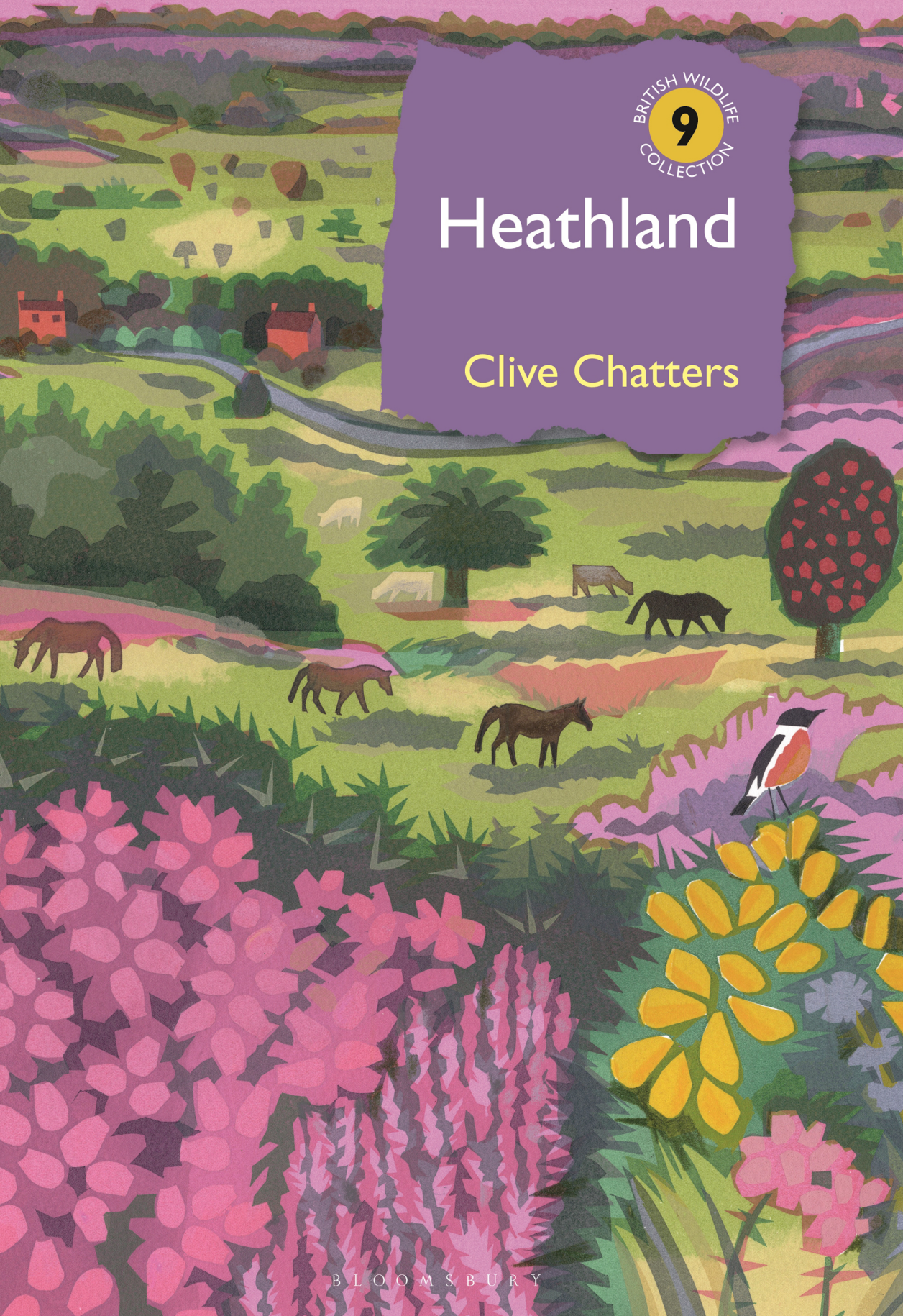
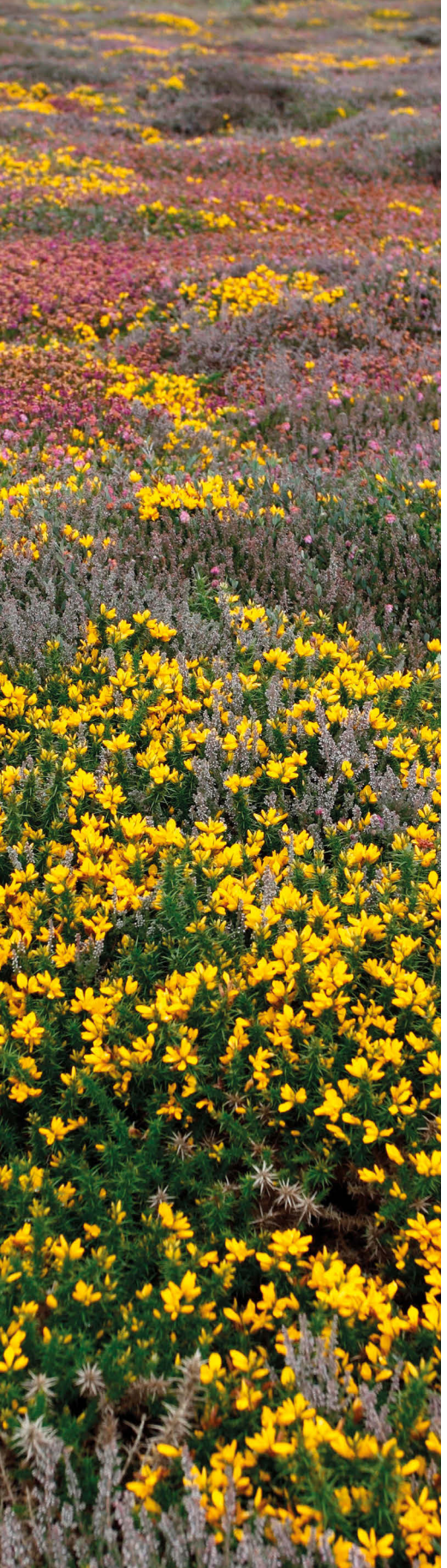

BRITISH WILDLIFE
9
COLLECTION
Heathland
Clive Chatters
BLOOMSBURY

Heathland



BRITISH WILDLIFE 9 COLLECTION

Heathland

Clive Chatters

BLOOMSBURY WILDLIFE
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Dedicated to Jenni and Colin Tubbs and their team at Lyndhurst.

BLOOMSBURY WILDLIFE
Bloomsbury Publishing Plc
50 Bedford Square, London, WC1B 3DP, UK

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Bloomsbury Publishing Plc

First published in the United Kingdom 2021

This electronic edition published in 2021 by Bloomsbury Publishing Plc

A catalogue record for this book is available from the British Library

ISBN: HB: 9781472964748; ePDF: 9781472964762; ePub: 9781472964779

Page layouts by Susan McIntyre

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HALF TITLE: A Heath Potter Wasp *Eumenes coarctatus* stocking its nest.
FRONTISPIECE: Dwarf shrubs of the open heath.

Contents

Foreword

Clive Chatters and I joined the Nature Conservancy Council at much the same time, in the mid 1980s, and found ourselves in its Hampshire office at the heart of the New Forest. Clive was taken on as a contract worker surveying the rivers of the Isle of Wight for NCC, while I had come fresh from a postgraduate spell on the Lizard heathlands in coastal Cornwall. But it was in the Lyndhurst office of NCC that we both truly learnt our trade as botanists, ecologists and nature conservationists. There were some great teachers in Hampshire at the time, and none more so than Colin and Jenni Tubbs in charge of the office, together with Francis Rose, at large in the county as a whole.

