

COAL MEASURE GIANTS

HENRY CASTLE



Lepidodendron Aculeatum
Pen and North Sea Crude Oil
Henry Castle

Introduction

Having been given the opportunity to develop a piece of work for the Forest of Dean Sculpture Trail, which would reveal hidden aspects of the Forest, I set about making direct, personal contact with the place, and have subsequently spent a lot of time there getting to know it. My first impression was that it felt quite different to other forests that I had walked in, and I came to realise that this was due in part to its industrial history. Forests can be reflective places where you expect secrets to be revealed; places of the imagination and discovery, but this forest with its discreet revelations of water drainage systems and of depressions in the ground, suggested something extensive and unnatural going on below the surface, and I was instinctively drawn to finding out more about how man had impacted on the ground I was walking on. This led me on to research the fascinating history of coalmining in the Forest of Dean, and meetings with the Deputy Gaveler of Forestry Commission England were central to this. I met up with free miners and gained access to three mines, Morses Level, Wallsend Drift and Hopewell. It was in the latter on my first visit underground early in 2015 that my attention was taken by the sight of what turned out to be a stigmara fossil lying on the coal face. A stigmara is a root fossil of a primitive tree from the carboniferous period, and this one a *Lepidodendron*, had been embedded in a coal seam. This discovery sparked off a second line of research into the formation of, and near disappearance of coal from the seams beneath the Sculpture Trail. This spans a time period of 300 million years from when the Forest of Dean was positioned close to the equator and these coal-forming trees were growing, through to the present day after the coal had been extensively mined in the 1930s below the Sculpture Trail.

A short residency in the Forest gave me the chance to discover and excavate for myself many other fossils from the carboniferous period down the mines and in the spoil heaps, and working with the quarrymen at the sandstone quarry at Bixslade, revealed more finds. The range and beauty of these things threw up many surprises and an interest in identifying them, which led me to the Natural History Museum in London and the expertise of its Curator of Paleobotany.

This publication documents the realisation of the sculpture *Coal Measure Giants*, born out of time spent above and below the ground of the Forest of Dean, and developed from research into its history both geological and industrial.



Artist's impression of Carboniferous Landscape
300 Million Years Ago



Bixslade Quarry
Forest Of Dean
2016



Tree fossil on working quarry face - Forest Of Dean



Lepidodendron Fossil







Tree fossil from Bixslade Quarry - Forest of Dean



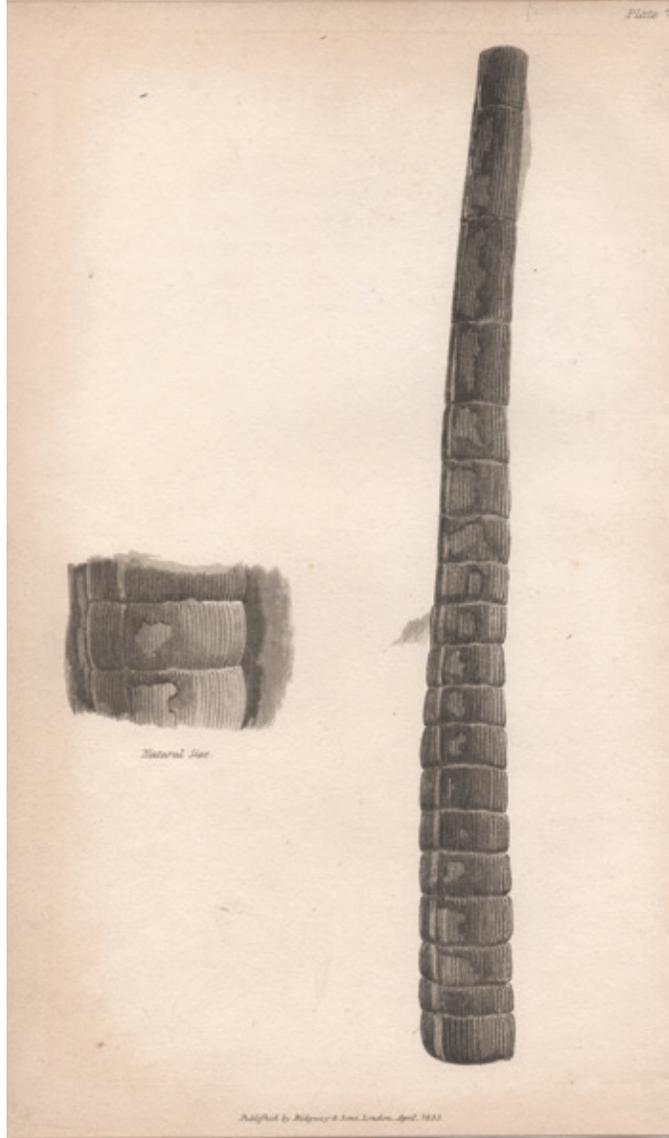
Various tree fossils found in the Forest of Dean
Calamites, Neuropteris, Lepidodendron



