Cumbrian Alchemy

ROBERT WILLIAMS AND BRYAN MCGOVERN WILSON

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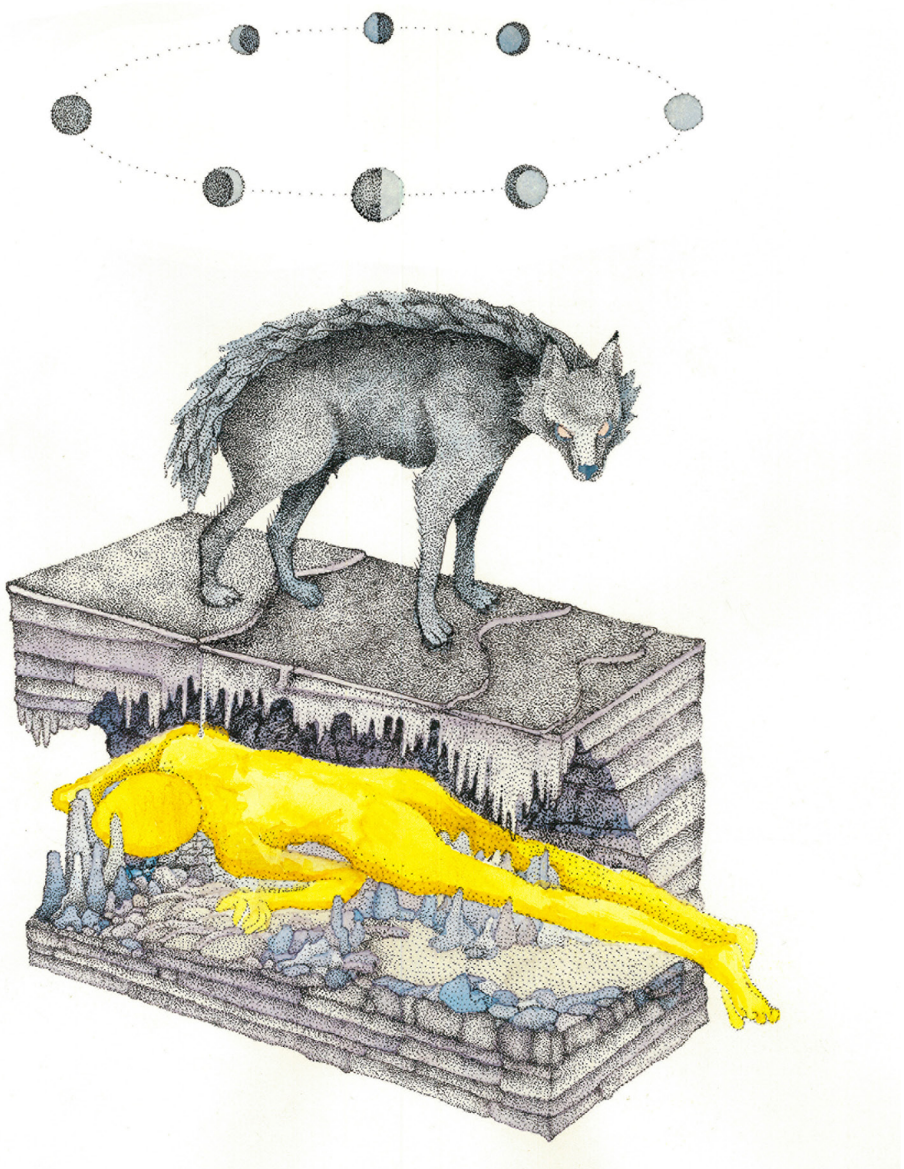


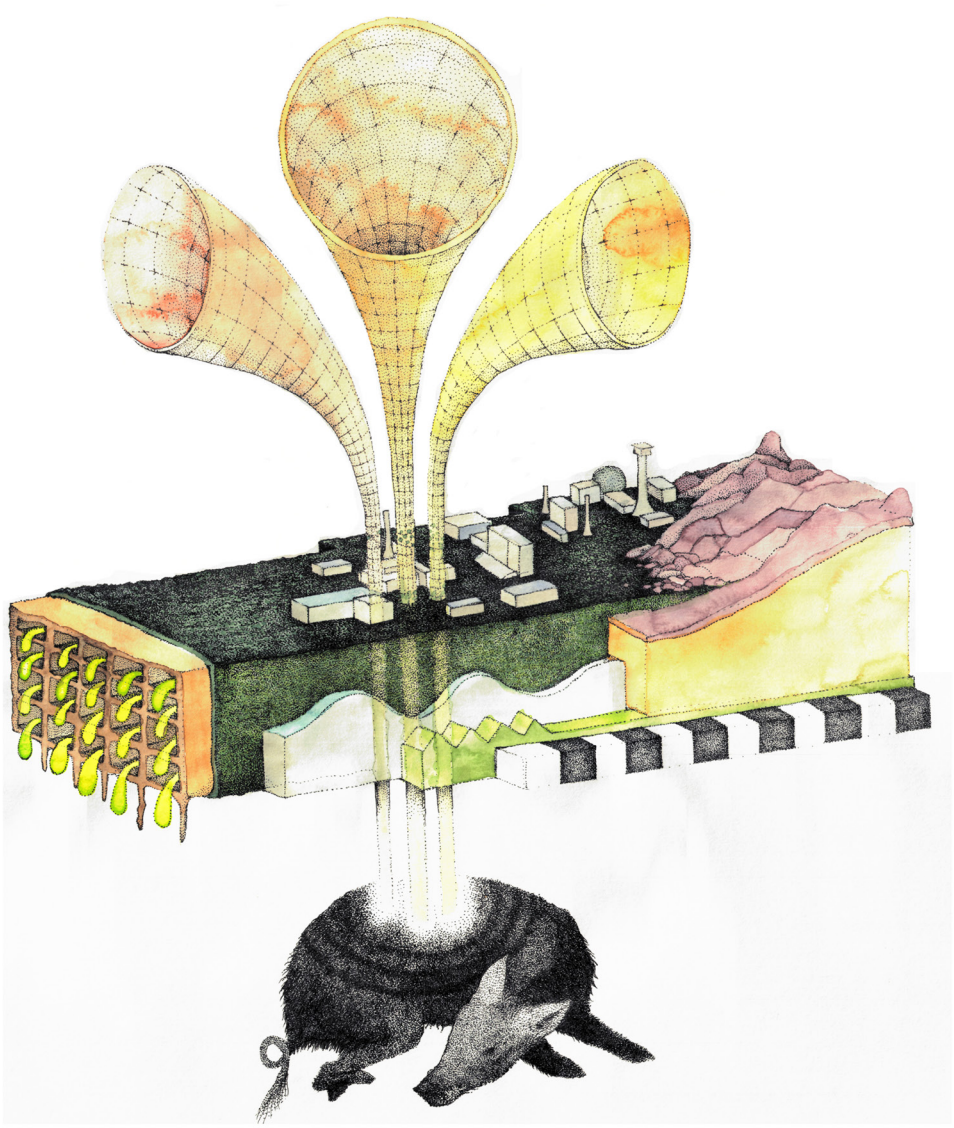
Mark Dion
Foreword

The community of artists, art enthusiasts and art historians (my community) relish stories of rivalry and competition between artists. Tales of social snubs, historic humiliations, apprentices overtaking masters, colour the creative environment as Darwinian as any antediluvian swamp. However, just as the first Darwinian scholars overvalued competition and struggle over symbiosis, there is another story, overwhelmingly more prevalent; that of collaboration, generosity and mutualism. This project by Robert Williams and Bryan Wilson is an epic example of how greatly artists benefit from sharing ideas, expertise and skills. It exemplifies the way artists sharing related interests can make connections between bodies of knowledge; in this case secret bodies of knowledge, which may be separated by centuries.

Cumbrian Alchemy results from rigorous research over periods of years, brought together in the studio, classroom, laboratory, home and pub. In addition to countless hours reading, researching and discussing, the artists opened a dialogue with experts from fields well beyond the realm of visual culture. I can only imagine the tact and charisma as well as the persistence it must have taken to open the doors and imaginations of professionals in the field of nuclear industry and research. Organizing an audience with Paracelsus or Athanasius Kircher could not have been more brazen and implausible. Throughout the process, our resolute artists shared the labours, ever intensifying the stakes and honing the work's scope and focus.

Both Robert Williams and Bryan Wilson share an expansive sensibility of rich concern with the history of science and its black sheep sibling, alchemy. The other concern and skillset both bear this exceptional skill as makers. As artists with developed sculptural sensibility and graphic virtuosity, they shared not merely the conceptual research ability necessary in such a project but an ever-evolving sense of how the visual expression of the ideas might appear. The exhibition took shape largely through drawing and the production of related work. This material and visual investigation (of which this publication is a part) distinguishes aspects of artistic research from other forms. This project very much demonstrates the connections, transcriptions and speculation, which can be productively fostered in a visual arts practice that might be unachievable in other disciplines.

This project results from a collaboration theorized and physically formulated over many months, sites, beers and books. The two artists exemplify the generosity of spirit, expansiveness of intellect and masterful technical ability of our moment in art. Together they interrogate a shadowy past, troubled present and inscrutable distant tomorrow. Bryan Wilson and Robert Williams may be the first archaeologists of our future.



Introduction
Certum Est Quia Impossibile Est[*]
Robert Williams

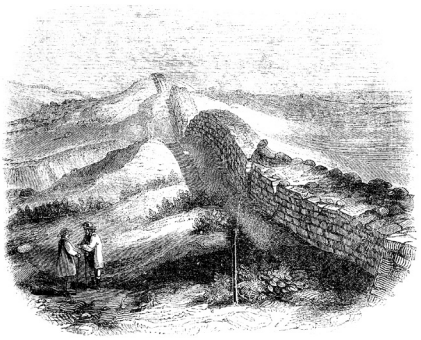
Late March 2010, two men, one British and the other American, were deep in conversation in a small but busy sushi bar in New York's Midtown district. They had first met some seven months earlier in rural Pennsylvania during a demanding, immersive and stimulating workshop based on alchemy[1] and had discovered much by way of common ground existing between them. Their meal follows a busy day involved in installing the collaborative exhibition *An Ordinall of Alchimy* at the Cabinet Magazine Gallery in Brooklyn[2], with artist Mark Dion and the Fellows from the Mildred's Lane Project session of 2009. Over the next two hours or so, their conversation ranges across subjects as diverse as The Manhattan Project[3], European post-Renaissance hermeticism, long-term underground repositories for the storage of high-grade radioactive material within the nuclear industries of the US and Europe, William Camden's *Britannia*[4] and archaeological monuments in the county of Cumbria in North West England. This is the genesis of the *Cumbrian Alchemy* project.

It took more than twelve months to bring artists Bryan McGovern Wilson and Robert Williams together again. Bryan made the trans-Atlantic journey, his first to the United Kingdom arriving in Cumbria during what was a very cold, wet and inhospitable January of 2011. By this time, we had both completed considerable research to move the dialogic and interdisciplinary project forward. Not least of which was in the identification of three primary areas of interest emerging from our investigation of the region. The first aspect being the *Energy Coast* of Cumbria and North Lancashire, which encompasses the historically significant industries of nuclear power, renewable energy and mineral extraction[5]. That these were then considered in relation to what we had begun to conceptualise as other *places of power* in Cumbria was significant in our exploration of the wealth of extant archaeological monuments in the region, referencing as they do millennia of human occupation since the last glaciation; ranging from the Mesolithic and Neolithic, later Western Megalithic cultures, Brythonic Celt, to the Roman occupation signalled by the presence of Hadrian's Wall[6], and the mediaeval Norse heritage of Cumbria and North Lancashire. The third aspect of our interests was to explore how ideas of these places of power, of *deep-time*[7], *mythic-time*[8] along with a sense of continuity with the land might find expression within the narratives, stories and folklore of the region. By the end of 2012, after a second visit by Bryan, hosted by the Fine Art[9] programme and supported by the Research and Enterprise Co-ordination team from the Faculty of Arts, Business and Science of the University of Cumbria, and the Arts Council England (ACE), the fieldwork had done its job and the project was well underway.

At its core, this project is as much about the discursive relationship between the two of us as artists as it is about the subjects and sources that we explore

individually and collectively. This collaboration, a mutually reflexive process that is both challenging and liberating, is insightfully encapsulated within Mark Dion's generous foreword. Here Dion, friend, collaborator and mentor to both of us, signals the collaborative dynamic at work within the project. Drawing from each artist a different set of responses to the material, the individual lines of enquiry crossing and diverging gave rise to a rich dialogic process. Bryan and I present in this volume a transcript of one of our many conversations. This is by way of an attempt, however limiting the medium might be, to indicate the range and breadth of our interests and priorities of research within the *Cumbrian Alchemy* project. Because of this we wanted to extend our idea of collaboration for the project. In considering an enquiry that crosses so many boundaries, that speaks to so many different disciplines, sensibilities and perspectives, it seemed impossible to contain all its potential within a simple dialogue between two people. What we needed was a discussion, a discourse.

The way forward was simple in its formulation but complex in its operation and consequences. By inviting other minds to participate in the exploration of the themes and subjects that were absorbing us, we were then enabled to extend the project exponentially. We are fortunate to have found a group of contributors who were each in their own way as engaged and as excited in the work of the project as we were, and who were insightful in their considerations of the field of enquiry and the conceit for the work.



Amongst the first of these contacts made during the fieldwork was a serendipitous encounter with, ironically a Yorkshireman, the late Mr. John Disney, Chief Guide at St. Peter's Church, Heysham. He enthralled Bryan and me with his stories of Norse heroes, magical deeds, of dragons, wolves, boars and sundry talking animals. The narrative, which includes elements from the *Völsungasaga*[10], is hidden within the famous Viking Hogback stone at Heysham[11] and transcribed here as a monument to Mr. Disney. It was as beautifully memorised, delivered and was as rich in incident and detail as any tenth century oral rendition of the saga[12]. There was something numinous about being in the presence of an object that tells of such epic and powerful events across enormous periods of time. That it also exists in close relationship to a contemporary *place of power* in the form of a nuclear installation means that its qualities evoke further ideas of place, duration and legacy. It is such qualities that chime with John Disney's timeless narration of myth. It was in the consideration of how this plays out on a larger scale in relation to the Energy Coast, the proximity to nearby archaeological monuments and the relationship to the land that Disney's narrative came to underpin the sensibility of the project from that point on. It is such relationships between time, trace and legacy that are also explored in David Barrowclough's astonishing essay. His scholarly text provides a unique perspective on the scope of the project and the work of the two artists. Not only because of his own hugely important contribution to understanding the significance of both Cumbria and Lancashire to British archaeology[13], but also because of his deep awareness of the relationship between art and archaeology as disciplines for mutual research and enquiry[14]. As a consequence, his essay becomes the lynchpin of the whole enterprise in the exploration of the emerging themes and preoccupations raised by our work, particularly so with a view to the historical, theoretical and critical underpinning to the project as an enquiry across both disciplines.

It may seem strange that a project so concerned with myth and meaning should find it necessary to seek a contributor to help demythologise certain aspects of the enquiry. However, from the very early days of the project Paul Abraitis has been both a stalwart supporter of the investigation and one of its principal scientific advisors. Part of the issue arising from the subjects and sources investigated here, particularly with the controversies surrounding the nuclear industry, is to recognise that this is a highly contentious and emotive area to approach. We are indebted to him for his depth of knowledge and clarity in explaining the complex matters of the technologies, the science and the realities of nuclear power.

Whatever we may feel ethically, morally, politically or emotionally, the fact of the existence of the energy industries along the northwest coast is undeniable. Our strategy was to approach the subject mindful of our own different prejudices, fears and political perspectives, but also with the recognition that here was a reality that we needed to take account of and to examine with the same level of critical distance that we apply to the archaeology, geography and mythic cultures of the region. Paul Abraitis' text frames the subject in such a way that helps in the understanding of the principles of radioactivity. It provides a clear perspective for a balanced and rational consideration of the phenomenon and the issues arising from this scientific alchemy. By implication, the essay also contributes to the exploration of the preoccupations and themes of the project: time, power, the human scale and the human imagination. It speaks to the alchemical imagination, of the Microcosm and the Macrocosm[15], how the very, very small is very often analogous to the very, very large, and what this might mean in terms of power, actual, metaphoric or occult.

Similar themes are explored from a very different perspective in the contribution from Cumbrian journalist Alan Cleaver. Based at Whitehaven, he is an expert in the folklore and oral traditions of the region, his rich essay provides the third thematic aspect of our exploration in thinking about how power, natural, human, and supernatural, might be identified with *place*. How such communication of this might be used to warn, beguile or control, and to do so whilst transcending time on the scale of a human lifespan. This is a recurring theme of the project. Cleaver explores the mythic spaces of the Energy Coast, the maritime and industrial districts of Copeland, the Lake District National Park, eastwards to the village of Orton with its local wizard, the mysterious Dr. Farrar, and further towards Kirby Stephen. In so doing we meet again the animal stewards of the land first encountered at Heysham, the Wolf and the Boar[16] emblematic of deep time mnemonics concerned with strength and power and remembered in old Norse names across the region such as Ulpha, Ulverston, Ullswater, Ullscarf, and in Grizedale, grizzle, grislymires. Their passing into mythic time is signalled at Wild Boar Fell where the last Cumbrian boar was killed in epic battle and at Humphrey Head where the last Cumbrian wolf leapt into legend[17].

Our final collaborator lies hidden within an object. Rather like Dr. Farrar of Orton, this most hermetic of our alchemists is concealed amongst the arrangements of text, image and page of what might be thought of variously as a field guide, a grimoire, a text-book, a narrative, a mythos, tractate or treatise. It may be considered unusual or unconventional to include our book designer as a major contributor to the project. However, James Brook's role is pivotal in helping

to both frame and contextualise this aspect of the project and the relationship that it has to each of its elements: the artwork, the research material, the discourse and its audience. We are grateful that a designer so renowned[18] who is familiar with and sensitive to the needs of artists has added his voice to the discourse. He has compiled a fitting contextual frame for the project as a whole, one that can exist beyond the exhibition, as a separate but related entity.

Cumbrian Alchemy as a project was never meant to be a puzzle to be solved, whilst it may be mysterious, it is not a mystery. Its subjects and themes emerge from within the region in which it is located. Its references are those that might also be found in conversation or discourse surrounding such elements, in the bringing together of the different streams of thought, imagination, learning and observation from that particular context and yet it is not limited only to that context in its implications. As such, there are no conclusions to be drawn here. No final statements that encapsulate the whole. Rather, it is a series of what may be considered to be disparate artworks, images, objects, ruminative texts and thought brought together in a particular configuration. It exists to begin conversations, not to end them.

* It is certain because it is impossible.

NOTES

1. Robert Williams' long term project, *Opus Magnum: Theatrum Chemicum Britannicum*, first proposed in 1998 and still underway in 2013. See http://www.mildredslane.com
2. See http://cabinetmagazine.org/events/dion_williams.php
3. Wilson's studio in New York overlooks the Columbia University building where in 1942 Urey and Compton were working on elements of what would become Robert Oppenheimer's Project Trinity.
4. Particularly 'Westmorland' and 'Cumberland' in William Camden (1695 edition). *Britannia*. Philemon Holland. pp. 805–846. These sections provided at an early stage, the range for the project, but which in view of the monuments and power station also included Heysham in Lancashire.
5. This includes the nuclear installations at Sellafield and Calder Hall (Britain's first nuclear installation on the site) and the Heysham nuclear power station reactors A & B in Lancashire. It also includes one of the largest renewable energy initiatives in Europe, The Walney Wind Farm, as well as the gas terminals at Rampside and Roosecote. Also included amongst the energy coast rosta is the Energus site at Lilly Hall which functions as a centre for engineering training, primarily for the nuclear industry. *Britain's Energy Coast* is also a trademark of the consortium set up to manage the resources of the West Cumbria region see http://www.britainsenergycoast.co.uk.
6. The Brampton Road Campus, home to many of the applied arts programmes for the University of Cumbria is actually built on the *vallum* at Stanwix. Now a World Heritage site, this was one of the largest and most militarily important of the forts on Hadrian's Wall. It was headquarters for the largest cavalry regiment in Britain at the time, the elite *Ala Petriana*, a Gaullish auxilliary unit who had won for themselves Roman citizenship.
7. See Gregory Benford (1999). *Deeptime: How humanity communicates across millennia*. Perennial.
8. See Alan Garner (1997). 'The Beauty Things'. Ch.14. pp.193–207 in *The Voice That Thunders*. Harvill.
9. Bryan was Artist in Residence at The Project Room at the Caldewgate Campus, home of the Fine Art programme at Carlisle between 9.11.12 – 8.12.12.
10. See R.G. Finch (1965). *Völsunga Saga*. Nelson.
11. See e.g. S.W. Partington (1909). *The Danes in Lancashire*. Sherratt and Hughes. See also Rachel

Newman (1996) Ch.6. 'The Dark Ages' in Richard Newman (ed.) (1996). *The Archaeology of Lancashire: Present state and future prioritie.* Lancaster University Archaeology Unit. pp.93–107.