Like many conservationists today, these luminaries had soft spots for individual species: Colin was a leading authority on Buzzards and the Dartford Warbler, whilst Francis was never happier than when wading knee-high through mire and mud in search of Slender Cotton-grass or Small Fleabane. Yet both were ecologists first and foremost: theirs was a CineScope vision of heathlands in which the supporting cast of pools and puddles, holms and carrs, Bracken and grass was every bit as important as the lead role played by heathers. To them, such wildlife-rich landscapes were very much the incidental result of age-old pastoral land practices: differing human management regimes across different heathland districts had shaped their respective landscapes, vegetation and wildlife every bit as significantly as had the local geology and climate.

In this volume Clive takes over from where Colin and Francis left off, adding much to their musings and observations, and to our cumulative knowledge of heathlands. In Clive we have an ever-fascinating guide to Britain's heathery districts, not only marvelling at the wildlife of such wild places, but also celebrating their fascinating origins, uses and cultural resonances.

OPPOSITE PAGE:
Dry heath on the Westleton Walks, Suffolk.

The sheer diversity of our heathlands is immense. From a vegetation and landscape perspective, the continental heaths of Breckland are a world apart from the oceanic heathlands of the Lizard, whilst floristically, three of our six richest botanical regions are heathland districts. Equally fascinating are the intricate and intimate plant–animal relationships that must have evolved over many millennia. Fascinating indeed is the Heath Bee-fly *Bombylius minor*, which coats each egg in dust before 'flicking' the egg into the burrow of some luckless *Colletes* bee. Or consider the larva of the Sundew Plume Moth *Buckleria paludum*, which, in a seemingly foolhardy manner, feeds on the sticky, trapping leaves of Sundews.

Witnessing such complex and intimate relationships, Clive concludes that heathland habitats have been around for a very long time. He presents an abundance of additional evidence to support the theory that heathlands are indeed age-old natural habitats fashioned by large and now-extinct native herbivores, and not 'artefacts' that owe their existence solely to the labours of wildwood clearances by humans.

In the absence of such native herbivores today, traditional management assumes a critical role in shaping the structure and diversity of heathland vegetation – a fact brought home to me following a study of Dorset's heathland flora that I undertook with good friend and botanical authority, David Pearman. In the 1930s Ronald Good criss-crossed the county of Dorset, precisely recording the species present within, and the location of, 7,500 'stands' of 'natural' vegetation. This remarkable early 20th-century record of a county allowed David and me to accurately resurvey these stands in the early 1990s, and to document the fate of 41 rare plant species on the Poole Basin heaths over the intervening 60-year period. Our studies showed that the Dorset heaths had lost 74.7 per cent of rare plant populations (644 were present in Good's days), even though only 35 per cent of the habitats they previously occupied had been entirely destroyed. We concluded that it was the decline of traditional management – and particularly a long continuity of traditional grazing – that lay behind most of this botanical decline on surviving sites, even on the most celebrated of nature reserves. Wherever traditional pastoralism survives, we would do well to treasure it.

Over and above neglect, wholesale destruction of heathland landscapes has indeed had catastrophic impacts, air-brushing

Larvae of the plume moth *Buckleria paludum* develop within the leaves of insectivorous sundews.

complete heathland landscapes from our countryside and leaving nothing but names on maps. Fortunately, a rich cultural history has been committed to paper: stories abound of mired carts and carriages, of dust-storms and deserts, and even of vast mobile dunes that have engulfed whole villages. All too often, confronted by such horrors, outsiders have seen such areas as ones to be plundered and tamed – be it for mineral extraction, agriculture, forestry or urban development. Perhaps better than any author before, Clive describes whole landscapes that have vanished, some in living memory.

Largely gone are the Juniper-rich boreal heaths of Scotland's Black Isle, the expansive heathlands of Shropshire and the inland dunes of the Lincolnshire Coversand heaths. In their heyday, the Lincolnshire heaths were more expansive than those of Dorset in their prime. Even as late as the 1920s, some 5,000 hectares of Coversand heath survived: today just 600 hectares persists, a tragic loss of nearly 99 per cent of their original extent. Largely gone are the Purple Milk-vetch *Astragalus danicus*, Marsh Gentian *Gentiana pneumonanthe* and much more that characterised this elevated wilderness of grass and ling, which dipped gently down to merge with the saltmarshes of the tidal Trent.

Heath Spotted-orchids.

Yet Clive's writings provide hope for those of us nomads who love heathlands and the myriad specialised and beautiful wildlife therein. Local initiatives are restoring both species and spaces, demonstrating that the glories of heathland can return in good part, where politics and funding allow. At Dowrog (Pembrokeshire) restorative grazing has revitalised 'lost' populations of Yellow Centaury and Three-lobed Crowfoot from seed buried in the mud for decades, or perhaps even centuries. And on an altogether larger scale, in Purbeck (Dorset) the removal of whole plantations is revealing lost hills and hollows from under dense conifers, linking two fragmented nature reserves into one magnificent sweep.

Looking to the future, restoration of heathland through the removal of plantation forests offers unquestionably the most effective means of revivifying heathland riches, for fragments of vegetation survive in rides and the populations of rare reptiles and plants alike endure in pockets of failed forestry or in the seed bank respectively. The Public Forest Estate is managed by the Forestry Commission and its subsequent manifestations, for the nation, for us, the taxpayer. All that is required to restore this most wild and expansive of lowland habitats is public support and political will. With that, landscapes lost for centuries could yet emerge from the dark gloom of commercial forestry, and our hearts could sing. To paraphrase W. G. Clarke, author of *In Breckland Wilds*, and an early lover of heathland, whoever lives near the open heath, with its far-spread horizon and the 'rondure of illimitable blue', thinks in miles.

Andrew Byfield


A selection of British heaths
N
SHETLAND SERPENTINE
Shetland Islands
ORKNEY
Orkney Islands
Heathland regions
Individual heaths
0 200m 500m
relief
ASSYNT
DORNOCH FIRTH & LOCH FLEET
BLACK ISLE
Sands of Forvie
Muir of Dinnet
Cherryburn
Irish Sea
North Sea
Mynydd Parys
Great Orme
SHERWOOD & THE COVERSANDS
LINCOLN'S HEATH
YNYS GYBI & PEN LLŶN
Delamere
Prees
Charnwood
Helpston
Catherton
Arden
Kidderminster
BRECKLAND
Grogwynion
Stanner
SANDLINGS
ST DAVIDS
Constable Country
Malmesbury
Hampstead
Epping
Tidenham
Hounslow
THAMES BASIN
Blackheath
Hook
HIGH WEALD & ASHDOWN FOREST
HAMPSHIRE BASIN
LOW WEALD & WOOLMER FOREST
DARTMOOR DOWNS
NORTH CORNWALL
Dorset Heaths
New Forest
Isle of Wight
ISLES OF SCILLY
THE LIZARD
Atlantic Ocean
English Channel
0 100 200km
scale

Part One

An introduction to heathland

British heathlands

chapter one

Heathlands defy ready definition. The diverse places that we call heaths are cultural landscapes overlain with the language of ecology. It is unnecessary to reconcile these different perspectives, as both offer a path to understanding what makes our heathlands special.

Heathlands are one of a handful of British landscapes that have been recognised by English-speaking people for as long as we have had a written history. Legal documents and literary works have made frequent references to heaths for over a millennium, without needing to define what was an everyday feature of the countryside. Barely a century has passed since scientists first sought to classify what they meant by heathland; sadly, many of the places that these early ecologists were describing had already been depleted of much of their diversity and wonder. This accident of history means that any review of Britain's heaths needs to navigate through scientific descriptions that sometimes relegate heathland habitats to being little more than accumulations of heather. This book seeks to challenge those narrow definitions and to promote an understanding of heathland that would be familiar to our forebears, as well as respecting the experience of modern people whose livelihoods are bound up with the heath.

