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Moving forwards? Palynology and the human dimension

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ABSTRACT

For the greater part of the last century, anthropogenic palynology has made a sustained contribution to archaeology and to Quaternary science in general, and pollen-analytical papers have appeared in *Journal of Archaeological Science* since its inception. The present paper focuses selectively upon three areas of anthropogenic palynology, enabling some assessment as to whether the field is advancing: land-use studies, archaeological site study, and modelling. The Discussion also highlights related areas including palynomorph identification and associated proxies. There is little doubt that anthropogenic palynology has contributed to the vitality of pollen analysis in general, and although published research can be replicative or incremental, site- and landscape-based studies offer fresh data for further analysis and modelling. The latter allows the testing of both palynological concepts and inferences and can inform archaeological discovery and imagination. Archaeological site studies are often difficult, but palynology can still offer much to the understanding of occupation sites and the discernment of human behaviour patterns within sites.

1. Introduction

Since the employment of pollen analysis in human contexts over half a century ago (Firbas, 1937; Iversen, 1941; Fægri, 1944; Godwin, 1944), anthropogenic palynology has made a sustained contribution to archaeology, archaeological science and the wider realms of palaeoecology and Quaternary science (Behre, 1986; Birks et al., 1988; Edwards and MacDonald, 1991; Bell and Walker, 2004; Roberts, 2014). From its first volume, pollen analysis has featured in the pages of *Journal of Archaeological Science* (Dimbleby and Evans, 1974; Greig and Turner, 1974) – perhaps not a total surprise given that soils palynologist Geoffrey Dimbleby was a first editor – and this has continued. The number of papers containing a sole or substantial pollen content remained relatively constant over the first 20 years of the journal's life and has increased since then (Fig. 1a–b); however, allowance must be made for the increase in the number of all archaeological science articles published over time (Fig. 1c), which itself reflects the health of the field in general. Caveats clearly apply to the use of such data and the mode of extraction (see the caption to Fig. 1), but palynology obviously represents a recognisable component in the journal's profile and, indeed, following Dimbleby, two of the editors (Kevin Edwards 1983–92, and Chris Hunt 2011–14) have also been palynologists as have other members of the editorial board.

This is not the place to produce an in-depth analysis of the metrics associated with palynological papers within the *Journal of Archaeological Science*. As intimated, palynology is a mainstay of palaeoecology and Quaternary science, and journals covering these fields contain impressive numbers of palynological papers in their own right (Table 1). While many of these articles are concerned with anthropogenic topics, or are of relevance to human activity, that cannot be said to apply to the majority of them. In addition, there are journals for which palynology is a strength or even dominant, most notably *Review of Palaeobotany and Palynology*, *Grana* and *Vegetation History and Archaeobotany*.

We focus selectively upon three areas of anthropogenic palynology which enable us to assess whether the field is advancing. This paper does not claim to be comprehensive and there are areas which are not covered here at all, even if they could have relevance to the practice of humanly-related palynology (e.g. automated pollen counting [Holt and Bennett, 2014], genetics [Parducci et al.,

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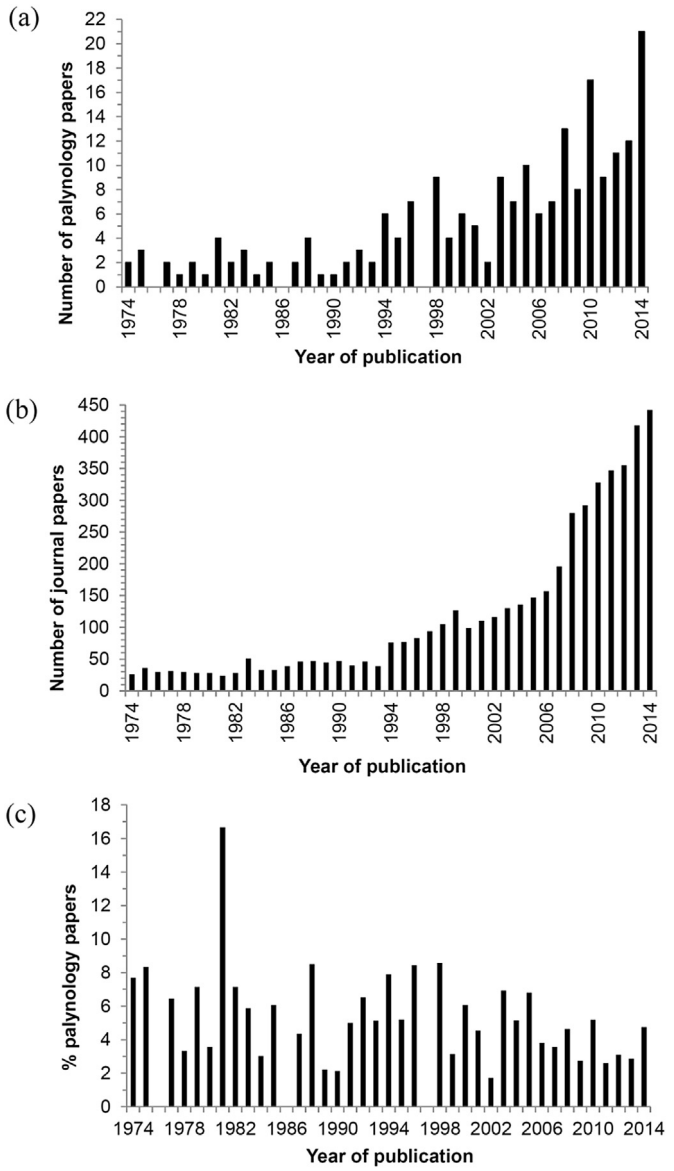

