

9. The southern English chalklands: molluscan evidence for the nature of the post-glacial woodland cover

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Mollusc analysis not only helps us refine our understanding of environmental change and land-use history, but can also fundamentally change long held perceptions of land-use development, which consequently have major archaeological implications. Although the environmental and land-use history of the downland has now been largely defined by the land snail evidence, in retrospect, it is important to interpret the land snail evidence *without* reference to wider assumptions of national vegetation histories (eg, Table 9.1). Such assumptions, as we will see later, have held back interpretations over the past 40 years.

By default, land snail evidence has been used to understand the land-use history of chalklands in the absence of the peat bogs mires, and waterlogging, and the consequent general absence of the survival of pollen (see Scaife 1987). This has meant that, until the 1970s to 1980s, the chalklands, containing key archaeological landscapes including Stonehenge, Avebury, Dorchester and Maiden Castle and Cranborne Chase, fell behind in environmental landscape and land-use studies traditionally covered elsewhere by the analyses of pollen and waterlogged plant remains. This was exacerbated by the persistence of the belief that they existed as large tracts of open downland and of thin calcareous azonal rendzina soils (typically 0.3 m thick) which were unlikely to have supported ancient deciduous forest. The common concept of the chalk downland was largely one of a beautiful natural landscape, upon which the 'impression' of ancient fields and farmsteads was left as a faint, but sometimes extensive, reminder of prehistoric communities. This chapter provides a new interpretation of prehistoric chalkland land-use and vegetation history. I have published overviews previously (Allen & Scaife 2007; Allen & Gardiner 2009), but the molluscan evidence that drives the change in interpretation is discussed here.

The chalklands of southern England were perceived by some in terms of a quintessentially rural idyll, with rolling green downland pasture gradually being turned brown in later historic times under the ever-expanding ploughscape. The conundrum

Table 9.1. Outline of climatic zonation, basic vegetational change and archaeological events for southern England

<i>Climatic zone</i>	<i>Pollen zone</i>	<i>Archaeological period</i>	<i>Climate & vegetation</i>	<i>approx. date calibrated BC (BP)</i>
FLANDRIAN				
Sub-atlantic	VIII	Roman period Iron Age Late Bronze Age	<i>Deterioration</i> Cold and wet, general deterioration. High rainfall. Decline of lime. Increase of ash, birch and beech	1250 cal BC (c. 2900 BP)
	FL. III			
Sub-boreal	VIIb	Middle Bronze Age Early Bronze Age Final Neolithic	<i>Stable</i> Warm and dry, low rainfall, wind-blown deposits. Woodland regeneration in southern England	3200 cal BC (4500 BP)
		Late Neolithic Middle Neolithic Early Neolithic	Declining warmth. Landnam and first agriculture. Elm decline:- 3800 BC/(5050BP)	
				4000 cal BC (5200 BP)
	Atlantic	FL. II VIIa	Later Mesolithic	<i>Optimum</i> Climatic optimum, warm and wet. Increase of 2°C, poly-climax forest. Increase of alder, some clearances
Boreal	VI	Mesolithic	<i>Ameliorating</i> Continental climate, warm and dry. Assynchronous expansions of mixed oak forest with hazel and successional from pine	8900 cal BC (9500 BP)
	V			
Pre-boreal	FL. I		<i>Rapid Amelioration</i> Sharp increase in warmth at 10,000 BP. Birch, juniper + pine woodland	10,000 cal BC
	IV	Early Mesolithic		

This enables pollen zones quoted in many specialist pollen and quaternary geography reports to be equated to the archaeological chronology and activity (Allen 2000b; Allen & Gardiner 2009)

was whether this downland, with its thin azonal rendzina soils ever supported the post-glacial woodland of, initially, Mesolithic (Boreal) pine and hazel (the former can hardly survive, let alone thrive on the thin chalkland soils today), to Neolithic mixed oak forests (see Tables 9.1 and 9.5). Despite the fact that this vegetational succession was seen across most of northwest Europe, archaeologists persisted in considering the downland as open, and subconsciously, but ironically as we will see later, this openness was seen in part to contribute to the Wessex chalkland becoming the centre of Neolithic and Bronze Age culture (Piggott 1954). Surprisingly, initially, many archaeologists and geographers alike considered the chalk Downs to have always been open grassland; even after the 1950s when myxomatosis almost destroyed the rabbit population allowing hawthorn shrubs and other woody vegetation to rapidly take hold (Sumption & Flowerdew 1985; Thomas 1960; 1963).

Table 9.2. The archaeological data selected are from Early Neolithic sites (long barrows and causewayed enclosures)

Author	Year	Site	Data	Grassland	Scrub	Woodland
Archaeologist						
Childe	1925	—	—	✓	—	—
	1957	—	—	✓	—	—
Curwen	1937	—	—	✓	—	—
Piggott	1954	—	—	—	—	? ✓
Ecologist						
Godwin & Tansley	1941	—	—	✓	—	×
Environmental Archaeology						
Salisbury & Jane	1940	Maiden Castle	charcoal	—	—	✓
Conchologist						
Kennard & Woodward	1929	The Trundle	snails	—	—	✓
Kennard & Woodward	1930	Whitehawk	Snails	—	✓	—
Kennard	1934	Whitehawk	Snails	—	—	✓
Woodward	1936	Whitehawk	Snails	×	✓	?
Kennard	1936b	Whitehawk	Snails	×	✓	?
Kennard	1936a	Thickthorn	Snails	—	✓	?
Kennard	1943	Maiden Castle	Snails	×	✓	?

Key: × = refuted, ✓ = present, ? = ambiguous

'The problem of the south English chalk downland' (Piggott 1954, 5)

Our understanding of the chalk landscape was tardy in comparison with many other areas of Britain; principally due to poor pollen preservation and the relatively late onset of soil (as opposed to peat) pollen studies (Dimbleby 1957; 1961; 1985). A lack of long environmental histories from the downland encouraged many prehistorians, geographers and naturalists to assume these landscapes to have been essentially unchanging – and to project the modern landscape back into prehistory (Table 9.2). In 1925 when Gordon Childe was writing *The Dawn of European Civilisation* (1925; with revised editions to 1957), throughout his text on the Neolithic of the Wessex and Sussex Downs there was an unwritten assumption that the Downs were open grassland. Similarly, Cecil Curwen, a Sussex archaeologist, wrote in 1937 in the first edition of his *Archaeology of Sussex*: 'in prehistoric times both the western and eastern [South] Downs were in all probability open grassland with a variable amount of scrub' (p. 13) – clearly projecting current perceptions of landscape into the past. This view remained unchanged in his 1954 edition. However when Stuart Piggott published *The Neolithic Cultures of the British Isles* in the same year (1954), there was a growing realisation among archaeologists that the chalk, like the rest of the European landscape, may also have been wooded after the last glaciation. But the evidence was elusive: a lack of waterlogged deposits and peat containing pollen data led Piggott (among others) to believe that chalklands constituted a 'special problem' (1954, 5). At this time land snail

evidence was not considered by many to be of great help as it was largely deemed to examine general 'climatic environments' rather than vegetation and land-use histories (cf. Evans 1972; Davies 2008). Confusion reigned, with the evidence from charcoal (Maiden Castle, Dorset) being used to suggest that in Neolithic times the chalk was covered in closed woodland (Salisbury & Jane 1940) whilst the famous palaeobotanists and ecologists Godwin and Tansley (1941) contended 'no sound evidence is presented for any such belief'. Like the archaeologists before them they also seemed to believe that the downland was essentially bare of trees in the Neolithic.

Early land snail studies, largely by A. S. Kennard (eg, 1933; 1935; 1936a; 1943), provided an independent and unquestionably local interpretation, even though the discipline was clearly in its infancy (Tables 9.3 & 9.4). Kennard suggested that the snail evidence indicated climatic and vegetation associations local to the sampling sites, and despite the lack of corroborative botanical evidence, he suggested these provided evidence of downland woodland (Table 9.2). Astonishingly, for the time (1934, 130), Kennard wrote from his analysis at the early Neolithic causewayed enclosure at Whitehawk, Brighton, East Sussex:

'It is obvious that the ecological conditions were very different from those of the present day ... The faunule is that of damp woodland or scrub, and these conditions must have existed on the Downs when the Camp was occupied'.