Throughout history, the land of Britain has been divided amongst a powerful elite. Heathlands represent a residue of what was left behind as more valuable tracts of countryside were exploited to the full. There have always been people who have depended on this landscape of leftovers; and many have suffered through being deprived of their heathland heritage whilst other communities have fought to retain their rights to its resources. The human history of heathland can be read as a struggle between communities reliant on

PREVIOUS PAGES:
Coastal heath at Bryher, Isles of Scilly.

OPPOSITE PAGE:
The Aglestone, Purbeck Heaths, Dorset.

pastoralism and the competing demands of those who seek exclusive use of the land. The natural history of heathland reaches back into evolutionary time, far before the emergence of modern humans. The habitats and species of heathland landscapes are natural, whilst their current character is a manifestation of how people have modified the landscape.

What are heathlands?

Heathlands are landscapes that are associated with pastoral economies – most of Britain's heaths are fragments of habitats derived from such places.

The habitats of heathland are associated with soils that are relatively base-poor and low in nutrients. Typical heathland vegetation has a prominent dwarf-shrub element, mostly comprising members of the heather family. These dwarf shrubs are found within matrices of bare ground and grassland, which in turn support herbaceous and annual flowering plants. Within these characteristic associations there is scope for other forms of vegetation to become dominant, including those composed of lichen, bryophytes and ferns. These shorter elements of a heath may be set within gladed thorn-scrub and forest trees, whilst elsewhere those same woody species grow as groves on an open plain. The location and relative proportion of each of these elements is not fixed in time; heathlands are naturally in a continuous state of change.

Where are heathlands found?

The nations of Scotland, Wales and England are part of an archipelago that lies off the western coast of Eurasia. The latitude of inhabited islands ranges from 60.7° in the north to 49.8° in the south. This breadth of latitude, combined with the presence of continental and oceanic influences, supports the development of habitats under highly diverse climatic conditions. Heathlands can be found throughout this range, including in the uplands – but uplands fall outside the remit of this book. The distinction of lowlands from uplands is far from clear-cut, as definitions that rely on altitude cannot be consistently applied across the whole country. In *A Nature Conservation Review*, Derek Ratcliffe devised an approach that drew on the practical realities of how people respond to their

environment. Under Ratcliffe's definition, a lowland landscape is a place where people live and farm throughout the year; I have followed this pragmatic approach.

Britain's heathlands can be viewed as part of a global continuum of habitats that fall within distinct climatic zones. In the Northern Isles and in the north-east of mainland Scotland there are heathland communities that exhibit affinities with maritime subarctic and boreal conditions; these communities can be found in both the uplands and the lowlands. The presence of the Atlantic Ocean is effective in moderating the extremes of climate at these high latitudes, so winters in the north of Scotland are much warmer and wetter than those experienced at the same latitudes in the continental landmasses of Siberia and central Canada. Maritime conditions, with their associated freedom from severe frosts, prevail throughout Britain's Atlantic seaboard and are reflected in the presence of oceanic heathlands from Shetland to the Isles of Scilly.

Oceanic influences moderate the climate of the extreme south-west of Britain to generate almost frost-free winters followed by warm but moist summers, which are conditions associated with heathland species characteristic of the Mediterranean and Lusitanian parts of southern Europe. As the influence of the ocean decreases in the south and east, so the summers become warmer and dryer. In these parts of the country the climate is still relatively humid and mostly free

Oceanic heaths in Assynt, Sutherland.

from harsh winters – circumstances that support the development of Atlantic and sub-Atlantic heaths. In a global context, Britain is particularly important for the scale and diversity of these oceanic and Atlantic heaths (Farrell 1989). The influence of the Atlantic is not universal, as Britain lies sufficiently close to the European mainland for elements of its continental climate to be detectable in eastern England and the English Midlands; the cold winters and parched summers of these regions share similarities with the heaths of Europe's central plain.

For most of Britain's history there were heathlands to be found throughout the lowlands, with their distribution and character being determined by environmental factors such as climate, geology and soil type. Heathlands lost their natural position in our landscape following the intensification of mechanised agriculture and the easy availability of inexpensive fertilisers. Today, where heathlands survive, their character is determined by a combination of environmental factors and the history of how people have used the land.

Where do heathlands come from?

Tens of millions of years ago

The genesis of Britain's heathlands is obscured by time and a paucity of hard evidence. There are a handful of sites were plant subfossils have survived recent glaciations, such as in the ball clays of Bovey Tracey on the southern flank of Dartmoor (Devon). Thirty million years ago, what is now Bovey Heathfield was an alluvial plain into which numerous small rivers flowed. Over aeons the neighbouring hills were weathered away, their detritus eventually washing out onto the plain by way of small deltas. The passage of time has compressed these deposits into bands of clay that are interspersed with layers of lignite – a low-grade coal composed of plant remains. In the early 1860s Oswald Heer, the Director of Zürich's Botanical Gardens, worked these deposits and described a surprisingly familiar flora. Heer recovered remains of Creeping Willow *Salix repens* and Scots Pine *Pinus sylvestris* alongside now extinct members of the heather family, including relatives of Bog Rosemary *Andromeda* sp. and Bilberry *Vaccinium* sp. Later investigations from the same site, reported by Chandler (1957), identified more heathland species, including relatives of Bog Myrtle *Myrica* sp. and Royal Fern *Osmunda* sp. From these, and other subfossils, we know that recognisable

Royal Fern *Osmunda regalis*, exhibiting its fire-tolerant qualities. Retire Common, Cornwall.

components of heathland habitats were evolving at the same time as large herbivorous mammals were becoming dominant over much of what is now north-west Europe.

Millions of years ago

Tens of millions of years later, more plant fragments were laid down in deposits of the Norwich Crag formation near Ludham in Norfolk. The Ludham flora grew in a cool but temperate climate, around two million years ago. Richard West's paper of 1961 draws on these fragments to describe a partially wooded landscape with glades of oceanic heath comprising Heather *Calluna vulgaris*, a Crowberry *Empetrum* sp. and clubmosses Lycopodiaceae. The flora and habitats would be recognisable today, albeit the tree cover was a mixture of Oaks *Quercus* spp. and a Hazel *Corylus* sp. growing amongst conifers including a Spruce *Picea* sp. and a Hemlock *Tsuga* sp. To the modern eye, the landscape would have looked like heathy pasture woodland that had been interplanted with ornamental conifers. Whilst the flora of this period is familiar to the modern naturalist, the mammal fauna was markedly strange.

Derek Yalden's *History of British Mammals* describes the animals preserved in deposits contemporary to the Ludham flora. The mammal fauna is so different from modern times that only one species, the Beaver *Castor fiber*, has not subsequently become extinct. There are subfossils that record a range of animals that collectively exploited all of the available vegetation. Some creatures fed by browsing on trees and shrubs, such as the elephantine Mastodons *Anancus arvernensis* and *Zygolophodon borsoni*, as well as graziers including a true Elephant *Archidiskodon meridionalis* and a Rhinoceros *Dicerorhinus megarhinus*. Living amongst these giants of grasslands and glades were a large deer *Eucladoceros* sp., Gazelles *Gazella anglica* and three-toed horses *Hipparion* spp. as well as *Equus stenonis*, an ancestor of the modern horse. Preying upon the herbivores were a carnivorous Panda *Parailurus anglicus*, Hyenas *Pachycrocuta perrieri* and that period's apex predator, the Sabre-toothed Cat *Homotherium latidens*.

