

B A R C O D E   S C U L P T U R E



S T D J L M M L P K G M K B J H A S

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Mae'r awduron, artistiaid a cherddorion yn dal hawlfraint pob testun, llun a recordiad

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# BARCODE SCULPTURE



**Sculpture Cymru** is an organisation of sculptors living and working in Wales. The organisation creates opportunities for sculptors to come together to make work, exhibit and exchange ideas.

Sculpture Cymru was formed in 2000 in response to Association of Sculpteurs Bretagne's wish to create exchange exhibitions with sculptors in Wales. Since its inception, the Group has gone from strength to strength with something like 30 sculptors from Wales and 60 from Brittany, plus some from Ireland, Cornwall and Catalunya, having taken part in these exchange activities.

Following on from this early activity, the Group began to focus its energies within Wales by organising exhibitions and demonstrations at venues such as Margam Park in South Wales, National Botanic Garden of Wales and Picton Castle in West Wales. These events have significantly helped to raise the profile of the Group and consequently Sculpture Cymru is now being approached to develop and manage a range of visual art projects. In recent years the Group has worked with Cadw (Welsh Government's historic environment service), creating and managing two major exhibitions of sculpture at Kidwelly Castle, Carmarthenshire - *Ironstone* in conjunction with the Sixth International Cast Iron Conference and *Castle: Sculptural Responses*, as well as working with the Strata Florida Project in mid Wales and with Groundwork Trust.

Sculpture Cymru is included in the strategies of both Cadw and the Strata Florida Project.



[www.sculpturecymru.org.uk](http://www.sculpturecymru.org.uk)

Mae **Sculpture Cymru** yn gymdeithas o gerflunwyr sy'n byw ac yn gweithio yng Nghymru. Mae'r gymdeithas yn creu cyfleoedd iddyn nhw ddod at ei gilydd i weithio, arddangos a rhannu syniadau.

Sefydlwyd Sculpture Cymru yn y flwyddyn 2000 oherwydd awydd Association de Sculpteurs de Bretagne i greu arddangosiadau cyfnewid gyda cherflunwyr yng Nghymru. Ers hynny, mae'r criw wedi mynd o nerth i nerth ac mae tua 30 cerflunydd o Gymru, 60 o Lydaw a rhai o Iwerddon, Cernyw a Catalunya, wedi bod yn rhan o'r cyfnewid.

Bu i'r criw ddechrau canolbwyntio ar waith yng Nghymru wrth drefnu arddangosfeydd ac arddangosiadau mewn llefydd fel Parc Margam, Gardd Fotaneg Cymru a Chastell Picton. Bu'r digwyddiadau yma'n hwb mawr i dynnu sylw at y grwp a chreu enw iddo. O ganlyniad mae Sculpture Cymru bellach yn derbyn gwaith datblygu ac arwain ar gyfer ystod eang o brosiectau celf gweledol. Yn ddiweddar, bu'r criw yn gweithio gyda Cadw, yn creu ac arwain dwy arddangosfa gerfluniau bwysig yng Nghastell Cydweli, Sir Gâr - *Haearnfaen* ar y cyd â Chweched Chynhadledd Rhyngwladol Haearn Bwrw, a *Castell: Ymateb Gerfluniol*, yn ogystal â gweithio gyda Phrosiect Ystrad Fflur a chydag Ymddiriedolaeth Groundwork.

Mae Sculpture Cymru yn ymddangos yn strategaethau Cadw a Phrosiect Ystrad Fflur.

# BARCODE SCULPTURE

Kevin Blockley

John Howes

Dilys Jackson

Paul Kincaid

Mandy Lane

Lyndon Mably

Glenn Morris

Antonia Spowers

Sarah Tombs

A Sculpture Cymru Project 2015

# Foreword

## Dr Rosetta Plummer

The Garden is extremely proud to be hosting this prestigious, exciting, and innovative *Barcode Sculpture* collaborative project. By bringing together art and science in our unique landscape we have created a prominent outdoor exhibition that drives to the very heart of our core purpose - stimulating and engaging our visitors with the significance of plants in the environment on which we all depend.

The Garden is recognised as a National Asset in the Science Strategy for Wales and increasingly prominent on the international stage for its collections, whether of plants or of art. This is entirely intentional, seeking to start conversations that generate links between artists and the public, developing interest and personal connections that can help communicate the significance of what the Garden is here for.