12. See Christopher Tolkien (ed.) (2009). J.R.R Tolkien. *The Legend of Sigurd and Gudrún.* Harper/Collins.

13. See David Barrowclough (2008). *Prehistoric Lancashire*. History Press; and David Barrowclough (2010). *Prehistoric Cumbria*. History Press.

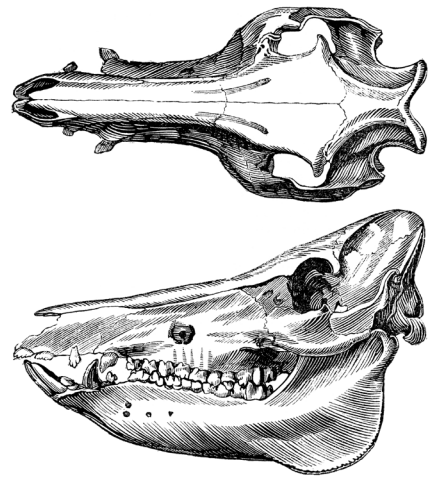
14. David Barrowclough (ed.) (2004). *Art and Archaeology: Unmasking material culture*. Archaeological Review From Cambridge. Vol.19.1 April 2004.

15. See e.g. Robert Fludd (1621). *Utrisque Cosmi: Tomus Primus de Macrocosmii Historia*. Oppenheim; Athaneus Kircher (1671). *Iter Extaticum*. Würzburg; Johann Daniel Mylius (1618). *Opus Medicochymicum*. Frankfurt.

16. Úlfr – a wolf (ON); Griss – a pig or boar (ON).

17. Notwithstanding the famous Allendale Wolf of 1904 discussed by no less a luminary than Charles Fort (1941:649) in *Lo*!

18. See Brook's fabulous design for a DVD and publication detailing the life and influence of Swedenborg in Phillip Makatrewicz's 2012 film *Heaven, Hell and Other Places: a film about Emanuel Swedenborg.* Directed and Edited by Jacob Cartwright and Nick Jordan. Published by the Swedenborg Society.



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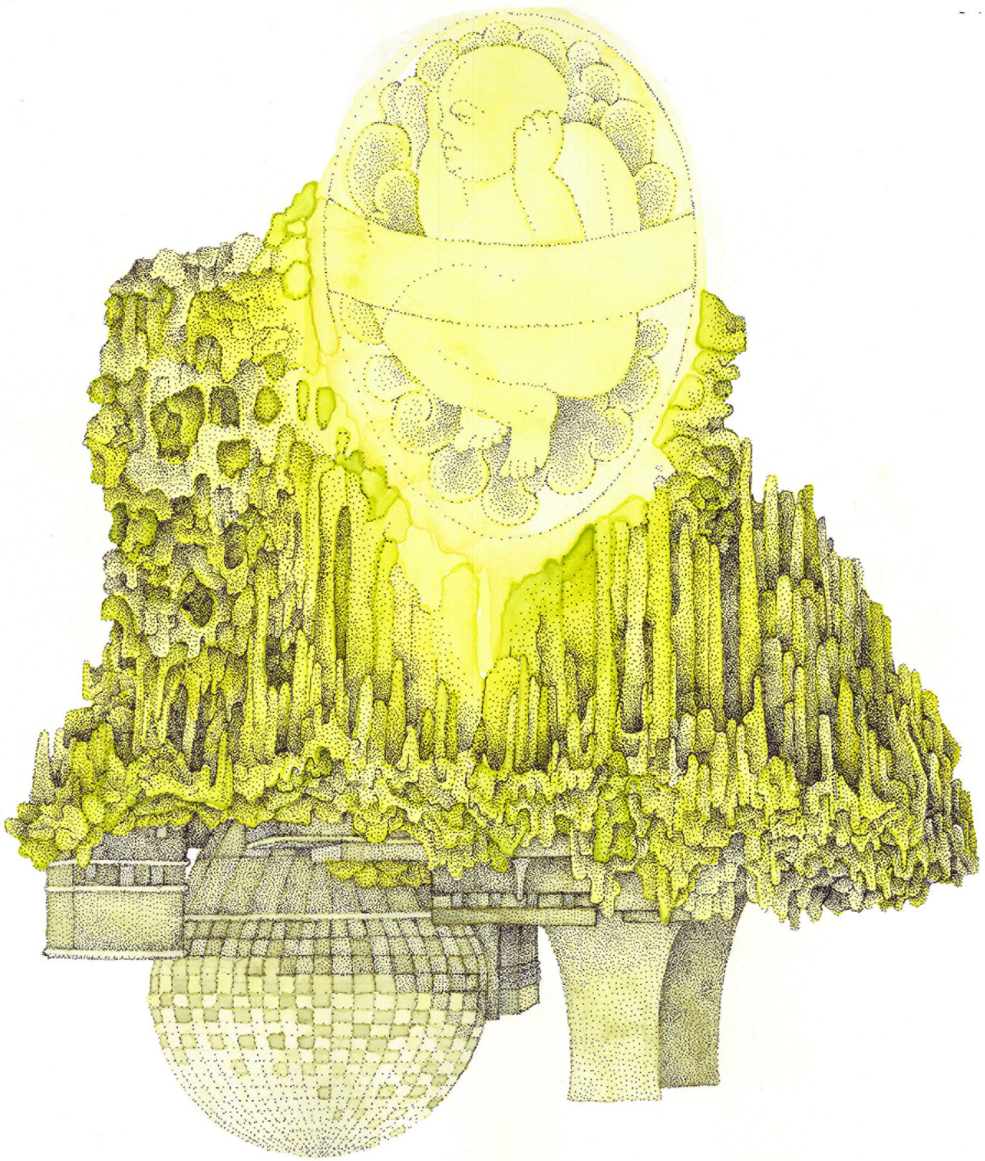


Dr. Paul Abraitis
A Natural History of Radioactivity in Cumbria

This chapter provides a brief natural history of radioactivity from an impartial, scientific perspective. It begins with the fundamental processes and origins of radioactivity and then describes some of the more recent human influences, as will be illustrated by a brief summary of major aspects of the nuclear industry in Cumbria.

Using the terms "natural" and "radioactivity" together in the same sentence may cause surprise to some. Mention of radioactivity may invoke images of purely man-made, industrial scenes, as typified by the Sellafield site in Cumbria, or the aftermath of nuclear disasters and nuclear explosions. However, as we shall see, our story begins not with the first nuclear facility built by humans but with the formation of the first radioactive atoms "shortly" after the universe began. Modern science has revealed that the first "natural" nuclear reactors operated on earth around two billion years ago at times long before humans had evolved. Human endeavours to harness the natural process of radioactivity are a very recent phenomenon in the context of geological time.

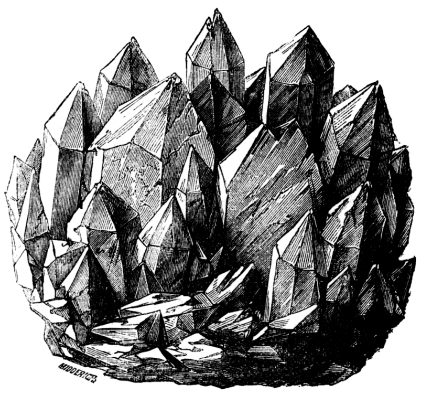
Alchemists have pursued the philosopher's stone, capable of *chrysopoeia* – the transformation of common and inexpensive base metals into the precious metal gold. Some might describe the nuclear fuel cycle as a kind of nuclear alchemy in that it involves a series of both chemical and nuclear reactions, which result in the conversion of ore (uranium minerals) into fuel and fuel into energy and waste. Central to the civil nuclear industry is the production of energy by nuclear fission in nuclear reactors. Here nuclear reactions are induced in an engineered environment and the desired product is energy (rather than gold) and the base metal is usually uranium (rather than lead).

Science reveals that transformations from one element to another are commonplace in nature as a result of nuclear reactions, which involve changes to atomic nuclei that are often accompanied by the emission of ionising radiations of various kinds. Radioactivity is a property of atoms that arises as a result of nuclear reactions. Nuclear reactions involve the spontaneous rearrangement of the atomic nucleus and are accompanied by the loss of mass and/or energy in the form of radiation. In contrast chemical reactions involve the sharing and transfer of electrons, which are located in the outer regions of the atom. Nuclear reactions can include a complex sequence of processes occurring via a number of possible paths, each with differing rates and probabilities. The term half-life is the time required for one-half the atoms of a given amount of radioactive isotope to undergo radioactive decay.

Nuclear reactions are responsible for radioactivity and in some cases may be induced by bombarding atomic nuclei with neutrons, as in a nuclear reactor. Some atomic nuclei are stable and unchanging but many others are not. Unstable nuclei include certain naturally occurring atoms and others are produced artificially by human activities (e.g. processes occurring in nuclear reactors). Ultimately the laws of physics explain how radioactivity arises and provides a framework to develop an understanding of the nature, effects and behaviour of the radiation.
To understand nuclear reactions we need to consider atomic structure and what follows is a basic description of the complex reality. Atoms are the building blocks of matter and are built from yet smaller sub atomic particles. A sense of the scale is important here. An order of 10,000,000 (10 million) hydrogen atoms in a row would span the head of a pin. Water molecules each contain two atoms of hydrogen (H) and one atom of oxygen (O) combined and are (hence) denoted H_2O. A 6ml teaspoon of water contains an order of 200, 000,000,000,000,000,000,000,000 (2×10^{23}) water molecules.

For our purposes we will consider three subatomic particles: protons, electrons and neutrons. Each atom comprises a central nucleus containing protons and neutrons. Electrons are located within specific paths or orbits surrounding the atomic nucleus. A simple analogy is that of a solar system, in which the planets (electrons) orbit around the nucleus (a sun). In relative terms the nucleus is very small but very heavy and carries of positive electrical charge. The electrons carry a negative charge. Electrical forces hold the particles together as an atom. In terms of mass the proton is 1800 times heavier than the electron. Neutrons have similar mass to protons but carry no electrical charge. A given element is characterised by a specific number of protons in the atomic nucleus. Hydrogen atoms have one proton whilst larger atoms may have tens of protons (for example atoms of the element uranium contain 92 protons). Different isotopes of a given element have the same number of protons in each atomic nucleus but a differing number of neutrons (for example atoms of uranium-235 contain 143 neutrons whilst uranium-238 atoms contain 146 neutrons).

Before the first atoms existed, some 13–14 billion or so years ago, the so called "Big Bang" resulted in everything that has now evolved in the "observable" universe, which is of the order 9×10^{23} kilometres in diameter. Rather than an explosion the "Big Bang" was an expansion from an infinitesimal, super-dense, super-hot and concentrated "singularity" which was perhaps the size of a pin head. This expanded very rapidly carrying everything with it and the expansion continues today.



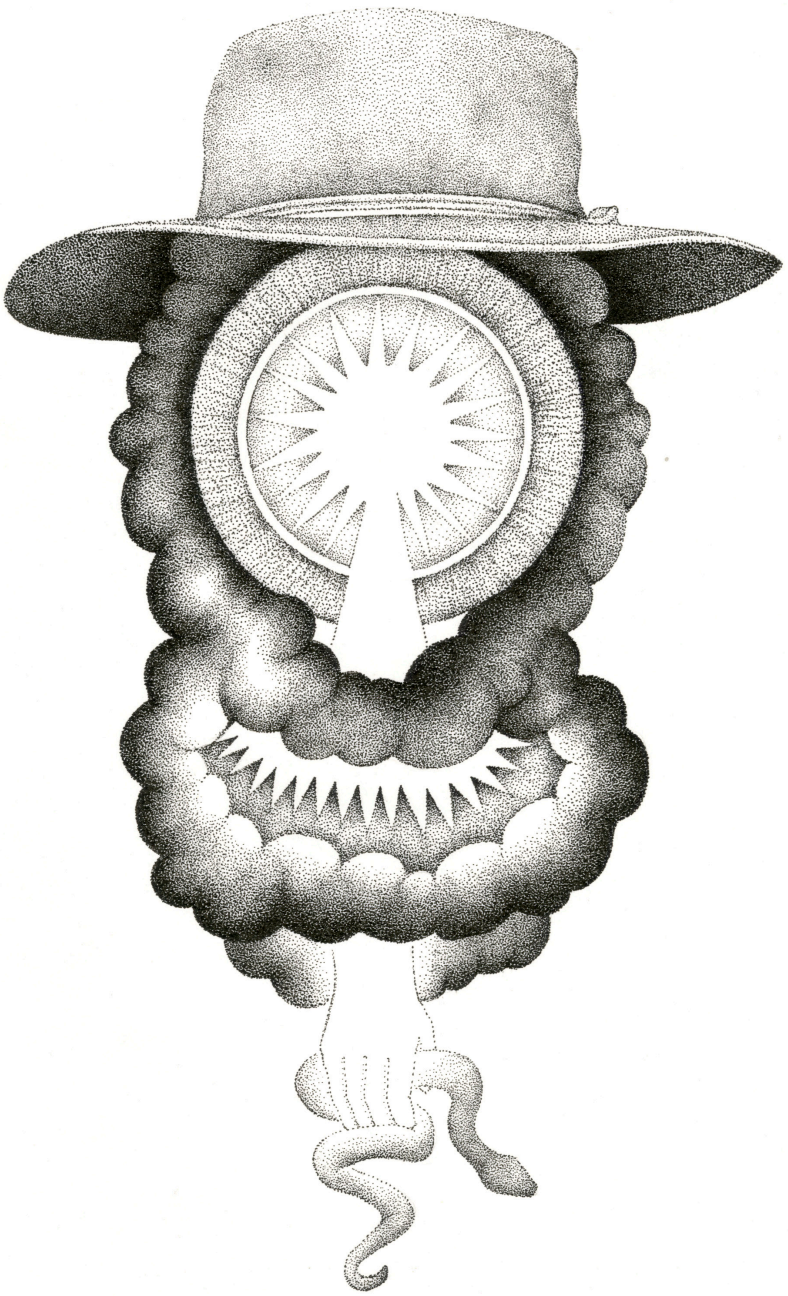
On the scale of a few minutes following the "Big Bang" all of the subatomic particles in the entire universe at that time had formed, including the protons, neutrons and electrons described above. Thus the building blocks of atoms were born. Shortly afterwards protons and neutrons fused to form helium ions (two protons and two neutrons together). Such matter was concentrated in clumps within the expanding space. As the space cooled and continued to expand, probably on timescales of several hundred thousand years, the temperatures became low enough for electron shells to form and helium and hydrogen atoms developed. Thus localised, gaseous clouds were scattered within the expanding space and the force of gravitational attraction resulted in coalescence to form

"protogalaxies", which continued to differentiate forming galaxies. Stars (such as our "nearby" sun) started out as gas clouds within which atoms came together. This generates high temperatures and electrons are stripped from atomic shells and hydrogen nuclei begin to fuse forming helium nuclei and vast amounts of energy. 620 million metric tons of hydrogen is fused each second in the Sun. Eventually, as contraction under gravity continues the helium nuclei then begin to fuse, forming still larger nuclei of the lighter elements (such as carbon and oxygen). Heavier and heavier atoms (more and more neutrons and protons combined) develop and eventually the core of the star is crushed by gravity and the resulting explosion is known as a supernovae. A supernova generates the larger atoms, including radioactive atoms of elements such as uranium. Complex processes of hydrogen burning and collapsing at the heart of stars has given rise to new accumulations of atoms through stellar cycles, each lasting perhaps billions of years. Within the observable universe there are billions of galaxies and each has billions of stars. Over unimaginable timescales small aggregates of material released through such stellar cycles have assembled into small aggregates, growing, combining and merging. Eventually such assemblies of matter stabilised to form planets, moons and comets.

The Earth contains an array of atoms created at the heart of supernovae. Within the Earth's core, decay of radioactive elements such as potassium and uranium gives rise to heat which drives convention in the molten interior. This ultimately causes continental drift as discrete plates within the Earth's crust drift and crash into each other over geological timescales. Ultimately geological activity has shaped and reshaped the continents. Gases released from the Earth's interior during volcanic activity and further matter derived from comets has created the atmosphere. After half a billion years or so conditions at the surface of the Earth were such that life began and the marvel of evolution has resulted in an amazing biodiversity. Man appeared very late in this story.

It is worth a moment to reflect on a number of bewildering scales (Figure 1): the scale of the universe to subatomic scales, timescales that are hard to imagine in human terms, the complexity of living organisms, distances that are beyond real comprehension and amounts of energy and matter that beggars belief. Radioactivity has been an integral feature of the universe since the first radioactive atoms appeared. Life evolved and continues to flourish in a radioactive environment. Natural radioactivity is all around and within us, although the amounts can vary depending on location. Indeed we are naturally radioactive because small quantities of the atoms that comprise our bodies are subject to radioactive decay.

There are several sources of natural radioactivity and each contributes to the radiation dose that we all receive from purely natural sources. Firstly, cosmic rays are highly energetic protons and alpha particles arising from the Sun together with components of wider galactic origin. Exposure to natural radiation also arises in part from the material comprising the earth's crust from which terrestrial gamma radiation arises. There are predominantly three naturally occurring elements giving rise to such gamma radiation and associated radiation dose. These are potassium, thorium and uranium and each is typically present in the soils, sediments, rocks and the building materials all around



us. Concentrations vary and certain types of rock, such as granite, are generally rich in these elements. A third type of natural radiation exposure arises from the radioactive gas radon and the daughter products resulting from its decay. The daughter products can adhere to atmospheric particles and become lodged in the lungs, resulting in irradiation and possible damage to lung tissue if exposure levels are high and prolonged.

Natural radioactivity is also encountered in food and water with the key radionuclide being radium-226 (Ra-226 formed by decay of uranium U-238) and its alpha emitting daughter products (including isotopes of radon, polonium and lead)[1]. Radium also occurs naturally in public water supplies and can vary widely in concentration, with certain springs and well supplies having relatively high radium contents[2]. An additional contributor is potassium-40 (K-40), which is a minor isotope of potassium. We each receive a radiation dose from our own internal potassium stocks because potassium is an essential element and a significant component of human soft tissue (circa 0.2%).

A further illustration of natural radioactivity specific to Cumbria arises from historic phosphate processing activities. The latter were a source of naturally-occurring radionuclides discharged into the marine environment. Phosphoric acid was manufactured from imported phosphate ore at a former "non-nuclear" chemical plant in Whitehaven. As a by-product of this process phosphogypsum slurry was discharged at Saltom Bay. Discharges from the plant ceased completely in 2002 and the site was demolished in 2004. Site discharges contained naturally occurring radionuclides of uranium, thorium and associated daughter products (including lead-210 and polonium-210). Here, naturally occurring materials had been processed, giving rise to what is known as technically enhanced naturally occurring radioactive materials (or TNORM). Notably the radiation dose arising from these historic operations dominated the total dose measured from all sources at Sellafield based on an assessment in 2011[3].

Artificial radionuclides arise from human activities. The first artificial radionuclide was produced in 1919 by Ernest Rutherford, working in Manchester, who passed alpha particles through nitrogen and produced a radioactive isotope of the element phosphorous. Since that time other activities on industrial scales have produced significant quantities of artificial radionuclides, particularly during nuclear power production and related industrial operations, from nuclear weapons testing and via certain medical and scientific facilities and related practices.