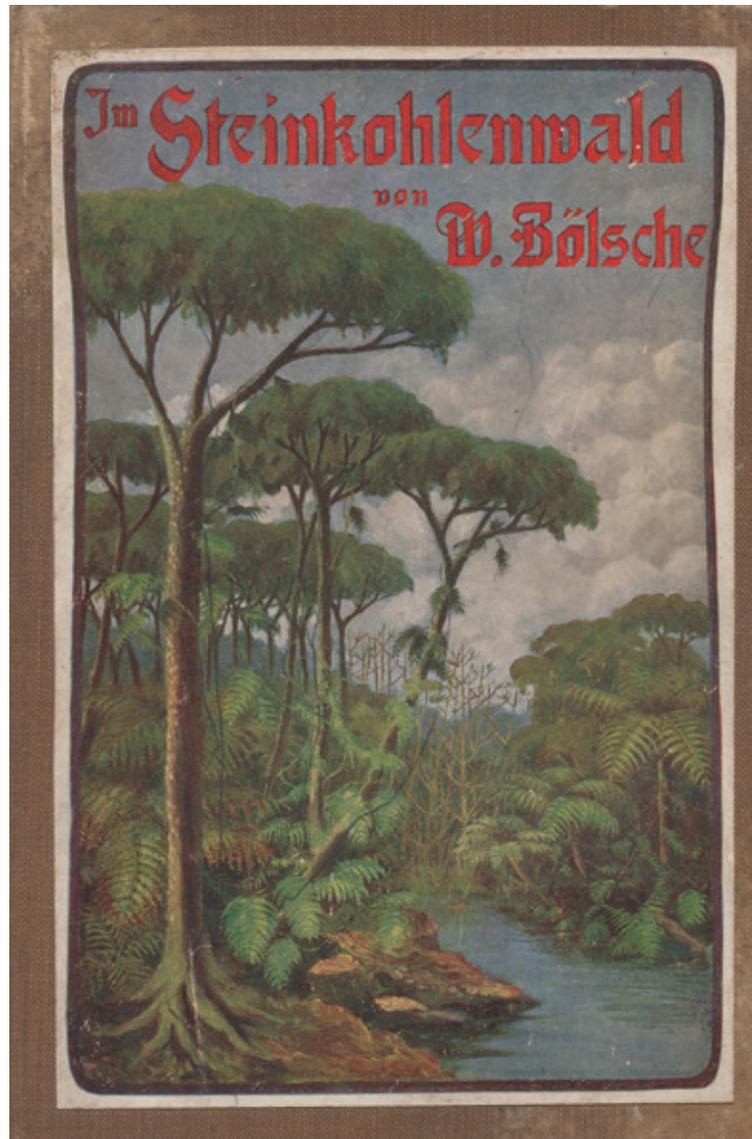
Forest of Dean coal taken from Hopewell Colliery

The Coal Measures, a series of rocks which formed during the late carboniferous period contain the remains of plants that were the first ever tropical rainforest. The Forest of Dean is a structural basin where coal-measure rocks lie enclosed within a dish of carboniferous limestone. The forest vegetation dies and forms layers of matter at the bottom of the swamps, which through a combination of heat, pressure and chemical changes over millions of years, results in coal being formed.

