



Sandrock in the Weald of Kent, Sussex and Surrey

A guide to a
unique feature and
its internationally
rare wildlife

Sandrock in the Weald



Mesolithic hunters sheltering under a sandstone cliff.



'The famous Toad Rock is to Tunbridge Wells what the leaning tower is to Pisa'
E.V. Lucas 1904



Modest homes, as well as grand buildings, were built from sandstone

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

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

Archaeological evidence suggests Mesolithic hunter-gatherers, who once roamed the Wealden forests, were the first humans to make use of the rocks. The discovery of thousands of tiny flint tools, as well as fragments of charcoal, suggest they camped beneath the shelter of the sandstone cliffs.

Sandrock was later valued as building stone. Many of the High Weald's well known attractions are built of Wealden sandstone – Battle Abbey, Bodiam Castle, Wakehurst Place and Batemans, Kipling's house at Burwash.

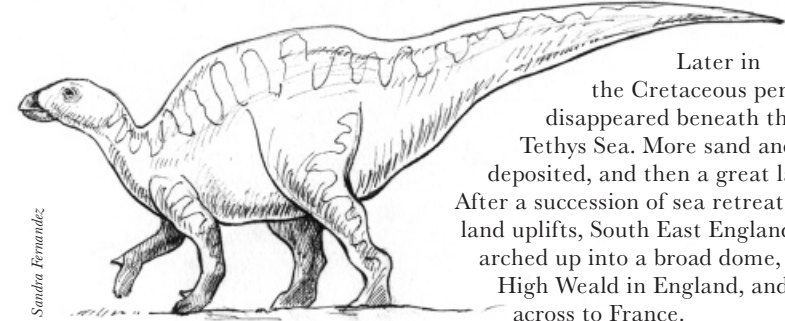
In Victorian times the rocks in and around Royal Tunbridge Wells were popular visitor attractions and tea rooms could be found nestling in the cliffs. Many of the rocks were named after things they resemble – Toad Rock, Loaf Rock, Pulpit Rock and Lion Rock. Wellington Rocks were named after the nearby hotel. Bell Rock was so called because of the metallic ringing noise it made when struck.

It was in the 1920s that the value of the rocks for climbing was discovered. As the only climbable rock in the South East, the accessible cliffs are some of the most heavily used in the country.

Today sandrock cliffs and boulders continue to be valued by local residents and visitors as important geological features, with special and rare wildlife communities.

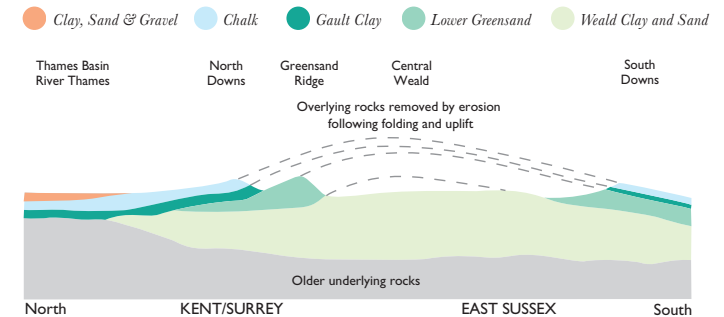
The formation of sandstone

Wealden sandstone formed 130 to 140 million years ago during the Early Cretaceous period. At this time rivers flowed across a vast plain close to the Tethys Sea depositing beds of sand, as well as clay. Dinosaurs, including large herbivorous iguanodonts, would have wandered across the plain.



Later in the Cretaceous period, the plain disappeared beneath the advancing Tethys Sea. More sand and clay beds were deposited, and then a great layer 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 England, and extending across to France.

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



Many of the Early Cretaceous beds of sand became compacted when they were buried beneath the later deposits, forming soft sandstone. Two of the sandstone beds (or layers) are resistant enough 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 named the Top Ashdown Sandstone and the younger, the Ardingly Sandstone. The majority of the cliffs are formed of Ardingly Sandstone.

