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Confirmation of the presence of *Cucubalus baccifer* L. (Caryophyllaceae) in the British Pleistocene

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A late Middle Pleistocene temperate stage plant macrofossil assemblage extracted from fluvial sediments collected from Belhus Park, Aveley, Essex, UK contained a seed of Cucubalus baccifer *L. (a member of the Caryophyllaceae family). It is an interesting record because today this species is not regarded to be native in Britain (Stace 1997). The species was recorded from an Ipswichian site near Ilford, Essex, UK (West* et al. *1964), but was not mentioned when Godwin (1975) catalogued the occurrence of plant taxa in the British Pleistocene. This may have caused confusion about the history of this species. The record from Belhus Park confirms that this species was present during the British Pleistocene.*

1 Introduction

Excavations made in 1979 at Belhus Park, Aveley, Essex, UK during the construction of the M25 Motorway exposed fluvial sediments (OS Grid Reference TQ 575810). These sediments were overlain by a clayey gravel deposit which contained archeological remains in the form of lithic artefacts (Gibbard 1994). Palynological analysis of the fluvial sediments revealed a single pollen assemblage biozone dominated by *Quercus*, *Alnus* and *Pinus* (Gibbard 1994). Other thermophilous deciduous tree pollen were represented (e.g. *Acer*, *Fraxinus* and *Tilia*) suggesting temperate conditions. A correlation was made with the first half of the Ipswichian Stage (the last interglaciation) (Gibbard 1994). More recently a multidisciplinary investigation of the fluvial sediments has been undertaken. A diverse plant macrofossil assemblage was recovered during this study. Woodland and shade tolerant taxa were well represented including *Acer campestre*, *Alnus glutinosa*, *Clematis vitalba*, *Cornus sanguinea*, *Frangula alnus*, and *Viburnum opulus*. A reedswamp existed at the margin of the channel composed of, for example, *Butomus umbellatus*, *Eupatorium cannabinum*, *Lythrum salicaria*, *Sparganium erectum* and *Typha*. The water-body was inhabited by a diverse submergent (e.g. *Ceratophyllum demersum* and *Groenlandia densa*) and emergent (e.g. *Azolla filiculoides* and *Trapa natans*) aquatic vegetation. The plant macrofossil data supports Gibbard's conclusion that conditions were fully temperate at the time of deposition but suggests that the sediments are older than the Ipswichian Stage. The megaspores of the heterosporous pteridophyte *Azolla filiculoides* were present in the sediments. *Azolla filiculoides* does not occur in the Late Pleistocene in north-west Europe (Field 1999). Amino acid racemization (AAR) data supports a pre-Ipswichian age. AAR ratios from the opercula of *Bithynia* recovered from the sediments allow correlation with Marine Isotope Stage (MIS) 9 (Penkman *et al*. 2011).

2 The fossil *Cucubalus baccifer* L. seed from Belhus Park

One sediment sample from Belhus Park (BP AB 5-25) yielded a seed of *Cucubalus baccifer* L. The seed is fractured but has retained its shape which is roughly ellipsoid (fig. 1a). The specimen is 1.95 mm long and 1.62 mm wide. On one side is a distinctive hilum which consists of a raised rim surrounding a deep depression (fig. 1b). The depression is 381 μm in diameter. Relatively small elongated cells run up the sides of the hilum. Under a light microscope the larger, almost circular, slightly domed surface cells can be clearly seen. Unfortunately, on the scanning electron micrograph the surface cells are not so pronounced, but can be seen (fig. 1c). For comparison a modern seed of *Cucubalus baccifer* L. (from the Halle Botanic Garden collection, Germany) is shown in figures 1d, 1e and 1f. The cracking on the surface of this modern seed occurred when it was placed in the scanning electron microscope.

3 Discussion

West *et al*. (1964) investigated organic sediments from a borehole that was located next to Seven Kings Station at Ilford, Essex, UK. Palynological data suggested that deposition of the sediments had taken place during the first half of the Ipswichian Stage. The plant macrofossil investigation of these sediments yielded one seed which was "of a comparable size, similar surface and matching cell pattern" to seeds of the extant *Cucubalus baccifer*. For whatever reason when Godwin (1975) compiled a list of the plant taxa represented in British Pleistocene sediments this species was not mentioned. Although dated, Godwin's *History of the British Flora* (1975) is still a useful starting point when establishing the presence or absence of a plant taxon in the British Pleistocene. An omission in Godwin's

