

NEW RECORDS AND COMMENTS ON BRITISH PLEISTOCENE COLD-STAGE AMPHIBIANS AND REPTILES

J. ALAN HOLMAN

*Michigan State University Museum,
East Lansing, Michigan, 48824-1045, U.S.A.*

INTRODUCTION

Several publications on British Pleistocene interglacial amphibians and reptiles have appeared recently (see Holman, 1985, 1987, 1989; Hallock et al., 1990; Holman et al., 1990; and references within these papers); but there have been no new reports on cold-stage amphibians and reptiles since those briefly listed by Stuart (1982). The present report deals with new records of herpetological remains from a Wolstonian and a Devensian site, as well as comments on the distribution and abundance of cold-stage amphibians and reptiles in the Pleistocene of Britain.

WOLSTONIAN COLD-STAGE

The Wolstonian is the first cold-stage of the late Pleistocene in Britain and has recently been discussed in Stuart (1982). The Wolstonian cold-stage is followed by the Ipswichian interglacial stage.

Tornewton Cave, Torbryan, Devonshire — This site was detailed by Sutcliffe and Zeuner (1962) and has recently been discussed by Stuart (1982). The lowest stratum in Tornewton Cave has been designated the Glutton Stratum (diagram modified from Sutcliffe and Zeuner, 1962, in Stuart, 1982, Fig. 7.11) and has yielded arctic mammals. The immediately overlying Bear Stratum has a similar fauna. Both the Glutton and the Bear Strata are considered to represent the Wolstonian cold-stage, as amongst other evidences, they lie directly beneath the Hyaena Stratum which contains a typical Ipswichian fauna, "Frogs and/or toads" have been recorded amongst the small vertebrate remains of the Glutton and the Bear Strata (Stuart, 1982).

Rana temporaria Linnaeus

Material — Left ilium (Natural History Museum London, BM(NH) R-8972).

Remarks — In 1984 I was able to study the above material through the kindness of Dr. Angela Milner and Ms Sandra Chapman of the Natural History Museum, London. The ilium is from what I believe to be the Wolstonian portion of the Tornewton Cave strata. The ilium is identified as *Rana temporaria* based on the fact that it has its dorsal ilial blade (vexillum) low and indistinct from the shaft (ala) throughout about the posterior two-thirds of its length (see Holman, 1987, Fig. 2). This distinguishes it from other species of British and European *Rana* as well as from all of the North American species that I have been able to examine. *Rana temporaria* and *Lacerta vivipara* have the most northerly distributions of any of the modern British herpetofauna, and both species occur within the arctic circle today (Arnold and Burton, 1978, maps 36 and 70).

DEVENSIAN COLD-STAGE

The Devensian is the last cold stage of the British late Pleistocene and has recently been discussed by Stuart (1982). It is mainly equivalent to the Wisconsinan glacial stage of North America and is thought to have lasted for about 100,000 years. The Devensian cold-stage is preceded by the Ipswichian interglacial stage and is followed by the Flandrian = North American Holocene) interglacial stage.

Shropshire D Pocket, Norfolk — The greater Shropshire site contains fossiliferous beds of both Ipswichian and Devensian age (Holman and Clayden, 1990). These fossiliferous beds occur in the Minn's Aggregates Company Pit near Shropshire, Norfolk. (TM 005938). The

stratigraphy from the bottom to the top of the area where the Ipswichian herpetofauna was collected (Holman and Clayden, 1990) consist of (1) an undetermined thickness of Cretaceous chalk, (2) a chalky, pebbly gravel about 1 m thick, (3) a fossiliferous detritus mud containing typical Ipswichian mammals (including *Hippopotamus amphibius*) that ranges from approximately 1 to 5 m thick, and (4) Devensian gravels and muds at the top of the site that have yielded bear, wolf, woolly rhino, bison, red deer, reindeer, and mammoth.

A detrital pocket within the Devensian stratum yielded a cache of anuran bones that were collected by Martin R. Warren of the Cromer Museum, Norfolk, on May 22, 1985. These bones are the basis of the records below.

Rana temporaria Linnaeus

Material — One left and two right ilia (Cromer Museum Nos. CMSH-D-1-3) collected by Martin R. Warren May 22, 1985.

Remarks — These ilia represent one large adult and two smaller adult Common Frogs. The ilia, all nearly complete specimens, were identified on the basis of the same criteria used to identify the Tornewton Cave *Rana temporaria* in the section above.

Rana sp. indet.

Material — Four left and five right fragmentary ilia (Cromer Museum Nos. CMSH-D-4-12). Two fragmentary scapulae and a distal portion of a humerus (Cromer Museum Nos. CMSH-D-13-15).

Remarks — The above fragmentary ilia are identified as *Rana* in that they all have an ilial blade (vexillum). The fragmentary scapulae and the distal portion of the humerus are identified as *Rana* based on characters discussed in Hallock et al. (1990, see Figs. 3 and 4). Several other fragmentary anuran bones from the Shropshire D pocket are not assigned to genus. It seems probable that all of these anuran bones represent the Common Frog, *R. temporaria*.