In what follows we focus on nuclear power related industry and how this has been enacted in Cumbria. The modern nuclear industry is based around the nuclear fuel cycle (Figure 2). The nuclear fuel cycle involves progressing nuclear fuel through a series of differing stages consisting: enrichment to increase the reactivity of natural uranium (where required), the manufacture of nuclear fuel; the "burning" of nuclear fuel during reactor operations and the "back end" in which spent fuel and waste products are safely managed and contained, with the intention of final disposal.

"Burning" of nuclear fuel involves the process of nuclear fission or "splitting of the atom". Nuclear fission involves the splitting of large atoms (such as those of uranium). Only certain isotopes of heavy elements are readily fissioned and of

particular importance to the nuclear industry is uranium-235 (the term "fissile" is applied to such isotopes). Fission of U-235 can be induced by bombardment with subatomic projectiles, such as neutrons. When fission occurs the atomic nuclei may split in a number of ways to yield around 800 different isotopic species, termed fission products, plus further neutrons. Many of these fission products are radioactive and typically decay via a series of steps with half-lives that are initially short and becoming longer in the later stages of the decay process.

Natural "as mined" uranium contains only a low proportion of the useful "fissile" isotope U-235. Currently the proportion of U-235 in natural uranium is approximately 0.7% as the non-fissile U-238 isotope dominates. However, long ago (about 2 billion years or so) the concentration of U-235 in uranium was much higher than today (i.e. several per cent compared to 0.7% at present). This is because U-235 has a shorter half-life than U-238 and hence the percentage of U-235 decreases over time, albeit very slowly in a human context. In 1972 French scientists discovered that uranium from a mine in Oklo (Gabon) had isotopic ratios suggesting that nuclear fission had occurred. Further scientific investigations have now concluded that low power, water moderated fission reactors operated in these ancient uranium ore bodies possibly for hundreds of thousands of years. The discovery of these entirely natural ancient reactors post-dated human induced nuclear fission (first accomplished in the late 1930's).

Understanding of atomic structure and radioactivity led to the realisation that splitting of the atom, that is nuclear fission, had the capacity to generate large amounts of energy. In fact, a single kilogram of U-235 can produce around 18.7 million kilowatt hours of energy. To compare with energy release from chemical fuel sources it is illustrative to note that each nuclear fission reaction yields of the order 200,000,000 electron Volts (eV) (a unit of energy), whilst the chemical reaction of two hydrogen atoms and an oxygen atom yields only 3 eV. Per equivalent mass of fuel burned this means that millions of times more energy is released from fission of nuclear fuel as compared to the burning of chemical fuels (such as coal or gas).

Einstein's famous equation $E=MC^2$ helps to explain the enormous energies involved in nuclear reactions. This states that energy (E) is equal to the product of mass (M) multiplied by the speed of light (c) squared. Following a nuclear reaction the sum of the masses of the reaction products is less than the mass of the reactants, as some of the matter is converted to energy. A small amount of mass transforms to a large amount of energy. The energy arising in such processes is mostly kinetic in nature (i.e. imparted as motion to the particles arising in the process) but some may arise as high energy electromagnetic radiation (gamma rays) as a result of transitions between energy states within atomic nuclei.

Uranium occurs in nature in a very wide variety of mineral forms which are ultimately the source of most nuclear fuel. Uranium is not a rare element compared to many and uranium mining becomes economically viable where it occurs in significant, concentrated amounts in the earth's crust. A variety of geological settings provide uranium ore. Mined uranium ore is typically converted to a purified, crude oxide form. This is characteristically yellow and the powder is termed "yellow cake". No uranium mining occurs in Cumbria[4] and the British nuclear industry relies on imported uranium.

Figure 1: Spiral patterns are found extensively in nature, both in living and non-living materials and at all scales.

(a) A spiral galaxy. Uranium and many other naturally radioactive elements were formed at the heart of stars in stellar cycles over billions of years.

(b) Spiral internals of a nautilus shell. Life evolved in a naturally radioactive environment. Mankind now harnesses radioactivity (and related nuclear reactions) in the nuclear fuel cycle.

(c) Spiral ionisation tracks produced by radioactive particles within a bubble chamber. Radioactivity interacts with matter. Significantly radioactive materials and waste must be managed to protect human health and the environment.

1

2

3

5

7

Figure 2: The nuclear fuel cycle (in NW England).

1 MINING AND MILLING *Uranium ore is mined and processed into yellow cake (overseas)*

2 ENRICHMENT *Uranium is enriched to increase the proportion of U–235 (e.g. at Urenco UK Limited, Capenhurst near Chester)*

3 FUEL FABRICATION *Nuclear fuel is manufactured, clad and assembled into fuel elements (e.g. at Springfields near Preston)*

4 POWER PRODUCTION *Fuel is burnt via nuclear reactions in reactors (e.g. the former Calder Hall reactors at Sellafield). Heat energy is converted to electricity. Used (spent) fuel is transferred to Sellafield for reprocessing.*

5 REPROCESSING *At Sellafield spent nuclear fuel is processed to separate plutonium and uranium. Waste fission products are immobilised by vitrification (conversion to glass). Historically fuel has been fabricated from separated plutonium and uranium. Wastes arising from reprocessing are stored and some have been converted into forms that are suitable for long–term storage and (potentially) eventual geological disposal.*

6 WASTE MANAGEMENT *Wastes can arise at all stages in the cycle. Radioactive wastes are categorised in terms of the radioactivity level. High Level Waste arises only at Sellafield during reprocessing. Low level waste can be disposed at the Low Level Waste Repository (located near Drigg in Cumbria). HLW and ILW are stored pending a final, geological disposal solution.*

7 HLW

8 ILW

9 LLWR

10 STORAGE

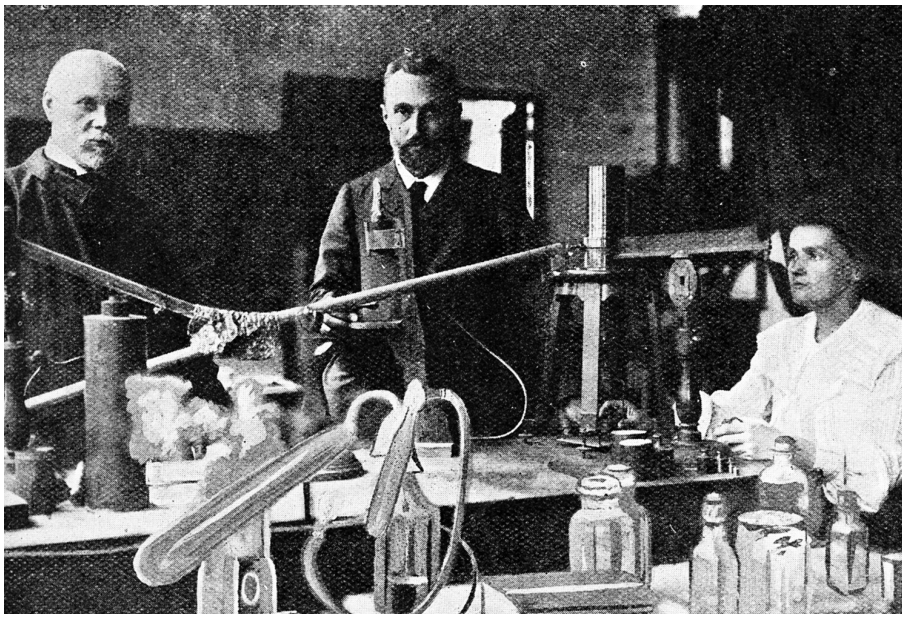
11 DISPOSAL

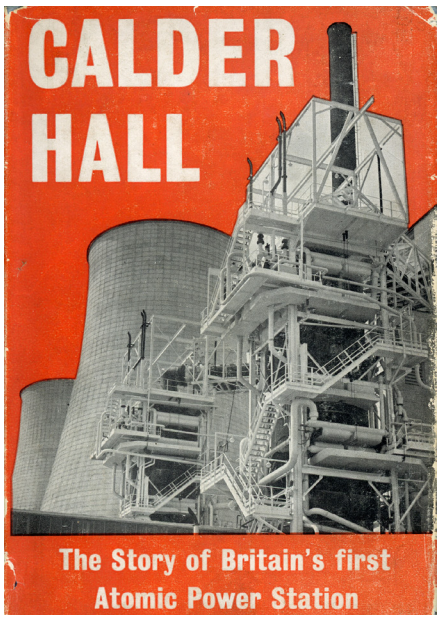
6

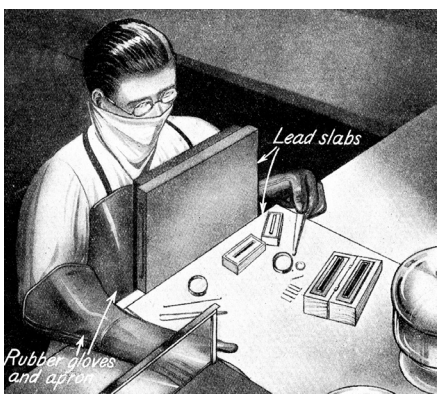
8

9


Wilesco
Atomic
power plant
110 VOLT
250WATT
7







Certain types of nuclear reactors, such as the Advanced Gas Cooled reactors in England and Scotland, and the modern Pressurised Water Reactors at Sizewell B, burn "enriched" uranium dioxide (UO_2) based fuels. Enrichment involves separating the uranium isotopes to enrich the proportion of fissile U-235, typically to a few per cent. Enrichment involves both chemical and physical processes. Firstly uranium is converted to a gaseous form via chemical reactions. The resulting uranium bearing gas is centrifuged at very high speed and the mass difference between the U-235 and U-238 leads to separation into "enriched" and "depleted" fractions. The enriched fraction (typically with a few per cent U-235) is used for nuclear fuel manufacture. In England, uranium enrichment is undertaken at the Urenco UK Limited site at Capenhurst in Cheshire.
Nuclear fuel contains fissile material within a suitable solid matrix and enclosed within metallic "cladding". Such fuel elements are arranged in appropriate geometries in so-called assemblies. Various types of fuel have been manufactured at the Springfields site in Lancashire and mixed uranium and plutonium oxide based fuel (MOX) has been manufactured at the Sellafield site in Cumbria.

In the UK, two broad classes of nuclear fuel have been used historically in nuclear power stations. There are fuels based on metallic uranium, where the uranium is not enriched (or only very slightly enriched). Such fuels are used in the so-called Magnox reactors, which include the Calder Hall reactors that operated at the Sellafield site. The term Magnox refers to Magnesium non-oxidising. Such fuel comprises metallic bars of uranium housed in a magnesium based alloy cladding. More recent reactor designs use enriched uranium in the form of uranium oxide pellets within suitable metallic cladding.

Nuclear power relies on engineered, sustainable neutron chain reactions involving the fission of nuclear fuel. Most nuclear reactors use a moderator to lower the kinetic energy of the neutrons and increase the probability that fission will occur. This allows reactors to use material with far lower concentrations of fissile isotopes. Graphite and heavy water are the most effective moderators, because they slow neutrons through collisions without absorbing them. Reactors using graphite as the moderator can operate using natural uranium without enrichment, such as in the reactors which use Magnox fuel. Calder Hall, located on the Sellafield site, was the world's first commercial nuclear power station and was based on Magnox technology. The Calder Hall reactors were designed principally to produce plutonium for nuclear weapons. Power generation started at Calder Hall in 1956 and ceased in 2003.

In a nuclear reactor the heat released in the core as a result of nuclear fission and related processes is used to produce steam and hence to drive turbines and produce electricity using essentially the same turbine technology as power stations fuelled by oil or gas. The only major difference is the source of heat energy. As fissile uranium is "burned" in a reactor fission products accumulate and a complex, highly radioactive mixture develops within the fuel. Ultimately the fission products decrease the efficiency of fission and the fuel must be removed and replaced (often on a three year cycle). Typically for each tonne of uranium burned of the order of 34kg of fission products are produced (although this varies depending on fuel type and reactor history). Used or spent fuel contains materials (such as plutonium) that may be considered valuable for further energy production or other uses in addition to the highly radioactive fission products.

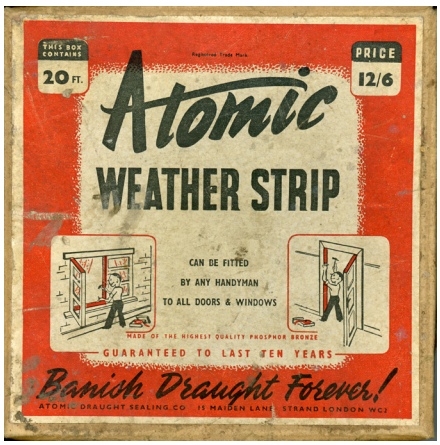

St Ann's Hill 76
via City Centre
people
have so far signed the petition
to save the Lake District
from becoming a nuclear dump.
Please do all you can
to stop these plans.


MIGHTY ATOM
SELLAFIELD VISITORS CENTRE


NUCLEAR POWER?
NO THANKS

Sellafield is a large and complex nuclear chemical facility located in West Cumbria and has been operational since the 1940s. Site operations include fuel reprocessing, fuel fabrication and storage of nuclear materials and radioactive wastes. Windscale is also located on the Sellafield site and comprises three reactors, which currently await decommissioning. Two of the reactors were shut down in 1957 and the third one was closed in 1981. The Windscale fire in 1957 caused substantial damage to one of the reactors and is the worst nuclear accident in Great Britain's history. On the 7-point International Nuclear Event Scale this was ranked in severity at level 5 "Accident with wider consequences" (compared with the 1986 Chernobyl and the 2011 Fukushima Daiichi nuclear disasters which were both ranked at level 7 "Major Disaster").

During reprocessing at Sellafield, spent fuel elements are disassembled and the fuel is dissolved at high temperatures in acid. The resulting highly radioactive liquor is then subject to complex chemical separation processes that effectively separate uranium, plutonium and the fission products. The latter are subsequently melted along with glass forming components resulting in canisters of vitrified High Level Waste (HLW). The waste product is essentially a boroslicate glass that is similar to Pyrex, but contains a highly radioactive mixture of fission products. Thus the waste is immobilised into a chemically durable "waste form" that has been designed for safe storage and eventual disposal.



Radioactive wastes are generated at all stages in the nuclear fuel cycle. Storage and disposal of radioactive wastes is subject to regulatory control. Only low concentrations of radioactivity from industrial operations can be legally discharged into the environment (e.g. as gases or liquids) where this is practicably unavoidable and the impacts of doing so are assessed and shown to be suitably low.

Radioactive wastes can vary widely in terms of radioactivity level (or content) and in terms of chemical and physical form. Given that radioactivity diminishes over time, waste management aims to store and isolate it until the hazard is significantly reduced. The period of time that waste must be stored depends on the type of waste. The most long-lived radioactive wastes, including any spent nuclear fuel that may be declared as waste, must be contained and isolated from humans and the environment for a very long time. To illustrate this, it has been estimated that the radiotoxicity (a measure of the associated hazard) of typical HLW will exceed that of natural uranium ore for periods of the order 10,000 years. The preferred option for long-term management of higher activity radioactive wastes (ILW & HLW) in many nuclear programmes around the world is geological disposal. This involves disposal in engineered facilities (or "repositories") located at depth within suitable geological settings.

Wastes with the lowest radioactivity content (or level) are termed Low Levels Wastes (LLW). Such wastes arise in relatively large volumes during all applications of radioactivity, including those in the medical, industrial, scientific and military sectors. Typical LLW arisings include: contaminated solids and liquids, wastes from cleaning and decontamination activities, laboratory items and other equipment, together with the operational discharges of gases and liquids from nuclear facilities.

The Low Level Waste (LLW) Repository is located in Cumbria near to the village of Drigg. This site has operated as a national LLW disposal facility since 1959. Currently LLW is compacted and placed in containers before being transferred to the facility. Historically, waste was disposed in trench like landfills at the site. However, all LLW is now disposed in engineered concrete vaults following a major upgrade of disposal operations in 1995.

LLW is also treated at a metals recycling facility operated by Studsvik UK Limited at Workington. Waste is now treated using techniques such as size reduction and shot-blasting, which aim to achieve volume-reduction and stabilization of the waste before disposal. This also provides the opportunity to recover valuable metals for recycling and hence, avoids the need for disposal.

Intermediate Level Wastes (ILW) has radioactivity levels above LLW, but below those of HLW. Unlike HLW, such wastes do not generate sufficient heat for it to be considered in the design of storage or disposal facilities. ILW can include solid and liquid wastes generated during fuel reprocessing (e.g. cladding removed from fuels), residues from effluent treatment plants (e.g. sludges derived from effluent treatment) and wastes arising during the decommissioning of nuclear facilities. A large proportion of the UK's ILW is stored at Sellafield and some such waste has been treated or "conditioned" into forms that are suitable for storage and eventual disposal. Typically, to date, such treatment has involved encapsulation in cementitious grouts and packaging in stainless steel containers.

HLW consists of residue and very active liquors that arise from reprocessing. The high levels of radioactivity generate heat and such wastes require cooling as part of safe storage prior to (eventual) disposal. As was described above, HLW from reprocessing is stored and converted to glass at Sellafield. Certain types of spent nuclear fuel that are not reprocessed would also be classified as HLW if they are declared as waste.

The Government's Managing Radioactive Waste Safely (MRWS) programme aims to find a practicable long-term solution for the UK's higher activity radioactive wastes (including ILW and HLW). The policy intent is for geological disposal, preceded by safe and secure interim storage. As a part of this process, the Government has invited communities interested in hosting a geological disposal facility to express an interest in beginning discussions. Subsequently, three local authorities in West Cumbria expressed an interest in two areas (Copeland and Allerdale). However, in January 2013 a decision was taken by Cumbria County Council not to proceed any further in the MRWS process and involvement in West Cumbria came to an end.

In summary, the natural history of radioactivity spans time immemorial and begins with the formation of the first radioactive atoms billions of years ago. Only very recently (on geological timescales) have human activities sought to utilise nuclear reactions for industrial, medical, scientific and military purposes. Humans developed nuclear reactors about 2 billion years after natural fission reactors operated in the Earth's crust without human influence. Human activities have contributed artificial radioactivity to the natural radioactive background. The

nuclear industry in Cumbria enacts a number of aspects of the nuclear fuel cycle. Any final solutions for dealing with the higher activity wastes arising from such activities remain to be implemented.

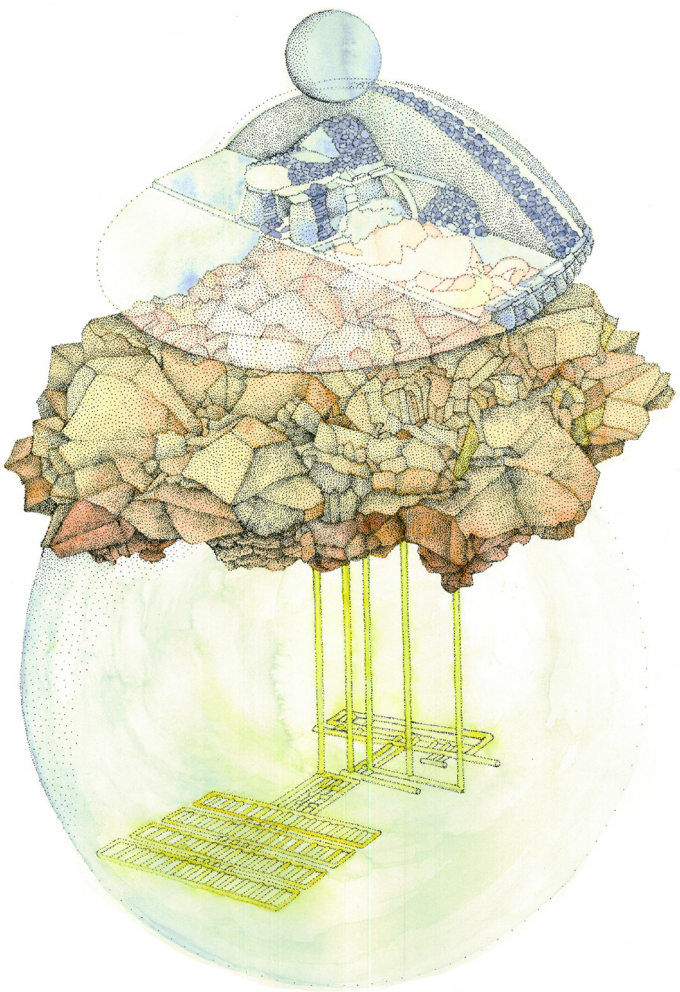
NOTES

1. Some foods accumulate radium and hence exhibit enhanced natural radioactivity. The most widely quoted example is Brazil nuts, which selectively accumulate radium in place of calcium (which is chemically similar). Bananas are a rich source of potassium (and hence radioactive K-40). Indeed when interpreting radiation doses the term banana dose is sometimes used as one unit of radiation dose uptake for illustrative purposes.
2. Indeed the relatively high radium content of certain mineral waters and presumed health benefits has historically been promoted as a selling point.
3. Here radiation doses from man-made (i.e. nuclear industry derived) and naturally occurring radionuclides were assessed to be 0.068 and 0.11 mSv respectively (See further suggested reading for more detail).
4. Natural uranium is widely distributed in rocks throughout Cornwall and was mined at the South Terras Mine from 1873 to 1903 (clearly not for nuclear industry purposes at that time). The mine was also an important source of radium (radium being a decay product of uranium).