He went on to presciently say

'It would be of great interest if we could date when the damp period [woodland/scrub] ended ... We now know that in Wiltshire it had practically ended in the Middle Bronze Age period.'

This latter question is still being posed with as much clarity 50 years later. Subsequently, pioneering work by Godwin (1962) on peat adjacent to the Downs at Wingham and Frogholt in Kent indicated the existence of woodland and subsequent deforestation by human agencies, rather than natural causes. Important studies of peat in river valleys by Anne Thorley at Amberley Wild Brooks, Arundel and Vale of Brooks, Lewes (1971; 1981), and also by Waton at Winnal Moor, Winchester (1982; 1986), and latterly by Waller (Waller & Hamilton 2000), demonstrated the presence of post-glacial woodland on the Downs, and confirmed that the vegetation history followed the general pattern seen elsewhere in Britain (Table 9.1).

Archaeologists and ecologists initially denied the presence of woodland on the Downs; not being able to conceive that the thin soils could support this vegetation despite the detailed contrary reporting by conchologists in the archaeologists' own excavation reports. Kennard and Woodward, from 1929 onwards, had indicated that, in the Early Neolithic, the downland environment associated with long barrows and causewayed enclosures was a) not grassland, and b) that was mesic (damp) environments existed supporting scrub, or c) woodland. These interpretations were from sites spread across the Downs from Maiden Castle and Thickthorn Down in west Dorset, to The Trundle and Whitehawk in West and East Sussex respectively. Despite the strong indications from snails (analysed by Kennard and Woodward, see Tables 9.3 & 9.4) and charcoals (eg, Salisbury & Jane 1940) and the plain, clear prescient words of Kennard (1934, 130),

Table 9.3. Kennard's records (1936; 1943) from Neolithic contexts in Dorset

Table 9.5. Kentham's records (1955)										Maiden Castle
Thickthorn Down long barrow										
Feature	Buried soil			Neolithic			Beaker			
				mound	ditch	posthole	ditch			
Context	1	3	4	2	6	8	5	7		
Sample										
Wt (g)										
MOLLUSCA										
<i>Pomatias elegans</i> (Müller)	1	—	+	3	—	5	1	212	—	
<i>Carychium tridentatum</i> (Risso)	—	—	—	—	—	—	24	1	—	
<i>Cochlicopa</i> cf. <i>lubrica</i> (Müller)	1	—	1	—	—	—	7	4	—	
<i>Pupilla muscorum</i> (Linnaeus)	—	5	—	—	—	1	6	6	—	
<i>Vallonia costata</i> (Müller)	5	6	5	—	1	1	11	3	—	
<i>Vallonia excentrica/pulchella</i>	5	17	3	—	—	—	—	1	—	
<i>Acanthinula aculeata</i> (Müller)	—	—	—	—	—	—	+	—	—	
<i>Ena montana</i> (Draparnaud)	—	—	—	—	—	—	2	1	—	
<i>Punctum pygmaeum</i> (Draparnaud)	—	—	—	2	—	—	28	10	11	
<i>Discus rotundatus</i> (Müller)	—	—	—	+	—	—	+	+	—	
<i>Arion</i> spp.	—	—	—	—	—	—	2	—	—	
<i>Vitrina pellucida</i> (Müller)	—	—	—	—	—	—	—	—	—	
<i>Vitrea crystallina</i> (Müller)	—	—	—	4	—	—	18	4	1	
<i>Aegopinella pura</i> (Alder)	—	—	—	—	—	—	4	1	—	
<i>Aegopinella nitidula</i> (Draparnaud)	—	—	—	—	—	—	8	1	14	
<i>Oxychilus cellarius</i> (Müller)	—	—	—	1	—	—	—	—	39	
Limacidae	—	1	—	—	—	—	1	1	—	
<i>Euconulus fulvus</i> (Müller)	—	—	—	—	—	—	—	1	—	
<i>Cecilioides acicula</i> (Müller)	—	—	—	(2)	—	—	—	—	—	
<i>Clausilia bidentata</i> (Ström)	—	—	—	—	—	—	5	1	—	
<i>Helicella itala</i> (Linnaeus)	—	—	—	—	1	1	2	16	4	
<i>Trochulus striolatus</i> (Linnaeus)	—	—	—	—	—	—	—	—	1	
<i>Trochulus hispidus</i> (C. Pfeiffer)	—	—	—	—	—	—	5	7	5	
<i>Arianta arbustorum</i> (Linnaeus)	—	—	—	1	—	—	—	1	—	
<i>Helicigona lapicida</i> (Linnaeus)	—	—	—	—	—	—	2	1	—	
<i>Cepaea nemoralis</i> (Linnaeus)	18	2	26	—	—	2	34	4	3	
Taxa	5	5	5	7	2	5	20	21	8	
TOTAL	30	31	35	11	2	10	164	279	78	

Thickthorn Down long barrow and Maiden Castle causewayed enclosure. Thickthorn Down: 1, 3, 4 turf line/buried soil; 2 mound; 6 ditch layer 5 (primary fill); 8 posthole A; 5, 7 ditch layer 2 (secondary fill)

Although in the publication Kennard records *Carychium minimum* Mull (1936, 94), this is probably *C. tridentatum*, so is recorded as such in Tables 9.2 and 9.3

both archaeologists, and more significantly leading palaeo-ecologists such as Godwin as late as 1940 and beyond (1940; *et seq.* see Godwin 1975), failed to acknowledge or accept this. Interpretation and research were probably hindered by this failure. Michael Kerney and his students, when studying land snails to look at late glacial and early Holocene environments from long stratified colluvial valley fills in Kent and Buckinghamshire

Table 9.4 Woodward and Kennard's records of land snails from Neolithic deposits in Sussex

	Trundle	Whitehawk		
Published	1929	1930	1934	1936
MOLLUSCA				
<i>Pomatias elegans</i> (Müller)	✓	c	c	c
<i>Acicula fusca</i> (Montagu)	—	1	—	vr
<i>Carychium tridentatum</i> (Risso)	✓	c	c	vr
<i>Cochlicopa cf. lubrica</i> (Müller)	—	c	r	vr
<i>Vertigo pygmaea</i> (Draparnaud)	—	—	—	vr
<i>Pupilla muscorum</i> (Linnaeus)	✓	8	r	c
<i>Vallonia costata</i> (Müller)	✓	c	r	r
<i>Vallonia excentrica</i> Sterki	—	3	r	r
<i>Vallonia extrentrica/pulchella</i>	—	2	—	—
<i>Acanthinula aculeata</i> (Müller)	✓	3	r	vr
<i>Merdigera obscura</i> (Müller)	✓	—	—	—
<i>Discus rotundatus</i> (Müller)	✓	c	r	—
<i>Arion</i> spp.	✓	c	r	vr
<i>Vitrea crystallina</i> (Müller)	✓	c	r	—
<i>Nesovitrea hammonis</i> (Ström)	✓	5	r	vr
<i>Aegopinella pura</i> (Alder)	✓	4	—	vr
<i>Aegopinella nitidula</i> (Draparnaud)	✓	c	r	vr
<i>Oxychilus cellarius</i> (Müller)	✓	c	r	vr
Limacidae	—	—	—	vr
<i>Cochlodina laminata</i> (Montagu)	—	4	r	—
<i>Clausilia bidentata</i> (Ström)	✓	6	r	—
<i>Helicella itala</i> (Linnaeus)	✓	2	r	—
<i>Trochulus striolatus</i> (C. Pfeiffer)	✓	4	r	vr
<i>Trochulus hispidus</i> (Linnaeus)	✓	8	r	c
<i>Helicodonta obvoluta</i> (Müller)	✓	—	—	—
<i>Arianta arbustorum</i> (Linnaeus)	✓	c	c	r
<i>Helicigona lapicida</i> (Linnaeus)	✓	1	—	—
<i>Cepaea nemoralis</i> (Linnaeus)	✓	c	c	c
<i>Cepaea hortensis</i> (Linnaeus)	✓	c	c	c
Taxa	23	25	21	20

Key c = common, r = rare; vr = very rare

The Trundle and Whitehawk causewayed enclosures (Kennard & Woodward 1929; 1930; Woodward 1934; 1936)

(Kerney *et al.* 1964; Evans 1966), clearly showed that post-glacial woodland developed on the chalk. From a very early stage in this research (eg, Kerney 1968) he linked this to Scandinavian botanists Blytt and Sernander's general climate and vegetation history (Table 9.1) promoted by palaeo-ecologists (eg, Godwin 1940), and palynologists across northwest Europe (Lowe & Walker 1982, 132–133). Such still was the confusion, perhaps