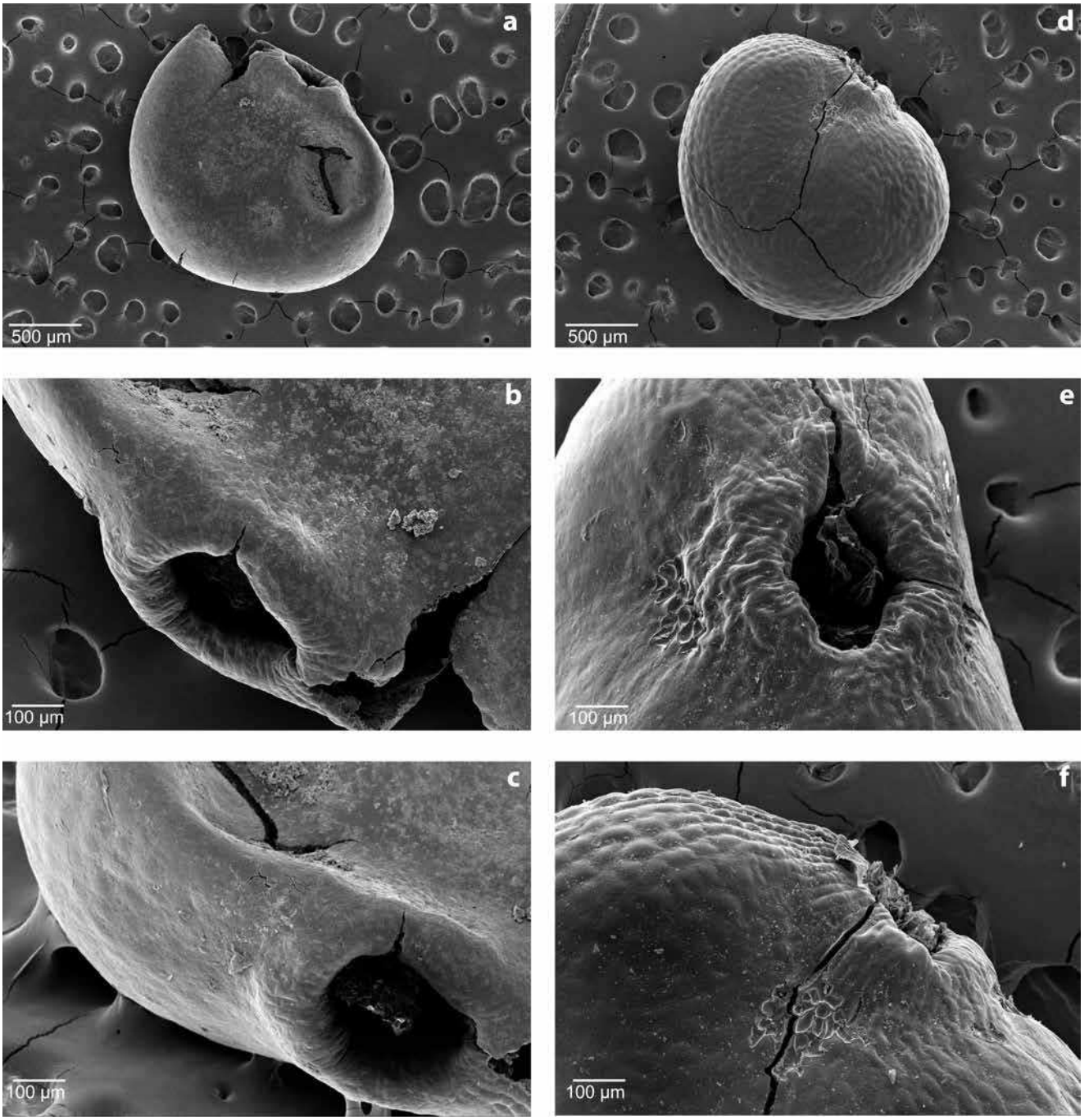

Figure 1 a, b and c the seed of C*ucubalus baccifer* L. extracted from late Middle Pleistocene fluvial sediments found at Belhus Park, Aveley, Essex, UK (sample BP AB 5-25); d, e and f – a modern seed of C*ucubalus baccifer* L. from the Halle Botanic Garden collection, Germany (Collected in 1979 at Wittenberg by Jage).

book may lead a researcher to conclude that a plant taxon had not been identified prior to its publication. To avoid confusion a note, on the Belhus Park specimen is used to confirm this species occurrence in the British Pleistocene record.

This Eurasian and North African species has been described as 'introduced' to Britain by Stace (1997). If this is the case the records from Ilford and Belhus Park would indicate that the range of this species has expanded and contracted at various times in NW Europe during the late Middle and Late Pleistocene, probably as a result of fluctuating climatic conditions. However, Clement and Foster (1994) and Lousley (1961) have considered whether it has native status in eastern England today. This can only be determined with certainty if Holocene records of *Cucubalus baccifer* are forthcoming. So far no Holocene records of this species have been made in the British Isles.

4 Conclusion

The presence of a seed of *Cucubalus baccifer* from fluvial sediments dated to MIS 9 at Belhus Park, Aveley, Essex, UK is confirmation that this species did occur in Britain during the Pleistocene.

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