FURTHER READING

This brief text is intended to provide an impartial overview and introduction to a very complex, potentially emotive and poorly understood subject. The following texts are recommended for interested readers.

Anon. (2011). *Radioactivity in Food and the Environment*. RIFE 17. Environment Agency, Food Standards Agency, NIEA and SEPA in 2012.
Choppin, G, Liljenzi J.O and Rydberg, J. (1995). *Radiochemistry and Nuclear Chemistry*. Butterworth/Heinemann.
Wilson, P.D. (1996). *The Nuclear Fuel Cycle From Ore to Waste*. Oxford University Press



Dr. David Barrowclough
Making the Past: Prospective Memorialisation and the Creation of Myth

Time present and time past
Are both perhaps present in time future
And time future contained in time past.

T S Eliot: *Four Quartets, 1 Burnt Norton*

INTRODUCTION

Meticulous illustrations of a fantastical world juxtaposing industrial mine shafts, nuclear power stations with a prone mummified body and dangerous wolf. All illuminated by an eerie yellow glow. A series of photographs featuring a smartly dressed, yet masked, man in unexpected situations next to a prehistoric standing stone, within a Neolithic stone circle and seated in an armchair in an underground cavern. What are we to make of these recurring images? What is driving Bryan Wilson and Robert Williams to produce this subtly disturbing work? In short, what does it all mean?

Ever since Rutherford split the atom and discovered the concept of radioactivity's half-life, we have been forced to confront the radioactive legacy of both atomic weapons and nuclear energy, and the capacity for one generation of scientists to change the course of history for all future generations of humans. With a half-life of tens of thousands and sometimes millions of years, nuclear waste its storage and containment has become a topic of both scientific and political debate, central to which is how its safety can be maintained over millennia. This is the stimulus for Wilson and Williams' work, which invites us to consider how we might communicate the presence and danger of these exotic materials far into the future.

TIME

Time is a central theme within this work. These artists challenge us to think about scales of time by juxtaposing long-term radioactive decay, which takes place over 10,000s to 100,000s of years, with the instantaneous detonation of the atom bomb. This is a challenge familiar to archaeologists whose discipline has developed theories and methods to help make sense of a single event, such as a funeral, on the one hand, and the long-term rise and fall of civilizations on the other.

Traditionally, time is conceived of as progressing in a linear manner rather like an arrow in flight (Barrowclough 2007). This progression is represented in the sequences of deposits and artefacts revealed in the stratigraphy, the succession of layers that archaeologists excavate. From this comes the Three Age System of Stone

(Palaeolithic, Mesolithic and Neolithic), Bronze and Iron Ages, which give us the prehistoric chronology. As Wilson knows the presentation of time as a uniform linear phenomenon is problematic as it has defined historical explanation in a similar linear way. An alternative approach, which draws on ethnographic studies (Durkheim 1915, 9–11; Evans-Pritchard 1939; 1940) measures time according to cycles, particularly those of the seasons and human life-cycle.

The notion that time can be marked by events in the human life-cycle, or by the natural phenomena of lunar or solar movements, is one that figures repeatedly in Wilson's drawings, for example *Wolf 2*, as a way of comprehending the life-cycle of radioactive elements. There have been numerous archaeological studies, which have found that these ideas of temporality offer persuasive interpretations of archaeological data, not least for interpretations of Cumbria's Neolithic stone circles (Barrowclough 2010 chap 5), which are explored by the two artists.

The challenge has been to find ways that combine the two approaches of linear time and cyclical time to be able to fulfil its role as to explain change over the long-term.

The *Annales* school was critical of traditional history as a linear sequence of events (Bloch and Febvre 1929, Fernand Braudel 1972; 1980). As a solution they proposed a model with three different parallel timescales: the short-, medium- and long-term (figure 1, below).

TIME SCALE	DESCRIPTION
Evenements History of events	Short-term – *evenements* Narrative, political history: events: individuals
Moyenne durée Structural history	Medium-term – *conjunctures* Social, economic history; economic, agrarian, demographic cycles; history of eras, regions, societies; world views, ideologies (*mentalités*)
Longue durée Structural history	Long-term – structures of the longue durée Geohistory: 'enabling and constraining'; history of civilizations, peoples; stable technologies, worldviews (*mentalités*)

Figure 1. Braudel's model of historical time: short, medium and long-term history.

By using more than one scale of time, the model is able to combine long and short-term events both linear and cyclical. The long term, *longue durée,* covered very slow-moving processes such as the environment over several tens of thousands of years. The medium term, *moyenne durée*, referred to social or structural history, such as persistent forms of social or economic organization over periods of up to several centuries, for example, the present industrial age. The short-term, *evenements*, referred to events or individuals, usually the main focus of most traditional history. An example would be the life and events that led Robert Oppenheimer to lead the development and detonation of the first nuclear bomb.

For the two artists, as with the *Annalistes*, each scale affected the course of the others, all being intertwined. Thus, the radioactive residue that last 100,000s of years arise out of the short-term event of detonating a bomb or activating a power station. Given archaeology's long timescale and resolution, I have found it attractive to adopt the *Annales* representation of time to help me understand prehistory and in the same way it is useful as a means to understand this work as to how ideas pass down through the ages, which might allow us to communicate the dangers of a nuclear depositary. By using different scales in archaeological analysis a much richer representation of time is created.

TRINITY

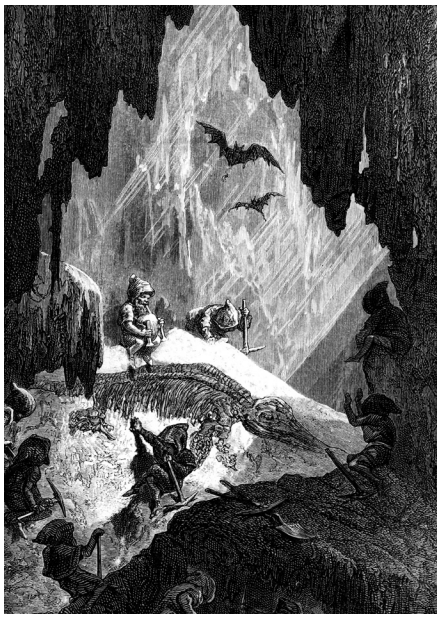
At 05:29:21 on 16th July 1945 the first nuclear device, codenamed Trinity, exploded with an energy equivalent to around 20 kilotons of TNT at the White Sands Missile Range in the USA, and the Atomic Age was born. The near instantaneous event illuminated the surrounding mountains 'brighter than daytime' for one or two seconds, and the heat was reported as 'being as hot as an oven'. The roar of the shockwave took 40 seconds to reach the observers and was felt over 100 miles (160 km) away, and the mushroom cloud reached 7.5 miles (12 km) in height. The enormous energy released in that instant changed the world. It left a crater of radioactive glass in the desert 10 feet (3 m) deep and 1,100 feet (330 m) wide. Trinitite, the name given to this glassy residue left on the desert floor melted by the atomic blast, is a light green colour and mildly radioactive, and was an early focus of Wilson's artistic attention.

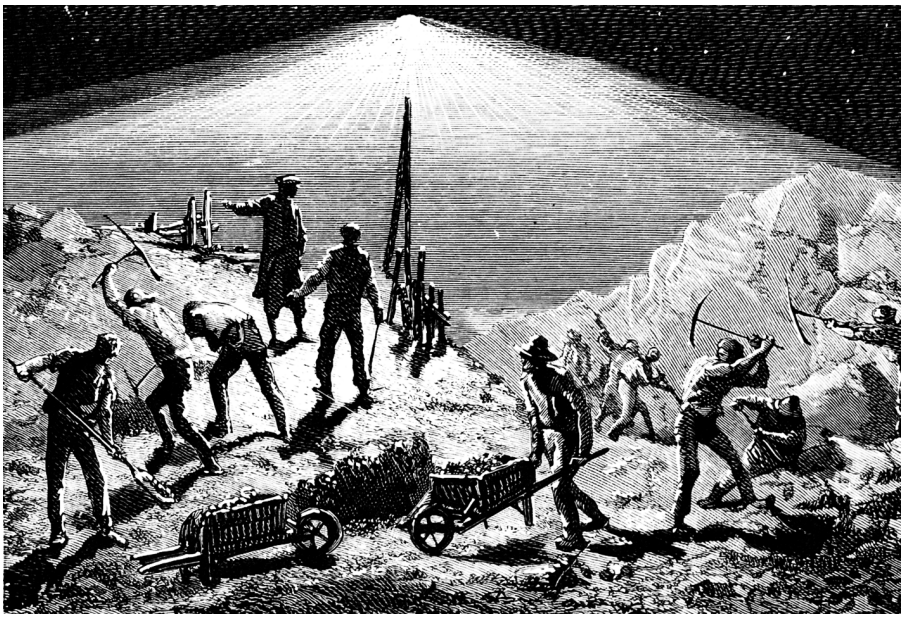
Less safe were some of the other fission products, derived from the civil nuclear power industry, which developed shortly after. Of particular concern are two long-lived fission products, Technetium-99 with a half-life of 220,000 years and Iodine-129 whose half-life is 15.7 million years. Other troublesome elements in spent fuel are Neptunium-237 with a half-life of two million years and Plutonium-239 with a half-life of 24,000 years. The challenge of storing high-level radioactive waste over such long periods is incomprehensible.

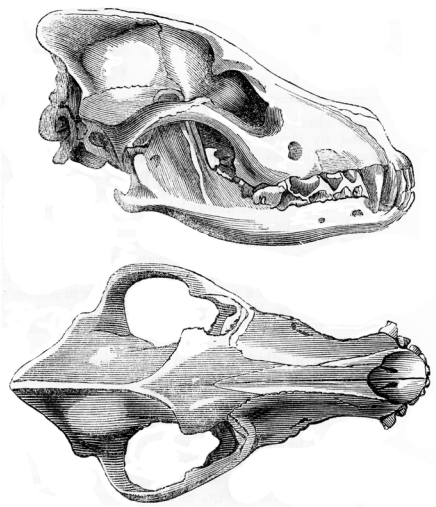
Internationally, governments favour burials deep underground, although there has been limited progress toward implementing such long-term waste management solutions. This is partly because the timeframes in question when dealing with radioactive waste range from 10,000 to millions of years, and fears that knowledge of the existence of a waste repository will be lost over a period of hundreds of years allowing for the accidental disturbance of the waste at some future date with possibly catastrophic consequences. This is a central interest for the work here: how we might communicate the danger of the waste to people in tens even hundreds of thousands of years' time.

LONGUE DURÉE

The notion of creating ways of communicating with future generations over the *longue durée* of 100,000s to millions of years seems overwhelming. But because Cumbria sits in northern latitude, where it is susceptible to regular cycles of ice age glaciation, we are able to dramatically reduce the timescale over which we need to communicate our fears.







Skull of European Wolf.

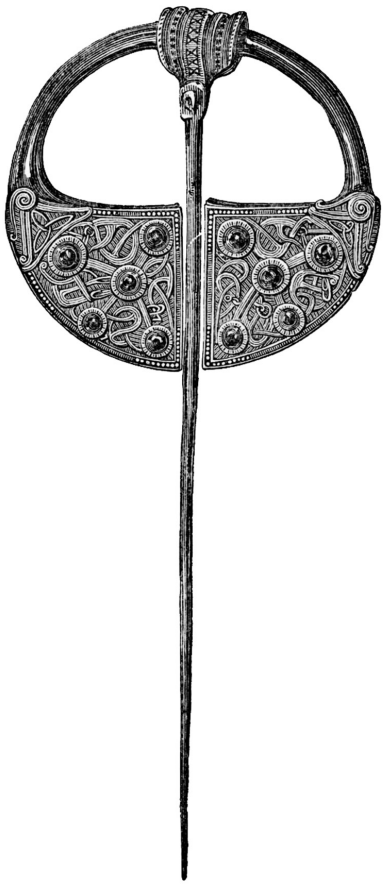
Data from the last 800,000 years shows that the Earth periodically warms and cools in cycles of *c.*100,000 years. Long Ice Age periods are punctuated by shorter warm ones, called interglacials, which last approximately 15,000 to 20,000 years before regressing back to a cold ice age climate. We are currently living through one such interglacial period that has already lasted *c.*18,000 years, suggesting that our current warm period is due to end within the next 2,000 years or so, when a new Ice Age will overtake us. This has significant implications for long-term storage of nuclear waste.

The erosional effect of the last Ice Age, known as the Devensian 110,000 to 10,000 years ago, removed many traces of the first occupants of Cumbria during the previous interglacial period. Throughout the glacial periods, huge slow moving rivers of ice covered the land with the power to move rocks and slowly grind away steep valley sides. It was during the period, known as the Palaeolithic in archaeological terms that the genus *Homo* evolved in Africa. Eight hundred thousand years ago, *Homo erectus* was living in Britain hunting elephants, rhinos and hippopotamuses. But with the onset of the last Ice Age temperatures plummeted, and the animals migrated across the land bridge between Britain and Europe to warmer climes. They were followed by the *Homo erectus* hunter-gatherers in search of food. Britain became uninhabitable. Huge ice caps covered Scotland and Northern England. At this time, glaciers several thousand feet thick covered England (Gallois 1988), which eradicated all evidence of our ancient cousins. It was during this Ice Age period between 40,000 and 10,000 years ago that the first Anatomically Modern Humans, sometimes referred to as '*Cro-Magnons*', appeared and co-existed with *Neanderthals* who also lived at this time.

When the temperature increased, the glaciers began to melt creating Arctic tundra conditions with melt-water rivers. In the uplands of northern Britain the fast flowing water scoured out U-shaped valleys typical of the Cumbrian landscape. As Britain progressively warmed, the ice continued to melt and sea levels rose by as much as 120m. It was at this time, about 10,000 years ago, that humans reoccupied Britain.

The implication of this cycle is that the next Ice Age will arrive within the next 2,000 years. It will cover Cumbria in an ice cap for *c.*80,000 years. People again will be forced to retreat as Britain becomes uninhabitable. The action of the ice will cause erosion, so waste needs to be buried at great depth. But provided it is, it will be protected from human interference. When the ice retreats most of the radioactive elements will have decayed rendering the site safer. Some will remain active with half-lives of 250,000 to 2 million years. The prospect of creating a monument etc. to the people who re-occupy the land is difficult to imagine – ice will scour away the surface and immediate subsurface taking with it any monuments, and there will be no surviving population to continue an oral tradition. Humans will either have died out or evolved into a new species by the time Britain is repopulated during the next interglacial period. Realistically, the problem is to protect the storage site from the time of construction until the next ice age, so we need to plan for 2,000 years or so. This is a much more realistic project.

Even though we are *c*.18,000 years into the current interglacial period, there are no buildings or monuments from the earliest part of this period, known as the Upper Palaeolithic, all that survives are a small number of flint blades found in caves at Kirkhead and Lindale Low dated to *c*.10,000 BC (Barrowclough 2010, 60). The earliest surviving man-made structure dates back to the Mesolithic hunter-gatherer period where, at Williamsons Moss, a wooden foundation platform was excavated along with 32,000 pieces of flint dated to the fifth millennium BC (Barrowclough 2010, 68). Wooden structures such as these rarely survive, usually only when waterlogged, and it is to the Neolithic period of the first farmers beginning around 4000BC that we need to turn to find surviving physically large monuments of stone and earth that have stood the test of time. An example of these long cairns, ancient burial chambers, is Skelmore Heads (Barrowclough 2010, 90 fig 39), and features in Wilson's drawings.



MONUMENTAL COMMUNICATION

Monuments figure in much of this work, and are clearly one way that we may communicate the presence of nuclear waste dumps to future generations. While it is customary to see megaliths as monuments from the past, Cornelius Holtorf (2000–2008) has argued that they can also be seen as monuments for the future. What makes monuments 'monumental' is their permanence and scale, their constant visibility, which evidence shows can span periods of 2000 years or more taking us to the next Ice Age.

According to Aleida Assmann (1991), monuments are a part of culture which wants to be seen, preserved and remembered by contemporary and later generations. They are signs that encode a message in a permanent way for communicating with people that are (possibly) millennia away (Assmann 1991: 13–4). There are many examples of this in history, but the pharaohs of ancient Egypt are perhaps the best known. They built monuments and left inscriptions in order to immortalize their names and deeds for posterity (Butterfield 1981: 48–9; Hornung 1982: 16; Seters 1983: 145–60). One Egyptian poet however, did not rate building monuments very highly, and recommended writing books instead in order to preserve one's name for the future (Hornung 1982: 14; see also Assmann 1996: 83–4, 305–6). Jan Assmann referred to this project of the Egyptians to construct 'sacred time', and create eternity, through the media of monumental architecture and written inscriptions as a 'monumental discourse' (Assmann 1992: 169; 1996: 78, 81–93).

The Greeks distinguished between 'human time' and 'monumental time' (Foxhall 1995). While human time refers to a time-span of three or four generations and is normally expressed as a kinship relationship, monumental time is truly permanent and connected with posterity and the realm of the divine Gods. Poetry, drama, historiography, sculpture and architecture are all to be seen as the Greeks' attempts to create memories-to-be; they were meant to act as signifiers which trigger off the words of humans, in which truly permanent memories reside. It is to this tradition that the work in this project gestures.

In an important ethnographic study, Debbora Battaglia has shown how extensive ceremonies in connection with death can be dominated by a concern with future memory, or 'projective remembrance', as she calls it (1990: 155f.). It is thus not

surprising that parallel to monument building, there were alternative ways of transmitting messages to an unknown future, some of which are also durable. Examples are oral narratives, regularly performed rituals and ceremonies, or regularly re-cut chalk figures on the surface of the earth, all of which may or may not have been directly connected with different sorts of monuments (see Vansina 1985: espec. 45–6, 157; Fleming 1987: 198–200; Connerton 1989; Bradley 1991; 1993: 98–9; Thomas 1991: chapter 4). Arguably, the custom of erecting conspicuous monuments implies a challenge to the ability of oral tradition and rituals to transmit important cultural information to the future (Larsson 1997).

ORAL TRADITION AND PERFORMANCE

Wilson, particularly, has drawn upon the ideas of Thomas A. Sebeok (1984), which propose that reliance on a physical structure is less likely to succeed in enduring through vast expanses of time, than an oral tradition led by an 'Atomic Priesthood'. Wilson's *Trinity Pilgrimage* is a series of performance works that explore the detonation of the first atom bomb through the eyes of its maker, Robert Oppenheimer. Central to this work is Wilson's physical embodiment as Oppenheimer (1904–1967) who, along with Enrico Fermi, is often called the 'father of the atomic bomb' for his role in the Manhattan Project, the Second World War programme that developed the first nuclear weapons. The figure of Oppenheimer was a recurrent presence in Wilson's earlier work, dressed in distinctive clothes with a trademark hat. For Wilson Oppenheimer is the alchemist, translating one substance into another.

In his most recent work, Wilson has developed the persona of Oppenheimer into a Priest-like figure. The character retains the hat and suit, but is masked, and assumes the role of a Guardian, through whose situated performance future generations might be warned off the sites of radioactive waste. The focus is then the deliberate creation of a prospective memory. Combined, the elements of Wilson's art serve as a warning to future generations.