Table 9.5. Main environmental events on the chalk of Wiltshire, Dorset and Sussex in the late-glacial and post-glacial periods

Period	Environment (Evans & Jones 1979; Entwistle & Bowden 1991)	Allen
Medieval/Romano-British/Iron Age	Intermittent cultivation & grassland. Formation of ploughwash deposits.	
Bronze Age	Open environment of grassland or arable. Cultivation/grazing intermittent. Formation of wind-lain material	Essentially the creation of open downland, extensive downland pasture & increasing tillage and formalised field systems. Opening of land & field leads to colluviation (& wind blow)
Late Neolithic	Woodland regeneration. Not at Woodhenge	
Late Neolithic	Construction of henge monuments	Extensive tracts of open grassland, managed woodlands, & possible expansion in localised tillage
Neolithic	Long period of grassland, probably maintained by grazing.	Expansion of open grassland & graze, localised tillage
Neolithic	Woodland clearance. Ploughing & possibly other forms of tillage. Ploughmarks at Avebury.	Progressive woodland modification & woodland clearance; pasture being more extensive, localised tillage
(Mesolithic)	Dense woodland. Recorded only at Atlantic (?)	Mosaic of woodland, varying from dense closed canopy, to light open scrub, & some extensive almost open grassland glades
Mesolithic	Open woodland. Evidence of fire & possible influence of Mesolithic man (Evans 1972, 219, 256).	Open woodland, including pine & hazel (Allen 1995), localised influence if fire & Mesolithic activity
Boreal (?)	Subarctic environment, probably tundra. Formation of periglacial structures & wind-lain material.	
(Upper Palaeolithic)		
Late-glacial		

From Evans and Jones (1979, 209) modified by Entwistle and Bowden (1991, 41), and as presented here (based on Allen & Gardiner 2009)

largely residing in the archaeological community (see Curwen 1954 vs Piggott 1954), that it was then that one of Kerney's students took up the baton to specifically research the vegetation (and land-use history) of the downland from archaeological contexts. And so it was that John Evans undertook his PhD (1964–1967) and post-doctoral (1967–1969) research, culminating in the seminal publication of *Land Snails in Archaeology* (1972). Evans clearly demonstrated the presence of post-glacial woodland, and its local anthropogenic clearance for Neolithic monument building and activities (long barrows and causewayed enclosures). John Evans continued work, sampling widely from archaeological monuments, reinforced the presence, and then clearance, of woodland across the downlands (eg, Evans 1971; Evans & Jones, 1979, 209; see Allen 2006). Thus,

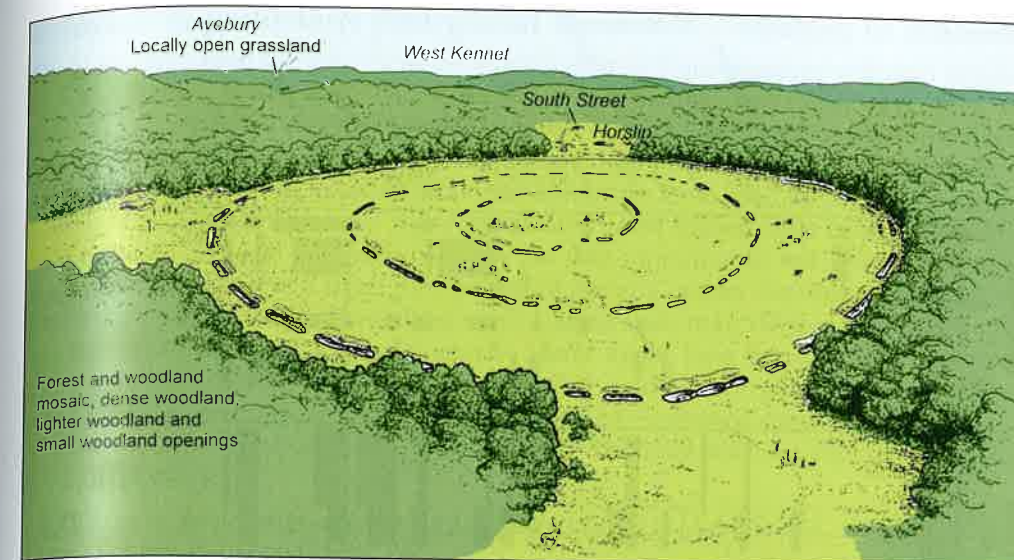


Figure 9.1. Reconstruction and interpretation of Windmill Hill early Neolithic causewayed enclosure set within a woodland clearing (Whittle et al. 1999), base reproduced by kind permission of Josh Pollard (illustration: Abby George)

from the 1970s the existence of an essentially continuous woodland blanket across the Downs (in common with the rest of the northwest Europe) was widely accepted; a woodland that required removal for monument building, for settlement, and for farming (Table 9.5). This clearly seems to have been the case for Neolithic causewayed enclosures dating to the 36th century BC in Sussex (eg, Offham, Bury Hill, The Trundle, and Coombe Hill), and Windmill Hill, Wiltshire (Fishpool 1999; Fig. 9.1).

This, however, provided an assumption of an essentially continuous unbroken woodland blanket that had developed more or less uniformly not just across the Downs but the whole of northwest Europe. Even Evans failed really to engage with the type of variations in woodland, but instead concentrated on change and opening of the woodland, clearance, tillage and grazed grassland; see South Street, Beckhampton, Horslip and Easton Down analysed from 1967 – c. 1990 (Fig. 9.2), and even Ascott-under-Wychood, re-appraised in 2003–2004. This assumption too hindered research. Woodland seems to have been just as 'present', and its uniform distribution across the whole landscape was taken as unquestioned; the nature, distribution and diversity of that woodland was not really explored. The lack of woodland at an archaeological site was seen to confirm its anthropogenic clearance and removal, its potential absence was not questioned. The lack of evidence for early woodland on any archaeological site was taken as sample location bias; after all archaeological excavations were located specifically where there was evidence of human activity, and therefore, woodland clearance! This leads us to briefly examine two prehistoric downland ecologies; the nature of the post-glacial woodland, and downland openness.

