This material was examined as a possible means of establishing the pool frog Rana lessonae *Camerano as a native British species.*

The analysis has identified a group of material which does not show the same bone morphology as the common frog Rana temporaria *L. and falls within the morphological range of the green frogs which includes* R. lessonae.

It is therefore recommended that further work be conducted ,based on sampling ancient sediments at the locality supporting the last remaining population of the pool frog in the British Isles.

Keywords: Anuran; Ranidae; pool frog; *Rana lessonae*; fenland; zooarchaeology

Author's address:

17 Wharton Road
Stamford Bridge
York YO4 1PN

Telephone 01759 372940

Prepared for:

Dr Tony Gent
Reptile and Amphibian Ecologist
Lowlands Team
English Nature
Northminster House
Peterborough PE1 1UA

4 May 1995

Technical report: Status of the pool frog *Rana lessonae* Camerano as a native British species, based on zooarchaeological evidence from the English fens.

Introduction

The purpose of this project was to examine the status of the pool frog *Rana lessonae* Camerano, as a possible native British species. The pool frog is rare in the British isles at the present time and occurs in a single location in Norfolk. By establishing the history of this species, legislation may be brought by English Nature to protect the remaining range of the pool frog in the British Isles. By examination of sub-fossil amphibian material of known age, based on archaeological dating criteria, it was postulated that the history of the species in Britain might be revealed. As a first step toward this goal, zooarchaeological studies of amphibian remains from a range of fenland archaeological sites, excavated during the English Heritage 'Fenland Management Project' in the 1980s and 90s, are reported on here. The age of the sites examined range from the Iron Age through to the Medieval period, a span of approximately 2,000 years.

Background

The pool frog is generally thought to have been introduced to the British Isles during the Holocene by man. The first record of the species being introduced is at Morton Hall, Morton, Norfolk in 1837. However, the pool frog has been recorded since the 1700s in Cambridgeshire and no information which conflicts with the idea that the species is a native is forthcoming. Recently Snell (1994) has stressed the possibility that the pool frog is a natural coloniser whose range is now limited to Thompson Common in Norfolk, this restriction in range being the outcome of wholesale and widespread drainage of the fens over the past two centuries.

The pool frog was, in the earlier literature, confused with a closely related species, the edible frog *Rana esculenta*. Therefore the details of the introductions are unreliable and they may have both species. There are three British Pleistocene records of green frogs. One is from the West Runton Freshwater Bed (Cromer Forest Bed Formation), Norfolk, dated to around 450,000 years ago, British Cromerian interglacial (Holman and Stuart 1988). Cudmore Grove, Essex, dated to the Hoxnian interglacial at around 350,00 years ago (Holman *et al.* 1990) produced more material. Finally, Greenlands Pit, Purfleet, Essex produced a further record (Holman and Clayden 1988). This site has been assigned to either the Hoxnian or the younger Ipswichian interglacial.

The green frogs are represented by three species in Northern Europe, all closely related (Arnold *et al.* 1978). The green frogs interbreed, the edible frog *Rana esculenta* being a hybrid from the pool frog *R. lessonae* and marsh frog *R. ridibunda* Pallas.(Frazer 1983).

Material

Eight sites, from twelve examined, produced amphibian remains. The material was sorted from residues of bulk sampled sieved to 0.5mm and hand picked for vertebrate material under a low power microscope. Other material recovered from the samples included remains of reptiles, fish, birds and small mammals. Most of the amphibian material consisted of long bone fragments such as femur, tibia, radio-ulna and tibio-fibula. Other skeletal elements included ilia, vertebrae, and cranial fragments.

Sites

The sites inspected are listed in Table 1 together with details of their age and the number of samples/contexts examined.

Analysis

According to Böhme (1977) and Holman *et al.* (1990) there is a clear skeletal morphological distinction between *Rana temporaria* L. and *R. lessonae* using the ilium and frontoparietal. The fragmentary nature of archaeological material precludes the use of the frontoparietal as it rarely survives intact. The ilium, however, consistently survives well in archaeological assemblages, although it may be fragmentary around the area of the acetabulum for which Böhme (1977) describes the identification criteria (Figure 1). The *R. lessonae* ilial morphology is described here by comparison with *R. temporaria*, the most common species identified during the study. The vexillum in *R. lessonae* is much broader dorso-ventrally than *R. temporaria* and this tuber superior extends laterally and has a sharper angle, the pars ascendens is more prominent in *R. lessonae* , *R. ridibunda* and *R. esculenta* (Figure 1).

The analysis was based on the criteria outlined above, the ilium being considered exclusively.

Results

The range of sites and context types produced a varied set of preservation states which range from very fragmentary to almost pristine. This has had a limiting effect on the usefulness of material from some sites. The species identified, sites and archaeological periods, are presented in Table 2.