Throughout the year, changing with the seasons, the outdoor gallery will act as a canvas for these visually and conceptually stimulating works. You will be able to see them glistening with raindrops or warmed by the sun, in the green of summer or the glow of autumn. They will seem different on every occasion.

So whether the children are stepping along the *Tread Gently* path and dancing to *Poppies in the Wind* or you are running your hands over the cool dimpled Carrara-surface of *Invisible Element* or sitting at the foot of *Osmunda regalis*: - ‘*Living Fossil*’ it doesn’t matter. They are here for you to enjoy - admire them, feel them, think about them. We believe this exhibition enhances the artistry inherent in the Garden, adds measurably to its messages and enjoyment, and thereby helps us celebrate and understand our world better.

We are enormously grateful to all the artists, staff, and volunteers who have contributed to making this installation a success. We thank the funding bodies in particular the Arts Council Wales, Sculpture Cymru, The National Lottery, and Brecknock Arts Trust without whose support the works themselves and the year-round calendar of activities accompanying it would not have been possible. Most of all we thank you, the reader and visitor for your interest, and very much look forward to hearing your views and receiving your feedback.

*Director*

*National Botanic Garden of Wales*

# Rhagair

## Dr Rosetta Plummer

Mae’r Ardd yn hynod falch o gael cynnal y prosiect ar y cyd mawr ei glod, cyffrous ac arloesol yma: *Cerflunio Côt Bar*. Rydym ni wedi creu arddangosfa awyr agored barhaol drwy ddod â chelf a gwyddoniaeth at ei gilydd yn ein safle unigryw. Mae’r arddangosfa’n ymgorffori ein nod, sef: ysbrydoli a denu ein hymwelwyr i ddeall arwyddocâd planhigion yn yr amgylchedd, sy’n hollbwysig i’n bywydau ni i gyd.

Mae Strategaeth Gwyddoniaeth Cymru’n cydnabod yr Ardd fel caffaeliad cenedlaethol sy’n dod yn fwy ac yn fwy amlwg yn rhyngwladol oherwydd ei chasgliadau o blanhigion a chelf. Rydym ni’n ceisio sbarduno sgysiaiu fydd yn creu cysylltiadau rhwng artistiaid a’r cyhoedd, ennyn diddordeb a chreu cysylltiadau personol a all drosglwyddo neges ac arwyddocâd creiddiol yr Ardd.

Drwy’r flwyddyn, ac yn newid gyda’r tymhorau, fe fydd yr oriel y tu allan yn ddalen ar gyfer darnau o waith sy’n bwydo’r llygaid a’r meddwl. Fe fyddan nhw i’w gweld yn disgleirio â pherlau glaw, yng ngwres yr haul, yng nglesni’r haf neu yng ngolau mwyn yr hydref. Fe fyddan nhw’n ymddangos yn wahanol bob tro.

Felly os ydy’r plant yn camu llwybr *Ysgafndroedio* ac yn dawnsio i nodau *Pabi yn y Gwynt* neu os ydych chi’n bodio arwyneb Carrara *Elfen Gudd* neu’n eistedd wrth droed *Osmunda regalis*: - ‘*Ffossil Byw*’, dydy hi’n ddim o bwys. Maen nhw yma i chi gael eu mwynhau nhw, eu hedmygu nhw, eu teimlo nhw, a meddwl amdany’n nhw. Rydym ni’n credu bod yr arddangosfa’n gwella’r gwaith celf sydd eisoes yn yr Ardd ac yn ychwanegu at y mwynhad y bydd pobl yn ei gael ohono. Mae felly yn ein helpu ni ddathlu a deall ein byd yn well.

Rydym ni’n ddiolchgar dros ben i’r holl artistiaid, y gweithwyr a’r gwirfoddolwyr sydd wedi cyfrannu at lwyddiant y gosodiad yma. Fe hoffem ni ddiolch i’r sefydliadau a ariannodd y prosiect, yn enwedig y Cyngor Celfyddydau, Sculpture Cymru, y Loteri Genedlaethol ac Ymddiriedolaeth Celf Brecknock. Hebddyn nhw, fyddai’r gwaith ei hun na’r gweithgareddau sydd ar y gweill drwy’r flwyddyn heb fod yn bosib. Yn fwy na dim, rydym ni’n diolch i chi, y darllenwyr a’r ymwelwyr am eich diddordeb; rydym ni’n edrych ymlaen yn arw at gael clywed eich barn drwy dderbyn adborth.