The plants and animals of the Ludham deposits were eventually displaced by climate change. Over the next two million years great fields of ice repeatedly ebbed and flowed across the land; these multiple periods of freezing and thawing are popularly known as a single event, the Ice Age. The components of Britain's vegetation during the Ice Age are described in the work of Sir Harry Godwin (1975) and Richard West (2000). Warmth is a relative term that can be applied

The presence of Beaver in British landscapes pre-dates the Ice Age.

to any period during the Ice Age when there was sufficient soil and liquid water to support flowering plants. Some intermissions in the frozen climate never warmed beyond supporting boreal and tundra habitats, comparable to today's subarctic. Other, full, interglacials witnessed the establishment of temperate conditions capable of sustaining broadleaved forests and open habitats similar to those of Britain today. The earliest evidence of our ancestors in Britain comes from about 800,000 to 900,000 years ago, when a family group of *Homo antecessor* left their footprints on a muddy foreshore in what is now Happisburgh beach (Norfolk).

Partially preserved plant remains have survived from the beginning of the Ice Age. There are fewer remains from this distant past than those of the richer deposits of the near-present. However, ancient deposits from the early phases of the Ice Age are sufficient to illustrate that the Ludham landscape was not unusual and that oceanic heath was widely distributed in Britain and the near-continent. Fortunately, the characteristic dwarf shrubs of heathland are woody and waxy – which are useful features for withstanding the passage of time. Dwarf shrubs and other heathland elements appear in the subfossil record from each of the warmer phases of the Ice Age, with the regular appearance of Heather, Cross-leaved Heath *Erica tetralix* and Crowberry *Empetrum nigrum*. Fragments of

Swards of Crowberry and Creeping Willow have a pedigree of at least two million years.

Red Deer grazed across heathland landscapes long before the emergence of modern humans.

vegetation are scarce when compared to the survival of microscopic grains of pollen. The subfossil pollen record is invaluable in recording the presence of flowering plants, particularly those pollinated by the wind. The tough spores of ferns are also persistent, so that the remains of dwarf shrubs are often accompanied by evidence of the presence of heathland species including Bracken *Pteridium aquilinum*, Pillwort *Pilularia globulifera*, Moonworts *Botrychium* spp. and Adder's-tongue ferns *Ophioglossum* spp.

There were times during the Ice Age when the climate was so severe that there was nowhere in the precursor of Britain that was capable of sustaining flowering plants. Recent research by Stanislav Sannikov and colleagues at the Urals Botanic Garden has shown how Heather survived the coldest periods when ice covered the whole of northern Europe. Through an analysis of genetic material, Sannikov (2018) determined that Heather migrated with the shifting climate into refugia in the Cévenne, the Southern Alps and the western Mediterranean. Heathers, and the other species that collectively comprise heathlands, are eminently adapted to climate change just so long as they have somewhere to migrate to and enough time to move.

Whilst the floral components of prehistoric heathlands remained fairly constant throughout the Ice Age, the mammal fauna underwent significant changes. Derek Yalden's *History* describes the sequence of species that colonised Britain with each advance of vegetation. By about half a million years ago this fauna was becoming increasingly familiar. Giant herbivores related to the Ludham Elephants and Rhinoceros still grazed the temperate plains, and amongst them lived Red *Cervus elaphus* and Roe Deer *Capreolus capreolus*, as well as Horses *Equus ferus*, Wild Pig *Sus scrofa* and Aurochs *Bos primigenius*. A tibia of *Homo heidelbergensis* was found amongst such a bone assemblage at Boxgrove (Sussex) and is the oldest human body-part yet found in Britain. These early hominins were organised social animals and they made stone tools but they probably had no greater influence on the landscape than any other animal of their size and strength.

Tens of thousands of years ago

Half a million years have passed since Britain was colonised by *Homo heidelbergensis*, a species that latterly became extinct; ice has retreated and advanced many times since. Before the climate warmed, so enabling modern people *Homo sapiens* to populate the land, there were deep ice fields covering most of the north and west. Those parts of the country that were free from glaciers experienced various degrees of cold, depending on latitude and their proximity to the ice and the ocean. There were times when the climate was suitable for the growth of heathland species and the subsequent preservation of their remains. The most recent of these relatively temperate periods lasted for some 60,000 years and is known as the Devensian.

A list of plants that have been recovered from Devensian deposits reads very much like our contemporary flora. The table overleaf illustrates a selection of these species, which are grouped by modern habitat associations. Inevitably such a list is not comprehensive and the grouping of the plants belies their disparate origins. However, the collective subfossil flora is evidence that the constituent species of our modern heaths were growing in prehistory, long before people had a significant role in modifying their environment. It is a matter for speculation as to whether a modern naturalist would recognise Devensian landscapes as heathland.

Plant subfossils from the Devensian period and their modern heathland habitats

Vernacular name	Scientific name	Modern habitat association
Bearberry	*Arctostaphylos uva-ursi*	Dwarf shrubs of the open heath
Spiked Heath	*Bruckenthalia spiculifolia**	
Crowberry	*Empetrum nigrum*	
Heather	*Calluna vulgaris*	
Bilberry	*Vaccinium myrtillus*	
Sundew (unspecified species)	*Drosera* sp.	Wet heath
Cross-leaved Heath	*Erica tetralix*	
Marsh Gentian	*Gentiana pneumonanthe*	
Marsh Pennywort	*Hydrocotyle vulgaris*	
White Beak-sedge	*Rhynchospora alba*	
Marsh Violet	*Viola palustris*	Bog
Cranberry	*Vaccinium oxycoccos*	
Marsh Lousewort	*Pedicularis palustris*	
Bogbean	*Menyanthes trifoliata*	
Bog Pondweed	*Potamogeton polygonifolius*	
Common Cottongrass	*Eriophorum angustifolium*	
Bottle Sedge	*Carex rostrata*	
Bracken	*Pteridium aquilinum*	Bracken Beds
Stag's-horn Clubmoss	*Lycopodium clavatum*	Seasonally parched grasslands
Adder's-tongue (unspecified species)	*Ophioglossum* spp.	
Moonwort (unspecified species)	*Botrychium* spp.	
Hairy Buttercup	*Ranunculus sardous*	
Fairy Flax	*Linum catharticum*	
Sheep's Sorrel	*Rumex acetosella*	
Perennial Knawel	*Scleranthus perennis*	
Smooth Rupturewort	*Herniaria glabra*	
Maiden Pink	*Dianthus deltoides*	
Blinks	*Montia fontana*	
Buck's-horn Plantain	*Plantago coronopus*	
Harebell	*Campanula rotundifolia*	
Sheep's-bit	*Jasione montana*	
Greater Burnet	*Sanguisorba officinalis*	Herb-rich heathland
Devil's-bit Scabious	*Succisa pratensis*	
Pillwort	*Pilularia globulifera*	Poached seasonal pools
Water Crowfoots	*Ranunculus* subg. *Batrachium*	
Lesser Marshwort	*Helosciadium inundatum*	
Starfruit	*Damasonium alisma*	
Quillwort	*Isoetes lacustris*	Nutrient-poor pools
Shoreweed	*Littorella uniflora*	
Needle Spike-rush	*Eleocharis acicularis*	

Sources: Godwin 1975 and West 2000.
*Now confined to the Balkans.

Large mammal subfossils from the Devensian period

Herbivores	
Woolly Mammoth*	*Mammuthus primigenius*
Woolly Rhinoceros*	*Coelodonta antiquitatis*
Bison*	*Bison priscus*
Musk Ox	*Ovibus moschatus*
Reindeer	*Rangifer tarandus*
Red Deer	*Cervus elaphus*
Horse	*Equus ferus*
Wild Pig	*Sus scrofa*
Saiga	*Saiga tatarica*
Carnivores	
Spotted Hyena	*Crocuta crocuta*
Wolf	*Canus lupus*
Arctic Fox	*Alopex lagopus*
Omnivores	
Brown Bear	*Ursus arctos*
Humans	*Homo sapiens*

Source: Yalden 1999.
*Now extinct.

