



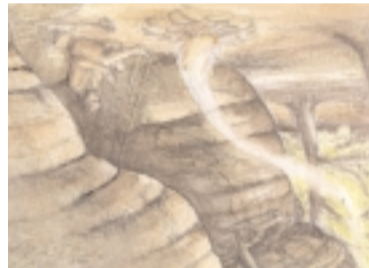
Grand houses and more modest homes were built from sandstone

E.W. Lucas 1904

The famous Toad Rock is to Tunbridge Wells what the Leaning Tower is to Pisa



Mesolithic hunters sheltering under a sandstone cliff



Today sandrock continues to be valued by local residents and visitors. This leaflet explains how sandrock was created, why the plants it supports are so special and how they, and the cliffs and isolated boulders which support them, can be cared for.

It was in the 1920s that the value of the rocks for climbing was discovered. As the only climbable rock in the South East, some of the cliffs have now become the most heavily used in the country. It was so called because it yielded a metallic ring when struck. Wellington Rocks was named after the nearby hotel, Bell Rock. Others on the basis of their proximity to nearby landmarks – Toad Rock, Loat Rock, Pulpit Rock and Lion Rock – given names; some on the basis of their resemblance to other objects – Tread Rock, Pulpit Rock and Lion Rock. Many of the rocks were attractions in and around Royal Tunbridge Wells and tea rooms in Victorian times the rocks were often popular visitor destinations in the Wealden sandstone.

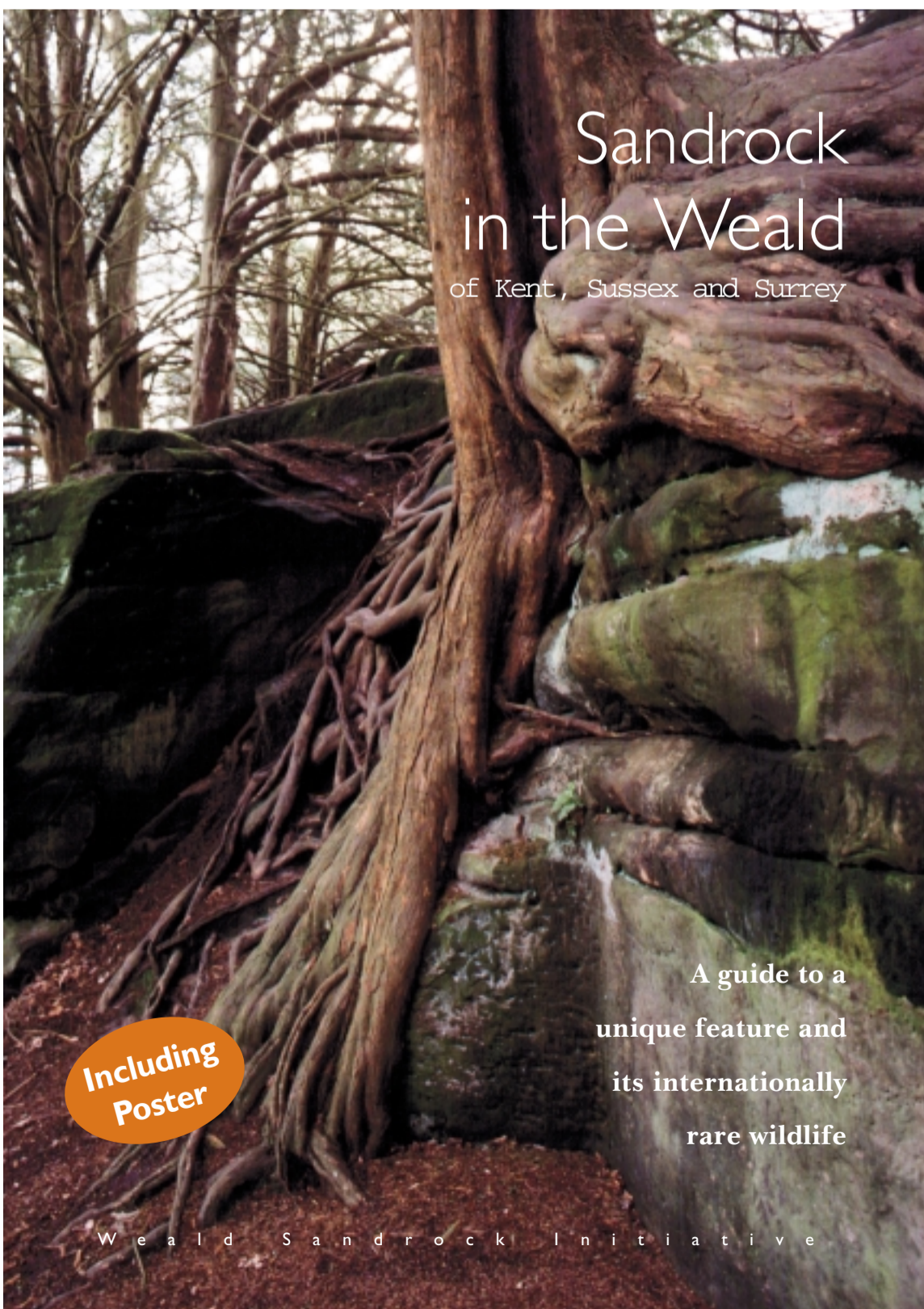
Sandrock was later valued as building stone. Many of our most well known grand houses – Battle Abbey, Bodiam Castle, Wakehurst Place and Bateman's, Kipling's house at Burwash – are built of Wealden sandstone.

