

Recent studies of beetle data -
what does it tell us about our ancient
treescape?

Keith Alexander
Freelance Ecological Consultant

Introduction

- There are many lines of independent evidence that demonstrate, or imply, that the vegetation cover of parts at least of lowland Britain was very open when first colonised by people
 - A kaleidoscope of meadow and heath with varying densities of trees and shrubs



Evidence base for vegetation structure

- Real data from palaeoecology
 - Pollen
 - **Beetle fragments**
 - Snail shells
 - Limestone districts
 - Species of open grasslands
 - Soil profiles
 - Beneath prehistoric monuments
 - Bones from large mammals
 - Aurochsen, ponies, deer, boar, beaver
 - Wolf, bear
- Implications from modern ecology
 - Epiphytic lichens
 - **Saproxylic beetles**
 - **Fauna of decaying wood**
 - **Associations with ancient and veteran trees**
 - Light-demanding trees and shrubs
 - Others?

The beetle fauna of Britain's distant past – the postglacial treescape

- Palaeo-ecologists have recently provided a very useful compilation of subfossil beetle data
 - Sandom, Ejrnaes, Hansen & Svenning [PNAS 111 (11) 2014]
 - collated evidence for all beetle species known from sub-fossil studies across GB
 - But linked with misleading habitat associations
 - a subjective approach which led to serious error
 - “dead wood beetles require trees, and trees are found in woodland”
 - data manipulated to support the hypothesis of closed forest
- Re-examine data using Natural England's developing ISIS/PANTHEON application
 - a computer application which analyses species lists in terms of known associations with habitat structures in the modern GB countryside
 - a more objective approach:
 - system developed for conservation assessment
 - not based on false assumptions
 - the data actually demonstrates a very open landscape with trees

ISIS analysis of Sandom et al (2014) data – percentage species composition

Beetle assemblage	Last interglacial	Last glacial	Early Holocene 10000 – 5000 BP	Late Holocene 2000 – 0 BP
Grassland & Scrub	35	69	28	44
Arboreal	18	10	13	11
Wood-decay	34	0	47	34
Mineral marsh	4	9	3	3
Shaded field layer	0	0	2.5	2.5
Unshaded early successional mosaic	0	0	1	3

Why the disparity?

- The standard approach from palaeo-ecology has been to associate an assemblage rich in wood-decay beetles with closed woodland
- Modern sites rich in such species are actually open wood pastures
- Palaeo-ecologists study dead remains and just don't understand the ecology of living organisms!



Cotswold wood pasture – an open landscape with ancient ash trees rich in wood-decay beetles

Case study 1: *Prostomis mandibularis*

- Commonest beetle in sub-fossil assemblages in Britain; now extinct
- Lives between the annual growth rings of heartwood partially decayed & softened by certain white-rot fungi
- Host trees therefore need to be of substantial age



Modern landscape supporting *Prostomis mandibularis* [Cordillera Cantabrica]

- Note diverse age structure of trees
- Landscape-scale habitat



Case study 2: *Dryophthorus corticalis*

- Sub-fossil remains from Thorne Moor (Buckland & Kenward 1973)
- Today only known in GB from Windsor Great Park area and Croome Park
- Lives amongst large volumes of moist brown-rotten heartwood in ancient open-grown oaks (Windsor) or pines (Thorne Moor)
- Requires a landscape full of large open-grown trees





- Typical habitat structure for *Dryophthorus corticalis* in the modern landscape
- large old open-grown oaks in ancient wood pasture at Windsor Great Park
 - Lots of old trees
 - Lots of decaying wood
 - but not 'closed woodland'

Oak

- Light-demanding tree
- Large old examples are dependent on open canopy conditions to survive
- Succumb to crown competition from young vigorous secondary woodland in absence of grazing
- Oaks die young under closed-canopy conditions



Impact of 'forest clearance'?

- Palaeo-ecologists talk about widespread forest clearance as human population expanded
- 18 species present as sub-fossil but now extinct in GB (Buckland & Dinnin 1993)
- 2.6% of native fauna
- Not a major shift in species richness
- Parts of the modern cultural landscape not very different in structure?
- Early people colonised an already open landscape

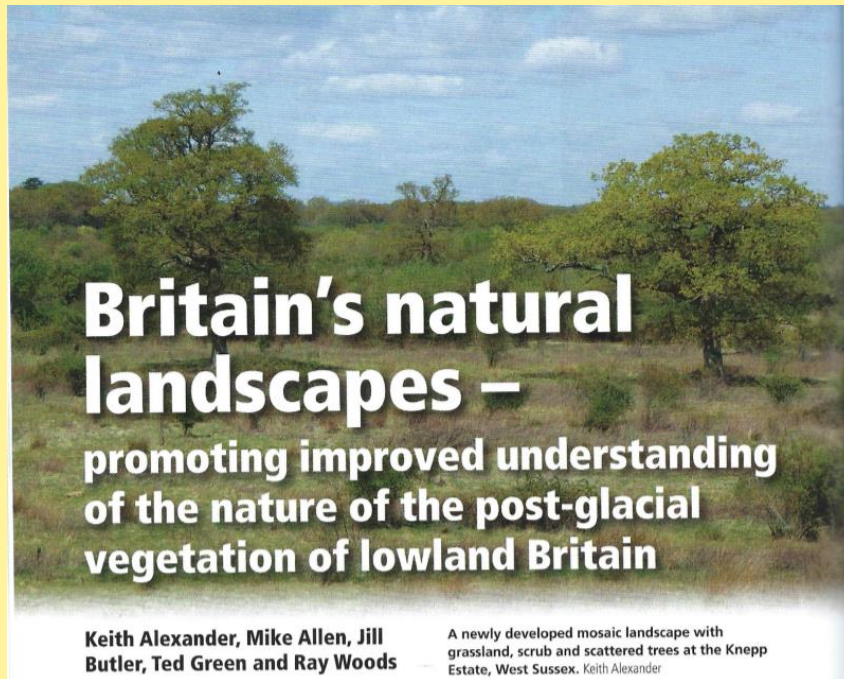


Dromaeolus barnabita

Conclusions

- The rich biodiversity of the Holocene ‘forests’ was associated with **open wood pasture type conditions** not closed forest
 - more of a very open forest
 - clearly demonstrated by ISIS analysis of the sub-fossil beetle data
- This assessment is consistent with all lines of available evidence
 - Recent review in *British Wildlife* magazine – see next slide
- The scientific evidence is that, before people started to change things, the natural British treescape was a mosaic of
 - open areas, some with open-grown trees able to reach their full expression and to age and decline without competition
 - scrub
 - shady ‘woodland’ – not much – very localised
 - this mosaic would be dynamic, ever-changing, reflecting current conditions.

Further reading



British Wildlife magazine

- June 2018
- Pp330-338
- Also:
- 'Natural' vegetation in Britain: the pollen-eye view.
- Ralph Fyfe
- Pp339-349