There were no definite identifications of the green frog group. However, the material outlined in Table 2 as indeterminate green frog, and in Figure 2 is sufficiently different from *Rana temporaria* to separate it from the brown frogs. Frustratingly, the material in the green frog category is more fragmentary than the *Rana temporaria* material, the larger and thinner vexillum tends to break more easily. This can also bee seen in the material illustrated by Holman *et al.* (1990) from Cudmore Grove, where the patterns of breakage are consistent with the breakage on the material examined here.

Discussion

The condition of the archaeological materials examined has limited the number of identifications to species level. Böhme (1977) uses modern skeletal material to illustrate the morphological differences between species of the family Ranidae. In practice, however, the identification criteria are not as clear cut as those described by Böhme. Growth stage also has a bearing on ilial morphology, since smaller specimens seem to show specific characters less clearly.

This study has gone some way in attempting to establish the history of the pool frog in the British Isles. Furthermore, it has highlighted the variation in skeletal morphology of the Ranidae.

Recommendations

Based on the findings presented above I strongly recommend further work in order to establish whether this species is native. A possible strategy would be to examine, in detail, the last known refuge of the pool frog in Britain by taking auger samples and bulk samples from exposed sedimentary units. This may establish the presence of the species over a long timespan as Radiocarbon dating may be used directly on the identified bone material to establish its antiquity.

Bone material from natural death assemblages is generally better preserved than material which has been through a range of attritional processes like those which prevail on archaeological sites. It is therefore a better proposition to sample naturally deposited material, which should provide greater success in species identification. British sites which have provided identifications of the green frogs are all natural (Holman and Clayden 1988, Holman and Stuart 1988; Holman *et al* .1990).

As Snell (1994) rightly points out, positive action must be taken quickly to conserve this species.

Acknowledgements

I would like to thank Peter Murphy, Tom

Lane, David Hall and Rosie Luff of English Heritage for their help in supplying the samples.

References

Arnold, E. N., Burton, J.A. and Ovenden, D. W. (1978). *A field guide to the reptiles and amphibians of Britain and Europe*. London: Collins

Böhme, G. (1977). Zur bestimmung Quartärer Anuran Europas an hand von Skelettelementen. *W issenschaftliche Zeitschrift der Humboldt-Universität zu Berlin, Mathematik-Naturwissenschaft* **26**, 283-300.

Frazer, D. (1983). *Reptiles and amphibians in Britain*. London: Collins.

Holman, J. A. and Clayden, J. D. (1988). Pleistocene interglacial herpetofauna of the Greenlands Pit, Purfleet, Essex. *British Herpetological Society Bulletin* **26**, 26-27.

Holman, J. A. and Stuart, A.J. (1988). Herpetofauna of the West Runton Freshwater Bed (Middle Pleistocene; Cromerian interglacial), West Runton, Norfolk. *Bulletin of the Geological Society of Norfolk* **38**, 121-136.

Holman, J. A., Stuart, A.J. and Clayden, J.D. (1990). A Middle Pleistocene herpetofauna from Cudmore Grove, Essex, England, and its paleogeographic and paleoclimatic implications. *Journal of Vertebrate Paleontology* **10**, 86-94.

Snell, C. (1994). The pool frog - a neglected native?. *British Wildlife*, 1-4

Table 1. Number of samples examined per site and period

SITE	CODE	PERIOD	AREA	No SAMPLES
Coveney	COY91	(Iron Age)	Cambs	70
Deeping Fen, Barrow	DEN28/91	(Bronze Age)	Cambs	12
Gosburton Third Drove	GBT93	(Early Saxon)	Lincs	8
Leaves Lake Drove, Pinchbeck	PLL94	(Early-Mid Saxon)	Cambs	6
Terrington St Clement	TSC23	(Middle Saxon)	Norfolk	16
Market Deeping	MAD91	(Middle Saxon)	Norfolk	37
Walpole St Andrew	WPA23	(Middle Saxon)	Norfolk	26
Gosburton Chopdyke Drove	GOS92	(Middle Saxon)	Lincs	108
Gosburton Mornington House	GOS93	(Middle Saxon)	Lincs	9
West Walton	WNW42	(Mid Sax-Medieval)	Norfolk	20
Parsons Drove	PDR15/91	(Medieval)	Cambs	94
Holme Fen	HOM2	(Medieval)	Cambs	14

Table 2. Identifications by site and period.