TABLE 1: Occurrences of British Pleistocene cold-stage herpetofauna

ANGLIAN

Halls Pits, Oxfordshire <i>Bufo</i> sp. and/or <i>Rana</i> sp.	Stuart (1982)
---	---------------

WOLSTONIAN

Waterhall Farm, Hertfordshire <i>Bufo</i> sp. and/or <i>Rana</i> sp.	Stuart (1982)
Tornewton Cave, Devonshire <i>Bufo</i> sp. and/or <i>Rana</i> sp. <i>Rana temporaria</i>	(this paper)

DEVENSIAN

Coston, Norfolk <i>Bufo</i> sp. and/or <i>Rana</i> sp.	Stuart (1982)
Nazeing, Essex <i>Bufo</i> sp.	Stuart (1982)
<i>Rana</i> sp.	
<i>Lacerta vivipara</i>	
Shropshire D, Norfolk <i>Rana</i> sp.	(this paper)
<i>Rana temporaria</i>	
Upton Warren, Worcestershire <i>Rana temporaria</i>	Stuart (1982)
Wilmen's Pit, Middlesex "Amphibians"	Stuart (1982)

COMMENTS

The known amphibians and reptiles of the British Pleistocene cold-stages represent a strikingly depauperate herpetofauna. Only *Rana temporaria* and *Lacerta vivipara* have been specifically identified (Table 1), and the combined list from all of the British Pleistocene cold-stage sites consists only of the following forms:

Bufo sp. and/or *Rana* sp.

Bufo sp. indet.

Rana sp. indet.

Rana temporaria

Lacerta vivipara

The Nazeing, Essex, Devensian site (Stuart, 1982) has yielded the largest known cold-stage herpetofauna, yet this consists of only three forms: *Bufo* sp., *Rana* sp. and *Lacerta vivipara*. In striking contrast is the Cudmore Grove Hoxnian interglacial herpetofauna (Holman et al., 1990) that yielded 14 species of amphibians and reptiles including four exotic continental forms.

The two forms that are specifically identified from British Pleistocene cold-stage sites, *Rana temporaria* and *Lacerta vivipara*, have the most northerly distributions of any modern British herpetological species, and both occur well within the arctic circle today (Arnold and Burton, 1978, maps 36 and 70). It would be a parsimonious assumption that the material from British cold-stage Pleistocene sites identified as *Bufo* sp. represents *B. bufo* (also a northerly distributed species) rather than *B. calamita* or *B. viridis*; but this has not yet been substantiated by comparisons with series of modern skeletons.

In summary, the British Pleistocene cold-stages are represented by only three genera, *Bufo*, *Rana*, and *Lacerta* amongst which only the species *Rana temporaria* and *Lacerta vivipara* have been identified. Both of these represent the most cold-tolerant modern species that occur in Britain today.

ACKNOWLEDGEMENTS

United States National Science Foundation Grant NSF-BSR-851-5665 supported initial work done on the British Pleistocene cold-stage amphibians and reptiles. I owe special thanks to Martin R. Warren of the Cromer Museum, Norfolk, for allowing me to study the fossil anuran material collected by him. I thank Dr. Angela Milner and Ms Sandra Chapman for allowing me to study the Tornewton Cave *Rana* ilium at the Natural History Museum, London.

REFERENCES

- Arnold, E.N. and Burton, J.A. (1978). *A Field Guide to the reptiles and amphibians of Europe*. Collins, London.
- Hallock, L.A., Holman, J.A. and Warren, M.R. (1990). Herpetofauna of the Ipswichian Interglacial Bed (Late Pleistocene) of the Itteringham Gravel Pit, Norfolk, England. *Journal of Herpetology* 24, 33-39.
- Holman, J.A. (1985). Herpetofauna of the late Pleistocene fissures near Ightham, Kent. *Herpetological Journal* 1, 26-32.
- Holman, J.A. (1987). Herpetofauna of the Swanton Morely site (Pleistocene: Ipswichian), Norfolk. *Herpetological Journal* 1, 199-201.
- Holman, J.A. (1989). Additional herpetological records from the middle Pleistocene (Cromerian interglacial) freshwater bed, West Runton, Norfolk. *British Herpetological Society Bulletin* 21, 9-12.
- Holman, J.A. and Clayden, J.D. (1990). A late Pleistocene herpetofauna near Shropshire, Norfolk. *British Herpetological Society Bulletin* 31, 31-35.
- 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.
- Stuart, A.J. (1982). *Pleistocene Vertebrates in the British Isles*. Longman, London and New York.
- Sutcliffe, A.J. and Zeuner, F.E. (1962). Excavations in the Torbryan Caves, Devonshire. 1. Tornewton Cave. *Proceedings of the Devon Archaeological Exploration Society*, 5, 127-145.