*Cyfarwyddwr*

*Gardd Fotaneg Genedlaethol Cymru*



# Barcode Sculpture

## Introduction

*Barcode Sculpture* is a collaborative art-science project between nine members of Sculpture Cymru who have made artwork in response to the ground-breaking *Barcode Wales* DNA research carried out by Dr. Natasha de Vere and her team of students at the National Botanic Garden of Wales. Following visits to the science laboratories at the National Botanic Garden of Wales, the sculptors undertook a period of research to develop proposals, which they presented to the scientific team. Rather than seeking a literal or visual explanation of the scientific aspects of the *Barcode Wales* project, each sculptor was given the freedom to explore and express an individual artistic point of view.

This project signals a new phase in the development of Sculpture Cymru's creative collaborations with partner organisations, which have facilitated exploration of new contexts for making work and challenged members to seek new ways of making work that respond and interpret stimuli from other disciplines. Sculpture Cymru has recently collaborated with Cadw, with exhibitions at Kidwelly Castle and with University of Wales Trinity St David at Strata Florida; and the current collaboration with the National Botanic Garden of Wales represents a progression of this expanding developing cross-disciplinary approach.

The project has generated a diverse range of individual responses and methods of working. The pieces therefore do not form a coherent collection with each other, but are all linked by their relation to the Garden and the *Barcode Wales* research. Together they form a sculpture trail around the Garden which delights and surprises with its variety of styles, materials, and interpretations.

John Howes has transposed DNA code into musical notes to be played in different locations around the Garden. Antonia Spowers has investigated the notion of barcodes as both text and texture. Sarah Tombs has worked with engraved stepping stones, each representing a different - Welsh rare plant. Kevin Blockley and Dilys Jackson have developed work based on the microscopic forms of pollen. Mandy Lane has interpreted the concept of discovery and biodiversity from a child's point of view. Glenn Morris celebrates the fossilised ferns with carved Kilkenny Limestone, while Paul Kincaid uses two different materials - wood and stone - to communicate the relationship between plants and the DNA which defines them. Lyndon Mably has constructed a sculpture that examines the notion of replication in the context of the walled garden, the site of experimentation.

### *Sculpture Cymru*

# Cerflunio Côt Bar

## Cyflwyniad

Prosiect celf-gwyddoniaeth ar y cyd rhwng naw aelod o Sculpture Cymru ydy *Cerflunio Côt Bar*. Buon nhw'n gwneud gwaith celf yn ymateb i waith ymchwil DNA pwysig *Codau Bar Cymru* a gyrhaeddodd gan Dr. Natasha de Vere a'i thîm o fyfyrwyr yng Ngardd Fotaneg Cymru. Yn dilyn ymweliadau i'r labordai gwyddonol yng Ngardd Fotaneg Cymru, bu'r cerflunwyr yn gwneud cyfnod o waith ymchwil i ddatblygu syniadau cyn eu cyflwyno wedyn i'r tîm gwyddonol. Yn hytrach na cheisio egluro agweddau gwyddonol prosiect Codau Bar Cymru mewn ffordd lythrennol neu weledol, roedd pob cerflunydd yn rhydd i archwilio ac i fynegi ei safbwynt artistig unigryw.

Mae'r prosiect yma'n dynodi cyfnod newydd mewn datblygu cydweithio creadigol Sculpture Cymru gyda phartneriaid. Mae'r cydweithio wedi galluogi archwilio cyd-destunau newydd ar gyfer creu gwaith ac wedi herio aelodau i chwilio am ffyrdd newydd o greu gwaith sy'n ymateb i ac yn dehongli symbyliadau o feysydd gwahanol. Mae Sculpture Cymru wedi cydweithio â Cadw yn ddiweddar; bu arddangosfeydd yng Nghastell Cydweli. Mae hefyd wedi cydweithio gyda Changen Prifysgol Cymru Y Drindod Dewi Sant yn Ystrad Fflur Strata, ac mae'r cydweithio cyfredol gyda Gardd Fotaneg Cymru'n dangos adeiladu ar ac ehangu'r dull traws-faes yma sy'n datblygu.