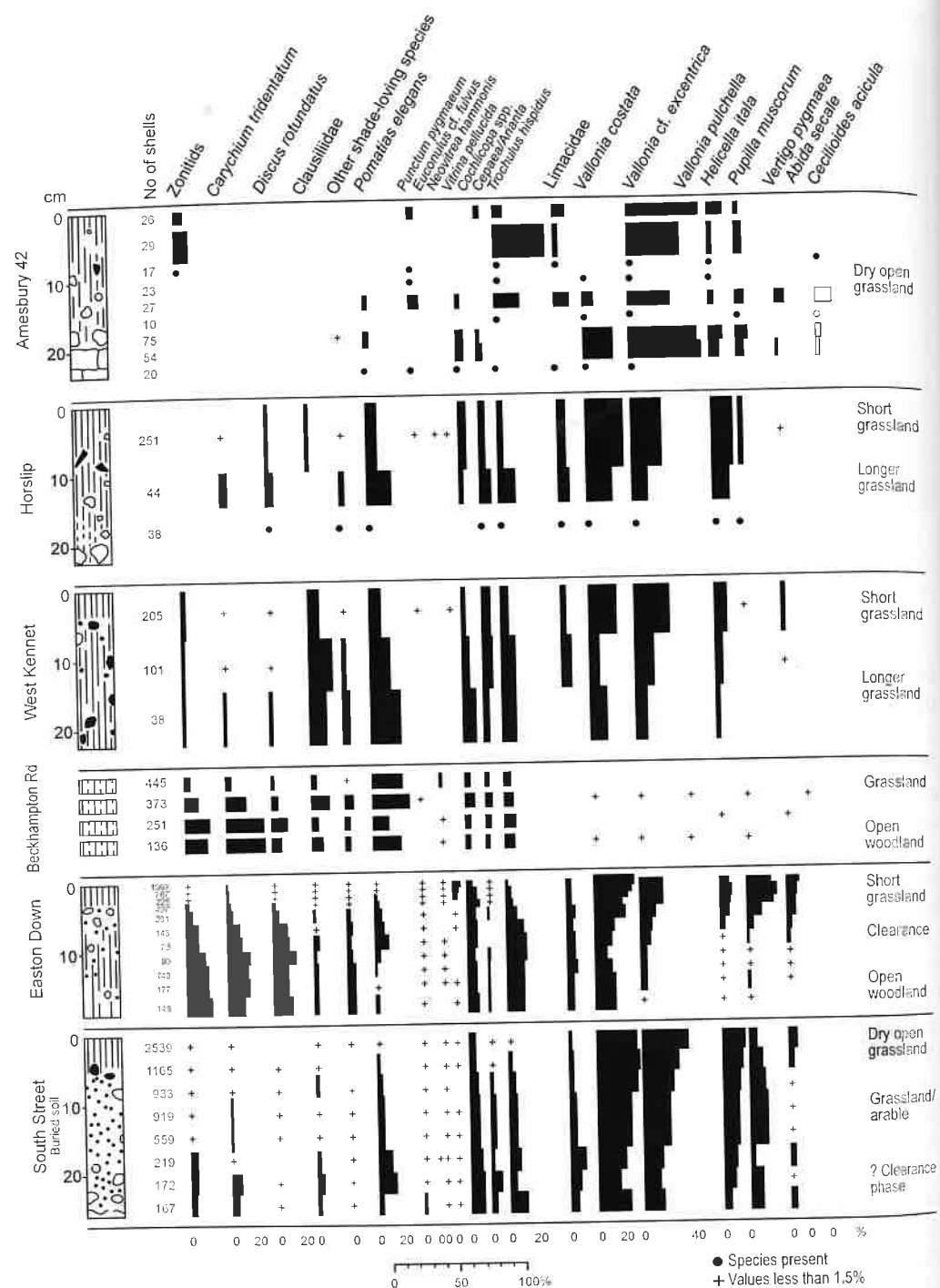


Figure 9.2. Land snail histograms diagram of buried soils under key Neolithic long barrows (illustration: Abby George)

Evidence of prehistoric post-glacial woodland – wanting to conform

There are clear long records of environmental change from stratified colluvial deposits at Brook, Kent (Kerney *et al.* 1964; 1980), Pitstone, Buckinghamshire (Evans 1966), and Asham, East Sussex (Ellis 1985; 1986) for example; the land snail sequences of which were clearly related to phases of Boreal, Atlantic and sub-Atlantic vegetational succession. Here, however, I wish to concentrate on Neolithic land snail sequences recovered from archaeological sites, and more specifically from buried soils beneath Neolithic long barrows as these represent not only the first monuments, but their construction also seems to represent a short time period of about a one to one-and-a-half centuries (Bayliss & Whittle 2007). These land snail analyses we may think are now common, but the evidence is still relatively sparse. Many major long barrows were excavated prior to land snail analysis (Nutbane, Hampshire, and Fussell's Lodge, Wiltshire), and others such as North Marden, West Sussex whilst excavated more recently, were so heavily ploughed that no buried soil survived. The long barrows rapidly considered here are (Table 9.2):

South Street, Beckhampton Road, and Horslip, Wiltshire (Ashbee *et al.* 1979)
 West Kennet, Wiltshire (Evans 1967; 1972)
 Easton Down, Hampshire (Whittle *et al.* 1993)
 Amesbury 42, Wiltshire (writer)
 Alfriston, East Sussex (Drewett 1974)
 Ascott-under-Wychwood, Oxfordshire (Benson & Whittle 2007)

West Kennet, Avebury environs, Wiltshire

Only three samples were taken from a small cutting exposing the buried soil (Evans 1972, 263–264). The basal sample was dominated by 'other shade loving species' and *Pomatias elegans* with *Vallonia costata* and *V. excentrica*; a very mixed assemblage with c. 30% shade-loving species and c. 25% open country. Evans suggested that the sequence of three samples showed the development 'of dry open grassland from one previously shaded' but the 'previously shaded' environment may well not have been dense deciduous Atlantic forest, but open woodland with a grassy sward. Only three samples have ever been examined from the buried soil, and again clearly this site offers much more potential.

Easton Down, Avebury environs, Wiltshire

The pre-barrow environmental history indicates woodland, followed by clearance, cultivation, and ending in grassland (Rouse & Evans 1993, 211), which like South Street suggests significant pre-barrow activity in terms of both events and duration (Evans in Ashbee *et al.* 1979). The soils, even in a shallow subsoil hollow are typical humic rendzinas (Macphail in Whittle *et al.* 1993, 218–219), and the buried soil itself is a typical humic rendzina, from which pollen suggests open downland with hazel scrub (Cruse in Whittle *et al.* 1993, 219–221).

Sequences of 11 and 26 samples were taken through the buried soil. The body or base of the soil and subsoil hollow, however, is dominated by land snail assemblages characteristic of relatively closed woodlands with, in part, a deciduous leaf litter floor. The only open country species of any significance was *V. costata* – an open country species occasionally found in woods (Evans 1972, 156). The land snail assemblages were high diversity and dominated by *Discus rotundatus*, and *Carychium tridentatum* with *Vitrea* spp., *Aegopinella* spp. and *Oxychilus cellarius*. These were accompanied by low levels of *Cochlodina laminata*, *Ena montana*, *Merdigera obscura*, *Clausilia bidentata*, *Acanthinula aculeata* and included *Vertigo pusilla* and *Lauria cylindracea*. The only other significant species was the omnipresent *Trochulus hispidus*.

Alfriston, East Sussex

A very poorly preserved plough-damaged buried soil produced three depauperate land snail assemblages (16–21 shells) from which little can be said (Thomas 1979), except that they were generally mixed and contained both open country species (including the xerophile *Helicella itala*) and only two, common, shade-loving species (*Discus rotundatus* and *Clausilia bidentata*); hardly a dense closed deciduous woodland.

Ascott-under-Wychwood, Oxfordshire

The buried soil was a relict argillic brown earth (brown forest soil) from which a sequence of five samples was taken (Evans 2007). A woodland fauna was recorded in the lower four samples, which was superseded by an open grassland one in the last, uppermost, sample. The assemblages are moderately species-diverse with relatively uniform representation of each species present (Evans 2007, fig. 3.1, table 3.1); again suggesting good woodland cover, possibly little leaf litter, and open habitats. Again the only significant open country species present is *V. costata*, and Evans records the environment here as open woodland (Evans 1972, 254, fig. 88). This woodland follows from, and succeeds, an earlier clearly closed woodland from a Mesolithic tree hollow.

Horslip, Avebury environs, Wiltshire

A very shallow, almost stone-free, black rendzina buried soil only 125–150 mm thick was present producing an essentially open country grassland fauna; the lowest samples (A/C horizons) of which have hints of a former more shady regime (Evans in Ashbee *et al.* 1979, 275–276).

Beckhampton Road, Avebury environs, Wiltshire

The buried soil over the coombe deposits was essentially a grey calcareous rendzina

with, on the coombe rock and brickearth, a relict Bt horizon of an argillic brown earth. Three of four spot samples from the buried soil were dominated by shade-loving species with one open country assemblage (Evans in Ashbee *et al.* 1979, 278–298; Evans 1972, 248). Although the shade-loving assemblages were relatively diverse with 13 species present, they were accompanied by open country species (*Vallonia costata* and *V. excentrica*, *Helicella itala*, *Pupilla muscorum*), and again suggest a woodland with more light, and openings, and possibly some grassy or herbaceous swards.

South Street, Avebury environs, Wiltshire

A rendzina soils exists over a subsoil hollow; it is a complex soil with ard marks at the base scoring the chalky periglacial drift. The soil has a history of late glacial cold stage (tundra) to a clearly defined open woodland (Evans 1972, 257–261, fig. 80; Evans in Ashbee *et al.* 1979, 282–285; Evans 1971, 40–52). Evans struggles with the openness here, knowing that a more closed woodland existed on the chalk in the Avebury area (1972, 257), and suggested that the open country species imply either 'a cover of light woodland or that the deposits are contaminated with late glacial shells'. Although shade-loving species (dominated by *D. rotundatus*, *C. tridentatum*, with *Aegopinella* spp., and *Oxychilus* spp., small occurrences of *Acanthinula aculeata*, *Clausilia bidentata*, *Vitrea contracta*, *Vitrina pellucida*, *Euconulus fulvus* and the ancient woodland rarities *Vertigo pusilla* and *Ena montana*) represent the woodland, the significant presence of *V. costata* and *V. excentrica* with *Helicella itala*, *Pupilla muscorum* and *Vertigo pygmaea*, clearly represent a significant openness, perhaps short grazed small glades.