Geologists tell us that we are living in an interglacial, as ice still dominates the polar regions whilst long-term climatic trends mean that we are in the process of emerging from the Devensian glacial period. Even at the height of this latest glaciation, much of southern Britain was free from permanent ice. The table above summarises the Devensian subfossils of Britain's large mammal fauna, including the now extinct Woolly Mammoth *Mammuthus primigenius* and Woolly Rhinoceros *Coelodonta antiquitatis* together with extant Reindeer *Rangifer tarandus* and Musk Ox *Ovibos moschatus*, all of which grazed a steppe-like landscape. Steppe winters are bitterly cold and dry but the summers are sufficiently warm and moist to produce luxuriant grasslands that are capable of sustaining the largest of mammals.

It is interesting to consider the flora of the Devensian in the context of its mammal fauna. As with previous interglacials, there were animals that both browsed and grazed. The vegetation was made up of grassy, herbaceous and woody elements, suitably aligned with the diets of the herbivores. The subfossil flora suggests that there were times and places that were suitable for the growth of species of milder climates, such as Starfruit *Damasonium alisma* and Marsh Gentian *Gentiana pneumonanthe*, which today are plants with distinctly southern distributions.

At Chauvet, in southern France, there are paintings of the native fauna dating from between 28,000 and 37,000 years ago.

The diversity of plants associated with short swards and sunny habitats offers an insight into the impact of the herbivores on the vegetation. Pillwort, Lesser Marshwort *Helosciadium inundatum* and Starfruit are all associates of the trampled margins of heathland ponds, which is a natural habitat maintained by large herbivores gathering around a water hole. A modern naturalist searching for Sundews *Drosera* spp., Marsh Gentian and White Beak-sedge *Rhynchospora alba* would look for scuffed peaty ground on wet heaths or skirting the borders of a bog. Today Perennial Knawel *Scleranthus perennis*, Smooth Rupturewort *Herniaria glabra* and Maiden Pink *Dianthus deltoides* are all found in the harshest of seasonally parched grasslands; they are classic species of the occasionally broken turf of Breckland heaths. Such associations offer us tantalising suggestions as to the character of the heathland ecosystems of the Devensian.

Modern humans were a part of the great migrations of the Ice Age. Scientific opinion varies as to what degree the earliest of these people were like us. Evidence from artwork, tools and musical instruments illustrates modern sensibilities in the people who occupied our landscape from at least 40,000 years ago (Cook 2013). We are as much a part of the natural history of our heaths as the other mammals that migrated into Britain as the ice retreated. However, unlike the role of hominins in the deep history of the Ice Age, modern people have become an increasingly significant force in modifying the environment.

Thousands of years ago

There is an abundance of evidence to help us understand how Britain's landscape and habitats have developed over the last few thousand years; however, there is no consensus as to how best to interpret that evidence. As with previous interglacials, there are organic remains preserved in our landscape that illustrate the colonisation of Britain by a heathland flora and its attendant large mammals.

The relative extent of prehistoric dark forests to open landscapes is the subject of much academic debate. There are those who suggest that most of the country was once covered with trees. This period is generally taken to have extended through the Middle Stone Age, the Mesolithic, when for over 5,000 years there were people who lived by hunting and gathering wild food. There are conjectural maps illustrating Mesolithic Britain that show only the highest mountain tops, blanket bogs and the outer Islands as being free from a continuous cover of trees (Bennett 1988). This model of history attributes the creation of extensive open landscapes, such as heathlands, to the introduction of settled farming some 6,000 years ago.

Maroo and Yalden's (2000) review of Mesolithic mammals refined the notion of a Mesolithic forest by reconsidering the subfossil pollen record. Having adjusted the records to reflect the differential production of pollen by different species, they speculated on how the subfossil record may indicate the relative proportion of land occupied by major habitat types. Through using this approach, Maroo and Yalden suggested that around 7,000 years ago the vegetation of Britain was mostly dominated by trees (approx. 58 per cent) but otherwise included a range of open habitats. Heather accounted for 8.4 per cent of the subfossil pollen; when expressed as a proportion of lowland landscapes, this suggests that dwarf-shrub communities were present over about 1.5 million hectares.

Maroo and Yalden used their landscape model to estimate the likely abundance of Britain's Mesolithic mammal fauna, a calculation based on known populations in near-natural habitats elsewhere in Europe. The exception to these known populations was the Aurochs, which became extinct in the seventeenth century. By order of body mass, the estimated populations of larger herbivores were Aurochs 84,000, Elk *Alces alces* 65,000, Red Deer 1.2 million and Wild Pig 950,000. The larger predators were represented by around 6,600 Wolves *Canis lupus* along with roughly the same number of Lynx *Lynx lynx*. Whilst Wolves are generalists in their predation, Lynx specialise in

Wolves were the apex predators of interglacial Britain and are slowly returning to the heaths of mainland Europe.

hunting Roe Deer, which at that time had an estimated population of 830,000. The largest omnivore was the Brown Bear *Ursus arctos*, with a population of a little over 13,000.

People lived amongst these creatures, but their abundance is difficult to estimate. McEvedy and Jones (1978) proposed a human population of around 2,500, which represents, on average, one person for each 100km^2. This estimate needs to be revisited now that we have a better understanding of the competency of Mesolithic cultures in using their environment. Mesolithic people were highly organised and sufficiently capable of securing food to enable them to settle and live in substantial buildings such as at Star Carr (Yorkshire).

There are heathland sites in southern England showing occupancy by Mesolithic people where the habitat had been disturbed by fire (Keef *et al.* 1965). What the archaeological remains cannot tell us is whether these people deliberately manipulated the landscape through starting fires, or if they were just opportunistic. Fire rejuvenates heathland vegetation by promoting sweet grasses and the soft regrowth of dwarf shrubs. The flush of green that follows a fire will attract grazing animals from a wide area, inevitably followed by predators and scavengers, including humans.

In recent years, the debate over the prehistoric abundance of trees and open spaces has been led by ecologists from the European mainland. Michiel Wallis De Vries and colleagues (1998) have

promoted a hypothesis that the natural habitats in north-west Europe would not have been dominated by trees – a theory that is supported by the simple reality that a significant proportion of our wildlife is adapted to open landscapes, including open woodlands. Much of the biological diversity that we associate with woodlands is actually composed of species dependent upon sunlit edges, of glades or living on well-lit trees. There are those that dwell in the darkness of a closed-canopy forest, but they are few when compared to the species of the light.

The degree to which wild animals determine the relative proportions of trees and open spaces is also a matter of debate. Early ecologists, such as Sir Arthur Tansley (1871–1955), regarded forest habitats as the natural climatic-climax vegetation of lowland Britain, with heathlands mostly being a subclimax created by people and their livestock (Tansley 1939). In the late twentieth century this model was challenged by Frans Vera (2000) and others, the new theory being that natural assemblages of grazing animals have a strong influence on the development of vegetation. Under the Vera model there are areas of open habitat, such as heaths, which are entirely natural elements of temperate ecosystems with an origin in prehistory.

What is not disputed is that heathland ecosystems are native to Britain and represent an immensely complex series of interactions between interdependent species. The diversity of life found within each heathland, and between heathlands, is testimony to the coevolution of species in a habitat of great antiquity. Heathland ecosystems are not artefacts that were created by a few thousand years of tree clearance and farming.

The domestication of heathland herbivores

In an era defined by people, it is inevitable that heathland ecosystems are inextricably bound up with how humans exploit their environment. Archaeological excavations help to explain when the wild mammal fauna of Britain was displaced by farmed animals. Domesticated mammals arrived in Britain as part of the adoption of settled agriculture in the New Stone Age, or Neolithic, some 6,000 years ago. Prior to the Neolithic it is difficult to assess the extent of change in the landscape that can be directly attributed to people. Once Neolithic people were established, there is no doubt that they progressively reduced the dominance of trees for the purposes of

Undomesticated Przewalski's Horses *Equus ferus przewalskii* graze alongside Highland cattle on a North Hampshire heath.

expanding arable and pastoral agriculture. The technology available to these people would have made it cumbersome to clear old-growth forests through clear-felling veteran trees. However, it only takes a few centuries of consistently suppressing the recruitment of saplings to convert the glades of a grazed forest into an open plain. By introducing domesticated livestock and clearing the land of trees, these prehistoric farmers established management processes that would influence the character of heathlands for millennia.