The Coal Measure giants refer to a dominant group of plants that formed the coals of the Late Carboniferous period. These include lycopsids (club mosses of today) such as the *Lepidodendron* or Scale Tree, which is known to have grown to a height of 120 feet, and the *Sigillaria*, or Seal Tree with its exquisitely patterned bark. The *Calamites* were giant horsetails of the time. Moving forward in time, amongst the coal measures today there can be found fossilised evidence of these primitive Coal Measure giants as described in words and by an artist's impression on the cover of the book *Im Steinkohlenwald (In the Coal- Forming Forest)* by W. Bolsche of 1906. The magnificent fossil specimens from the Forest of Dean in the store of the Natural History Museum are inspiring and informative as are the beautifully crafted wooden models of the Forest of 1843 by Thomas Sopwith showing an above ground impression as well as cross sections of the coal seam below the present day Sculpture Trail. The impressive *Sigillaria* fossil in the collection relates to a German diagram of how a *Sigillaria* in a coal seam would have looked.



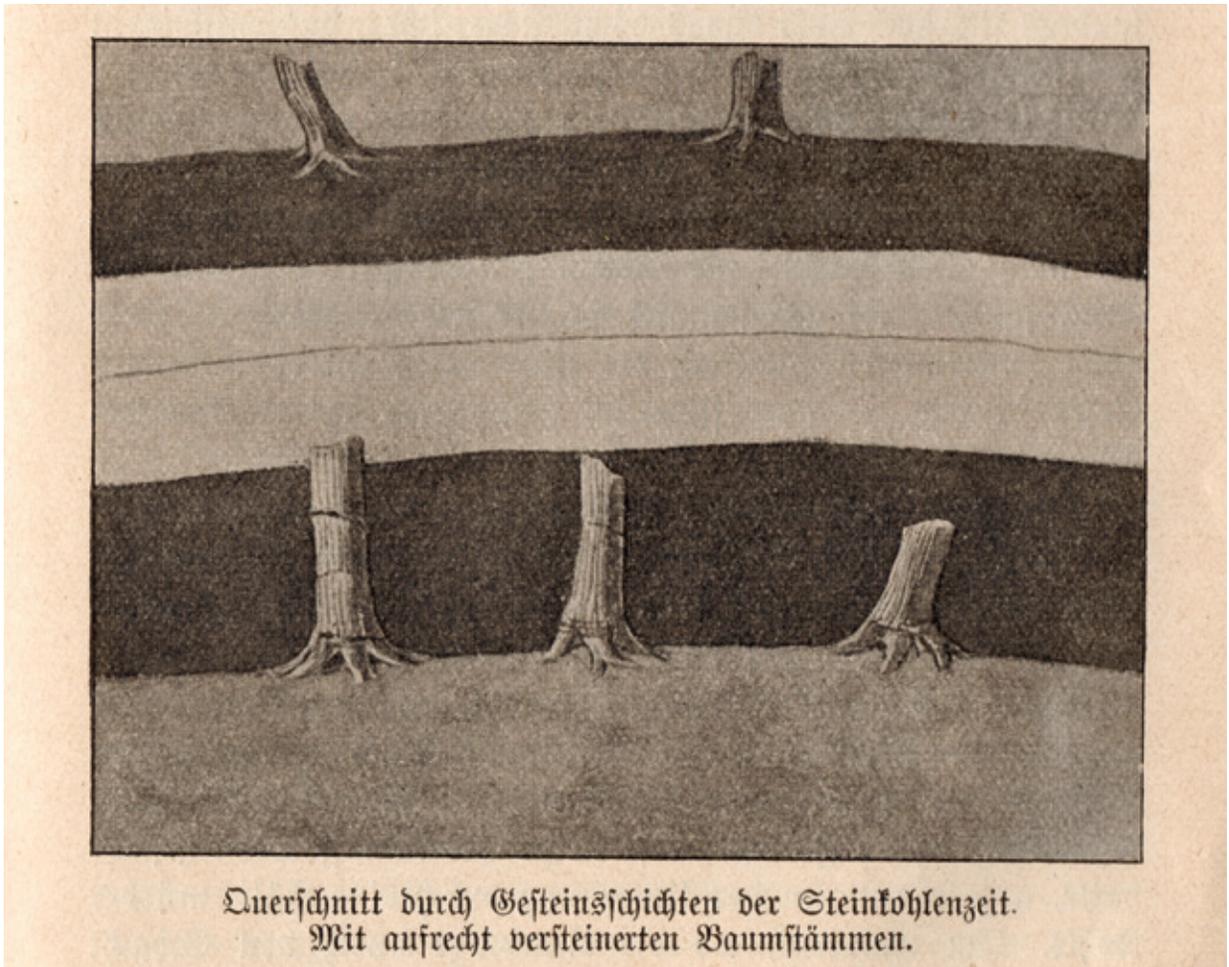
Calamite fossil engraving



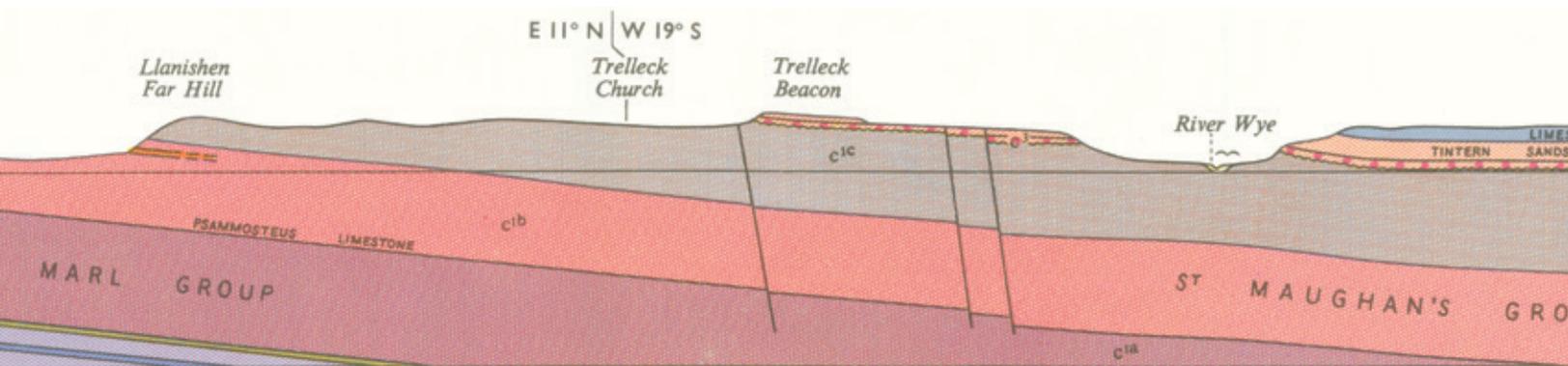
Im Steinkohlenwald (In the Coal-Forming Forest)
by W. Bölsche of 1906



