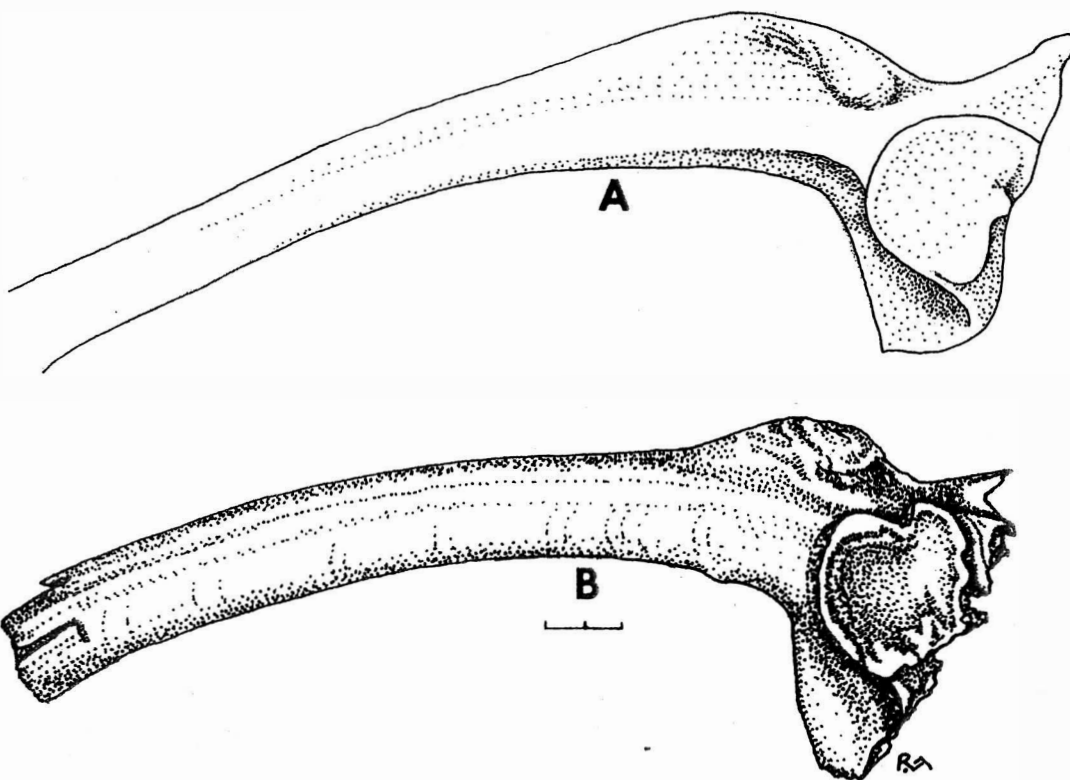


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HERPETOFAUNA OF THE SWANTON MORLEY SITE (PLEISTOCENE: IPSWICHIAN), NORFOLK

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ABSTRACT

The Swanton Morley Ipswichian site yielded fossils of *Bufo bufo*, *Rana arvalis arvalis*, *Rana temporaria*, *Rana* sp. indet., *Emys orbicularis*, and *Natrix natrix*. This is the first British fossil record of *Rana arvalis arvalis* which today occurs in the European low countries adjacent to England. A second continental form, *Emys orbicularis*, has previously been reported from the site. The nearest to Swanton Morley that these herpetological species could be found living together today would be in the Mecklenburg District of northern East Germany.

INTRODUCTION

A detailed report on amphibians and reptiles from an Ipswichian interglacial age site has never been presented, although Stuart (1979, 1982) reported *Emys orbicularis* from six Ipswichian sites in Britain, including Swanton Morley. Through the kindness of Dr. A. J. Stuart who collected the fossils, and Dr. J. Clack who now is in charge of the fossils at the University Museum of Zoology, Cambridge, I was given the privilege of studying the Swanton Morley herpetological fossils in the summer of 1986.

The Ipswichian Interglacial Age. The Ipswichian age may be defined as the temperate interglacial sequence between the cold Wolstonian glacial age (exact dates unknown) and the cold Devensian glacial age which began about 110,000 years before the present. In terms of the human fossil record, the Ipswichian would represent mid Palaeolithic times. Stuart (1982) has provided a general discussion of Ipswichian sites and their vertebrate faunas. The Ipswichian is the best known interglacial age, and many of its sites have yielded the African hippo (*Hippopotamus amphibius*). The type site is Bobbitshole, Essex.