Forests were the first to appreciate the rocks, often choosing to clear the Mesolithic hunters and gatherers who once roamed the Wealden 'wildwood' to make way for the advent of agriculture.

The rocks are important geological features and home for some nationally rare ferns, mosses, liverworts and lichens. Many are a living legacy from the climate that most of Britain experienced around 4,000 BC, before the first farmers started to clear the

Sandrock outcrops are a distinctive local feature found scattered across the hilly core of the Weald – the High Weald. Occasionally visible at the edge of roads and lanes, they are more often found hidden away in remote valleys.

### Sandrock in the Weald



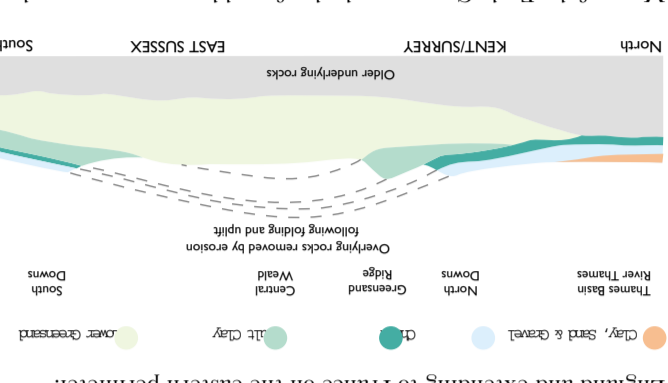
# Sandrock in the Weald

of Kent, Sussex and Surrey

A guide to a unique feature and its internationally rare wildlife

Including Poster

Many of the Early Cretaceous beds of sand became compacted when they were buried beneath the later deposits, and now form soft sandstone. The two most massive sandstones are sufficiently resistant to form inland cliffs, up to 15 metres high. In places, these cliffs extend for distances of half a kilometre or more along the sides of river valleys. The older of the two cliff-forming sandstones is called the Top Ashdown Sandstone and the younger the Airtightly Sandstone. The majority of the cliffs are of Airtightly Sandstone.



Erosion has stripped away the chalk from the High Weald, exposing the Early Cretaceous beds. Around the edges of the dome, however, the chalk has survived, forming the North and South Downs on the English side of the Channel.

England and extending to France on the eastern perimeter. The sand grains that form the cliffs are only weakly cemented together, but the rock develops a hardened skin or rind, which helps to protect it from the weather. The rind is enriched with organic matter, and with silica and iron salts which are deposited when water from within the rock evaporates at the surface. On some cliffs the rind has weathered and cracked, giving the rock a crocodile hide or tortoiseshell. Equally strange are the massed hollows known as honeycomb weathering.