Amesbury 42, Stonehenge environs, Wiltshire

The thin grey to brown silty rendzina 240 mm thick under the relict bank was sampled in a small test pit by the writer. The land snail assemblages were almost complete devoid of shade-loving species, and were dominated by the *Vallonia* species with *Helicella itala*, and *Pupilla muscorum*; clearly open dry, probably short grassland, environment. Even samples from the ditch showed no evidence of shady habitats until well into the secondary fill (ie, much later in prehistory).

The Neolithic post-glacial woodland

Many palaeo-geographers considered post-glacial vegetational succession in terms of a simple, and more or less uniform, history from a cold and open landscape, through mixed oak forest, followed by the clearance of the woods to create the present open downland. That sequence has been well rehearsed in vegetation (or climatic) terms (eg, Table 9.1). Without going into more detail, what is clearly evident here, is that the post-glacial woodland cover of the 38th–37th centuries BC was not a uniform dense, Atlantic

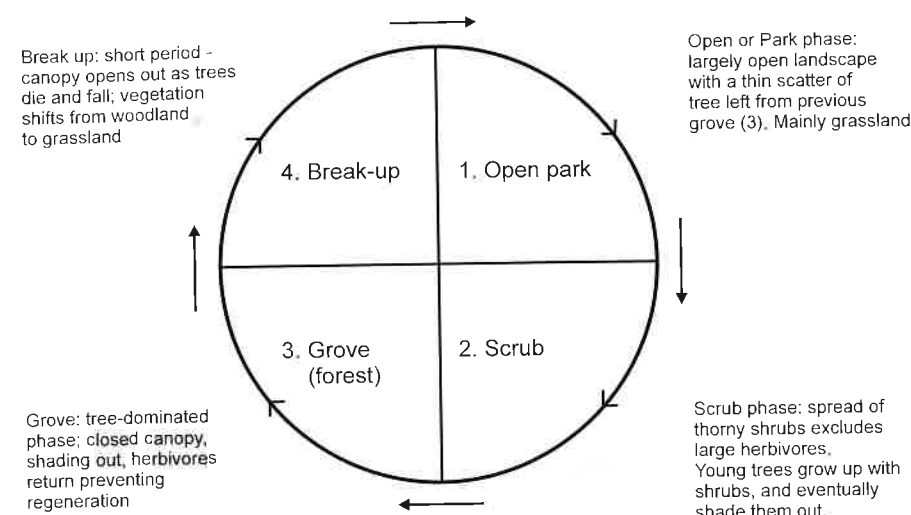


Figure 9.3. Vera's model, consisting of the three phases of Open Park, Scrub and Grove (Vera 2000), to which a fourth Break-up has been added by Kirby (2003) to represent the transition from woodland grove back to open habitats 'Park' (from Allen & Gardiner 2009; illustration: Abby George)

closed-canopy forest, but a much greater *mosaic* of woodland. Some was closed-canopy ancient woodland with leaf litter, other areas seem to be more scrubby, whilst others represent significant openness varying from glades within woodland (South Street), to very open established grassland by the 37th century BC (eg, Amesbury 42). The very nature of the variable but varying woodland habitat would also effect the distribution of edible plants and berries, and of animals (herds of deer and wild cattle etc), and thus may directly or indirectly affect the location of human activities, or choices to occupy particular parts of the woodland landscape. We may ponder further on this woodland mosaic and diversity. The post-glacial openness is discussed below, but woodlands were clearly spatially diverse (the ecological norm). Those areas that were more open, allowed more light, and were more accessible, might have been preferentially browsed by deer, and in particular cattle (cf. Vera 1997; 2000; Fig. 9.3). This might then create a greater division, or contrast, between a denser woodland with a closed-canopy that was not browsed, and a more open woodland in which browsing and opening occurred; essentially creating an almost bipartite woodland. A greater range and variety of human activities are more likely to have been performed in, and focussed upon, the more open woodland. Clearing and preparing areas for activities, even for animal slaughter and butchery from the Mesolithic, may have been concentrated in these more open areas, and thus the concentration of human activities, establishing a sense of place, and of repeated visiting or meeting and ultimately monument building, may essentially fossilise an ecological pattern of diversity. How much is the distribution of early Neolithic (or even Mesolithic) activity predicated upon the nature of the vegetation

and type of woodland, and how much is more one of human decision, whether based on topographical, hydrological, social or personal considerations? Or put another way how much does the distribution of human activity reflect the former woodland ecology?

How open was the downland?

The accepted model of post-glacial vegetation history follows Tansley's ecological developmental progression (1939) through vegetation seres to climax woodland. Evans' general land-use scheme based on land snails (Table 9.5), is undoubtedly applicable at the landscape or regional scale, as he intended. But our unquestioning assumption that woodland existed, and then was cleared, prevents us from being able to challenge or modify this model on a local, site by site basis. It is perhaps necessary to prove the existence of closed woodland, rather than to assume it. Prehistoric populations may have deliberately exploited niche habitats and more open ground. The presence of extensive post-glacial woodland on the chalk was challenged as a result of pollen analysis from mires on the Yorkshire Wolds (Bush 1988; 1989; Bush & Flenley 1986); but the application of this model to the southern chalk Downs was vigorously refuted by Thomas (1989).

In the past 25 years work, largely by Rob Scaife, has provided a series of important, and key pollen sequences, such as Mesolithic contexts at Stonehenge (Scaife 1995), Neolithic deposits at Gatcombe Withy Beds, Isle of Wight (Scaife 1980; Tomalin & Scaife 1979) and alluvial sequences at Durrington (Scaife 2004) and Cranborne Chase (Scaife in French *et al.* 2003; 2005; 2007). Combined with this, a significantly increased level of land snail analysis has started to look at spatial resolution and mapping of past environments *within* landscapes rather than considering single sites or sample points to be wholly representative of their landscapes. This has been facilitated by commercial archaeology (eg, Dorchester By-pass) and personal research involving very detailed molluscan analysis. Studies of defined chalkland research areas have thus enabled us to move from a two dimensional history to the postulation of a three dimensional mapped history of vegetation and land-use (Allen 2000a), as at Dorchester (Allen 1997a), Stonehenge (Allen *et al.* 1990; Allen 1997b) and Cranborne Chase (Allen 2002; Allen in French *et al.* 2003; 2005; Allen 2007).

If we examine chalkland landscapes by attempting to prove the existence of woodland, rather than assuming it, then the examination of selected, well-studied areas is informative. In the Dorchester landscape to the north of Maiden Castle, analysis of over 260 snail samples from nine prehistoric sites (Allen 1997a), with over 75,000 snail identifications, failed to prove conclusively the existence of prehistoric closed woodland. Perhaps the sampling was biased in favour of archaeological sites where woodland was cleared. But it is also possible that a full post-glacial woodland maximum did not exist. Yet at Maiden Castle itself John Evans (Evans & Rouse 1991) clearly demonstrated the presence of an ancient woodland. So – contrary to Evans's suggestion that this was representative of the landscape – perhaps Maiden Castle survived as a wooded hilltop on open downland, as Danebury does today? Mesolithic posts (around 7000 cal BC) were erected 250 m north of Stonehenge in an open pine and hazel woodland, and the

first earthen, monument (c. 3700 cal BC) of Amesbury 42 long barrow, as we have seen, was constructed in a pre-existing, long-established and expansive open downland. On Cranborne Chase, an even more extensive land snail programme of over 400 samples from 22 sites and over 175,000 snail identifications in an area smaller than that studied at Dorchester has also failed to find evidence for extensive closed post-glacial woodland, a finding confirmed by pollen analysis from peats in the chalkland valley at Wimborne St Giles (Scaife in French *et al.* 2007, figs 2.19 & 2.20).