The Swanton Morley Site. The Swanton Morley Site (Fig. 1) lies on the right bank of the River Wensum, about 2km north of the village of Swanton Morley, Norfolk. All of the herpetological material came from pits (A, B, C, etc.) that were described in detail by Coxon *et al.* (1980). Pollen and faunal analysis (Coxon *et al.*, 1980; Phillips, 1976; and Stuart, 1976, 1979, 1982) all verify that the vertebrate assemblage is from several subzones within the Ipswichian age. The fossils and sediments indicate a back channel of a meandering river. Bone of *Hippopotamus amphibius* and *Emys orbicularis*, and fruits of a water chestnut (*Trapa natans*) indicate a warmer climate than that of today.

Herpetological fossils are all from either Pit A or from Pit C. Fossils from Pit A all represent the IpIIb subzone of the Ipswichian and fossils from Pit C all represent the IpIIa subzone of the Ipswichian.

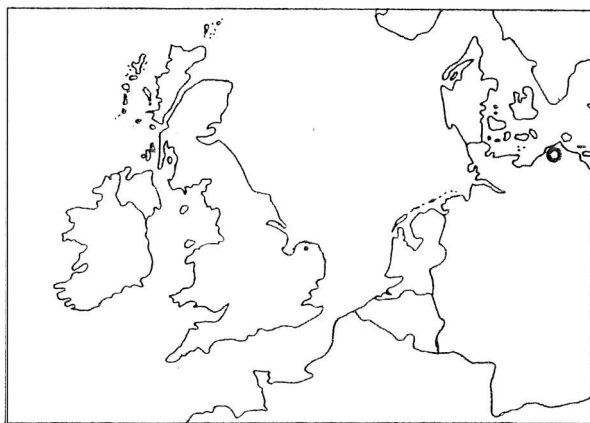


Fig. 1 The dot indicates the location of the Swanton Morley Site, Norfolk. The open circle indicates the nearest area where all of the Swanton Morley herpetological species can be found living together today.

SYSTEMATIC PALAEONTOLOGY

The fossils reported below all reside in the collections of the University Museum of Zoology, Cambridge. Specimen catalogue numbers are prefixed by the letters SM which designate the Swanton Morley site.

Class Amphibia

Order Salientia

Family Bufonidae

Bufo bufo Laurenti

Identified Material. Pit C1 (Zone IpIIa), Sample 4: right ilium SM 273.

Remarks. Holman (1985) has discussed the identification of *Bufo bufo* on the basis of ilial characters. *Bufo bufo* occurs in the area today (Frazer, 1983).

Family Ranidae

Rana arvalis arvalis Nilsson

Identified Material. Pit C1 (Zone IpIIa), Sample 4: left ilium SM 268; left ilium SM 271; sacral vertebra SM 272.

Remarks. This is the first fossil record of *Rana arvalis* from Britain. *Rana arvalis* does not occur naturally in Great Britain today, but occurs in the adjacent low countries of the European Continent (Arnold and Burton, 1985, p. 258, map 37). The ilium of *Rana arvalis arvalis* (Fig. 2) has been shown to be distinguishable from other British and European species (Böhme, 1977). The ilium of *Rana arvalis arvalis* has a smooth, elongate, unelevated tuber superior (term of Böhme, 1977, Fig. 1) that separates it from *Rana arvalis wolterstorffi*, *Rana graeca*, *Rana latastei*, *Rana lessonae*, and *Rana temporaria*. *Rana arvalis arvalis* has a well-developed ilial blade (vexillum of Böhme, 1977, Fig. 1) that separates it from *Rana temporaria*. The ilium of *Rana arvalis arvalis* has a very small pars descendens (term of Böhme, 1977, Fig. 1) that separates it from *Rana arvalis wolterstorffi*, *Rana dalmatina*, and *Rana graeca*. Finally, *Rana arvalis arvalis* has a well-developed ventrolateral ridge on the ilial (vexillum) that separates it from *Rana dalmatina*, *Rana esculenta*, *Rana latastei*, and *Rana ridibunda*. The sacral vertebra is assigned to *Rana arvalis arvalis* as it differs from *Rana temporaria* in having its sacral diapophyses directed much more anteriorly.

Today, *Rana arvalis* occurs in damp fields, fens, and sphagnum bogs, often in the same area as *Rana temporaria* (Arnold and Burton, 1985), but it is said to prefer wetter habitats. It rarely occurs at high altitudes.

Rana temporaria Linnaeus

Identified Material. Pit A1 (Zone IpIIb) 1971 Sample: right ilium of a juvenile specimen SM 407. Pit C1 (Zone IpIIa) Sample 4: left ilium SM 269; right ilium SM 270.