Oral tradition has certainly been a factor in preserving prehistoric monuments, demonstrating the efficacy of Sebeok's notion. In Cumbria, as elsewhere, they are often laden with myth and folk legend, which serve to warn off vandals and protect the stones. The Neolithic henge and standing stone of Leg Meg and her Daughters illustrate this point. The site is a large ceremonial enclosure, 109m x 93m in diameter, and Long Meg is the name given to a standing stone positioned 25m outside the circle, the stones of which are the Daughters. Long Meg is the tallest of the 69 stones at *c.*3.8m high and weighing *c.*9 tonnes. It is made of local red sandstone in contrast to the Daughters who are made of boulders of rhyolite, a form of granite. The south-west face of Long Meg is encrusted with crystal, while the broad face that looks toward the circle is covered with rock art motifs (Barrowclough 2010, 125–6). Long Meg has been a fertile source of legend, and is said to have taken its name from a local seventeenth century witch, Meg of Meldon. Folklore also tells how the standing stone will bleed if it is damaged, perhaps a reference to the fact that it is made of red stone (Barrowclough 2010).
The Daughter's are associated with three common stone circle legends. The first tells that the stones were originally a coven of witches, who were turned to stone by the Scottish wizard Michael Scott. The second tells that the number of stones in

the circle are said to be uncountable, if anybody can count the same number twice then Michael Scott's spell will be broken and in turn the witches will be released from their granite prisons. Thirdly, storms are said to be the result of trying to move the stones, a supernatural protection for those who would destroy the circle. One story recounts that in the late 1700s Colonel Lacy, the local squire, was planning to dynamite the stones (perhaps to find the hidden treasure that was long believed to be buried under such stones), but, before his men could light the powder, a fearful storm suddenly started to rage and the attempt was abandoned.

ART AS LONG RANGE COMMUNICATION

As Wilson and Williams are very much aware, art has been a means of long-range communication since prehistoric times. Their work here is an exploration of how art may be deliberately deployed to communicate with future generations, and draws upon selected images and motifs to create a lasting impact on the viewer. Their intention is to test the notion that we might be able to protect future generations from the dangers inherent in the burial of radioactive waste, and it seems that it is perfectly possible that we might be able to communicate with those that occupy Cumbria, at least until the onset of the next ice age sometime in the next two thousand years. Contemplation of this work also invites us to consider whether long-range communication might also have been in the minds of those building some of our ancient monuments. We often assume they were aimed at the contemporary members of the community in which they were built, but maybe they were built with the intent that that they would endure and were a form of communication with future generations.

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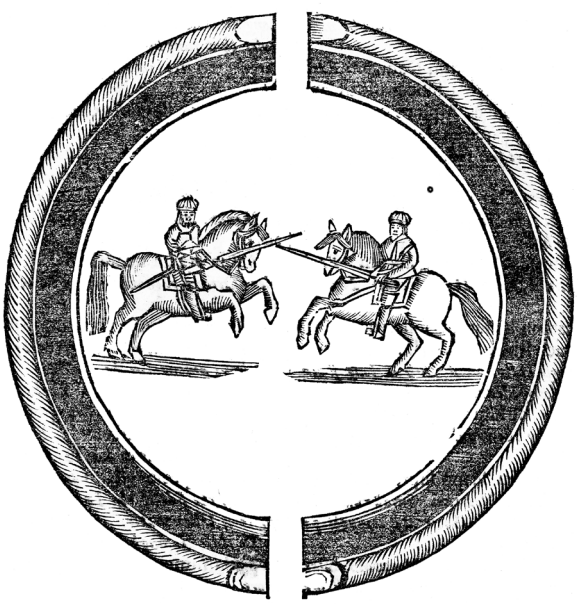


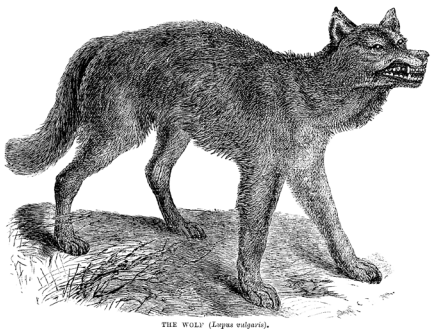
Mr. Alan Cleaver
Genius Loci: Folklore of Cumbria and Lancashire

"Observe yon rocky mass, which, like a couchant lion, seems to guard the entrance to the port of Whitehaven, and against which the waves are dashing, flinging up their spray – that is the Tom Hurd rock"

So speaks the guide in Thomas Rymer Jones's (1858:264) book, *The Aquarian Naturalist – A Manual For The Sea-side,* before going on to relate the legend of Tom Hurd's Rock. The rock, or rather rocks, is on the south side of Whitehaven's harbour. On the north side are rocks known as Jack-a-Dandy Hill. Tom Hurd, so legend recalls, was a sailor whose courtship of his childhood sweetheart – his 'bonny Jane' – was put on hold when he went off to sea. But his heart was true and she remained faithful to him so after many years apart the two were eventually reunited. Shortly after his return, he decided to go with his fiancée on a day out to Parton. The village of Parton lies just north of Whitehaven and in the past would have been a reasonably sized port of its own. The two romantics took a rowing boat to Parton and spent a pleasant day in one of the taverns in the town. But they were unaware of the changing weather outside and, even when they decided to make their return, Tom felt that he could safely get back before the storm broke. Tom was an experienced rower but, as one version of the legend claims, Tom's oar broke just as they were approaching Whitehaven harbour. The boat crashed on to the rocks that now bears Tom's name and, despite the best efforts of Tom, the girl's life was lost. Tom of course was distraught and blamed himself for the tragedy. He would sit for hours on the coast by the rocks mourning his bride-to-be. Then one day – when another storm was raging – he was seen to walk on to the rocks "until a wave, engulfing him in its broad bosom, bore him off to join the lass so dearly and so fatally beloved".

Tom Hurd's rock still exists and many Whitehaven people will still give you a reasonably fair account of the legend of poor Tom. Assuming the legend was already old when Thomas Rymer Jones included it in his book in 1858 it's probably at least 200 years old. It shows the manner in which legends can survive over long periods of time. The legend of Tom Hurd's rock has probably survived better than most because the rocky outcrop (Tom Hurd's Rock) can still be seen at low tide from Whitehaven harbour. Other examples of long-lasting legends in Cumbria are easy to find, although, it's interesting to see how some have become distorted from their first written appearance in the 1700s or 1800s to their current state. The Whitehaven boggle for example (a boggle is a Cumbrian term for a ghost or apparition) has changed repeatedly over the last 200 years. Trying to 'unpick' the legend is all but impossible though it would seem that there may have been two ghosts haunting the town that merged sometime in the Victorian era into the solitary howling dog figure that people recall today.

People love re-telling tales – the spookier the better! When a number of people are gathered together late at night it is not usually long before the conversation turns to ghosts, boggles and things that go bump in the night. A society might be defined by its structure, its government, its religion or even its commerce – but it is folklore which is the 'flesh' on these sociological bones. Folklore is a wide-ranging term which takes in not just legends but also superstitions, songs, poetry, games, art – even language or dialect terms. Indeed it's probably fair to say that a vocal tradition is rarely enough to provide a long-lasting legend. The colourful idea that one generation passes on to another, essential skills or fanciful stories through some oral tradition is sadly unlikely to be true. Many of our 'ancient' legends can usually be traced back to ballads or short stories that were written down at some point. The hob-thross (a type of goblin) at Millom castle, for example, was first written down by John Pagen White in 1873 as a ballad (though almost certainly an oral tradition of some standing even at that date). Since then it has been written up in one folklore book after another – gradually being watered down, changing slightly with each author. It's unlikely the legend would have survived at all if Pagen White and other authors had not committed it to paper. Indeed, many people who live close to the castle (now a privately-owned farm) are unaware of the story. Writing a legend down may all but guarantee its survival for a few years at least but anchoring the folk tale to a specific geographical location (such as Tom Hurd's Rock) would also seem to aid people's memory.


THE WOLF (*Lupus vulgaris*).

The 19th century was undoubtedly the golden age of folklore in Cumbria and Lancashire. Cumbria only came into existence in 1974. Before that, it was Cumberland and Westmorland. A re-organisation of government boundaries in 1974 merged the two counties into one (Cumbria) but parts of Westmorland were annexed with Lancashire. Such was the anger at the changes that the people of Appleby changed the name of their town to Appleby-in-Westmorland. The 19th century saw the 'invention' of the Lake District and the tourism trade that has sustained it ever since. Southerners seeking escape from the stresses of the industrial revolution learned from poets and authors about a magical place (increasingly in striking distance thanks to better roads and the creation of railways) in the north-west of England where the rural idyll still existed. Further, the likes of Wordsworth, Southey and others also told of its dark side: the dangerous mountains, the boggles, hob-throsses and mischievous fairies who still wandered the fells and valleys. The civilised folk of southern England were also no doubt amused by the continued belief in supernatural creatures – at a time when science was explaining everything and consigning the ghost or fairy to children's bedtime books. Perhaps fortunately, the people of Cumberland and Westmorland were in no hurry to discard the old ways.

Cumberland bard Robert Anderson (1805:123) probably argued best when in 1805 he defended the rustic's belief in fairies as a healthy and necessary respect for things we don't understand:

"The fault of the present age is, not that it believes too much, but that it believes too little. Its illuminati have rejected from their creeds, not only the fables of giants, fairies and necromancers, but the truths of revelation, and the facts of sacred history. They wish to reform our politics, our philosophy, and our manners, and yet, would take away that religion to which we are indebted for our public

and domestic happiness. Were a missionary, from this new school, to visit those sequestered parts of Cumberland where the superstitions of our ancestors are preserved in all their purity, what stubborn tenets would he have to contend with? What shades of mental darkness would his philosophy have to penetrate? In almost every cottage he would see the Bible, and the histories of giants, fairies, witches, and apparitions, occupying the same shelf and, equally, sharing the belief and engaging the attention of their rustic readers. The effects, indeed, of these sacred and fabulous records are different: the one shedding over the mind a pleasing serenity; the other, a sombre melancholy."

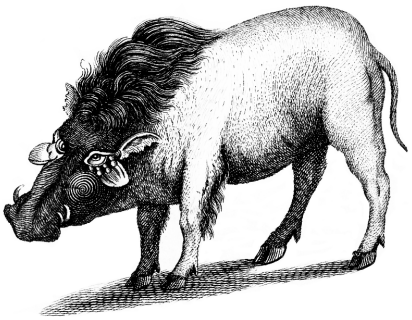
With hindsight, we realise there was great value in the old stories even if it was just a sociological value or as an inspiration for writers and artists. And we also realise that even today many people are dissatisfied with the explanations offered by science and still seek the company of astrologers, homeopaths, tarot readers or psychics.

Is there also a feeling lurking at the back of many people's minds that for all these amusing tales of fairies and goblins there may still be 'something in it'? It is the 21st century, but people still report seeing ghosts, black dogs, strange lights in the sky and other phenomena. Robert Anderson (1805:124) urged respect for these things we could not explain. He wrote: "The Genii that haunt the romantic vallies, the hills, woods and rivers of Cumberland, are so mischievous and malevolent in their disposition, so terrific in their aspect, and hostile to the human race, that a person would be thought very regardless of his safety, were he to entrust himself at any late hour of the night in the neighbourhood of their haunts."

Are you sure you want to ignore his warning?

The ancient Romans – who once controlled this part of the world and whose archaeological sites still remain – believed in the concept of the Genius Locii; the idea that each place in the landscape had its own particular spiritual guardian. It's a concept still shared by many people today and it contains with it another key idea: that anchoring beliefs to a particular geographical place could aid the memory. The ancient Greeks crystallised this idea with the legend of the poet Simonides. He was hired to recite at a banquet and, after doing so, was told by a servant that two men were at the door asking to see him. Simonides went outside but could see no one. At that moment the roof of the banquet hall collapsed, killing all inside. The bodies were so mangled that relatives could not identify the bodies, but Simonides realised by recalling who was sitting next to whom, that he could name everyone. He is credited with discovering that order and place could be a key aid to memory – techniques still used by today's 'memory men'.

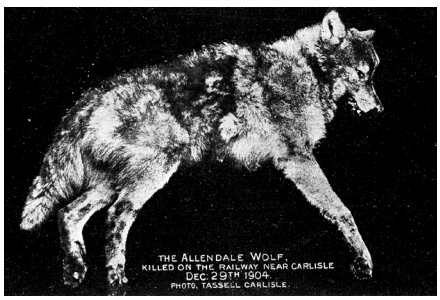
Along the Energy Coast of Cumbria and Lancashire we see a number of legends that have endured probably because they are associated with a particular spot. For example, near Coniston's Tarn Hows is a pond known as Jenny Greenteeth Tarn. The legend tells how a witch (with green teeth of course!) inhabits the pond, dragging into it anyone who dares to get too close. It's a tale designed to scare children and keep them away from such a dangerous spot. A combination of location, a sense of fear and the strong image of a haggard old witch with green teeth has no doubt ensured the legend has endured for at least 200 years. Similarly,



Long Meg stone circle near Penrith is used to anchor a number of legends. One tells how the Scottish wizard Michael Scot saw the witch Long Meg and her daughters dancing at this spot on the Sabbath and turned them to stone as punishment (Findler 1967:53). Stone circles, standing stones, holy wells, rocky outcrops – all these and more have been used as locii for boggles, fairies, witches, wizards and other tales.

The giant with one stroke on his loins
Deprived the boar of life
Which gave a title to the hill
That ne'er will pass away
For it is called Wild Boar Fell
E'en to this very day

(Gibson 1887:192)[1]



Ask anyone who lives near Kirkby Stephen in the east of Cumbria about the last wild boar killed in England and they will undoubtedly be able to tell you it was slain nearby Wild Boar Fell by Sir Richard Musgrave – even though it happened more than 500 years ago. It was a major event that has been retained in the local memory thanks to the stories of the battle between knight and beast, and rhymes such as the one quoted above, but also because a tusk from the boar (recovered from Sir Richard's grave) means there's a physical object to look at and therefore focus the memory. Indeed, Sir Richard's tomb itself would no doubt have been a memory locii as well. Numerous grave-stones throughout Cumbria have legends associated with them – even those dating back a thousand years. The Norse invaders left behind their relics including curious hogback stones. These carved stones are believed to be grave markers but their true purpose is unknown.

In a similar vein to the last boar, the story of how the last wolf met its demise near Hymphrey Head on the north shores of Morecambe Bay is fondly told. Legend tells how the boar was slain in the 14th century by a knight – one John Harrington – winning the hand of the fair maiden at the same time. The legend was given a boost with a romantic re-telling of the tale in the 19th century by Mrs Jerome Mercier.

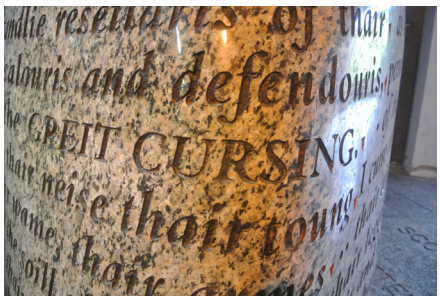
It's easy to understand how both real and fictional beasts that roamed Cumbria have achieved an almost totemic status among the communities they haunted. The symbols of wolves and boars are to be found on coats of arms or engraved on churches, aiding the survival of the memory of these beasts.

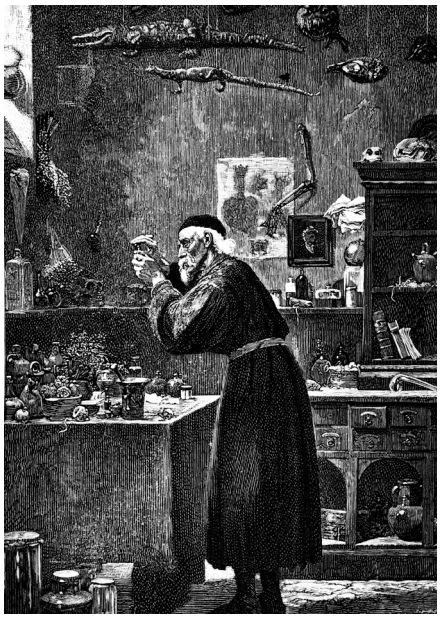
For just across the Lune's broad stream
A man once lived could solve a dream
Or by the stars could fortunes tell;
Circumvent a witch; love philters sell;

(Gibson 1887:199)[2]

It can be the people as much as the places they inhabit who are imbued with great power. Sometimes these seem to be purely legendary figures or their true identity has been lost over the centuries. But on other occasions they are known to have


HOMO HOMINI LUPUS





been real people, perhaps people who had great knowledge in science or medicine while they were alive or the stories about their ability to work miracles which grew disproportionately after their death. One such figure is Dr Farrar who lived at Orton in the east of the county in the first half of the 18th century. It is known he led a distinguished and upright life. But his interest in astrology, science and 'the black arts' led to him gaining a reputation after his death which he probably didn't deserve. Jeremiah Sullivan (1857:161) wrote in *Cumberland and Westmorland, Ancient and Modern*, that one of his books – Dr Farrar's Book of Black Art – covered "the motions of the heavenly bodies and shows some knowledge of astronomy". But even Mr Sullivan added menacingly, "until very lately it was believed there was great danger in opening this book". It is a pity the book no longer survives.

Sullivan detailed Dr Farrar's powers: "If the spouse was jealous that the heart of her husband was estranged from her, she immediately consulted the anti-conjuror, and desired him to restore the affections of her bewitched partner. If a friend or relative was confined to the bed of sickness, relief and convalescence could not be expected without the supernatural assistance and balsamic medicines of Mr Fairer. If a person became deranged in his intellects the injured cells of the brain were to be healed and adjusted by the magic charms of this celebrated man. If a farmer happened to lose his cattle it was necessary to purify the walls of the house with water sprinkled by this famous conjuror; and in endeavouring to account for the latent cause of this disaster, he generally found small parcels of heterogeneous matter deposited in the walls and consisting of the legs of mice and the wings of bats; which he affirmed to be the work of witches. If a person was desirous of knowing the issue of any event he repaired to Mr Fairer who failed not to satisfy him in this particular."

Dr Farrar's books of magic were called upon in 1849 when Cooper House near Tebay was haunted by a boggle. Pots, chairs, knives and other items in the house began to move of their own accord – so much so that the family fled. News of the haunting appeared in the local newspapers and then national ones so that literally hundreds of visitors descended on this remote farmhouse – many claiming they witnessed the phenomena. Even the police investigated but dismissed it as a hoax cooked up by the maid servant and the mistress. They denied the accusation. Dr Farrar's books proved of little use but eventually the boggle's activities diminished. The farmhouse no longer exists but there are people still alive who were told tales by their grandparents about the boggle. It was said that even when the farmhouse was in ruins the very stones of the building were imbued with special powers, where children collecting them hoping to evoke some magic.

Another local worthy remembered in legend, is Uther Pendragon (the father of King Arthur), including one story that tells of how he founded Pendragon Castle. The castle may now be a ruin – it stands near Wild Boar Fell – but few can look at the castle without thinking of Uther Pendragon and the legends surrounding him. Once again a rhyming couplet helps keep the legend alive:

Let Uther Pendragon do what he can,
Eden will run where Eden ran.

goes the short verse recalling how he tried to divert the river to provide its moat – and failing!

Perhaps the creation of folk tales was a deliberate attempt by our ancestors to send a message to future generations that there was indeed something important about a particular location. In another few thousand years the inhabitants along the Energy Coast may well tell tales of sources of great power at Sellafield or Windscale. But if so, how will that message be communicated over such a length of time? Where are today's story tellers? The simple answer is: At the Story-tellers Garden in Grasmere. There you will find the storyteller laureate Taffy Thomas, who collects, re-tells and creates stories about this part of the world. He entertains people of all ages with the tales and it is to be hoped that some of them are passed on to future generations. The story-telling tradition also continues through music and the north-west of England can be proud to have a strong folk scene (including dance) with numerous singers and song-writers still performing old favourites such as *Borrowdale Johnny*, *M'appen I May*, *D'ye Ken John Peel* as well as new songs – often written in dialect. Legends still provide a rich source of material for literature – either as collections of folk tales or inspiration for new tales of fiction. But the demise of the printed word and the birth of the digital word may provide a threat to the longevity of such a medium. Some of our oldest books are hundreds of years old and can still be picked up and read with comparative ease. But will digital books last more than a few decades? To mark its thousand-year anniversary, the BBC created – in 1985 – video discs for an electronic *Domesday Book* detailing life in Britain in the 19th century. A mere 30 years later and the discs are unreadable. The technology to read them has long been superseded and the discs themselves have probably deteriorated badly. If we're anxious to store our spoken legends in a form that will help them survive for future generations then we need to think carefully how it is done. Ink on parchment would seem to be the tried and trusted method.