Today there are three species of native large mammal whose domesticated descendants graze heathlands; these are horses/equines, pigs and cattle/bovines.

Horses were native to Britain during the end of the Devensian period and into the early millennia of this interglacial. Before they were domesticated, horses were an important source of meat for people and it is likely that the native herds were suppressed, even exterminated, through hunting. It is tempting to believe that modern horses, particularly our native breeds, are the direct descendants of prehistoric herds. But Molly Kaagan's doctoral thesis of 2000 has dispelled the ambiguities in the archaeological record, which Derek Yalden observed had left 'scope for the romantics'. Wild Horses died out in Britain some 9,100 years ago and did not reappear until 5,000 years later, when they were imported by Neolithic farmers.

The evidence of continuity of pigs in our landscape is much stronger. Wild Pig naturally recolonised Britain once the climate became favourable, about 13,000–11,000 years ago. Derek Yalden concluded that domesticated pigs were imported by Neolithic farmers, as their remains appear in archaeological sites that date from that period, the inference being that the native pigs of Britain are not the ancestors of the farmed animal. However, the opportunities for wild and domesticated pigs to interbreed and share pathogens were considerable, given that they occupied the same landscape for over 12,000 years. The extinction of Wild Pig, as the native form of the species, occurred some time in the medieval period but the precise circumstances are obscured by myth.

Within living memory there were many cottagers who let their pigs run on heathland commons, but it is only in the New Forest that this practice persists at any scale. Forest law means that most pigs are turned out during the pannage season, when there is an abundance of crab apples, acorns and mast. Pigs are equally attracted to Bracken where they forage for rhizomes and bulbs as well as exploring the open heath for anything that appeals to their curiosity. There are some commons in the New Forest where pigs may be turned out all year. During the warmer months, the rootling and loafing of these creatures provide wallows and scuffed ground for plants and invertebrates that need muddy places but are incapable of generating this habitat themselves. Away from the New Forest, there are several populations of feral pigs that have become established in southern England and on the Welsh borders. Rather appropriately, they can

Domesticated pigs still work the heaths of the New Forest, Hampshire.

Heck cattle are the result of breeding programmes that seek to recreate the now-extinct Aurochs.

be seen rooting through the heaths of Powerstock Common (Dorset), near to the village of Toller Pocorum, whose ancient name translates as 'the valley of the swine'.

The largest wild herbivore of the current climatic period was the Aurochs, the progenitor of domesticated cattle. There is much speculation as to the size of Aurochs. Evidence from their bones suggests that a bull could grow up to 1.8m at the shoulder, but this varied considerably over geography and time. Cis van Vuure's review of Aurochs morphology (2005) concluded that there were significant differences between the sexes and that body weight was highly variable within genders. Bulls are conjectured to have weighed between 436kg and 840kg, with cows ranging from 340kg to 540kg. The body mass of Aurochs was therefore broadly similar to Wisent, Europe's native Bison *Bison bonasus*. Unlike with Aurochs, there is not enough evidence to be sure whether Wisent colonised Britain during the current interglacial.

The dentition of Aurochs, and an analysis of isotopes in their preserved remains, indicates that their diet was very similar to domesticated cattle (Noe-Nygaard *et al.* 2005). Both cattle and Aurochs are grazing animals by preference but are equipped to browse on coarser forage. An eyewitness account of herds of Aurochs was published in 1602 by Conrad Gesner of Zürich. These animals were not fully wild, as they were preserved as game in a forest in what is now Poland. Gesner describes Aurochs as being at their fattest after gorging on acorns in autumn. When this glut had been exhausted,

the animals would gather into herds and feed on trees and branches. At the time that Gesner was writing, the pasture woodland habitats of Aurochs were under pressure from woodcutters and domesticated livestock. The dwindling population was further suppressed by hunting and the last of their kind died in 1620. Aurochs have the dubious distinction of providing the first well-documented case of extinction at the hands of humans (the next species to be the subject of such attention was the Dodo *Raphus cucullatus* in 1665).

An analysis of mitochondrial DNA indicates that domesticated cattle were bred from Aurochs in the Near East, about 10,500 years ago (Bollongino 2012). It took another 5,000 years before the progeny of the original herds were imported into Britain. Neolithic farmers were sufficiently confident in their seamanship to carry livestock from continental Europe onto all of the larger islands of Britain. Remains of Aurochs and domesticated cattle have been found together in archaeological sites, which indicates that they shared the same landscape and forage with inevitable opportunities for interbreeding. As the last bones of a British Aurochs date from the Bronze Age, just 3,200 years ago, this coexistence lasted for some 2,000 years. Furthermore, Ludovic Orlando's (2015) analysis of genetic material collected from British 'native' breeds of cattle suggests that a significant proportion of their DNA derives from Aurochs, which reinforces the position of these breeds as ecological successors to the prehistoric herds.

The Bronze Age was a tipping point in the history of the British landscape. This was the period when domesticated animals supplanted wild mammals as the principal graziers of open habitats. For the first time in their evolutionary history, the ecosystems of heathland became dependent on domesticated livestock and the necessities of the people who owned them. In the Bronze Age, organised agriculture expanded to occupy most of the biddable soils of the lowlands. Human societies continued to develop in technology and sophistication, the benefits of which supported an expanding population. There is an abundance of Bronze Age field monuments that define occupancy and subdivisions of the landscape, with a clear inference of communities establishing property rights over natural resources. All of the principal features that make up our modern landscape were now in place. Compared to the evolutionary processes that generated Britain's heathlands, it is just a short step from prehistory into the age of the written word.

Some commonplace heaths

chapter two

Today we consider heaths as places that are rather rare and special, but that has not always been the case. Many of our ancestors would have regarded a heathland landscape as an everyday element of their working life.

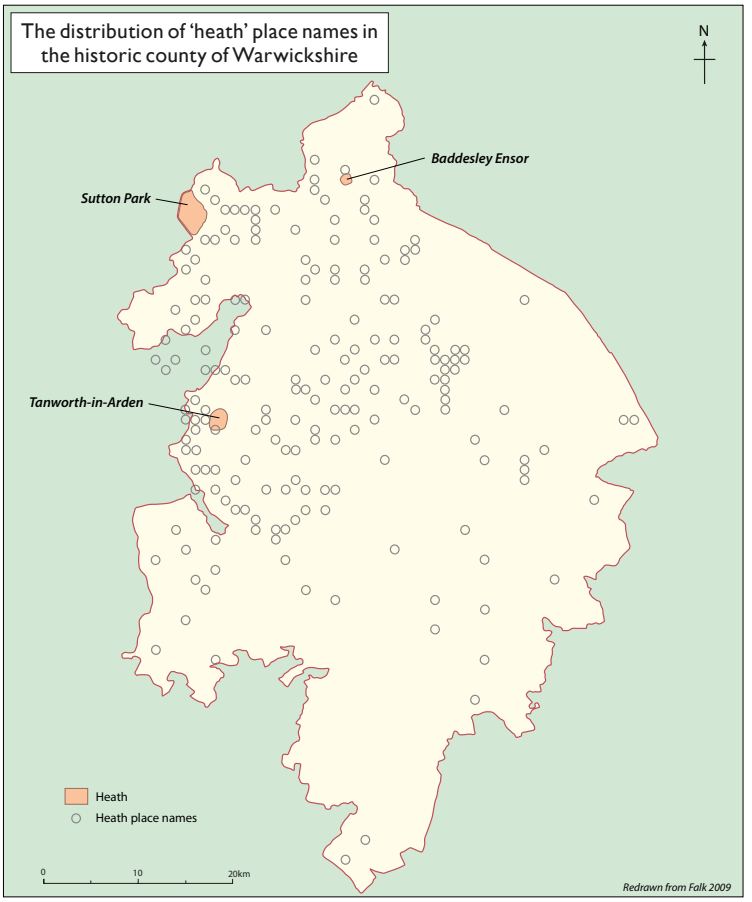
Birmingham and the Forest of Arden

The train through Birmingham Moor Street will carry you past the suburban stations of Cadley Heath and Small Heath. Within living memory, there were similarly named stations at Wednesfield Heath, Heath Town, Kings Heath and Short Heath, all of which were lost to the Beeching cuts. A walk across the city will take you along Balsall Heath Road, Bell Heath Way, Druids (or Drews) Heath, Highters Heath, Heathmore Avenue, Leach Heath Lane and Washwood Heath Road; there are many more such street names. Birmingham grew up in, and eventually grew over, a landscape of heath, woodland and farms.