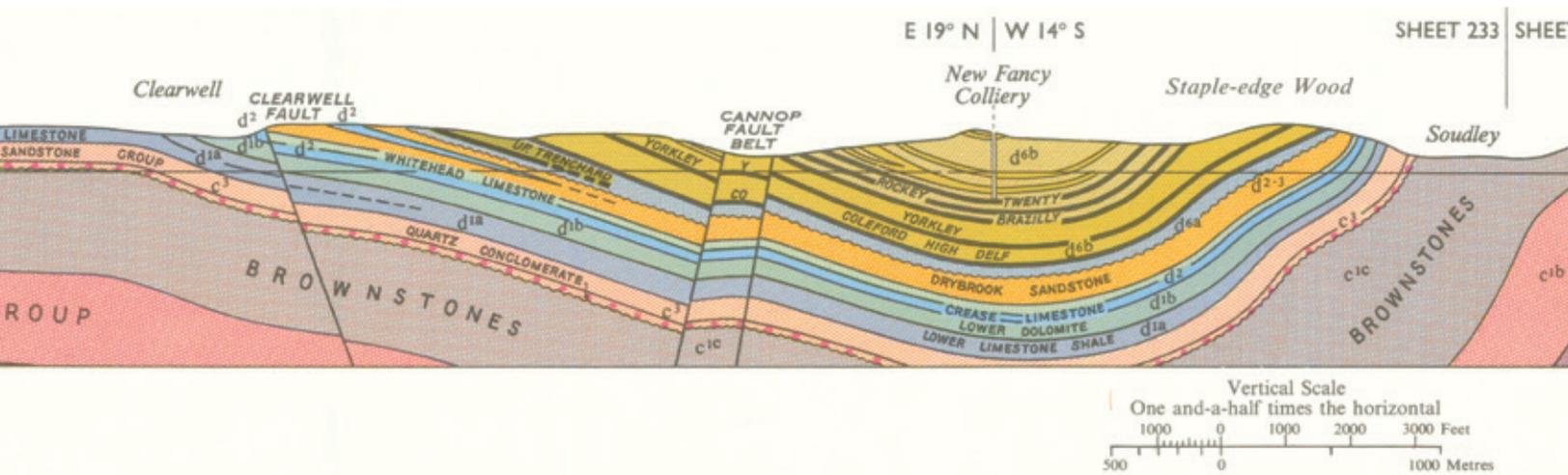
Sigillaria fossil V10937 - Courtesy of the Trustees of the
Natural History Museum, London



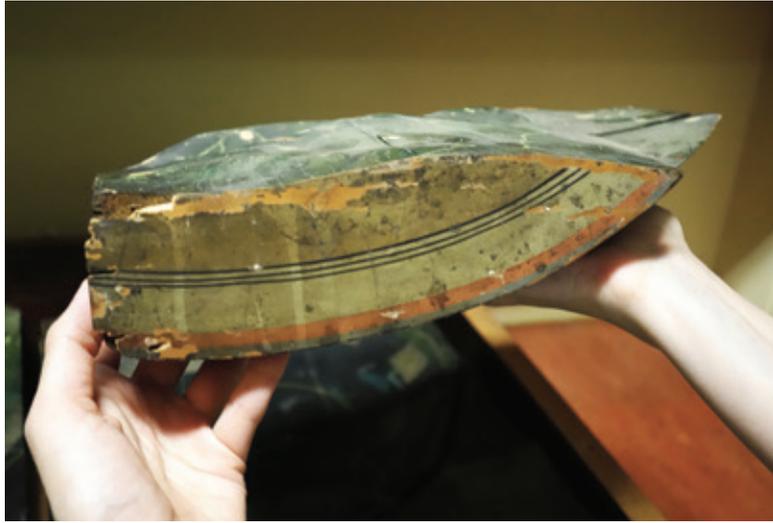
German illustration depicting Sigillaria in a coal measure



3 Miles
4 Kilometres



British Geological Survey Map 1952
illustrating a cross section of the Forest of Dean



3D Model of the Forest of Dean
by Thomas Sopwith 1843 (made in wood)
Bottom image showing cross section below the Sculpture Trail.
Courtesy of the Trustees of the Natural History Museum, London

Opposite page - Coal dust in the quarry face at Birch Hill





Coal seam Morses Level Mine - Forest of Dean



Tree fossil in the ceiling of Morses Level Mine

In the partially water-filled mines, emptied of coal, such as Wallsend Drift, the mines are going back to nature; clay deposits push up into the tunnels from below, continuing the circle of time. A drift mine, is a mine where the coal seam comes to the surface out the side of a hill.

The absence of coal in these mines is apparent but the size of the coal seam is very much suggested by the series of larch props or sets that have been made to hold up the tunnels once the coal was extracted. These three piece structures continue to be made today as they have always been made by the free miners who still work the mines. They each have their own signature way of jointing these structures.