The origin of the sandstone cliffs

Facts & Figures

- There are over 75 significant sites of natural sandrock outcrops recorded in the Weald.
- Since 1688 a total of 264 'lower plants' have been found growing on the 15 major sandrock outcrops in the Weald, including 165 mosses and liverworts and 90 lichens.
- Surveys in the last 50 years suggest 18 lichens and 21 mosses and liverworts have disappeared.
- There are only four areas of soft sandstone in lowland Europe: the Weald; the Fôret de Fontainbleu in France; the Petite Suisse in Luxembourg; and the Elbe Sandstone on the Czech/German border.

No-one knows exactly when the Wealden cliffs originated, but it was during the very last stages of the formation of today's hills and valleys.

Some geologists think that the cliffs were created by intense frost action during the last Ice Age. Present day processes of weathering and erosion are thought to be slowly destroying the cliffs.

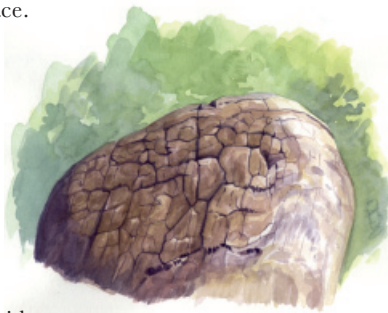
Other geologists believe that the cliffs originated during one of the many milder periods of the Ice Age when the climate was as warm as it is today. They think the cliffs may still be forming, rather than being fossil features.

The changing face of the cliffs

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 inside the rock evaporates at the surface.

On some cliffs the rind has weathered and cracked, giving the rock the appearance of crocodile hide or tortoiseshell. Equally strange are the massed hollows known as honeycomb weathering.

The joints within the sandstone have become so wide on steep valley sides – perhaps caused by successive freezing and thawing during the Ice Age – that narrow passageways have sometimes been formed. Many of the cliffs are undercut at the base, probably because the dampness at the bottom of the cliffs speeds up the rock's decay.



Polygonal Cracking

Sandra Fernandez

The changing landscape



The forest was cleared for agriculture and converted to coppiced woodland

After the Ice Age, dense forest spread across Britain. Between about 8,500 and 5,000 years ago, in the Atlantic Period, the climate was warmer and wetter than today. Many of the rare ferns, mosses, liverworts and lichens that grow on the Wealden sandstone cliffs probably first reached them around this time.

Later, as the climate became drier, these species retreated to the north and west of Britain. Relict communities were left on the Wealden cliffs, especially in the deep, steep-sided valleys with a humid microclimate.

From the Neolithic period onwards, humans began to settle, gradually clearing the forests to create open areas for farming. By the end of the medieval period, woodland clearance was extensive; timber was in high demand, particularly for charcoal to fuel the Wealden iron industry.

Use of the High Weald's abundant resources had created a landscape of small, irregular shaped fields and open heaths within a woodland setting.

Drawings show that in the eighteenth century many of the sandstone outcrops had only light or patchy tree cover. But from the late Victorian period onwards, the cliffs became increasingly hidden by the growth of trees and shrubs, especially rhododendrons. Some of the rare plants on the cliffs became extinct, possibly as a result of too much shade.

In the 18th century the cliffs had light tree cover



Right: 18th-century drawing by Grimm: View of Penns Rocks

Sandrock's special wildlife



Leiostyla anglica:
a minute snail

The mild, shaded conditions of the steep-sided streams (gills) of the High Weald favour the luxuriant growth of ferns, mosses, liverworts and lichens on the surface of the sandrock. 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.

This little fern was first discovered on the High Rocks at Tunbridge Wells by a Dr. Dare in 1686. 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, the Atlantic coast of Europe as far as the Azores and soft sandstone outcrops in Luxembourg.

The beautiful Hay-scented Fern (*Dryopteris aemula*), with large crisped fronds like curly parsley, has a similar oceanic distribution. It more often grows on the steep banks of the valley sides than the rock surfaces.

Most of the oceanic species are 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, *Leiostyla anglica*.

The sandrocks are the British stronghold of the tiny silky-leaved moss *Orthodontium gracile*, now only found in a few areas of rocky woodland.

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

This extraordinary community of oceanic, moisture-loving plants exists in the High Weald because the sandrock is kept moist through:

- its water-absorbing qualities
- extensive woodland which provides dappled shade in summer
- the relatively high rainfall and number of rainy days in the area.

Like many other species, the High Weald's unique ferns, mosses and liverworts are at risk from climate change.