There's little doubt people in a hundred, thousand or ten thousand years will still be telling tales and recalling great battles fought and monsters slain in days gone by. We can only wonder at how many of them will be rooted in events we are witnessing at the start of the 21st century.

NOTES

1. A local rhyme recalling the killing of the last boar in England.
2. A poem written about Dr Farrar of Orton

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Mr. John Disney
A Narrative of the Hogback Stone at St. Peter's Church, Heysham, in Lancashire

This is the famous hogback stone, which is more or less unique. It is called a hogback because of its shape, like the shape of a pig. It is a Viking gravestone and would have been carved somewhere between 930 and 970 AD. There is no certainty as to whose grave it was, but it was found just over two hundred years ago just behind the northeast corner of the church. There are two accounts of where it was found, one was that it was in the churchyard and the other that it was in the garden when they extended the churchyard into the north corner of the garden…

This story is from the *Saga of the Völsungs*, which would have been written down about three hundred years after the stone was carved in the 1200s. The four little figures, the gingerbread men I believe to be the brothers of Sigmund, who was the youngest son of King Völsung. There are differences in different versions of the story as to how many sons King Völsung had.

King Völsung was an old Viking king and he had a large family, the youngest son being Sigmund who had a twin sister called Signy. Some people think these four figures are the four dwarves who hold up the sky, but I'm sure they aren't, I will explain why in a second. King Volsung had this daughter, Signy, who was a very attractive young woman. He was in his seventies and he wanted to get her paired off to some other king or chief who had got a lot of money or land. So eventually, he paired her off with King Siggeir who was the king of the Goths. Due to her duty to her father she married the Gothic king and went to live in Germany, but she found out that she didn't love this King. As soon as she was married she found out that all he was interested in was getting hold of the Völsungs' kingdom and their fortunes and when he'd got them, he was going to bump them all off, including her I think.

So she sent a messenger to her father, who of course exploded and soared at about 30,000 feet and gathered together all his sons and an army of people and they set sail to go and meet Siggeir in battle. There was a long battle, which they fought all day, but neither side really becoming victorious. Until in the last charge of the day poor old Völsung was killed.

The Gothic king claimed victory and he rounded up the sons straightaway and was deciding what to do with them. His wife, Signy, the sister of these people was very crafty and said, "If you want to destroy them?" Because he was going to have them executed, but she said, "Why don't you have them executed by being taken out into the forest and left overnight for the wolves to come and eat?" He liked that idea, so that's what happened.

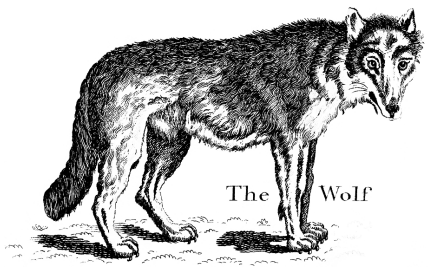
Now, to authenticise, that this one here doesn't look very happy does he?

ROBERT WILLIAMS No. Distinctly unhappy!

There is a wolf on its hind legs there with its mouth open taking a good bite of him …

RW Right.

… and one at his feet, so I'm quite satisfied that they are the brothers of Sigmund rather than dwarves who hold up the sky. The reason their arms are up in the air, well, maybe in horror, but the *Saga of the Völsungs* says they were fastened to a tree trunk. So this is how they were left you see. But she wanted to preserve her twin. Now the book says they were all fastened to this tree trunk and every night, for up to ten nights, the she-wolf who lived in the forest came and ate one of them. But I think the way it has been illustrated on here, she led a wolf pack and they came on the first night to have a good supper. The fact that they are in the forest is, I think, illustrated by the deer or stag, which is in the middle and the animals with the long tails were the male wolves and those with the short curly tails are the females.

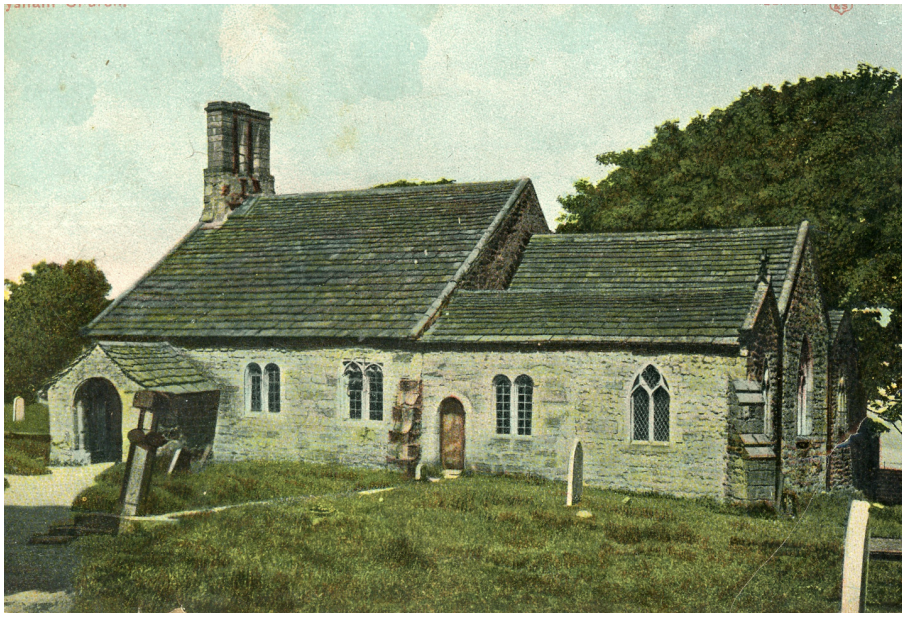


RW There seems to be a boar just above where the deer is …

Well, some people think it is and that may also be to show that it is in the forest.

RW Yes.

It could be a boar or it could be a she-wolf. They were all secured in our version of the story they were all secured and left. When they had been left, Signy, the twin sister of Sigmund, sent out a servant with a big bowl of honey. He came out and painted Sigmund, who is here (gestures) and painted him with honey from head to foot and gave him a message from his sister as to what to do when the wolves came, and then of course he left them. When the wolves came, they were led by this very fierce old she-wolf, who, there is no name appears for her in the book; his sister must have known that she normally had the first bite and that she also had a sweet tooth. So, she came straight to Sigmund and began to lick the honey off him, clambered all over his body until she got up to his head. When, as he had been told in the message, he opened his mouth wide and she stuck her tongue in to lick the honey out and he bit it and held on to it. Of course, the wolf struggled and pulled back to try to get her tongue back, but she couldn't. So, they had what they termed in the book as 'stocks' which was like a wooden board around their ankles and she dragged her hind legs on this thing and pulled with all the strength she'd got – wolves are very strong and that snapped, so she went backwards like that and pulled her own tongue off. Unfortunately for the wolf, she bled to death and I think that this is her when she was bled to death. It is a female wolf, I can't think of any other good reason why they put her upside down. So that was it, the brothers were all eaten by the wolves, but Sigmund was free. Then he lived in the forest for quite a long time with the aid of his sister, having the most terrible adventures you could imagine, or not really adventures but full of debauchery and all that sort of stuff, typical Viking legendary. Now this is where I deviate from the book because actually there is another generation that interferes with the story



Wild Boar.


St PATRICK CHAPEL
BARROWS STONE · COFFINS · BEACH


Roman Coffins, Heysham.


VIEW FROM HEYSHAM CLIFFS LOOKING TOWARDS HEYSHAM

as in the book, but it is easier to tell it that he became a great warrior king. He met a princess called Hiordis who was the daughter of one of his friends and he admired Hiordis. He had a son who they called Sigurd.

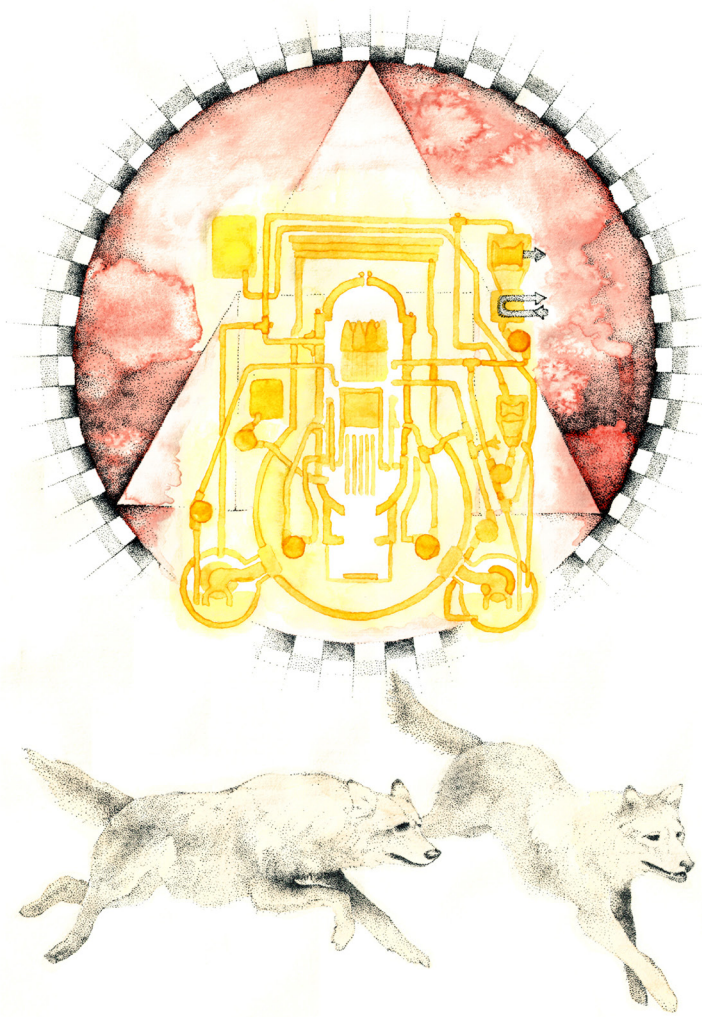
About the time that Sigurd was born, Sigmund was mortally wounded in a fight when his sword broke in half. As he lay there dying, his wife came to him and he gave her the two halves of the sword and said, 'Take these and have them made into a sword for Sigurd for when he's old enough". Which she did, but she also got Sigurd a foster father who was called Regin. In some books he's termed or recorded as a dwarf, in others he's a thoroughly good Viking. He's got all the skills, blacksmith, goldsmith, fighter, everything that a good Viking needed. He trained Sigurd in all these skills, who grew up to be a very fine young man, he is described in another book as six foot odd tall, red hair and a red beard. When he was in his teens, he said one day to his foster father, Regin, he said, "Regin, I want to avenge my father's death". Then he said, "Also my ancestors'. How should I go about it?" So he said. "Well, you've got to first of all prove your credibility and show how good you are at all these skills and that's no problem you can do everything". "But", he said, "You will need some gold". So he said, "Well, where do I get gold from?" "Well", he said, "you'll have to earn it, the same as everybody else! You can't just keep sponging on your mother". That wasn't quick enough for Sigurd, so he persuaded Regin eventually to tell him where there was a cache of gold that was hidden out on a big plain, it was guarded by a fierce serpent called Fafnir. To get the gold, he would have to kill Fáfnir. So he said, "Well, I don't mind killing a serpent, but I shall need a sword. So, make me a sword!" to Regin. So, Regin went into the forge and made him a sword and brought it out, "There you are, there's your sword". So Sigurd tested it by smashing it on the anvil with all his might and it broke in half. He said, "This is no use it's only a toy". "I don't just want to kill a serpent, I want to be able to fight with it, to avenge my father", he said, "Make me another". So Regin made another and he brought this one and said, "You'll like this one, it's very strong!" So of course he tested it again in the same way and bashed it down on the anvil and that one broke in half. Sigurd was very angry and he said, "I think you are either trying to get me killed Regin, or else you are not a very good blacksmith. Assuming that we can say that you are not a very good blacksmith, I'll get the two halves of my father's sword and you can make a sword out of them". There is actually one of these stave churches in Norway that's got a carving, a wooden carving of this actual making of the sword, which was called Gram and so he fetched the two halves of the sword from his mother and Regin made them into the most marvellous sword that had ever been seen. It gleamed in the sunlight, in fact it looked as though it were on fire and it dazzled everybody. So Sigurd got it and he brandished it in the air and he said, "Ah, this is the sword for me, I'm off now to go and avenge my father. So Regin said, "Well, before you go, you promised me that I made your sword, you'd go and kill Fáfnir the serpent and get the gold from their". "Oh yes", he said, "I will, but", he said "I've no time for that now; I want to go and avenge my father". So, he went and jumped on his horse, Grani, and off he went. He was away for three or four months doing whatever Vikings did with their swords and subsequently returned, complete with a certain amount of gold that he had collected on the way. Everybody was saying what a brave young man he was and how marvellous he was. Regin left him for a day or two and then he went and he said, "Before you went away", he said, "You promised me you would kill Fáfnir the serpent". So he

said, “Yes I did”, he said, “Let’s go and do it now”. So they got on their horses and they rode out to where Regin said Fáfnir lived on a huge plain. Fáfnir was rather more than just an ordinary serpent; he was what is known as an Icelandic Dragon – a huge serpent, long enough to stretch around the world (it was flat like a plate) and he was very fierce. As they were riding across this plain, they came across this big track where all the heather was burnt and dead. Sigurd said, “What’s this, I don’t like the look of this?” So Regin said, “Oh, it’s nothing it’s just where Fáfnir goes down to the lake”. “But”, he said, “You said it was just an ordinary serpent!” “Well”, he said, “It is an ordinary serpent but it is a very big serpent”. “Well”, he said, “How am I going to kill a thing like that?” So he said, “Well, that’s up to you to sort out”, he said, “I’m only showing you where he is”, he said. Anyway, they discussed it and eventually it seemed to be that he’s got to get underneath Fáfnir because Fáfnir had armoured scales on his back and if he saw them coming then they thought he’d swish his tail and kill them. So he set to and dug a hole in the middle of this track and hid in it, but, just before he’d finished digging this hole, Odin came along. Odin was like an old man, with one eye and a long grey beard. He said, “What are you doing Sigurd?” and he knew Sigurd because Sigurd’s horse came from one of Odin’s horses, sired by Sleipnir, Odin’s horse. So he said, “I’m digging this hole, I’m going to hide in it and I’m going to kill Fáfnir”. He said, “Well if you do it like that you’ll drown in his blood”, he said, “You must dig a trench away from it and a couple more holes to catch the blood”, he said. “If he comes and you kill him while he’s over the top of you, you won’t be able to get out and you’ll drown”, then he disappeared. Sigurd thought, “Well that’s a good idea”. So he dug a trench and a couple more big holes and just as he was finishing, he saw Fáfnir coming slithering across the plain on his way to the lake, puffing out fire and smoke and poison and whatnot. So he hid in the hole and as Fáfnir went over the top, this is where we go around the other side

This is Fáfnir and there is his nose and here is his eye and I think this bottom row of tiles, are the scales on his back. At that point when he killed or when he stabbed Fáfnir, Fáfnir was like the old opera singer who didn’t die straightaway and he said, “Who are you young man that dares to kill me?” He said, “That’s none of your business all I want to know is where the gold is. So Fáfnir said, “Well, you tell me who you are and I’ll tell you where the gold is. You tell me who sent you”. He said, “Well I’m Sigurd son of Sigmund”. So Fáfnir said, “Ah! Now I know who sent you, it was Regin sent you. Regin was my brother”, he said, “I had two brothers Regin and Ótr. He said, “Ótr, our father and the god Loki killed a dwarf who had got a gold treasure. They took the treasure, stole the treasure. Loki killed Ótr for his share and Regin and Fáfnir wanted a share of the father’s. Of course they didn’t get one, so they planned to kill the father. Regin killed him, but Fáfnir took the treasure and went off and hid it out on this plain, but he was turned into this horrible monster. So, he said, “If I were you young man, I should forget all about it because”, he said, “the dwarf who made it put a curse on to anybody who possessed a ring that is in it would die”, which is what was happening, of course the dwarf died, Ótr died and the father died and now Fáfnir was dying. Sigurd said, “Oh, I’m not bothered about any of that rubbish, I just want to know where the gold is”. So Fáfnir said, “Well, I promised you I would tell you if you told me who you were. It’s over there. It is buried in an old ruin”, and then he died.

As soon as he died, Regin came out from behind the bushes where he was hiding, and said, "Marvellous Sigurd, I've never seen anything as well done in my life. No wonder you get all this acclaim for what a clever young man you are. Brilliant! I've never seen anything like it! Did he tell you where the gold was?" So, he said, "Yes he did, I'll go and collect it in a minute". So Regin said, "Well, I'll come with you, but", he said, "Before we go I don't know about you, I'm hungry. Let's have a meal". He said, "Cut his heart out and we'll roast it over a fire". So, Sigurd cut the heart out of Fáfnir with his sword and they made a spit and a fire and they put the heart on and of course started to roast it. As it was roasting, it was spitting out juices and blood and so on and some hit Sigurd on his finger. So he sucked his finger, like that and as soon as he'd sucked his finger he could tell what the birds in the in the trees were saying to each other. He could understand what they said and there were three birds there, and the first bird said, "I think Sigurd's a fool, because Regin only wants the gold", and the second bird said, "Yes, when he's got it he'll kill him". The third bird flew into the tree and as he flew he said, "If I were Sigurd, I'd kill him now". So, that's what he did, he took that birds advice and he got his sword and chopped Regin's head off there and then!

Then he went and mounted his horse, Grani, who is here. Grani always bowed his head to his master, so that's who it is. You can see the shape of one of the pannier bags he's got on his back to carry away the treasure. So off he went, mounted the horse and away he went. Now the other thing to notice, is that this part of the tree, this tree, Ygrddrasil, the Tree of Life there. Nine branches, one at the top, four down each side. The birds, there's one there, second one there, long neck and a big fan-tail and the one that flew into the tree is this one, there's his head and his neck and his wing. I think this bit down here is Ótr, a lot of people think it is a hyena because Miss Tomlinson said it was a hyena, or thought it was a hyena, but I'm sure it isn't, I think it's Ótr. Of course, the story goes on, as you probably know that he met Brunhild, Brunhild in the Norse, Brunhilde in the German and had a long running affair with her, and finished up being killed in a fight.



Robert Williams and Bryan McGovern Wilson
Cumbrian Alchemy: A Conversation

ROBERT WILLIAMS How are you getting on with the drawings?

BRYAN MCGOVERN WILSON Working with the drawings this time around has been a little difficult. Not necessarily in (dealing with) the content, there is such a wealth of content to draw from, but that the challenge really is how to stay true to each interaction, each bit of research, each point of interest that has come up in the field-work and the anecdotal research that you and I have been doing. So, it has been a bit of a challenge in terms of making a thing that mediates the information in a way that could activate a viewer. Also, it is a very different kind of practice for me. Although certainly it is not the first time I have used drawing as a strategy for doing work, but it is very different in that I (have) never really used it as a means of processing information for a viewer, with a specific goal in mind if that makes sense? Maybe that's something that needs to be abandoned in terms of an expectation on my part? Then there is the technical challenge of the formal qualities of the drawings, the formal qualities of the practice and how effective that is as a tool of communication. My whole reasoning for doing drawing was that there is a quality to it that is very accessible.

RW Yes and inclusive I think. We discussed at an early stage the nature of the relationship that we might have to the aims of the funders. In this case it Arts Council England and the University of Cumbria. Drawing, as you say is one of those ways of actually making the project enquiry accessible for a larger component of the audience to engage with.