Brown frogs

Rana temporaria L. common frog

Deeping Fen, Barrow	(Bronze Age)	Cambs
Walpole St Andrew	(Middle Saxon)	Norfolk
Terrington St Clement	(Middle Saxon)	Norfolk
West Walton	(Mid Sax-Medieval)	Norfolk
Gosburton Chopdyke Drove	(Middle Saxon)	Lincs
Coveney	(Iron Age)	Cambs
Parsons Drove	(Medieval)	Cambs

Rana arvalis Nilsson. moor frog

Rana sp indeterminate brown frog

Deeping Fen, Barrow	(Bronze Age)	Cambs
Walpole St Andrew	(Middle Saxon)	Norfolk
Terrington St Clement	(Middle Saxon)	Norfolk
Gosburton Chopdyke Drove	(Middle Saxon)	Lincs
Coveney	(Iron Age)	Cambs
Gosburton Mornington House	(Middle Saxon)	Lincs
Parsons Drove	(Medieval)	Cambs

Green frogs

Rana ridibunda Pallas, marsh frog
Rana esculenta edible frog
Rana lessonae Camerano, pool frog

Rana sp indeterminate green frog

Deeping Fen, Barrow	(Bronze Age)	Cambs
Terrington St Clement	(Middle Saxon)	Norfolk
Gosburton Chopdyke Drove	(Middle Saxon)	Lincs

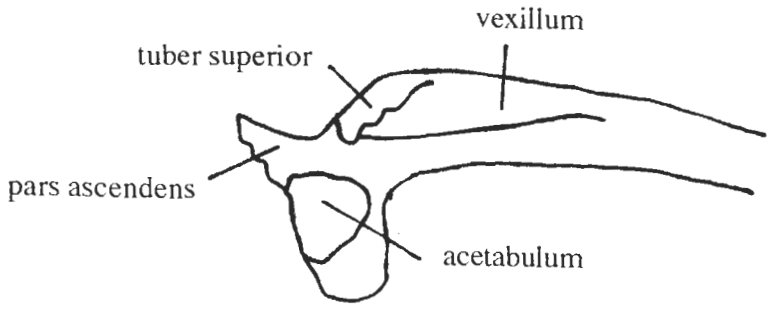

Figure 1. *Main criteria in identification to species of the ilium of the Ranidae (adapted from Böhme 1977).*

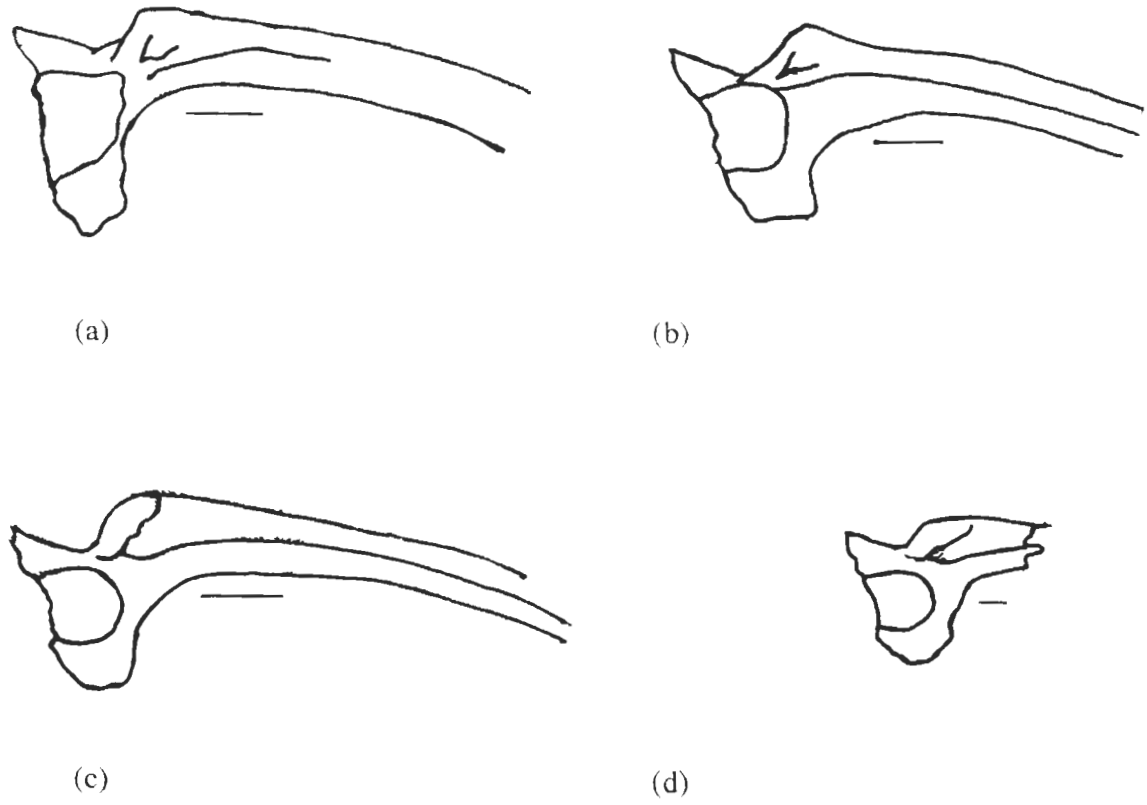

Figure 2. *Variation in ilial morphology of* Rana temporaria *L. (a and b) and* R lessonae *Camerano (c) and a single archaeological specimen from Deeping Fen, Barrow (d) showing the criteria for placing it in the green frog group (scales are 2mm).*