Looking after sandrock



Mosses, liverworts and ferns generally prefer dappled shade

The Southern Sandstone Code of Practice helps climbers look after the rocks. It advises:

- 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

From: www.thebmc.co.uk

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

Sandrock habitat needs to be managed to maintain the dappled shade that mosses, liverworts, lichens and ferns thrive in. If fully exposed the plants can dry out too much, even in winter. In dense shade, often created by evergreens, they cannot get enough light to grow, so they tend to die back and can disappear.

Management measures therefore include:

- coppicing trees at the foot of the rocks
- trimming back overhanging branches
- keeping bramble under control and
- clearing rhododendron.

Such work is often done with the help of volunteers.

Rhododendron is a particular problem. This non-native invasive evergreen shrub grows quickly and, as well as creating dense and year-round shade, it can kill surrounding plants through the natural herbicide it exudes from its roots. Rhododendron can be difficult to remove without damaging the rocks and needs on-going management.

Co-operation from visitors is also important. Trampling, climbing, fires and vandalism can damage the plants and the rocks, particularly the sandstone's hard, but thin, outer crust. If the crust is damaged or worn, the underlying softer stone erodes very quickly.

What you can do

As well as visiting the rocks responsibly, you can join and support:

- Sussex Wildlife Trust – a charity that manages Eridge Rocks Nature Reserve and organises practical volunteering tasks like cutting back trees and brambles: www.sussexwildlifetrust.org.uk
- The Sandstone Volunteers Group – climbers and others interested in conserving the rock and environment of the Kent and East Sussex sandstone crags. They encourage good practice in climbing and carry out practical work to clear overgrowth and protect the rock: www.sandstonevolunteers.org.uk



Volunteers using a winch to remove rhododendron



Tunbridge Filmy-fern

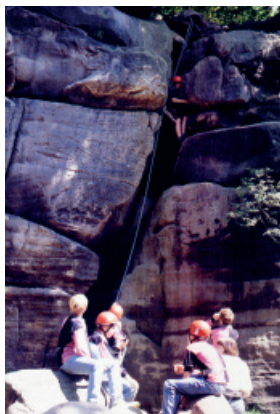


Orthodontium gracile:
a tiny moss



Hay-scented Fern

Visiting the sandrock cliffs



To help preserve the fragile sandstone, the BMC (right) provides essential guidance to visiting climbers

Climbing is allowed at Bowles Rocks, Harrison's Rocks and Stone Farm Rocks, as well as on parts of Eridge Rocks for BMC members, through an agreement with Sussex Wildlife Trust: www.bowles.rocks

Climbing is monitored by Natural England which has powers to protect these sites.

Further information

High Weald AONB
Partnership T: 01424 723011

E: info@highweald.org
W: www.highweald.org
– search for 'landform story'

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View of Penn Rocks by permission of the British Library Grimms Images MSS671 No19

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

Autumn or winter is often the best time to see the rocks and their rare plants. Sandrock is visible around the High Weald, particularly on the edge of ancient sunken lanes and steep-sided streams (gills).

In the central High Weald you can visit several sandrock outcrops on Tunbridge Wells and Rusthall Commons, including Wellington Rocks and Toad Rock: www.twcommons.org

The largest sandstone cliffs are found at Sussex Wildlife Trust's Eridge Rocks Nature Reserve near Tunbridge Wells, and Harrison's Rocks, managed by the British Mountaineering Council (BMC): www.thebmc.co.uk
www.sussexwildlifetrust.org.uk

In the western High Weald there are outcrops at the National Trust properties of: Standen House and Garden alongside the access lane; Nymans on the circular woodland trail; and at Wakehurst (managed by the Royal Botanic Gardens, Kew) on the Rock Walk: www.nationaltrust.org.uk/nymans
www.kew.org/wakehurst

In the east, near Hastings, are Ecclesbourne and Fairlight Glens in Hastings Country Park. Check access at: www.hastings.gov.uk

Many outcrops are in private ownership but may be open to the public on some days through the National Gardens Scheme, or as a ticketed attraction, for example High Rocks near Tunbridge Wells.