At Morses Level a tree fossil sits in the roof of the mine alongside one of these larch props.

The history of free mining begins in the Forest in 1296 and the first War of Scottish Independence when England invaded Scotland. Iron mining was already established in the Forest of Dean and to help him break the siege of Berwick upon Tweed, Edward the First called upon miners living in the Hundred of St Briavels (the old administrative capital) to undermine the town's defences. This was successful and the king granted to true born foresters and their descendants the rights to free mine there, in perpetuity. This legislation was redefined in a special Act of Parliament called the Dean Forest (Mines) Act 1838, which said that 'All male persons born or hereafter to be born and abiding within the said Hundred of St Briavels, of the age of twenty one years and upwards, who shall have worked a year and a day in a coal or iron mine within the said Hundred of St Briavels, shall be deemed and taken to be Free Miners.' Since 2010 this applies to women too but the closure of the maternity unit at Dilke Hospital may further accelerate the declining numbers of free miners mining coal, producing ochre and quarrying stone in the Forest of Dean.



OFFICE





Bread Shed - Hopewell Mine



Bread Shed - Hopewell Mine



Wallsend Drift Mine - interior



Wallsend Drift Mine - exterior



Lightmoor Colliery Forest of Dean
Courtesy of Philip Clifford



Free miners making sets - Lightmoor Colliery Forest of Dean
Courtesy of Philip Clifford



Sets - Morses Level Mine



The sculpture, Coal Measure Giants tells a story of coal in the Forest of Dean, albeit through its absence in the imagery of the piece. It brings to the surface aspects of what lies hidden to most people below the ground of the Sculpture Trail, bringing together different periods of the Forest's history both geological and industrial. The two sculptures have two elements each, both being castings, one natural and one made-made, which originate from the same land. The carboniferous forests that make up the Coal Measures are symbolized in one of these elements; a large stone taken from a local quarry, which carries the casts of trees from 300 million years ago and evidence the very same tree types that can be seen in the ceilings of the mines. An instant dialogue is set up between two landscapes 300 million years apart when bringing the tree fossils up from the underground and placing them in the living forest. The second element of the sculptures are two cast iron forms cast from a larch set. These sets can be seen throughout the mines and are used to brace between the layers of sandstone as the coal is removed to form the mine tunnels themselves. The props are a direct representation of the removed coal, cut and formed to the thickness of the coal measure. These are forms that have been left in the ground as the earth, clay and water take back the mine, and the sets become a skeleton of the mine works.

One form is an exact replica of a larch set made by a local free miner, and the other a vertical tree-like form resembling a Calamite, and cast from the three elements of the same set. The larch used to make the set, was felled by the Forestry Commission from the living forest. These man-made casts of trees in the living forest sit alongside natural casts of trees growing 300 million years ago.

The use of iron, as well as having a permanence, relates to coal and iron ore mining being common denominators of the industrial history of the Forest of Dean; the two come together in the larch sets cast in iron.