In *Warwickshire's Wildflowers* (2009), Steven Falk reviewed the distribution of heathland place-names in the historical county of Warwickshire. He treated the names as if they were biological records, with each location mapped onto a 2 × 2km grid. Falk's map demonstrates that heathland place-names are ubiquitous across Birmingham and beyond, into the adjoining countryside of Arden. Most of these named heathlands are distributed amongst fields and farms, where they reflect a pattern of settlement that pre-dates the Norman Conquest.

The place-name 'Heath' is deeply rooted in the English language and has its foundations in the vocabulary of the Anglo-Saxons. A location called 'heath', *hæþ or hæð*, is often associated with a person's

OPPOSITE PAGE:
Marsh Fritillaries were a commonplace heathland butterfly until the early twentieth century.

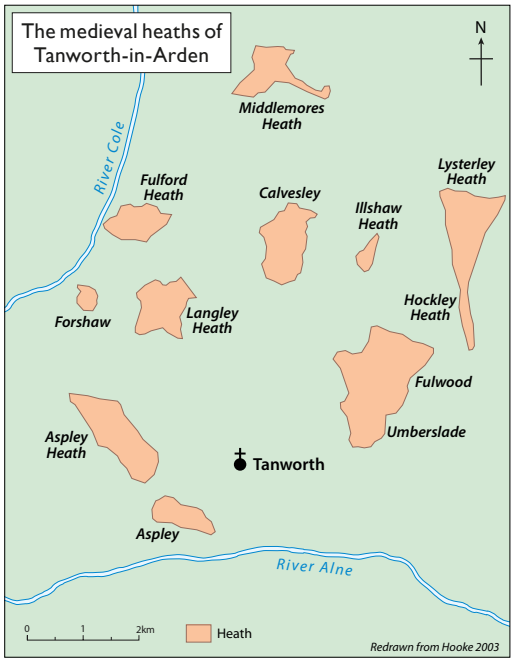


surname or is combined with another description of land-use, such as open spaces and pastures, *feld* and *lēah*. Places are also named after useful heathland products, particularly heathers *ling* or *lyng*, Gorse *fyrs*, *firse*, *gorst* or *whin* and Bracken *fearn*. Then, as now, heathlands are well suited to the creation of compound nouns.

There are references to heathlands in Arden dating from the ninth century. In her analysis of *Worcestershire Anglo-Saxon Charter Bounds*, Della Hooke translates a detailed description of a walk around Alvechurch, which was written down because Anglo-Saxon administrators followed procedures established in Roman law. Before maps were commonly available, the best way to define a parcel of land was to walk the boundary and record important landmarks along the way. The description in Alvechurch's charter of 849 AD relates to an estate that had been transferred to the church by King Offa but was now to be leased to King Berhtwulf by the Bishop of Worcester.

Fortunately for landscape historians, whilst a charter may be in Latin, the descriptions are usually in the vernacular. The journey around the estate at Alvechurch passed the boundary markers of *hæðleage sceagan* and *hæðleage wællan*, respectively translated as 'the heathy copse' and 'the spring in the heathy clearing'.

Anglo-Saxon charters describe points in a landscape that, over time, can be augmented by other evidence. To the east of Alvechurch, there is a wealth of medieval documents relating to Tanworth-in-Arden that illustrate landscape change between the twelfth and fourteenth centuries. These detailed accounts have supported the creation of conjectural maps of the area (Roberts 1968, Hooke 2003). Tanworth is a relatively large parish, at a little over 3,800ha, which in the late medieval period supported a network of heaths, the largest of which was about 200ha. These heaths were apparently created through expanding open spaces within pasture woodlands, usually as authorised by the manorial lord. This intricate mosaic of heath and wood was characteristic of Arden for centuries, before its unfortunate loss to conventional farming, plantations and urbanisation.



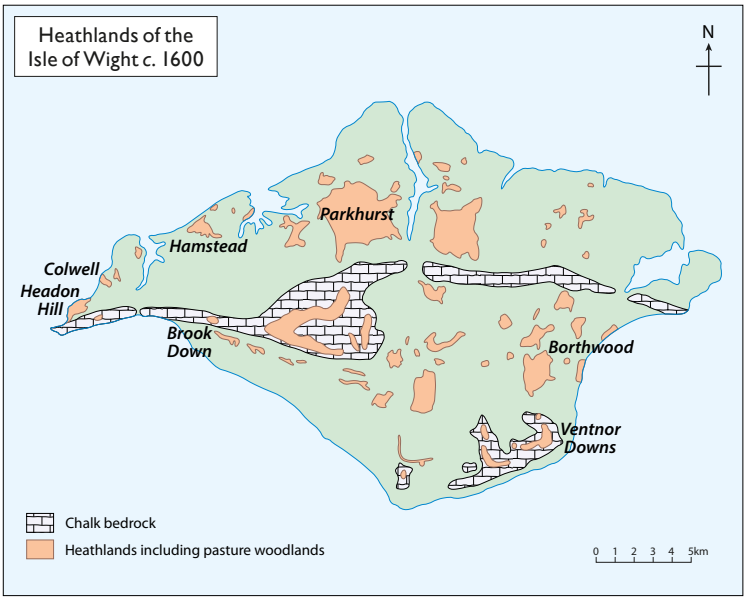
One of the last surviving heathlands of the Forest of Arden, Baddesley Ensor, Warwickshire.

The heaths within Birmingham and southwards into Arden shared a similar character, having formed on soils developed from superficial deposits overlying Triassic sandstones and mudstones. The historical landscape of Arden disappeared before its open habitats were described by naturalists, and so all we are left with are documents, contemporary place-names and a few fragments of habitat supporting a vestige of attendant species. To further appreciate the relationship of commonplace heaths with their underlying bedrock, it is useful to consider a similarly discrete area, but one with a more diverse geology.

The Isle of Wight

The Isle of Wight is the largest of England's offshore islands, with a complex geology that is compressed into around 38,000ha. The landscape of the Island's northern coastline is gently undulating clay country underlain by the Hamstead Beds and overlain with gravel terraces – this is part of the Hampshire Basin, the same geological formation that lies beneath the heaths of the New Forest and Dorset. To the south of this basin there is a high ridge of chalk that cuts through the centre of the Island, east to west, then descends into a broad valley formed from the ferruginous sandstones of the Lower Greensand. There are outcrops of Lower Greensand in neighbouring mainland Hampshire, where extensive heaths are found in Woolmer Forest. Other exposures of Lower Greensand are widely distributed

The Ventnor Downs are capped with dwarf shrubs and Bracken heath.



throughout the south and east of England; they are historically associated with heathland landscapes from the Humber through to Wiltshire. The Isle of Wight's Greensand vale rises to the south into another group of chalk hills, the Ventnor Downs, which are the highest point on the Island (altitude 240m) and are overlain with deep beds of angular flint.