High Weald Area of Outstanding Natural Beauty



The High Weald was designated an Area of Outstanding Natural Beauty (AONB) in 1983 to aid its protection and management

Sandrock in the Weald

The High Weald's rolling hills have been created by alternate bands of clays and sandstone. The landscape is studded with sandrock cliffs and dissected by streams that have created deep, steep-sided ravines called 'gills'.

The area's many sheltered and damp woods and gills, with their moisture-holding sandstone rocks, are ideal for ferns, mosses, liverworts and lichens, some of which are rare.

Many of the sandrock cliffs have distinctive features like honeycomb weathering and large, deep open joints.

The High Weald's sandrocks are some of the most important places in the UK for the conservation of mosses and liverworts.

Dead wood is vital for many fungi, insects and their predators.

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

Rhododendron can spread very quickly, casting dense shade and preventing the growth of other plants. It is better for wildlife to remove it.

Rich carpets of mosses and liverworts often cover isolated boulders.

Many different lichens grow on the rocks and trees.

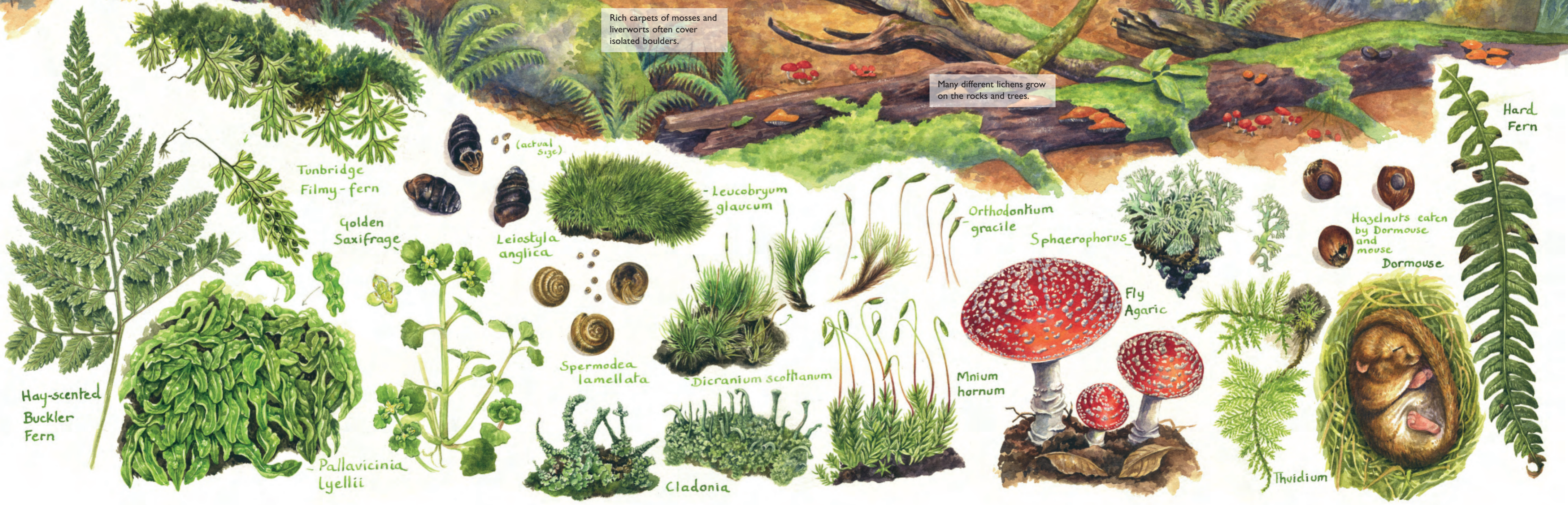
Did you know?

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

In remote High Weald 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.

Two of Britain's rarest mosses, *Orthodontium gracile*, and liverworts, *Pallavicinia lyellii*, have their stronghold on Wealden sandrocks.

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



Hay-scented Buckler Fern

Tunbridge Filmy-fern

Golden Saxifrage

Pallavicinia lyellii

Leiosstyla anglica

Spermodea lamellata

Cladonia

Dicranium scottianum

Leucobryum glaucum

Orthodontium gracile

Mniun hornum

Sphaerophorus

Fly Agaric

Hazelnuts eaten by Dormouse and mouse
Dormouse

Hard Fern

Thuidium