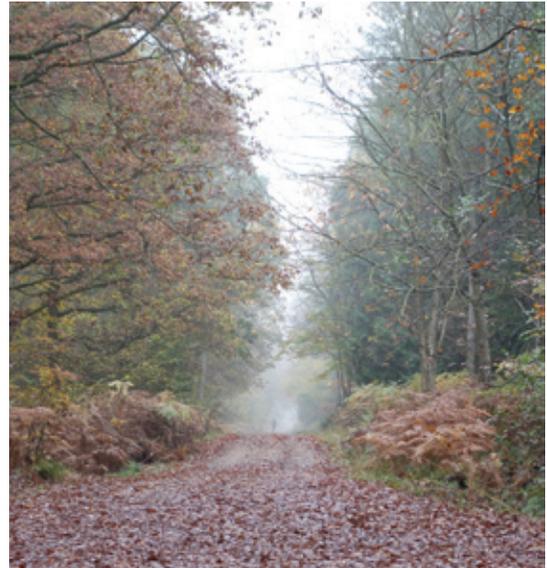
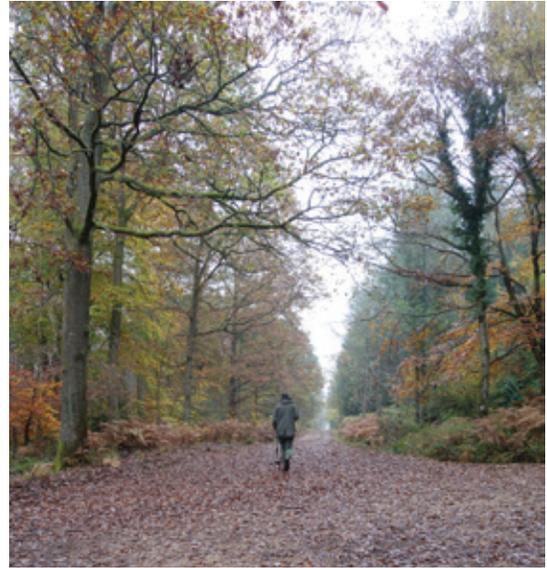
It is estimated that one meter of coal is the result of 7000 years of plant growth, which gives some kind of a physical measurement of time. This work invites the public to experience a physical expression of the vertical depth of the main coal seam (the Coleford High Delf), which lies 300 meters below the surface by walking this distance between the two sculptures, one of which can be seen from the other in the landscape. The site is very important; the sculptures are placed above actual mine workings in order for the public to be encouraged to visualise what lies below their feet, and to give understanding to the imagery of the sculptures themselves. One of the sculptures is sited close to a stream, which continuously runs red, rising up from underground where iron deposits lie. This element of the piece contrasts the fluid nature of iron and water with the hard, inert nature of the cast iron forms. The presence of iron is evident all over the Forest, coating objects man-made and natural in a mantle of bright orange.



Mining maps below Sculpture Trail,
Courtesy Forestry Commission England.
Redline depicts the depth of coal above ground



Distance measuring wheel used to measure out the Coleford
High Delf depth above ground



Walking 300 meters, above the the High Delf







Iron Oxide stream at the sculpture site



Maquettes cast in iron



Stigmaria fossil - 300 million years ago
found in the Forest of Dean



Iron cast of Larch growing in the Forest of Dean 2016



Free Miner building the sets at Morses Level mine





Tree fossil, Pennant Sandstone, Bixslade Quarry



Sand casting, Hargreaves Foundry, Halifax



Breaking the mould



Iron casting and pattern layout



Iron pour - Hargreaves Foundry



The trustees of the Forest of Dean Sculpture Trail have a history of commissioning promising sculptors in the early stages of their career. It was on this basis that Henry Castle was selected for this commission.

The sculpture 'Coal Measure Giants' by Henry Castle, has its origins in a thorough survey of the geology, history and technologies of the Forest of Dean. This survey has involved Henry – almost literally – painting a picture of what the Dean was like 300 million years ago in the carboniferous period. Then it was a very different landscape, being close to the equator with trees growing to a height of over 120 feet. As evidenced in this publication, this has necessitated Henry collecting and collating an extensive amount of visual material relating to this period, as well as creating some of his own. This has therefore been Henry's starting point – an excellent decision – since from this prehistoric landscape comes iron and coal, the two mineral deposits that define so much of the history of the Dean. Following this, Henry investigated mining practices in the Dean, and how they enabled iron ore and coal to be mined and quarried. This has involved him researching archives, interviews with free miners as well as exploring mines and quarries in the Dean where he has seen a subterranean drama of fossilised trees and flora. Of particular interest to Henry was the lepidodendron and stigmaria fossils, with their distinctive sculptural qualities. Henry has also made a study of the 'sets,' the constructions the free miners use to support the roofs of the mining tunnels. This resulted in him having a set made by the free miners, and then cast in iron to become a part of Coal Measure Giants.