Remarks. The ilium of *Rana temporaria* (Fig. 2) is easily separated from other British and European species in that it has a very poorly developed ilial blade and an elevated, sometimes roughened tuber superior. *Rana temporaria* occurs in the area today (Frazer, 1983).

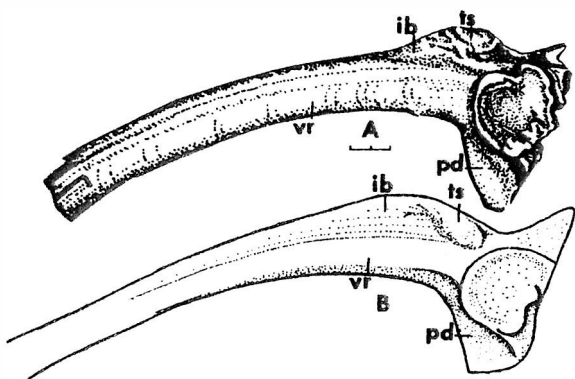


Fig. 2 Left ilia of *Rana* in lateral view. A, male *Rana temporaria* drawn from Michigan State University Museum Specimen Number 3867; the line equals 2mm. B, *Rana arvalis arvalis* redrawn from Böhme (1977); no scale was given. Symbols: ts, tuber superior; ib, ilial blade; pd, pars descendens; vr, ventrolateral ridge.

Rana sp. indet.

Identified Material. Pit C1 (Zone IpIIa) Sample 4: left humerus.

Remarks. The humerus of *Rana* may be distinguished from *Bufo* on the basis of its rounded rather than distally flattened distal condyle. The fossil may represent *Rana arvalis*, *Rana temporaria*, or possibly a third species.

Class Reptilia

Order Testudines

Family Testudinidae

Emys orbicularis Linnaeus

Identified Material. Pit C1 (Zone IpIIa) 1977-78 Samples: vertebra SM 192; right humerus SM 177; second right pleural plate SM 179; peripheral plate SM 178. This material was seen by J. A. Holman in August, 1986, but was originally identified by A. J. Stuart (1979).

Remarks. The pond tortoise does not occur in Britain today, but occurs on the European Continent (Arnold and Burton, 1985, p. 259, map 48). *Emys orbicularis*, however, does not occur in the adjacent low countries of Europe as does the other exotic Swanton Morley species, *Rana arvalis arvalis*.

Order Squamata

Family Colubridae

Natrix natrix (Linnaeus)

Identified Material. Pit C1 (Zone IpIIa) Sample 2, 1977: four vertebrate SM 68, SM 69, SM 70, and SM 71.

Remarks. Holman (1985) and Szyndlar (1984) have provided discussions and illustrations of how to distinguish the individual vertebrate of *Natrix natrix* from other British and European species. *Natrix natrix* appears to be separate from *Natrix tessellata* on the basis of the rounded (rather than a truncated) hypapophysis in *Natrix natrix* and on the less gracile parapophyseal process in *Natrix natrix* (Szyndlar, 1984). This species occurs in the area today (Frazer, 1983).

DISCUSSION

The previously reported biota and sediments of the Swanton Morley Site have indicated an ecological setting of a back channel of a meandering river (Coxon *et al.*, 1980; Phillips, 1976; and Stuart, 1976, 1979, 1982) and the herpetofauna is consistent with this interpretation. *Emys orbicularis* could have lived in the slow-moving back channel waters, and *Bufo bufo*, *Rana arvalis arvalis*, *Rana temporaria*, and *Natrix natrix* could have inhabited the adjacent wetlands.

Two of the five herpetile species from Swanton Morley do not occur in Britain today. The moor frog, *Rana arvalis arvalis* occurs in the adjacent lowland countries of the European Continent; the European pond tortoise, *Emys orbicularis*, occurs further inland on the continent (Arnold and Burton, 1985, p. 258, map 37 and p. 259, map 48). It is noteworthy that the nearest to Swanton Morley that these herpetiles could be found living together today would be in the Mecklenburg District of northern East Germany (Fig. 1 this paper and Arnold and Burton, 1985, maps 31, 36, 37, 48, and 114). Thus, the Swanton Morley

herpetofauna may well suggest a more continental type climate for Britain during Ipswichian times.

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Dr. Thomas Kemp kindly provided work space at the Oxford University Museum during part of this project. Dr. Jennifer Clack at the University Museum of Zoology, Cambridge, provided me access to the fossil material and study space at Cambridge. Dr. A. J. Stuart collected the material and kindly permitted me to study it. The United States National Science Foundation provided a grant (NSF BSR 851-5665) that supported my studies in Britain in 1986, a part of which resulted in this paper. Rosemarie Attilio and Lisa Hallock made the drawings.

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