Evidently woodland development was retarded in some locations. It seems increasingly likely that natural openings or glades comprising grassland, scrub and some trees formed a part of the natural ecological variation and patchiness in a large and extensive forest. Some of these relatively open areas may have been as large as an English parish. These would invite vegetation diversity, the woodland fringes providing a niche for fruiting trees and berries. These fruits would have encouraged a range of herbivores to feed and browse and thus maintain the glade. Such a location would also invite Mesolithic communities to hunt and gather, and possibly even maintain these glades artificially and perpetuate them. It is perhaps not too far-fetched to suggest that these areas attracted some of the first large human populations and that in consequence they survive today as zones of more concentrated monuments and sites. It is no coincidence that three of the apparently most densely populated parts of the prehistoric downland, all containing major earlier Neolithic monuments (Dorchester, Cranborne and Stonehenge), all seem to have been open, not closed, wooded downland. This concept has been explored further for the southern chalkland (Allen 2000b; French *et al.* 2007), see below.

Ironically, these ideas of open park woodland propagated initially by Bush (1988) and Bush and Flenley (1986) for the Yorkshire Wolds were independently postulated for areas of the Dorset Downs from 1988 to 1997 (see Allen 1997a, 278). Reassuringly these ideas conform directly to ecological models developed by Vera (1997; 2000), that landscape mosaics existed in which 'half-open' and park-like landscape existed in lowland areas, and were maintained by wild herbivores. We postulate that precisely these areas were exploited by Mesolithic populations because of their openness, wild fruit and berries, and the concentration of herbivores (cf. Allen 2002). Evidence of open park woodland and these man and nature interactions are explored further in Allen (1997b; Allen & Gardiner 2009), Scaife in French *et al.* (2003) and French *et al.* (2005; 2007).

Work by environmental archaeologists over the past 25 years has radically altered this perception. This essay provides a new narrative for the downland. It includes evidence for pine as a former constituent of the post-glacial vegetation. We now know that post-glacial forest did not form a uniform blanket, and we understand better the consequences of the varied tree cover for prehistoric societies. We attempt here to summarise the model developed by John Evans for chalklands (Evans & Jones 1979; Table 9.5), and present some new thoughts on both the natural changes, and the impressive consequence of human activities which essentially in prehistory created the chalkland landscape we recognise today.

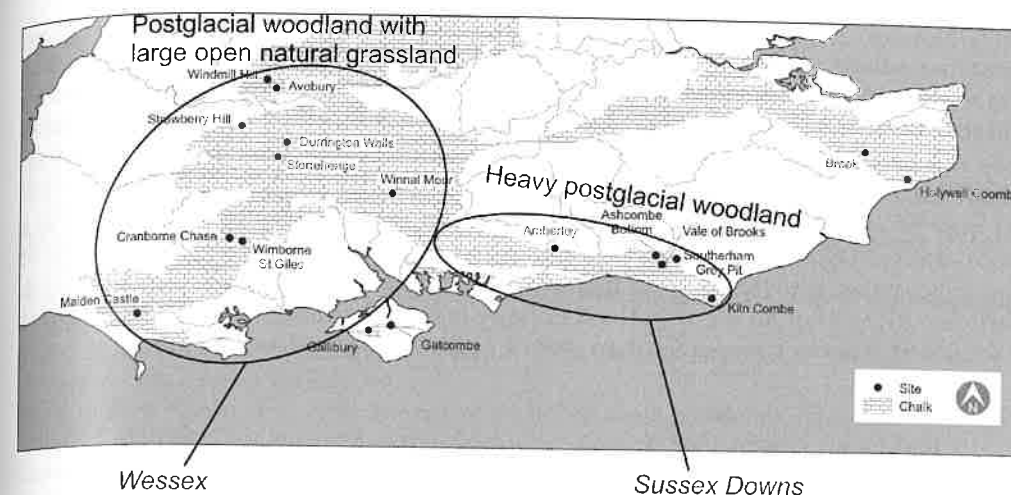


Figure 9.4. Archaeological and ecological contrasts between the Wessex chalk and the South Downs (from Allen & Gardiner 2009)

Concluding thoughts

Land snail evidence, and the careful re-examination of classic published land snail analyses has allowed us to, slightly more critically or objectively, re-appraise some of the downland vegetation history. The Downs were not a simple uniform landscape over which a single development history can be charted. Two major conclusion can be drawn.

1. Although widely accepted that the Downs were covered with a post-glacial woodland, it is now clear that this cover was not continuous, ubiquitous nor complete in either space nor over time. Areas of the Wessex Downs had large areas of post-glacial grassland or open land rather than woodland. These have been identified in the environs of Dorchester, Dorset, Cranborne Chase, Stonehenge, and possible the lowland area around Avebury (Fig. 9.4), and these are, not co-incidentally the locations of major centres of Mesolithic activity and flint scatters and/or Neolithic activity and monuments. Previously I have suggested that these areas became foci of human activity (Allen & Gardiner 2009); being more open they encouraged the growth of vegetation such as hazel and fruiting berries, which in turn attracted wild animals such as deer, cattle and such like. Consequently, these areas had both food and other resources, ideal for human exploitation from almost the earliest post-glacial times.
2. In some cases, previously, just the identification of the existence of a previous woodland was all that seemed required; and the nature of that woodland cover was not really interrogated, examined or discussed in detail. It is clear that the woodland was very variable, and represents a mosaic over space and time – an ecological norm. Areas of closed-canopy woodland with vegetation-poor ground cover and rich leaf litter, and elsewhere more open woodland with herbaceous vegetation and open woodland with scrub refugia, rupestral habitats and open grassland may have existed.

What is clear about these two conclusions is that they may have a significant, if not profound, effect upon human activity, occupation and settlement (see Allen & Gardiner

2009). Not only may the distribution of open areas, or more open woodland vs closed denser woodland effect the distribution of human activity at both a local site scale, but also at, potentially a regional scale (Fig 9.4), and also may affect the range of activities that could be, and were, undertaken. We must remember that the presence of woodland does not preclude many activities; flint mining, for instance can easily occur within woodland, as can grazing and browsing, specially of cattle. Archaeologists' perception too may be challenged. Instead of considering the removal of woodland to create a space and feeling of openness and huge areas for graze, in some cases it may be to enable activities, browse, or even monument building within the woodland (Allen & Gardiner 2012); after all the woodland ecology is far richer and more diverse in terms of food and economic resources than that of open chalk grassland.