One of the reasons Henry was awarded this commission was because of his approach to the contents and context of a subject. As a sculptor, one of his strengths is the acuteness of his perception when selecting objects that are central to the content of the subject, and how this acuteness guides their reusing or remaking as well as their transposition into another material. This transposition has a curiously destabilising effect on an observer's perception, what at first sight seems similar to the material normally associated with the object, is on closer examination found to be quite different and even in denial of the objects origins. This is prominent in Coal Measure Giants, where the apparent components of a set stand as a vertical tree like column, and although its mottled red, yellow and brown patina is ingrained with what appears to be the texture of a tree trunk, it finds its equivalence, not in the surrounding vegetation, but in the rich iron oxide colour of streams nearby. Correspondingly, 300 metres away, the related cast iron set exhibits the same qualities.

If the appropriation and replication of objects that comprise a work of art are to be successful, the procedure requires diligence and aesthetic commitment, if superficiality is to be avoided. In Coal Measure Giants superficiality is avoided through a comprehensive understanding of subject matter, coupled with a commanding knowledge of the language of sculpture. An underlying tenet of this language is that sculpture commences from a point, to a line, to a plain and then to a volume. Coal Measure Giants is not merely an exposition of this tenet, but it is quite literally a walk through it. This sculpture begins at the 'point' where the vertical tree-like column penetrates the ground, and from this its ascent becomes a 'line'. This tree-like column is a prescient form, since the Dean owes its existence to the contribution of its forbears. It might therefore be described as a gnomon, possessed of a knowledge and lineage that is timeless. It is from this point that one walks the 300 metres to the set like structure. This distance being the depth of the 300 metres Coleford High Delf coal seam, therefore with every step one is 'measuring' the depth of the seam. On approaching the set the scale changes and the emphasis shifts from the vertical to the horizontal, with the prominence of the horizontal beam of the set. (In essence this set is a post and lintel construction having its origins in prehistory) This causes the interior geometry of the set to define a spatial plain, one that is of human significance, since it relates to the height of mine tunnels in the Dean, therefore to the physiology of the men who worked there. On the ground adjacent to this construction is the large tree fossil, redolent of the imprint of the flora of 300 million years ago. This has a timelessness that resists its transposition into another material.

In Coal Measure Giants the observer is an essential participant, even it might be said, a performer; as one walks between the two components of the sculpture one walks a line that is a measure, not only of space and time over a distance of 300 metres, but also to a depth of 300 metres. Inevitably each step becomes a measure, a measure of distance, a measure of depth, a measure of time and ultimately perhaps a measure of oneself!

It is the hope of the trustees of the sculpture trail that the sculpture they commission will reveal exciting and original insights into the Dean. Coal Measure Giants is a sculpture that does this magnificently.

Andrew A Stonyer 2016

Chairman Forest of Dean Sculpture Trust and Trail.

FOSSILS OF THE CARBONIFEROUS.



- 7
1. The Tooth-Fern — *Odontopteris*.
2. The Scale Tree — *Lepidodendron*.
3. *Cordaites Borassifolia*.
4. *Pecopteris Cyathea*.

- 8
5. *Calamites*.
6. *Sigillaria*.
7. Rhizome of *Sigillaria* in Water.
8. Foliation of *Annularia*.

Acknowledgements

I would like to thank the Trustees and Selection Committee of the Forest of Dean Sculpture Trust, Andrew Stonyer, Paul Harper, Sarah Bowden, Glynn Williams, Nicholas Bury, Annie Cattrell and David Ball for giving me this opportunity.

Thanks to Forestry Commission England, Phil Morton, Hayley Skipper, Judith Lack, Lizzy Turner, Heather Lilley, James Williams, Stephanie Johns, Dan Howell and Lyndon Bragg.

Thanks to Hargreaves Foundry, Mike Howell, Brian at Bixslade Quarry, Peta Hayes and Tony and Elaine at Castlemain Cottages.

With special thanks to Cathy Mager, James and Susan Castle and Alyce Taylor for their continued support throughout this project.

Photography Henry Castle
Design Alyce Taylor and Henry Castle
Printed by Ex Why Zed



Coal Measure Giants The Forest of Dean

15th July 2016