Fig. 1. Data relating to palynological publications (n = 211) contained in *Journal of Archaeological Science*, 1974–2014. Data were extracted using the advanced search facility within the Elsevier home page of the journal, searching for 'pollen' or 'palynology' within title, abstract or keywords of articles, review articles and short communications: (a) number of palynological papers within the journal per annum; (b) total number of papers within the journal per annum; (c) palynological papers as a percentage of total papers within the journal per annum.

2013], many related proxies [O'Brien et al., 2005; Meadows, 2014], and, of course, dating issues [Whittle et al., 2011]). Similarly, we barely address the issue of microscopic charcoal and fire which have a long and continuing history in palynology (cf. Swain, 1973; Patterson et al., 1987; Bradshaw and Sykes, 2014; Sadoria et al., 2015). It does, however, cover key areas which could contribute to priority research questions identified for palaeoecology (Seddon et al., 2014).

2. Can traditional land-use employments of palynology still inform and surprise us?

The investigation of the past relationship between vegetation and people has classically involved the study of pollen and

Table 1
Numbers of palynological papers appearing in selected journals since their dates of release.

Journal	Period covered	Number of palynological papers[a]	Mean number of palynological papers per annum[b]
The Holocene	1991–2014	627	26.13
Quaternary Science Reviews	1982–2014	608	18.42
Quaternary International	1989–2014	476	18.31
Palaeogeography, Palaeoclimatology, Palaeoecology	1965–2014	792	15.84
Journal of Quaternary Science	1986–2014	398	13.72
Quaternary Research	1970–2014	606	13.47
Boreas	1972–2014	336	7.81
Journal of Archaeological Science	1974–2014	211	5.15

[a] Based on the words 'pollen' or 'palynology' appearing within the title, abstract or keywords of articles, review articles and short communications, where these are ascertainable within the relevant search engines of the journal home pages. There is likely to be uncertainty in these figures.
[b] These figures are not normalised for annual journal length.

associated proxies (e.g. fungal spores, microscopic charcoal) preserved within stratified, waterlogged deposits such as lake mud and peat (Fægri et al., 1989). The spatial scale of the vegetation reconstructions possible through this method are highly dependent upon the size of the pollen site under investigation; put very simply, small diameter sites such as woodland hollows will provide information about fine-scale vegetation patterns immediately around the sampling location, whilst large lakes record the regional picture (cf. Jacobson and Bradshaw, 1981; Prentice, 1985; Sugita, 1994; Bradshaw, 2007). The conventional methodological approach has been to make inferences based upon the analysis of a single core that is deemed by the investigator to be representative of changes occurring throughout the landscape in question. Research into multiple pollen profiles spread across the same site (e.g. Edwards, 1983; Waller, 1998), or combining data across a network of locations (e.g. Tipping, 2010; Ledger et al., 2014), whilst time consuming, can offer more precise details about the spatial patterning in vegetation and the impact of prehistoric society on land cover (e.g. Lechterbeck et al., 2014; Woodbridge et al., 2014).

Advances in the modelling and simulation of vegetation using practical tools that incorporate knowledge about pollen production, transport and deposition (e.g. Sugita, 2007a, 2007b; Gaillard et al., 2008), plus the widening availability of an expanding number of large pollen datasets though on-line media such as the European Pollen Database (http://www.europeanpollendatabase.net/ ; Fyfe et al., 2009) and Neotoma (http://www.neotomadb.org/), mean that the discipline may grow to rely less upon the 'traditional' field- and laboratory-based empirical studies described above for all its answers (see Section 4 below). Nevertheless, conventional pollen- analytical investigations still continue to play a key role within the discipline, not least in the empirical testing of models and simulations, the filling of gaps in the spatial and temporal coverage of vegetation histories, refining existing patterns, and challenging ideas and knowledge. This can be exemplified through a brief examination of selected aspects of recent pollen-analytical research from some of the North Atlantic islands colonised by Norse/Viking settlers during the late first millennium AD (Fig. 2).

In the Faroe Islands, pollen-analytical studies have played a crucial role in the re-examination of the timing of first human settlement. On the basis of saga literature and the archaeological record, the initial settlement ('*landnám*') of this island group has normally been ascribed to the arrival of Norse settlers sometime during the early 9th century AD; this being despite evidence to the contrary appearing in another contemporary literary source – *De*