References

- Allen, M. J. 1995. Before Stonehenge. In Cleal, R. M. J., Walker, K. E. & Montague, R., *Stonehenge in its Landscape: twentieth-century Excavations*, 41–63. London: English Heritage Archaeological Report 10
- Allen, M. J. 1997a. Landscape, land-use and farming. In Smith, R. J. C., Healy, F., Allen, M. J., Morris, E. L., Barnes, I. & Woodward, P. J., *Excavations along the Route of the Dorchester By-pass, Dorset, 1986–8*, 277–283. Salisbury: Wessex Archaeology Report 11
- Allen, M. J. 1997b. Environment and land-use; the economic development of the communities who built Stonehenge; an economy to support the stones. In Cunliffe, B. & Renfrew, C. (eds), *Science and Stonehenge*, 115–144. Oxford: Proceedings of the British Academy
- Allen, M. J. 2000a. High resolution mapping of Neolithic and Bronze Age landscapes and land-use; the combination of multiple palaeo-environmental analysis and topographic modelling. In Fairbairn, A. S. (ed.), *Plants in Neolithic Britain and Beyond*, 9–26. Neolithic Studies Group Seminar Papers 5. Oxford: Oxbow Books
- Allen, M. J. 2000b. Soils, pollen and lots of snails. In Green, M. G., *A Landscape Revealed: 10,000 years on a chalkland farm*, 39–46. Stroud: Tempus
- Allen, M. J. 2002. The Chalkland Landscape of Cranborne Chase: a prehistoric human ecology, *Landscapes* 3, 55–69
- Allen, M. J. 2006. Professor John Gwynne Evans, aka 'snails' Evans, *Journal of Conchology* 39, 111–117
- Allen, M. J. 2007. Land use and landscape development: the molluscan evidence. In French, C., Lewis, H., Allen, M. J., Green, M. Scaife, R. G. & Gardiner, J. 2007. *Prehistoric Landscape Development and Human Impact in the Upper Allen Valley, Cranborne Chase, Dorset*, 151–189. Cambridge: McDonald Institute Monograph
- Allen, M. J., Entwistle, R. & Richards, J. 1990. Molluscan studies. In Richards, J. C., *The Stonehenge Environs Project*, 253–258. London: English Heritage Archaeological Report 16
- Allen, M. J. & Gardiner, J. 2009. If you go down to the woods today; a re-evaluation of the chalkland postglacial woodland; implications for prehistoric communities. In Allen, M. J., Sharples, N. & O'Connor, T. P. (eds), *Land and People; papers in memory of John G. Evans*, 49–66. Prehistoric Society Research Papers 2. Oxford: Oxbow Books/Prehistoric Society
- Allen, M. J. & Gardiner, J. 2012. Not out of the woods yet: some reflections on Neolithic ecological relationships with woodland. In Jones, A. M., Pollard, J., Allen, M. J. & Gardiner, J. (eds), *Image, Memory and Monumentality: archaeological engagements with the material world*, 93–107. Prehistoric Society Research Papers 5. Oxford: Oxbow Books/Prehistoric Society
- Allen, M. J. & Scaife, R. 2007. A new downland prehistory: long-term environmental change on the southern English chalklands. In Fleming, A. & Hingley, R. (eds), *Prehistoric and Roman Landscapes; landscape history after Hoskins*, 16–32. Macclesfield: Windgather Press
- Ashbee, P., Smith, I. F. & Evans, J. G. 1979. Excavation of three Long Barrows near Avebury, Wiltshire, *Proceedings of the Prehistoric Society* 45, 207–300
- Bayliss, A. & Whittle, A. (eds), 2007. Histories of the dead: building chronologies for five southern British long barrows, *Cambridge Archaeological Journal* 17(1) (Supplement)
- Benson, D. & Whittle, A. (eds), *Building Memories; the Neolithic Cotswold long barrow at Ascott-under-Wychwood, Oxfordshire*. Oxford: Oxbow Books
- Bush, M. B. 1988. Early Mesolithic disturbance: a force on the landscape, *Journal of Archaeological Science* 15, 453–462
- Bush, M. B. 1989. On the antiquity of British grasslands: a response to Thomas, *Journal of Archaeological Science* 16, 555–560
- Bush, M. B. & Flenley, J. R. 1986. The age of the British chalk grasslands, *Nature* 395, 484–485
- Childe, V. G. 1925. *The Dawn of European Civilisation*. London: Routledge & Kegan Paul
- Curwen, E. C. 1937. *The Archaeology of Sussex*. London: Methuen
- Curwen, E. C. 1954. *The Archaeology of Sussex*. London: Methuen. Second edition
- Davies, P. 2008. *Snails: archaeology and landscape change*. Oxford: Oxbow Books
- Dimbleby, G. W. 1957. Pollen analysis of terrestrial soils, *New Phytologist* 56, 12–28
- Dimbleby, G. W. 1961. Soil pollen analysis, *Journal of Soil Science* 12, 1–11
- Dimbleby, G. W. 1985. *The Palynology of Archaeological Sites*. London: Academic Press
- Drewett, P. 1974. The excavation of an Oval Barrow Mound of the third millennium bc at Alfriston, East Sussex, 1974, *Proceedings of the Prehistoric Society* 41, 119–152
- Ellis, C. 1985. Flandrian molluscan biostratigraphy and its application to dry valley deposits in East Sussex. In Fieller, N. R. J., Gilbertson, D. D. & Ralph, N. G. A. (eds), *Palaeobiological Investigations: research design, methods and data analysis*, 157–166. Oxford: British Archaeological Report S226
- Ellis, C. 1986. The postglacial molluscan succession of the South Downs dry valleys. In Sieveking, G. de G. & Hart, M. B. (eds), *The Scientific Study of Flint and Chert*, 175–194. Cambridge: University Press
- Entwistle, R. & Bowden, M. 1991. Cranborne Chase: the molluscan evidence. In Barrett, J. Bradley, R. & Hall, M., *Papers on the Prehistoric Archaeology of Cranborne Chase*, 20–48. Oxford: Oxbow Monograph 11
- Evans, J. G. 1966. Late-glacial and post-glacial subaerial deposits Pitstone, Buckinghamshire, *Proceedings of the Geologists' Association* 77, 347–363
- Evans, J. G. 1967. The Stratification of Mollusca in the Chalk Soils and their Relation to Archaeology, Unpublished PhD thesis, Institute of Archaeology, University of London
- Evans, J. G. 1971. Habitat change on the calcareous soils of Britain: the impact of Neolithic man. In Simpson, D. D. A. (ed.), *Economy and Settlement in Neolithic and Early Bronze Age Britain and Europe*, 27–73. Leicester: Leicester University Press
- Evans, J. G. 1972. *Land Snails in Archaeology*. London: Seminar Press
- Evans, J. G. 2007. The snails. In Benson, D. & Whittle, A., *Building Memories; the Neolithic Cotswold long barrow at Ascott-under-Wychwood, Oxfordshire*, 55–70. Cardiff Studies in Archaeology. Oxford: Oxbow Books
- Evans, J. G. & Jones, H. 1979. Mount Pleasant and Woodhenge: the land Mollusca. In Wainwright, G. J., *Mount Pleasant, Dorset: Excavations 1970–1971*, 190–213. London: Report of the Research Committee of the Society of Antiquaries of London 37
- Evans, J. G. & Rouse, A. 1991. The land Mollusca. In Sharples, N., *Maiden Castle; excavations and field survey 1985–6*, 118–125. London: English Heritage Archaeological Report 19

- Fishpool, M. 1999. Land Mollusca. In Whittle, A., Pollard, J. & Grigson, C., *The Harmony of Symbols; the Windmill Hill causewayed enclosure*, 127–128. Oxford: Oxbow Books
- French, C., Lewis, H., Allen, M. J., Scaife, R. G. & Green, M. 2003. Archaeological and palaeo-environmental investigations of the upper Allen valley, Cranborne Chase, Dorset (1998–2000): a new model of earlier Holocene landscape development, *Proceedings of the Prehistoric Society*, 69, 201–234
- French, C., Lewis, H., Scaife, R. & Allen, M. 2005. New perspectives on Holocene landscape development in the southern English chalklands: the upper Allen valley, Cranborne Chase, Dorset, *Geoarchaeology* 20, 109–134
- French, C., Lewis, H., Allen, M. J., Green, M., Scaife, R. G. & Gardiner, J. 2007. *Prehistoric Landscape Development and Human Impact in the Upper Allen Valley, Cranborne Chase, Dorset*. Cambridge: McDonald Institute Monograph
- Godwin, H. 1940. Pollen analysis and forest history of England and Wales, *New Phytologist* 39, 370–400
- Godwin, H. 1962. Vegetational history of the Kentish Chalk downs as seen at Wingham and Frogholt, *Veröffentlichungen des Geobotanischen Institutes Rubel, Zurich* 37, 83–99
- Godwin, H. 1975. *The History of the British Flora*. Cambridge: University Press
- Godwin, H. & Tansley, A. G. 1941. Prehistoric charcoals as evidence of former vegetation, soil and climate, *Journal of Ecology* 29, 117–126
- Kennard, A. S. 1933. Report on the marine Mollusca, 235–241. In Stone, J. F. S., Excavations at Easton Down, Winterslow, 1931–32, *Wiltshire Archaeological Magazine* 46, 224–242
- Kennard, A. S. 1934. Report on the Mollusca, 129–131. In Curwen, E. C., Excavations in Whitehawk Neolithic Camp, Brighton, 1932–33, *Antiquaries Journal* 14, 99–133
- Kennard, A. S. 1935. Report on the non-marine Mollusca from the Stonehenge excavations of 1920–6, *Antiquaries Journal* 15, 432–434
- Kennard, A. S. 1936a, 94–5. Report on the non-marine Mollusca. In Drew, C. D. & Piggott, S., The excavation of long barrow 163a on Thickthorn Down, Dorset, *Proceedings of the Prehistoric Society* 2, 77–96
- Kennard, A. S. 1936b. The Mollusca, 90–92. In Curwen, E. C., Excavations in Whitehawk Camp, Brighton, third season 1935, *Sussex Archaeological Collections* 77, 60–92
- Kennard, A. S. 1943. Report on the Mollusca. In Wheeler, R. E. M., *Maiden Castle, Dorset*, 372–374. London: Reports the Research Committee of the Society of Antiquaries of London 12
- Kennard, A. S. & Woodward, B. B. 1929. The Mollusca, 69–70. In Curwen, E. C., Excavations in The Trundle, Goodwood, 1928, *Sussex Archaeological Collections* 70, 33–85
- Kennard, A. S. & Woodward, B. B. 1930. The Mollusca, 83–5. In Ross Williamson, P. R., Excavations in Whitehawk Neolithic camp, near Brighton, *Sussex Archaeological Collections* 71, 56–96
- Kerney, M. P. 1968. Britain's fauna of land Mollusc and its relation to the Post-Glacial Thermal Optimum, *Symposium of the Zoological Society of London* 22, 273–291
- Kerney, M. P., Brown, E. H. & Chandler, T. J. 1964. The late-glacial and post-glacial history of the chalk escarpment near Brook, Kent, *Philosophical Transactions of the Royal Society, London* B248, 135–204
- Kerney, M. P., Preece, R. C. & Turner, C. 1980. Molluscan and plant biostratigraphy of some Late Devensian and Flandrian deposits in Kent, *Philosophical Transactions of the Royal Society, London* B291, 1–43
- Kirby, K. J. 2003. *What Might a British Forest Landscape Driven by Large Herbivores Look Like?* Peterborough: English Nature Research Report 530
- Lowe, J. J. & Walker, M. J. C. 1984. *Reconstructing Quaternary Environments*. London: Longman
- Piggott, S. 1954. *The Neolithic Cultures of the British Isles; a study of the stone-using agricultural communities of Britain in the second millennium B.C.* Cambridge: University Press