Today the Island has very little heathland, as agriculture and forestry have overwritten what was once a substantial element of the landscape. Fortunately, there is sufficient evidence to draw up a conjectural map of the extent of heathland in the opening years of the seventeenth century. In about 1600, heathland landscapes accounted for some 4,120ha – a little over 10 per cent of the Island.

Clay heaths

Where the Hampshire Basin is exposed on the Island, it is made up of beds of heavy clay, some of which contain seams of subfossil shells. Very locally, there are bands of hard limestones that are occasionally exposed as reefs in the subtidal zone and as crags on the cliffs. Winter waterlogging results in the soils of the clay country developing into stagnant gleys, which are rock-hard in summer and claggy in winter. This is good country for beef and trees but it is a challenge to cultivate.

Historically, the clay country supported the most extensive heathlands on the Island. Parkhurst Forest was the largest of these landscapes and supported a complex of open heath and pasture woodland until it was broken up in 1812; fortunately, there are enough relics to explain its character. Clay heaths enjoy a degree of fertility unknown from sandier terrain and so have the capacity to provide habitats for a diverse herbaceous flora, which in turn sustains a rich invertebrate fauna. As well as supporting heathers and Bilberry *Vaccinium myrtillus*, there are remnants of these heaths with Narrow-leaved Lungwort *Pulmonaria longifolia*, Devil's-bit Scabious *Succisa pratensis* and Saw-wort *Serratula tinctoria*.

Until the introduction of modern plantation forestry, the Island's clay heaths supported an exceptional invertebrate fauna, including the Narrow-headed Ant *Formica exsecta*, a scarce species now confined to glades in Caledonian pine forests and a single heath on the edge of Dartmoor. The butterfly fauna of the Island's heaths was notably rich; both species of Pearl-bordered Fritillaries *Boloria euphrosyne* and *B. selene* were regarded as common, alongside more local populations of Dark Green and High Brown Fritillaries *Argynnis aglaja* and *A. adippe* (Morey 1909). On the Island, the Marsh Fritillary *Euphydryas aurinia* was called the Greasy Fritillary, probably on account of the fatty sheen that appears to coat newly emerged adults. Marsh Fritillaries were known from heaths at Parkhurst and Hamstead, a distribution they shared with Silver-studded Blues *Plebejus argus*. All but the Dark Green Fritillary have been lost from the Island as the northern heaths were fragmented, afforested, built upon and overgrown.

Outcrops of shelly beds and limestones in the clay create opportunities for species averse to poorly drained acidic soils. There are no marl heaths on the Island that are comparable to those of the neighbouring New Forest; however, the Island has rocky outcrops, which the New Forest does not. Bands of Bembridge Limestones were exposed in the cliffs of a coastal heath at Colwell Common in the West Wight. In 1904 Frederick Townsend described Yellow-wort *Blackstonia perfoliata* and Bastard Toadflax *Thesium humifusum* as characteristic of the Island's chalk hills, with outlying populations at Colwell where they were found in association with heathland species including Bristle Bent *Agrostis curtisii*, Field Gentian *Gentianella campestris* and Flea Sedge *Carex pulicaris*. A fragment of the Common survives as amenity grassland where Bog Pimpernel *Lysimachia tenella* was recently rediscovered in the closely mown turf.

Headon Hill, looking towards Colwell Common and beyond to the New Forest.

Chalk heaths

Chalk grassland plants can be found in heaths in the same way that heathland plants are encountered in chalk grasslands. The chalk heaths of the Isle of Wight fall into two distinct categories depending on their soils. There are heaths growing on gravels that sit over the chalk bedrock, where the depth of gravel isolates the heath from any calcareous influences. These are best described as heathlands over chalk. The other form of heath is rooted into soils that contain chalk fragments – this is 'true' chalk heath. In the best-developed chalk heaths, there will be heathers growing amongst the most faithful of chalk grassland species including Horseshoe Vetch *Hippocrepis comosa*, Common Rock-rose *Helianthemum nummularium* and Hoary Plantain *Plantago media*.

All good gardeners and ecologists understand that there are calcifuges (lime-hating plants) and calcicoles (lime-loving plants) – this is one of the first ecological distinctions that we learn. Lime, in the form of calcium carbonate ($CaCO_3$), is the dominant component of chalk and limestone rocks. Even on the hardest of limestones there will be traces of calcium that are weathered from the rock and released into the soil. The presence of lime enables plants to take up key nutrients; the absence of lime renders that fertility inaccessible.

Chalk heath can be found amongst the Gorse stands of Brook Down.

In 1989, Ron Allen and I visited a selection of chalk heaths on the West Wight; Ron sampled the soil, whilst I took quadrats of the vegetation (Chatters 1991). Our combined results were not what we expected. We had started by asking ourselves why Heather *Calluna vulgaris* and Bell Heather *Erica cinerea* were growing in chalk grassland. What we found was that the soils beneath the chalk heaths were shallow, free-draining and humic, with a chemical composition ranging from neutral, pH 6.8, to moderately acidic, pH 5.5. The majority of samples were slightly acidic, within the range pH 6.5–5.6. Chalk fragments were present in most of our soil samples but their effect on the soil chemistry was limited. Our question needed to be recast; why were shallow-rooted plants that we regarded as strict calcicoles growing in mildly acidic grasslands?

Further analysis of these soils showed that organic matter was abundant, as were the key nutrients of potassium and magnesium. Phosphorus was at extremely low levels, which limited the ability of plants to metabolise the other nutrients. In addition to low phosphorus levels, there was the stress of parching. All of the chalk heaths were in highly exposed places, closely grazed and open to the full force of the sun and drying winds. The combined stresses of nutrient deficiencies, close grazing and parching appeared to over-ride calcicole/calcifuge tendencies in the vegetation. In such a stressed environment there are no competitive disadvantages in being sensitive to the availability of lime.

Ecological descriptions of heaths tend to place great emphasis on the acidity of the underlying bedrock. Calcium is a base – in other

words, an element that accepts hydrogen ions or protons. Calcium is chemically opposed to elements such as iron, which donate protons and thereby generate acidity. The most common compound elevating the base status of heathland soils is calcium carbonate, but there are others, such as an abundance of magnesium in serpentine heaths and a range of rare metals around volcanic intrusions. The chalk heaths of the Isle of Wight are an object lesson in the multiple factors that control the distribution of calcicoles and calcifuges. The availability of bases in the bedrock is clearly important in describing heathland communities; however, it is over-simplistic to use this base status to define whether a community is a heath.

Lower Greensand heaths

The Lower Greensand is a sedimentary rock that is characterised by loosely consolidated iron-rich sandstones. The freely draining nature of these sandstones favours the development of podzols, soils where minerals are leached from upper layers to be deposited lower down the profile as an impermeable iron-pan. Historically, there were extensive heaths on the Lower Greensand, particularly in the East Wight, where open heaths could be found within a matrix of estuarine peatlands and pasture woods. One of the earliest descriptions of the Island's wildlife comes from this area; the record was made by Sir John Oglander (1585–1655) as an entry in his notebook:

> *There were many heath-cocks and hen heretofore in our Island, especially in Borthwood Forest. In Anno Domini 1585 there were some and, as I take it, were destroyed about them. Old Forder of Newchurch was punished by Sr. Edward Horsey for killing them with his gun.*

Heath-cock are also known as Black Grouse *Tetrao tetrix*.

Nearly three hundred years later, the first British record of Wild Gladiolus *Gladiolus gallaecicus* was made from a nearby heath. In July 1855, a Mrs Phillipps found Gladioli growing in 'the midst of a wild tract of copse and heath called Apse or America Woods'. The diligent Mrs Phillipps collected and preserved a specimen, which survives in

Black Grouse were known from heaths throughout southern Britain until the 1920s.