Later in the Cretaceous, the plain disappeared beneath the advancing Tethys Sea. More sand and clay beds were deposited, and then a great thickness of chalk. After a succession of sea retreat, invasion and land uplifts, South East England eventually arched up into a broad dome centred on the High Weald in

beds of sand, as well as clay. Dinosaur, including large herbivorous iguanodonts, wandered across the plain, which in places was covered by dense stands of giant horse-tails and other plants.

period known as the Early Cretaceous. During this period rivers flowed across a vast plain close to the Tethys Sea, depositing Wealden sandstone formed 130 to 140 million years ago in a

### The Formation of Sandstone



Mosses, liverworts and ferns generally prefer dappled shade

#### The Climbing Code of Conduct for sandstone includes:

- Always use top ropes or climb solo (without any rope at all)
Use slings to ensure that the moving part of the top rope does not come into contact with the rock, to prevent it cutting into the edge
Always use soft boots
Do not 'improve' holds or remove vegetation of any kind
Always walk down; don't abseil



Volunteers using a winch to remove rhododendron

### Management & Conservation of Sandrocks

Many of the significant sandrock outcrops in the High Weald have been notified as Sites of Special Scientific Interest for their ferns, mosses, liverworts and lichen communities. In addition 17 sites have been listed in the Geological Conservation Review for their nationally important sandrock exposures.

The sandrocks themselves are geological features that require protection rather than any active management. Co-operation and understanding from visitors to prevent damage from insensitive climbing, fires or vandalism is especially important. Climbing, in particular, can damage both the plants and lichens and the rocks themselves. The sandstone forms a hard outer layer, but, if this is damaged, the underlying softer stone can erode very quickly indeed.

In general mosses, liverworts and ferns thrive best in dappled shade, confirming the idea that their natural habitat is open or grazed woodland. When fully exposed they can dry out too much, even in winter which is their main growing season. In dense shade, often created by evergreens, they cannot photosynthesise, so they tend to die back and even disappear.

Rhododendron is a particular problem. Not only is it an introduced evergreen but it can actively kill surrounding plants by exuding a natural herbicide from its roots. Its spread in recent years has had an especially damaging effect on the plants growing on the rocks, especially the lichens. Removing rhododendron is time consuming and often expensive. The main stems must be winched out or cut up, and then burned or chipped, well away from the rocks. Remaining stumps must be poisoned, and any regrowth sprayed with a suitable herbicide. Any seedlings must also be pulled up.

Complete eradication of rhododendron from a site is rarely possible, and so nearly all sandrock sites will require some ongoing management. Recently, the future of the sandrocks and their unique plant communities has become much brighter with funding made available for restoration work by English Nature, the Forestry Commission and the Heritage Lottery Fund.

Photosynthesis – the series of chemical reactions, powered by sunlight, which create energy for plant growth



Eighteenth century drawing by Grimm: View of Penns Rocks

Coppiced woodland – woodland in which trees are cut back on a 5-20 year cycle to encourage the re-growth of many, straight branches

After the Ice Age dense forest spread across Britain. Between about 8,500 and 3,000 years ago, in the Atlantic Period, the climate was warmer and wetter than at present. Many of the rare ferns, mosses, liverworts and lichens that grow on the Wealden cliffs probably first reached them around this time. Later, as the climate became drier, the species retreated to the north and west of Britain. Keltic communities were left on the north and west of Britain. Keltic communities were left on the north and west of Britain. Keltic communities were left on the north and west of Britain.

The first farmers arrived in South East England about 6,300 years ago and set about clearing the forests which had spread across Britain after the Ice Age. However there seems to have been no major forest clearances in the High Weald until the late Iron Age, around 2,100 years ago. Extensive deforestation then occurred to make cultivated fields and provide grazing for cattle and sheep. From the 15th century onwards, many of the remaining areas of forest were converted to coppiced woodland to provide timber for the iron and other industries.

Eighteenth century drawings show that many of the cliffs had, by this stage, only a light or patchy tree cover. From the late-Victorian period onwards, however, the cliffs became increasingly hidden from view because of the growth of trees and shrubs, especially rhododendrons. Some of the rare plants on the cliffs became extinct, apparently as a result of excess shading.

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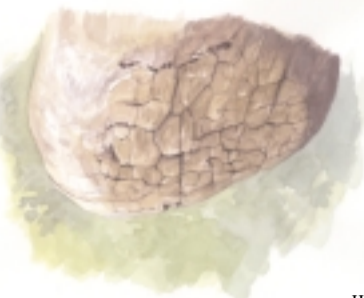


The forest was cleared for agriculture and converted to coppiced woodland

VA

In the 18th century the cliffs had light tree cover

Polygonal Cracking



There are only four sites of soft sandstone in lowland Europe: in the Weald; the Fens; the Forth; and the Paris Basin

There are over 75 significant sites of natural sandrock outcrops recorded in the Weald

Since 1888 a total of 264 lower plants have been found growing on the 15 major sandrock outcrops in the Weald, including 65 mosses and liverworts and 90 lichens

Sways in the last 50 years have failed to relocate 18 lichen and 21 mosses

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### Visiting the Sandrock Cliffs



Following the Climber's Code minimises damage to the rocks

### High Weald Area of Outstanding Natural Beauty



This leaflet has been written by the Working Group for the Conservation of Cryptograms in the Weald and produced by the High Weald AONB Unit on behalf of the High Weald Forum.