BMW Yes. I think it also makes sense too that there has also been a conversation about a publication.

RW Yes!

BMW That it would be the most appropriate and, I guess adds a certain moral twist to it, but this idea of something that operates as a field-guide, as an alternative kind of text-book, an alternative guide navigating this, admittedly very complex, convoluted project.

RW I can mirror that thought, in terms of trying to imagine how it might be to curate this exhibition at the end of the process. The book becomes one set of curatorial decisions. It has its own frame and its own aims and objectives. Then there is the show itself, I don't know about you but I am still wondering how on earth we can steer that?

BMW Yes. It made sense for me that there should be some kind of divisions within

the project. Both in terms of using things like photography and using things like writing, using things like sculpture, using things like drawing, all as ways of stimulating conversation. That is always something that I find really satisfying in terms of a body of work. Is each component of the project addressing the other part? Certainly there is a different curatorial aim when you are putting together a book as opposed to an exhibition, or even in terms of what we are doing right now. We are generating content in this conversation too. I think that each one (of us) has different aims in terms of specificity, but I keep going back to this idea of a holistic experience. You don't need to know all the information to have an experience, or to be engaged with the topics that you and I have invested nearly two years in (exploring), but if one is curious enough or stimulated enough, or motivated enough by the visual information then there are layers to explore. Hopefully (this will) empower someone to go further and do their own research, their own investigation into the things we are talking about. Issues of the land, issues of storytelling, history and industry. Really, it is about activation for me.

RW Certainly we agree on that particular point. Also, I think it is the fact that that this project is about engaging, perhaps in conversation, all those themes and issues. Rather than in attempting to reach some kind of conclusion or something that might be thought of as instructive or didactic. I am also interested in the notion that this creates a dialogue around the things that you and I find engaging.

BMW If there is a conclusion to be had, it is within the project, but it requires a certain level of investment from someone who is going to consume or view the project. In a way this is an experiment. The best that can be hoped is that somebody gets curious and really gets this notion of a lineage of symbols, a lineage of time and specifically, how that can be mediated by contemporary issues.

RW I am interested what you said there about symbols. That's not an area that I would normally feel comfortable being near, I have to say.

BMW OK, so how are you defining symbols?

RW Well, symbols in order to function as symbols have to have a universal meaning system attached to them. For example, you can't have such things as personal symbols that are capable of being understood by others. I'm not entirely sure if the imagery that is coming out is necessarily symbolic in that sense. Rather, it is certainly referential and sometimes it is metaphoric. Very often, just looking through the drawings, they are very poetic. So, I see that as existing in a different sphere than the symbolic. So, I am going to ask you unpack that a little? Sorry to be a bit mischievous …

BMW Ah, yes, I definitely see what you are saying, in that the language that I have been talking about it within myself hasn't really been in symbols. In a way, you are absolutely right when we are talking about symbols; we are really talking about kind of a half-step away from that language. We are talking about the short-hand so to speak. To me, that kind of works because it is a shorthand for very kind of complex things. Symbols are the vehicle or vessels for things. It is a reduction in a way and it also hits you on a level that language can't satisfy or time can't satisfy. The ways that I have been talking about this with myself and other people, is

the idea of icons – maybe a more appropriate (term). To me, that kind of fulfils a lot of the things that you have just mentioned in terms of poetics, metaphor, a certain quality of mysticism. There is certainly a reference to religion in this notion of making meaning. Of projecting meaning on (to) something that is pre-existing. Or, that it is generated and then because of its uniqueness or its framing, it becomes potent. To me, that is a product of making, and specifically within this project, it's the thing that I get very excited about. It is kind of building a lexicon of these icons, maybe that is a better way to put it?

RW Yes, I think I can understand that a little bit more now when we frame it as such, particularly when we do look at that imagery and the relationships that it has internally. There is something there that sometimes gives the impression that there is a puzzle to be solved, but I don't think that is the case. It is really about a set of influences that are conflated or that converge in a way, as you say, that suggests a meaningful relationship between those things (rendered).

BMW Yes, definitely. I think that has come up in some of the conversations I have had with other people in response to the drawings, and also in a way, the photographs. That there is in some way a narrative at play, a fluid narrative, a narrative that is going (on) without you, but that if you want to enter into it that there are points of entry, tributaries perhaps, to enter into the flow of the narrative.

RW In a sense that mirrors the influences that we identified right at the beginning, the idea of positing questions of what happens when we bring together subjects like the Energy Coast, in terms of the nuclear industries, renewable industries, the mining industries in Cumbria and North Lancashire? The moment we put that next to the archaeological monuments, already something emerges in the relationships formed between them. Again, if you remember the third aspect of that is to then join up the folklore or the narratives that emerge amongst the people who live in those places. I think that kind of triangulation is one of the outcomes of this project. The fact that we are both, in our own ways exploring those linkages and what happens when we close those vectors, is really where the drive is (behind the project).

BMW Right, right. I think that's kind of the most alternative form of how I would define collaboration, which is something that I am ever curious about. I guess that is a component of collaboration which means that that you can't pre-plan things, otherwise you are getting into the territory of happenings or Fluxus. I think what is exciting for me about this is that you and I do bring two convergent agendas to the project. I think that you and I are both on board in the terms that this would not necessarily be a common territory. The Energy Coast, the generation of energy through nuclear means, through extraction processes, through renewables, to me it was really important to consider them neutrally, because when you introduce these ideas of morality into those topics it really has a way of killing the metaphoric power that they really do have. It has been curious to me to think that the sites that provide the most literal sources of power have become the most poetic, allegoric of a driving force that lies behind this project. A lot of the imagery that I have been using in the drawings and evident in the photographs refers to the sites of the Energy Coast obliquely, kind of pointing around the sites themselves. I don't know if that is specifically because of an avoidance of wanting to comment

about the sites themselves, but to something that's been kind of a marker, seeing them as monuments, as sites of generating a conceptual power. That folds in with previous work that I have done latching so heavily onto the dialogues and conditions of contemporary nuclear problems and challenges that are emerging. It was never really my goal to solve those problems, or even to investigate fully the nuclear waste industry or nuclear weapons industry, or to comment on them, but they (the drawings) do operate as the vessels for much greater topics. Topics of time, topics of energy, how the mystical in the form of electricity, radiation, the cycles of renewal, come about when we talk about power and energy.

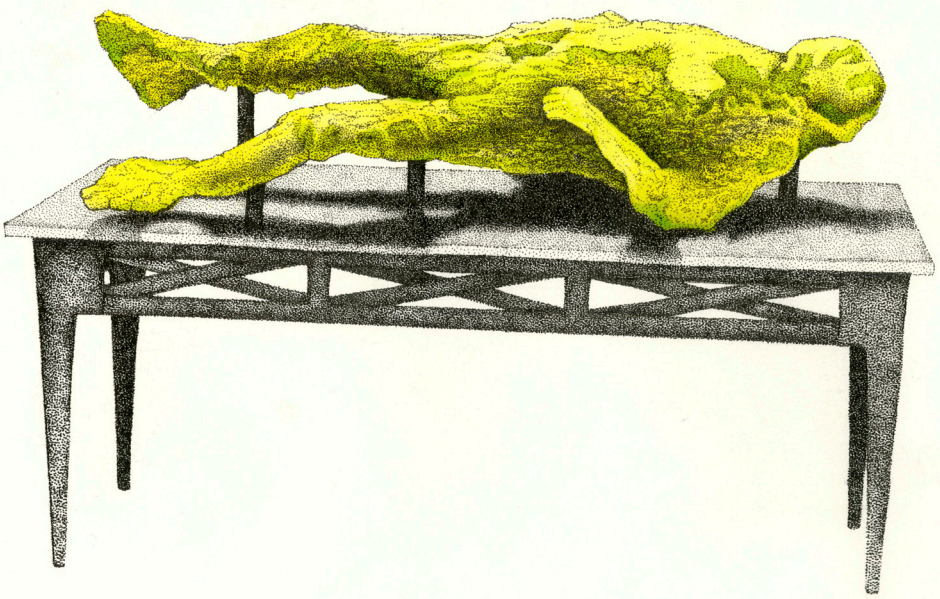
RW When we first got together to discuss this at Mildred's Lane[1], my view was then and still is now, that to put the moral or ethical spin onto those things would create a very different sort of dialogue. One that is arguably already taking place and exists in the world. So, it is a moot point as to whether further contributions to that discussion, pro or anti, would actually in any way reveal anything new?

BMW It is as you have said many times during this project, it is already happening.

RW So, treating the nuclear industry as a phenomenon that already exists and then to begin dealing with it as a fact is a really important step to take. That is not to say that one is personally neutral, but that in terms of approaching the central conceit here, to make the tripartite link of the three elements of the observations that we made on those first visits to Cumbria[2]. I think that this becomes very interesting part of the project that then makes its own contribution to the pro and the anti-debate.

BMW Yes. I am very curious to see how this can operate as a platform specifically for people to generate their own voice in terms of these bigger topics that the project alludes to. Or that it is a starting point, something that is meant to be responded to, either through the work itself or even if it is through the half-listening quality that people have when you start talking about nuclear power, or history, or folklore. There are only a certain percentage of people that are really activated by these things and feel passionately about them. People nonetheless have an opinion whether they have information about these issues or not. People have formulated by a kind of osmosis through culture, their opinions about these things. In a way this (project) is kind of like adding a little bit of grit to the oyster, so to speak, to see if something comes of it.

RW I think it is also the fact that we did make observations; we did notice those things happening, things not necessarily apparent in a broader discourse. It might exist on a microcosmic level, but in a broader discourse these things seem to be mutually exclusive in some way to each other, or somewhat beyond the pale in terms of the discussion. So one might then have elements of the debate concerning the nuclear industry, or the fact that there are wind turbines or that mining is going on and that somehow this takes away from the idea of a relationship to land, or to time, archaeology and monuments, as it renders it all quotidian or every day because of ideas we might hold about the industrial. On the other hand there was that question that the radio presenter[3] asked us about what is the relationship between such things. He was trying to imagine us drawing ley lines or something crazy like that …



BMW Or being explicitly referential, or didactic …

RW That's right. It is interesting isn't it, that this might be the response that many people have because of the expectations set up when you use phrases like 'Places of Power', or 'Deeptime', or 'Energy'.

BMW Right!

RW These are all loaded terms.

BMW Totally! They are all words that bring their own baggage, their own histories and they are almost universally misunderstood too. Some by design, when we talk about 'Places of Power', like ley lines (laughs), and then we get into a kind of new age territory which is not a goal of this project in any way …

RW Far from it!

BMW Yes. For me, that dialogue is so much about a very solipsistic view of greater forces in existence. Whereas the individual (here) is mediating experience in this project, it is so in the hope that there is a 'Macro' view of things. That is the benefit, the edge as it were, to me being the foreigner here. My being able to see things through a macro lens, so to speak, to have an overview of things. Yes, there are conditions of these sites, specifically in regard to the power stations, controversial in different ways for each one, but for me this seems to be temporary. Those seem like minute conversations, given the scale of time that we are talking about, geologic time, deeptime[4]. These sites remain material culture; they are (archaeological) artefacts or ruins in the making, because that is the nature of being in an entropic world I suppose.

RW I guess it is also quite interesting to think about these things in terms of the scope of industry within that culture too. We could talk about energy production, perhaps that is the easiest of the three aspects to discuss, but there is also an element I think in terms of the industry of the land, of managing the land itself. This is pure speculation now, of the spiritual managers of the archaeological monuments for example, there are other echoes I think that what I am driving at here is something that isn't normally discussed or thought about. Especially so in the context of new age thinking perhaps, or even in terms of the controversy surrounding renewable, or nuclear energy. I'm very interested in opening up those discussions too.

RW I think the word 'echoes' is very appropriate for this particular project. The conversations that we have about ghosts are also very important because these are all kind of unconscious … it is the conversation we have culturally about things that is fundamentally inaccurate. To me, that is a recurrent theme in the project that you can only know so much. You know when we talk about notions of stewardship. The bottom line is that stewardship, ecological stewardship means that literally, you can't stop in terms of (encountering) the layers, physical and ecological, in consideration of the components that are affected and need to be managed. Humans are flawed; we are a part of this (entropic) system. So it is impossible to solve (the problems of) a system that you are fundamentally

incapable of understanding as a totality. Then, we start talking about failure, not necessarily that you have failed in your duty, but in negotiating these forces of time, which are greater than ourselves. These kinds of complex systems that we are a part of, complex systems of history, of allegory that has the fantastical element, the kind of element that keeps cropping up is when we do talk about things like ghosts, the spirit world, we talk about the ether. This is clumsy language for talking about these forces that are greater than ourselves, forces that for better or worse we are subject to.

RW There is something very interesting too isn't there, about how those discussions are framed? How different idioms are employed to make sense of those ideas. Part of that is the metaphoric way that we might talk about things like 'energies'. You mentioned a few minutes ago that some of these terms are completely misunderstood and used in odd ways. That particular words associated with it are really just ways of identifying something that is hard to describe. I was very interested to have a conversation with Andrew Ramsey[5] yesterday that veered towards exactly what we are talking about here. We were discussing a particular diagnosis used to establish a cause of death in unexplained cases at the village of Lamplugh, maybe in the seventeenth century,[6] where in order to arrive at a cause of death and therefore to allow people to move on, was to employ the phrase "Frightened to death by faeries'. What that phrase does is to create a vague and ambiguous area to account for something (unexplained). What I am driving at here is that this word 'energies' is used in very much the same way, in both positive and negative terms. So, if we are discussing things with, perhaps a new ager, they might talk about feeling the 'energies' of Long Meg and her Daughters …

BMW The aura of a place …

RW Absolutely, this in some way would inspire them or 'rebalance' their own energy centres. Mediums talk about different 'energies' and then nuclear engineers will talk about 'energies'.

BMW Certainly! And they bleed into each other. There are never clear boundaries between them. They will always find that there are the public discourses around a thing and then there are the private discourses, where people's emotions, personal history, their hopes and dreads which are kind of non-existent really, talking about energy, become vital components for them in terms of making sense of these things.

RW That's right.

BMW I think that is something that you and I have encountered in terms of the fieldwork that we have done, in talking with people. There is, just as a way of contrasting, when we have talked to nuclear engineers they have their duties, they have their discipline, they have their industry to fall back on, in terms of mediating these forces, these materials, and the power that they generate, but then also there is this incredible receptivity to other interpretations. Which has been kind of the most surprising thing for me, how receptive these people that you would normally say would be dependent upon an objective truth, I terms of negotiating with the things they do. But they have opinions; they have strong

opinions that are in their way misinformed because they come from an emotional place. There is, kind of, a desire to reframe things in that the system in which they have operated within can only explain so much. I think that is a component of this (project) as well. Contrast that with somebody like Alan Cleaver who has immersed himself within the folklore culture of Britain, but nonetheless has his own interpretations of these conditions. John Disney at St. Peter's adds his knowledge of the archaeological significance of the hogback and then there is his interpretation of the hogback. Which is a thing that has also been very consistent, the public and the private persona, this interpretative persona which is put on and then projected back out into the world.

RW Interestingly, you raise John Disney there and his stories, the narrative of Sigurd and Fáfnir, which was just, if you remember, was amongst most enchanting hours of my life I think …[7]

BMW Right!

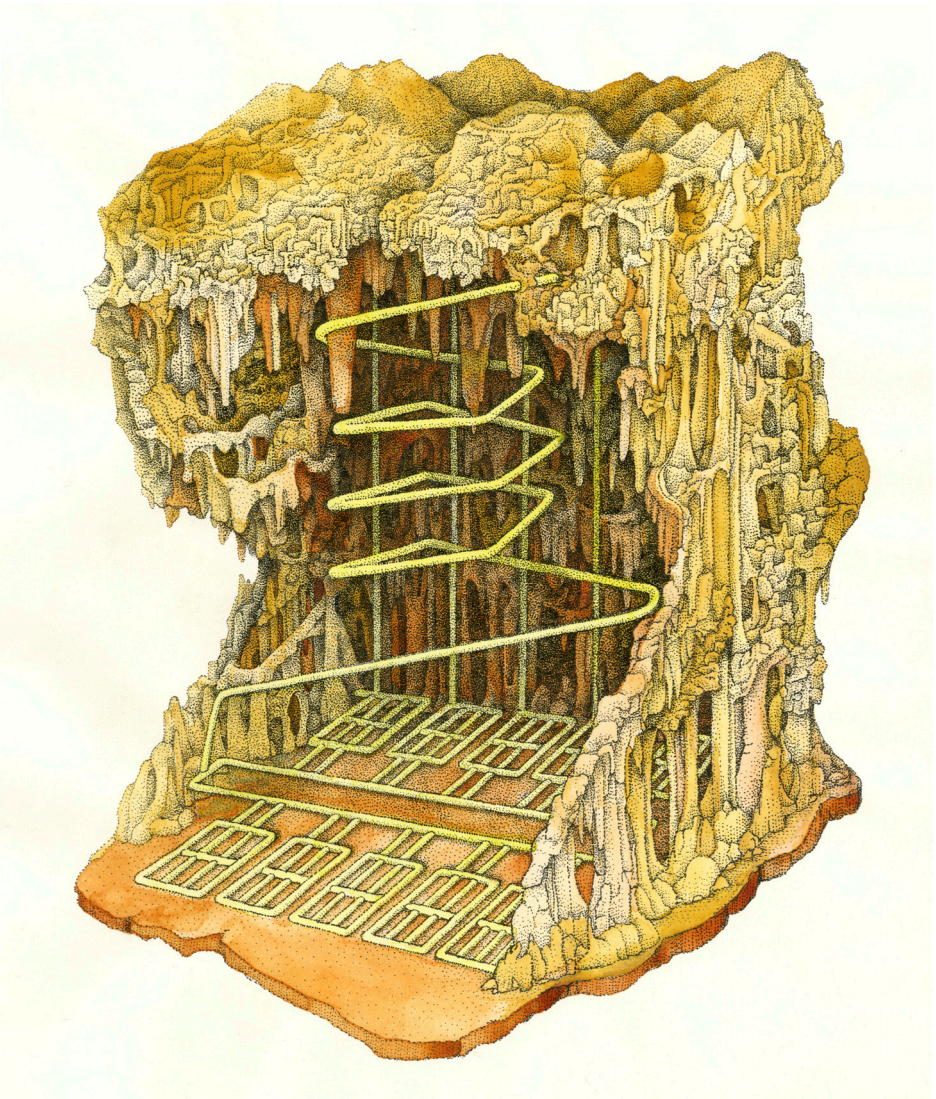
RW We were utterly transfixed by his story of that hogback stone.

BMW You know, the thing is I couldn't tell you what his story was. You were recording it at the time, but I loved the fact that I was very present in that moment and very kind of conscious that something was being generated, but as far as the specific narrative that he had, I could not tell you what that was. Nonetheless, the power of that exchange has stayed with me for more than a year. There is an incredible sadness in the fact that he has now passed on and that is a loss to us. I don't however, feel like 'it' has gone, because the exchange is still present, that 'energy' so to speak, is still being generated.

RW Yes. His delivery of that story was fascinating. What is palpable was the fact that he was as much taking ownership or stewardship of that story. He was passing that story on, actually in the way in which or the spirit in which the stone itself passes on the story. His mediation of that object was absolutely fantastic and absolutely what this project is about.

BMW Right. I would totally agree. The only element that I would add to that is that I became really excited about is this idea of entropy in those exchanges. I think that is a part of me being a bit of a stranger in a strange land. That these are conditions that people here might have grown up with, that maybe they weren't passionate about, but nonetheless it's kind of collecting in an unconscious way, building upon the archetypes that we all carry around. I really like that I am only getting a percentage of the exchanges and then it is up to me to fill in the gaps. To in some ways, undermine or reassess those exchanges. That has been the greatest freedom in terms of the contexts of really dense, really complicated, very personal stories, exchanges, conditions, technologies.

RW That does provide an opportunity for a kind of traveller's tale. I quite like the idea that you introduced earlier on about the notion of the book becoming an odd field-guide to such things. That is maybe an idea that we might run with?