- Rouse, A. J. & Evans, J. G. 1993. Land molluscs, 211–217. In Whittle, A., Rouse, A. J. & Evans, J. G., *A Neolithic downland monument in its environment: excavations at the Easton Down Long Barrow, Bishops Cannings, North Wiltshire*, *Proceedings of the Prehistoric Society* 59, 197–239
- Salisbury, E. J. & Jane, F. W. 1940. Charcoals from Maiden Castle and their significance in relation to the vegetation and climatic conditions in prehistoric times, *Journal of Ecology* 28, 310–325
- Scaife, R. G. 1980. Late-Devensian and Flandrian Palaeoecological Studies in the Isle of Wight. Unpublished PhD thesis, King's College London
- Scaife, R. G. 1987. A review of later quaternary plant microfossil and macrofossil research in southern England; with special reference to environmental archaeological evidence. In Keeley, H. C. M. (ed.), *Environmental Archaeology; a regional review, vol. 2*, 125–203. Historic Buildings and Monuments Commission for England, Occasional Paper 1. London: Historic Buildings and Monuments Commission for England
- Scaife, R. G. 1995. Boreal and sub-Boreal chalk landscape; pollen evidence'. In Cleal, R. M. J., Walker, K. E. & Montague, R., *Stonehenge in its Landscape; twentieth-century excavations*, 51–55. London: English Heritage Archaeological Report 10
- Scaife, R. G. 2004. Avon valley floodplain sediments: the pre-Roman vegetational history. In Cleal, R. M. J., Allen, M. J. & Newman, C., *An archaeological and environmental study of the Neolithic and Later Prehistoric landscape of the Avon Valley and Durrington Walls Environs*, 228–234, *Wiltshire Archaeological and Natural History Magazine* 97, 218–248
- Sumption, K. J. & Flowerdew, J. R. 1985. The ecological effects of the decline in rabbits *Oryctolagus cuniculus* L. due to myxomatosis, *Mammal Review* 15, 151–186
- Tansley, A. G. 1939. *The British Islands and their Vegetation*. Cambridge: University Press
- Thomas, A. S. 1960. Changes in vegetation since the advent of myxomatosis, *Journal of Ecology* 48, 287–305
- Thomas, A. S. 1963. Further changes in vegetation since the advent of myxomatosis, *Journal of Ecology* 51, 151–183
- Thomas, K. D. 1979. Appendix V. Land Mollusca and the environment of the Alfriston Barrow, 148–150. In Drewett, P., The excavation of an Oval Barrow Mound of the third millennium BC at Alfriston, East Sussex, 1974, *Proceedings of the Prehistoric Society* 41, 119–152
- Thomas, K. D. 1982. Neolithic enclosures and woodland habitats on the South Downs in Sussex, England. In Bell, M. G. & Limbrey, S. (eds), *Archaeological Aspects of Woodland Ecology*, 147–170. Oxford: British Archaeological Report S146
- Thomas, K. D. 1989. Vegetation of the British Chalklands in the Flandrian period: a response to Bush, *Journal of Archaeological Science* 16, 549–553
- Thorley, A. 1971. Vegetational history of the Vale of Brooks, *Institute of British Geographers' Conference Proceedings Part 5*, 47–50
- Thorley, A. 1981. Pollen analytical evidence relating to the vegetational history of the Chalk, *Journal of Biogeography* 8, 93–106
- Tomalin, D. J. & Scaife, R. G. 1979. A Neolithic flint assemblage and associated palynological sequence at Gatcombe, Isle of Wight, *Proceedings Hampshire Field Club and Archaeological Society* 36, 25–33
- Vera, F. W. M. 1997. *Metaforen voor de wildernis*. Eik, hazelaar, rund en paard. Unpublished PhD thesis, Wageningen University, Netherlands
- Vera, F. W. M. 2000. *Grazing Ecology and Forest History*. Wallingford: CABI
- Waller, M. & Hamilton, S. D. 2000. Vegetation history of the English chalklands: a mid-Holocene pollen sequence from the Caburn, East Sussex, *Journal of Quaternary Science* 15, 253–272
- Watson, P. V. 1982. Man's impact on the chalklands: some new pollen evidence. In Bell, M. & Limbrey, S. (eds), *Archaeological Aspects of Woodland Ecology*, 75–91. Oxford: British Archaeological Report S146

- Watson, P. V. 1986. Palynological evidence for early and permanent woodland on the chalk of Central Hampshire. In Sieveking, G. de G. & Hart, M. B. (eds), *The Scientific Study of Flint and Chert*, 169–174. Cambridge: University Press
- Whittle, A., Pollard, J. & Grigson, C. 1999. *The Harmony of Symbols; the Windmill Hill causewayed enclosure*. Oxford: Oxbow Books
- Whittle, A., Rouse, A. J. & Evans, J. G. 1993. A Neolithic downland monument in its environment: excavations at the Easton Down Long Barrow, Bishops Cannings, North Wiltshire, *Proceedings of the Prehistoric Society* 59, 197–239
- Woodward, B. B. 1936. The Mollusca. In Curwen, E. C., *Excavations in Whitehawk Camp, Brighton, third season, 1935*, *Sussex Archaeological Collections* 77, 90–92

10. (Some thoughts on) using molluscs for landscape reconstruction and ecology in Malta

Michael J. Allen and Bri Eastabrook

This chapter outlines the application of land mollusc analysis to the palaeo-environmental interpretation of Malta; an island archipelago with abundant archaeology, a strongly calcareous bedrock, but little evidence of the detailed natural history observation seen in Britain and northwest Europe. This is not the place to discuss the results of detailed analysis, but several topics are explored including the application and appropriate aims for palaeo-environmental analysis in this karst landscape, and the boundaries/limitation of palaeoecological studies. This review may be relevant to the application of land snail analysis to other landscapes where the molluscan ecology is poorly, or less well, understood, than in Britain for instance. We also explore the existence of a former more wooded landscape as defined by palaeo-molluscan studies and, as compared with comparative studies in Britain and northwest Europe.

Malta – geology and soils

The archipelago of Malta consists of the main island of Malta, with Gozo and the small island of Comino comprising about 316 km². The geology is predominantly Oligo-Miocene Limestone, mainly Lower Coralline (140 m thick) and Globigerina with a lesser Lower Coralline Limestone (Bowen Jones *et al.* 1961; Schembri 1993) with deep stratified 'valley loams' in the valleys behind Mellieħa, St Paul's and Salina bays (House *et al.* 1961). Much of the island is notably almost bare of soils, and where they do occur they are thin azonal rendzina-form or terra rossa soils such as calcareous rendzinas (carbonate raw soils), xerorendzinas and terra soils or near terra rossa soils (Lang 1960; 1961; Kubiena 1953). They are often thin (Vella 2001), variably stony, to stone-free, loamy soils. Although the parent material is mainly limestones, this weathers slowly resulting in only weakly calcareous soils, rather than the more strongly calcareous soils supported by the chalk of northwest Europe. The palaeo-environmental consequence of this is that shell preservation (or at least land snail shell preservation), may be poor and patchy (as in the limestones of the UK), but where Ca₂CO₃ levels are high enough,

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