Financial support has been provided by the Sir James Coyler Fergusson Charitable Trust, British Bryological Society, Royal Botanic Gardens Kew, Countryside Agency, English Nature, Sussex Wildlife Trust and West Sussex County Council.

Artwork Sandra Fernandez and Valerie Alford (ESCC Landscape group). View of Penn Rocks By permission of the British Library Grimms Images MSS671 No19

Frontcover illustration: Yew roots over sandrock along rock walk. Wakehurst Place, Royal Botanic Gardens Kew.

The High Weald was designated an Area of Outstanding Natural Beauty in 1983. The designation aims to assist with the conservation of one of the most beautiful landscapes in England and Wales.

#### Further information

High Weald AONB Unit Corner Farm, Hastings Road Flimwell, East Sussex TN5 7PR 01580 879500 email: info@highweald.org web: www.highweald.org

### Sandrock Biodiversity



Tunbridge Filmy-fern



Scapania gracilis



Leiostylia anglica



Orthodontium gracile

Hay-scented Fern

The mild, shaded conditions of the valleys and stream ravines of the High Weald have favoured the luxuriant growth of ferns, mosses, liverworts and lichens on the surface of the sandrocks. Many of these species are more characteristic of the mild oceanic climate of western Britain than the South East.

Most famous of these oceanic species is the tiny Tunbridge Filmy-fern, Hymenophyllum tunbrigense, with thin delicate fronds up to 8cm long and looking more like a moss than a fern. It was first discovered on the High Rocks at Tunbridge Wells by a Dr. Dare in 1686 and, although no longer in its original locality, it still survives in about 12 other places. Outside the Weald it is confined to the rocky woodlands of western Britain, extends southwards along the Atlantic coast of Europe to Madeira and the Azores and inland, occurs on the soft sandstone outcrops in Luxembourg.

Another fern with a similar oceanic distribution is the beautiful Hay-scented Fern, Dryopteris aemula, with large crisped fronds like curly parsley. It more often grows on the steep banks of the valley sides than the surface of the rocks themselves.

It is among the mosses and the liverworts that we find the largest number of these oceanic species; leafy liverworts like Scapania gracilis and Bazzania trilobata and mosses like Dicranum scottianum. The damp marshy ground in the valley bottoms and along the stream-sides hosts another speciality normally from the West, the minute snail, Leiostylia anglica.

The sandrocks are the British stronghold of the tiny silky-leaved moss Orthodontium gracile. It is now reduced to a few areas of rocky woodlands, probably as a result of competition from a closely related Southern Hemisphere invader, Orthodontium lineare.

Another great rarity is the beautiful liverwort, Pallavicinia lyellii, with its dark green, glossy strap-shaped fronds.

This extraordinary assemblage of oceanic plant species exists in the High Weald of South East England because a number of factors prevent the sandrock from drying out. These include the sandrock's water-absorbing qualities, the relatively high rainfall, the number of rainy days in the area and an extensive woodland canopy which provides shade in summer.

Biodiversity – the variation and variability amongst living organisms and the ecological complexes in which they occur

# S a n d r o c k i n t h e W e a l d

Many cliffs have distinctive features like honeycomb weathering and large, deep open joints

Dead wood is vital for many fungi, invertebrates and their predators

Rhododendron can spread very quickly, casting dense shade, and preventing the growth of other plants

Rich carpets of mosses and liverworts cover many isolated boulders

Many different lichens grow on the rocks and trees

## Did you know?

The Wealden sandrocks were being laid down when large dinosaurs like the iguanodon wandered across the once open plains.

In these remote Wealden valleys you can find plants on or near the rocks that are a living legacy from the climate that most of Britain experienced around 4,000 BC.

Most of the extensive sandrock outcrops are sites of Special Scientific Interest and also regionally important geological sites.

Two of Britain's rarest mosses and liverworts, *Orthodontium gracile* and *Pallavicinia lyelli*, have their stronghold on Wealden Sandrocks and are undergoing recovery programmes.

Some mosses and liverworts found in the High Weald are only encountered again in the moister west and northern regions of Britain.