BMW I think it worth having some kind of appendices or maps that are, you know, let's make the ley-lines so to speak … And this is a kind of other thing that has come up for me in the project. The idea of authority, and how that oscillates between people who are engaged in certain disciplines that culturally we have a conversation of 'authority' around. That has specifically come up when we have been in contact with established academics like David Barrowclough, and the nuclear engineers that we have engaged with. Authority has been a recent component of this project that has come up for me …

RW Tell me a bit more about that, I'm not sure what you mean?

BMW Authority in terms of being a mediator I guess? In the way that this has been given culturally, people in positions of authority having the power to make meaning. Specifically like David Barrowclough, or rather his discipline of being an archaeologist, which grants him a certain cachet and authority to talk about issues of the land, of the past which doesn't actually exist. The past is gone, it is really the process of piecing together what was, to make an imaginary state, simply by the fact that it is not in the present. Then we have people like the nuclear technicians and engineers who we have talked with during the course of the project, who have as a consequence of their training as scientists or engineers, are held to a standard that grants them authority. I am very curious of the artist as an authority figure within the context of these people.

RW Which is why I ask you these questions, it strikes me that in terms of those exchanges, what we are asking for when we meet such people who help us is the benefit of their knowledge and experience. It might be me, but I might be misreading your notion of authority because this is not 'authoritative' in power terms, but rather in the sense of someone imposing something upon you. What it seems to me is happening here is that we are opening doors to a dialogue that such people who, because of their disciplines, might not have necessarily been able to do themselves. Actually, that means that we, as the artists involved in this, have the power.

BMW Definitely.

RW That notion of authority is now deflected away from those experts to these experts.

BMW Broadly speaking I think artists are people who first and foremost are deliberate generators of meaning. Secondly, they are responsible for creating space, whether that's physical or conceptual. I think that is the missing element that you and I have brought to the conversation with these people. You know, a fairly broad group of people, very few of them are familiar with the kind of dialogues of art making or this process of meaning making. Then (we) opened up (the) space for them, space that was already there, mind you it is not like we are generating that space, but it is a space that we are granting authority upon them to explore and to feel comfortable within. In that way it is an exchange.

RW Conversely, it is interesting how we might view such people as the gatekeepers of their discipline, which may be one of the reasons why we have consulted them.

They also represent the three points of the discussion that we are interested in and in the middle of that triangle are you and me. Of course that makes an alchemical diagram doesn't it!

BMW It does, I was wondering when that was going to come up! What I would like to know from you is, given the working title of the project is Cumbrian Alchemy, that is something that has, again, been obliquely referred to, or vaguely referred to as a point of reference and is certainly something that you and I are engaged with. It is a history, a system of understanding the physical world that really speaks to or makes a bridge between the interests that you and I have with the physical world, with conditions of technology and ideas of progress, with an art making discipline. Again, if we want to go down certain paths it is in line with the alchemic philosophy that one can transcend the limitations of experience through an engagement with materials, the world, with the genesis of meaning, honestly. So, I would like to know how you see alchemy entering into this project and specifically how that has shaped either a methodology or how this becomes a product!

RW In response, I would like to recall the very origins of this, if you recall we had that time at Mildred's Lane[8], and then you and I went back to New York where we had various conversations in various sushi bars about this. The notion of alchemy for me necessarily tied in with ideas of change, of transmutation and transformation. We have echoes of that in even thinking about energy cultures, so we are changing one form of energy into another, or into an effect. We might be doing that through the real transmutation of elements that we might find in the nuclear industry. We might see that with the burning of fossil fuels and we will certainly see that in terms of renewable energies. So, right at the beginning when we were just thinking about what kind of resonances we might find there, the idea of transmutation was important. The next layer of course, is the idea that that is about transcendence and I'm glad you raised that because again, it is not something that we have either formally or consciously raised with each other, but that as a goal, a mission is to reach some level of consciousness about those things.

BMW I think even relatively formal connotations like 'As above, so below'[9], these notions of the micro and the macro being one and the same. How I interpret that in the context of this project is in viewing time and also to an extent, materials, but specifically time, this idea that the project exists on a very finite timeline. Hopefully, it's expansive, but it is addressing these issues that are on-going, expansive in the way that it resists physiology and resists our current consciousness. I am curious as to how you see it, maybe formally, or how these conditions of alchemy and the history of esoteric notions of the natural world and how humans mediate all that in the context of the project and the work that you and I have done?

RW I think that I might be seeing it in a slightly different way in the sense that for me it is about engaging in an enquiry. About wondering what happens if you do 'this' or 'that'? So it is perhaps much more affective for me, rather than something which points explicitly towards those (alchemical) things. In this context I refer to alchemy as a way of recognising how things change metaphorically. One that can equally be applied to the three strands under investigation. I wouldn't want that to be taken literally.

BMW No, of course not. This is a bit of a tangent, but do you think even the alchemists of antiquity wanted to be taken seriously?

RW Oh, I am sure they would want to be taken seriously, but again, if you look at the allegorical imagery that they would speak through, on the one hand it is about being obscure and difficult to engage with and on the other it is very, very clear if you have a sense of poetics. Actually, it can be read in both ways. My point there, is that it is really about being engaged in asking those questions, and following up the thought of 'I wonder what happens if …'. In the beginning, I asked myself the question, 'I wonder what happens if we look at the Energy Coast, and I wonder what happens when we join that together with the archaeological sites and monuments that exist within the region? Then, I wonder what happens if we then begin to find out what people are saying about those things in terms of their belief in transcendental things, like ghosts, like faeries, like boggles and boggarts, and all these kind of things?'

BMW Yeah. For me, it is at that point that humour starts to come in..,

RW Oh yes!

BMW I wonder if you could talk a little bit about that? Because I see in the exchanges and also in trying to leverage that, again, not in an explicit way, humour as a tool, the notion of the absurd, folly entering in (to the project). Certainly in the engagements we've had with others, but I am curious see how you (view it). It seems that you see humour entering in and being a component of this project?

RW Well I think it boils down to something that I talked about in Pennsylvania in July (2012) and strangely enough I was talking about this Wednesday, which is the idea of the formal structure of a joke. As stories they all work in similar ways, I mean jokes are of themselves a narrative structure that have certain characteristics, to create a context, provide an upward curve of expectation, a build-up, and then there is a dénouement or a punch line. Actually stories that we might come across with other narratives, like the ghost story[10], for example, follow exactly the same form. If you think about John Disney's discussion of the legend of Sigurd and Fáfnir, it had exactly the same kind of narrative structure to it. So, there is something about that structure which I find very interesting on a formal level, add to that notions of the 'absurd' and you now you do need handfuls of absurdity in order to make sense of the world I think. There is nothing more absurd than the conceit of bringing together a massively industrialised coast dealing with energy on a scale that we can't really come to terms with, and to make that collide with dead, ancient monuments that nobody has understood in five thousand years and then join that up again with ordinary people telling their stories in a pub. There is something absurd about doing that, which of itself might give rise to a certain wry humour. I am also very keen to see what happens in the minds of people who come along to witness or to be involved in our project. You can see, sometimes, people having a hard time keeping their faces straight when we talk to them about all this, which is great!

BMW For me it stops the analytic part of the brain, humour does that. You don't have to intellectualise it, the quickest way to kill humour is to pick it apart, right, to explain the joke or to screw up the timing? Just encountering the language that is used for these things that are supposed to be terrifying or mischievous or troublesome, even the word 'Boggle' to me, you know there is a certain quality of onomatopoeia, a ridiculousness to a word about a demon-ghost that is out to really mess up your life. I find that as a kind of a natural component of British culture too. There are these really heavy things that happened here, this is a land that has been colonised and re-colonised over the stretches of the centuries, to the thousands of years. There is an absurdity to having a Viking funerary stone very carefully set within an old musty chapel at the side of the sea. There is something about that and also the connection to Neolithic people. That this was also a site of survival, now this consecrated ground over multiple generations, was also the site of spearing some kind of wild animal. There is an absurdity over just a natural progress of history that occurs.

RW Of course in some of those names, I know that we were laughing the other day about Grisleymires Lane …

BMW (Laughing) Yes!

RW … Which to our ears sounds absolutely ridiculous. I'm sure that Grimley Fiendish lives at number thirteen Grisleymires Lane! That is incidentally, an address that I would love to have and yet it is a real place and we know that its history is to do with boars and pigs …

BMW The Hogback! (Laughing) The fact that this stone looks like the back of a hog! That's its taxonomy now in terms of archaeology, but nonetheless that stone looks kind of like the back of a hog, so it's a hogback now! That's what it is!

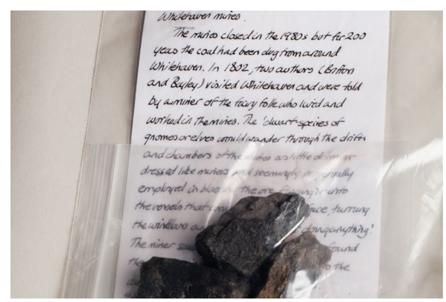
RW (Laughing) When I was an undergraduate in philosophy, I remember going off to an aesthetics lecture and the title of the lecture was something like 'what is more beautiful, the hog's behind or the horse's neck'. The debate there was based on mathematical formulae that would create the same curve for both …

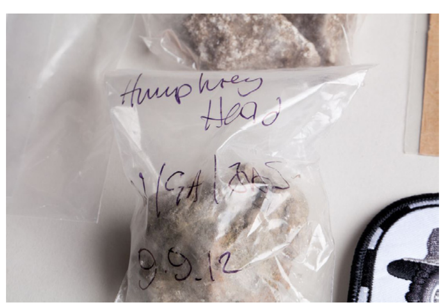
BMW Sacred geometry! But even within a conversation like that it is making the case on where you fall intuitively when a question like that is presented to you and then it is like defending your position because somebody is going to have a contrary view of it. To me, generating work for this is a way of going back to the idea of a platform for people to be contrary about it. To be like, 'Well, this is bullshit'. Or, conversely like 'What is going on here?'

RW For me it is like 'Oh! I never thought of that'. That would be the perfect response.

BMW That would be the jam right? In that conversation any response is good. Even shutting that down that dialogue altogether with somebody laughing. I mean in one of the drawings Jane[11] came up and was 'Oh, that looks quite phallic'. It was like, 'Yeah, it is! You are absolutely right'. Some people would just see the hogback-


SURVEY
OF
THE SITES
OF POWER
IN
N. ENGLAND
(2) HUMPHREY HEAD
SEPT. 9 2012
(3) LEVENS HALL
KENDAL CUMBRIA
(4) CORPSE PATH
AT THE START
(6) FAIRY STEPS
AT THE BASE
SEPT. 23 2012
(7) HUMPHREY HEAD
SEPT. 9 2012
(8) WHITEHAVEN
HARBOUR
OCT. 13 2012


Whitehaven mines.
The mines closed in the 1980s but for 200
years the coal had been dug from around
Whitehaven. In 1802, two authors (Britton
and Bayley) visited Whitehaven and were told
by a miner of the fairy folk who lived and
worked in the mines. The 'dwarf-species of
gnomes or elves would wander through the drifts


Humphrey
Head
9.9.12

dick, they are not going to see the referent, they are going to see the shape, the way that it is being presented. Who knows if that's deliberate, I can't even say if that's deliberate or not? Even though that is the framing …

RW Again, it comes down to using a poetic approach in the same way that we might look at it within alchemical illustrations of the sixteenth and seventeenth centuries. There is plenty of humour involved there …

BMW Yeah! Some of it I could imagine being quite scandalous during that era. Especially notions of copulation and rebirth …

RW (pause) … well it still gets a laugh today …

BMW (Laughing) Yeah, of course!

RW The work itself is as chaotic as its subject matter. Certainly, in your drawings we have a whole range of different visual conflations going on. Within the photographs too, there are odd meetings of things, not least of which is a man with a silver face looking out over a strange landscape.

BMW A tourist …

RW Yes. A very scary tourist, but a tourist nonetheless.

BMW That is something that has arisen in response to the work. It has an ominous quality to it, even if it is something that I have somewhat of a blind spot about. It is not something that I have been deliberately trying to put into the work.

RW No, but I think it is present, you are quite right. The photograph that we took right when you had just arrived this time, it is one that I think I would like to use somewhere. We are down on the pebble beach at Silverdale looking across to Heysham and the clouds have organized themselves to be a visual echo of Heysham Reactors A and B. So we have the squat towers on the horizon and then these enormous vaporous analogues of the power station and there is little you with your hat on standing looking out to sea.

BMW That brings up things like the mushroom cloud. Then there are issues for vapour, like discharge, that we often associate with pollution of sites like that.

RW You see, I am very happy with that. I always believe that coincidence is meaningful.

BMW Can you talk about that?

RW I'm not sure if I can! I will give it a bit of thought. If we are talking about poetic language within art making and within alchemy, and narrative structures – I mean, it is poetic, it is about analogy, metaphor and simile and makes reference to those things. It strikes me that within an idea of the magical, probably the worst term I can use, but the only one I have access to at

the moment is really about rules of correspondences and associations that we see within accounts of magic, for example.

BMW That is what I was about to say.

RW I am thinking about the kind of high magic that might also, mistakenly, be associated with alchemy …

BMW Sure, invocations, the power of language, of chanting and ritualized formula?

RW In some late mediaeval and Renaissance magical instructions and re-invented in the late nineteenth century[12], it works by a very strict set of magical instructions that deal specifically with things that became called *Tables of Correspondences*. So, if you do want to invoke something, what you would do is to bring together everything that puts you in the right mind-set to help think about the operation that you are doing. So, if you are making a love potion, for example, the operation has to happen on Venus's day, the colour has to be associated with Venus, the stone has to be associated with Venus, the perfume and incense have to be associated with Venus and so on and so forth. All these influences are brought together to focus the mind. Now, if we apply that thinking to the world, as it were, especially to a creative practice then those associations and correspondences become the meaningful things that join up circumstances, events and situations. So, we have to have a look at an image like that (the photograph of Heysham A and B with clouds), a happenstance or coincidence that takes place at the moment I released the shutter, and in the instant those elements combine meaningfully. In a sense, that is very different to the process that you are engaged with where you are consciously moving elements in order to compose the marks on the paper, so there might be something interesting in the discussion of those differences?

BMW Yes. As you were talking, I was also remembering – I don't know if you recall that the first time we went to St. Patrick's (Heysham)[13], we found a message in a bottle, on the beach. I still have it. Your first reaction was to say that it should never, ever be opened …

RW (Laughing) …

BMW … And I haven't! That idea of mystery is really important – that things happen, but you don't need to have all the answers. In fact, having all the answers shuts own a certain space that can exist. Cultivating that space, I think, is something that is on the wane culturally, because we are always looking for the 'answer' or the right thing to do, to be accurate, looking to be the 'best'. To me, it is very liberating to have a space that you can occupy to accept failure, being wrong and to accept that maybe laughing at the thing is the best response. Maybe your interpretation isn't required? Isn't necessary …

RW This may link in, perhaps with the idea of coincidence. The chance encounter, something that is not necessarily planned, but which nonetheless might be 'waited' for and one might leap at the opportunity of the moment …

BMW Perhaps this is the idea of receptivity, in that you can't be open to new concepts unless you are so to speak poachable, right?

RW Yes, as you say, to remain open to it.

NOTES

1. Mildred's Lane Projects, Beach Lake, Pennsylvania in the US. A significant contemporary art initiative developed by artists J. Morgan Puett and Mark Dion. In this instance the project *Opus Magnum: Theatrum Chemicum Britannicum*: The Alchemist's Shack Session 15.7.12 – 5.8.12 led by Robert Williams. See also, Thomson, Nato. 2012. *Living As Form*. p.146. Mark Dion, J. Morgan Puett and Collaborators: Mildred's Lane. MIT.
2. January 2011.
3. BBC Radio Cumbria. Robert Williams and Bryan Wilson discussed the project with presenter Ian Timms. 8:30am 15.11.12.
4. See Benford, Gregory. 2000. *Deep Time: How humanity communicates across millennia*. Perennial. Particularly relevant here are the debates concerned with the problems of devising language systems to warn future generations of nuclear waste sites.
5. Dr. Andrew Ramsey. Research co-ordinator for the Faculty of Arts, Business and Science, University of Cumbria.
6. Alan Cleaver suggests that this is an invention, see: Alan Cleaver and Lesley Park (2011). The Fairies of Cumbria. Strange Britain.
7. John Disney's narrative of the Hogback Stone at St. Peter's Church, Heysham on 10.1.11.
8. *Opus Magnum: Theatrum Chemicum Britannicum*: The Alchemist's Shack 2009 session. 17.7.09 – 8.8.09.
9. e.g. Fludd, Robert. (1621). *Utrisque Cosmi: Tomus Primus de Macrocosmi Historia*. Oppenheim.
10. See Williams, Robert and Schäfer, Hilmar (2013). *Dis Manibus: A taxonomy of ghosts*. INFORMATION AS MATERIAL.
11. Jane Topping, Leader of the Fine Art undergraduate programme at the University of Cumbria, Carlisle.
12. e.g. *The Clavicule of Solomon*. See: MacGregor Mathers, S.L. (1914). *The Key of Solomon the King*. Kessinger reprint 1997. For a broader discussion see also: Davies, Owen (2009). *Grimoires: A history of magic books*. Oxford University Press.
13. 10.1.11

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Contributors

Paul Abraitis has an academic background in geochemistry and, amongst other things, he has published scientific journal articles relating to nuclear waste. He spent some time living in Gosforth and is an occasional visitor to the Cumbrian Fells. He has been involved in nuclear related work since the mid-1990s and has worked in the nuclear industry in both research and operational roles. He is currently employed within the Nuclear Regulatory Group of the Environment Agency. However, his contribution to this book has been provided in a personal capacity and is dedicated to his daughter Scarlett Abraitis.

David Barrowclough is Fellow, Tutor and Director of Studies in Archaeology and Anthropology at Wolfson College and the McDonald Institute for Archaeological Research, at the University of Cambridge. He is also visiting Professor of Archaeology, Yeongnam University, S. Korea. He has recently published groundbreaking studies in the Prehistory of Lancashire and Cumbria.

James Brook is an artist and graphic designer, based in Edinburgh, specialising in book design and typography. He has worked extensively in contemporary arts publishing and has specific experience of facilitating artist's ideas within the format of the book, translating ideas into form, and articulating the decisions that inform the design process.

Alan Cleaver has worked in journalism throughout his professional career, beginning on the *Kentish Times* newspapers in 1978. Became Assistant Editor for the Spiritualist newspaper *Psychic News* before returning to the regional press at the *Wycombe & South Bucks Star*. He was made editor of the paper in 1987. He moved to the *Cambridge Evening News* in 1995 to help put the paper on the internet and in 1996 worked for a year on *The Times* and *Sunday Times*, helping prepare them for launching on the web. In 1997 he returned to the regional press to edit the *Hampshire Chronicle* newspaper. He is now freelance and living in Whitehaven, Cumbria.

John Disney was Chief Church Guide at St. Peter's Church, Heysham in Lancashire, until his death in 2011.

Mark Dion is a globally renowned contemporary artist whose work over the last twenty years examines the ways in which dominant ideologies and public institutions shape our understanding of history, knowledge, and the natural world. He has had major international exhibitions at the Het Domein Museum in Holland (2013), Miami Art Museum (2006); Museum of Modern Art, New York (2004); Aldrich Museum of Contemporary Art, Connecticut (2003) and the Tate Gallery, London (1999). Dion lives and works in New York and Pennsylvania.

Robert Williams an artist and academic is Professor of Fine Art at the University of Cumbria. His interdisciplinary practice encompasses an interest in systems of knowledge from the hermetic to the scientific and in diverse subjects drawn from archaeology, alchemy and anthropology. Recent practice includes a number of collaborative projects with his thirteen year old son, Jack Aylward-Williams, the American artist Mark Dion, German cultural theorist Dr. Hilmar Schäfer and the British conceptual practitioners and publishers INFORMATION AS MATERIAL.

Bryan McGovern Wilson is an interdisciplinary artist whose work addresses themes of time, the body, and ritual. An alumnus of the world famous Glass Department at the Rhode Island School of Design (RISD), Wilson looks to craft traditions as methodology, archaic symbolism and field research as strategies to inform his work. Showing widely in his native United States, *Cumbrian Alchemy* is his first project based in the UK. He currently lives and works in New York City.

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