Mae'r prosiect wedi cynhyrchu amrywiaeth o ymatebion a dulliau o weithio unigryw. Dyd y'r darnau felly ddim yn creu unrhyw gasgliad rhesymegol, ond maen nhw i gyd yn perthyn i'w gilydd oherwydd y cysylltiad â'r Ardd a gwaith ymchwil *Codau Bar Cymru*. Gyda'i gilydd maen nhw'n llunio llwybr gerfluniau o gwmpas yr Ardd sy'n hyfryd ac yn ddifyr oherwydd yr amrywiaeth arddulliau, deunydd a dehongliadau.

Mae John Howes wedi trawsosod côd DNA ar fariau cerddorol i greu cerddoriaeth fydd yn chwarae mewn manau gwahanol yn yr Ardd. Mae Antonia Spowers wedi ymchwilio cysyniad codau bar fel testun a gwead. Bu Sarah Tombs yn gweithio gyda cherrig llamu wedi eu naddu, bob un yn cynrychioli planhigyn prin Cymreig. Mae Kevin Blockley a Dilys Jackson wedi datblygu gwaith yn seiliedig ar ffurfiau microsgopig o baill. Mae gwaith Mandy Lane yn ddadansoddiad o gysyniad darganfod a bioamrywiaeth o safbwynt plentyn. Mae Glenn Morris yn talu teyrnged i'r ffosil rhedyn drwy naddu calchfaen Kilkenny. Mae Paul Kincaid yn defnyddio dau ddeunydd yn ei waith - pren a charreg - er mwyn cyfleu'r berthynas rhwng planhigion a'r DNA sy'n eu llunio. Mae Lyndon Mably wedi creu cerflun sy'n archwilio'r syniad o ddyblygu yn yr Ardd, safle'r arbrofi.

### *Sculpture Cymru*



# The Science of DNA Barcoding

## Dr Natasha de Vere

The ability to identify plant species is fundamental to our understanding of the world around us. To conserve plants, their habitats and ecosystems we need to be able to identify and monitor species. Correct identification is also vital in order for us to use plants for food, medicine or materials. Identification of plants generally relies on morphological examination but sometimes this approach is difficult or impossible to use. If we only have a fragment of tissue or pollen, roots or seeds or even mixtures or processed specimens then morphological identification can be difficult.

DNA barcoding is a technique for identifying species using short sections of DNA to act as a unique identifier. To begin with, a reference DNA database is developed using correctly identified plants, then unknown DNA sequences are compared to this to make an identification. Open Science is key, DNA barcodes and their associated information should be available to everyone. Initiatives around the world are now DNA barcoding all living things from animals to plants, microbes to fungi.

### Barcode Wales and Barcode UK

In 2008 the National Botanic Garden of Wales began an ambitious, multi-institutional project to DNA barcode all of the native flowering plants of Wales. There are 1143 Welsh native flowering plants and we aimed to DNA barcode at least three individuals for every species. Over the following years we collected specimens, extracted their DNA and amplified and sequenced the core DNA barcodes called rbcL and matK. In 2012 we completed this project making Wales the first nation in the world to have a complete DNA barcoded native flora. We published our results in the open access journal PLoS ONE <sup>1</sup> and all of the DNA barcodes and their associated information are publically available for everyone to use. Since then we have been DNA barcoding the rest of the UK native flora.

We are using our DNA barcodes to understand and conserve nature. A key focus is pollinating insects. We rely on honey bees and wild pollinators to pollinate the crops that keep us healthy but around the world pollinator populations are declining. We can use DNA barcoding to identify pollen grains carried on the bodies of pollinators or in bee pollen baskets or honey. This gives us a unique method for investigating pollinator foraging choices. If we can find out what plants are most important for pollinators then we can help to make sure that these are available in their environments.

### DNA Art and Science

Habitat destruction, climate change and over-exploitation threaten the survival of many species and habitats. In order to understand and help prevent this we need to all work together. If we bring together the expertise, skills and experience of a wide range of people we will be able to think of more innovative and powerful solutions to these problems.

This project began with the artists of Sculpture Cymru spending time with the scientists at the National Botanic Garden of Wales whilst we worked on our DNA barcoding activities. The artists and scientists then discussed the work and what we were trying to achieve and each artist produced their own response to this. The sculpture featured in the *Barcode Sculpture* exhibition provides a snapshot into the work of the artists and scientists involved. They provide a starting point for discussion and the beginning of an investigative journey.

### *National Botanic Garden of Wales*

- de Vere et al. 2012 PLoS ONE 7(6): e37945

# Gwyddoniaeth codau bar DNA

## Dr Natasha de Vere

Mae’r gallu i adnabod rhywogaeth planhigyn yn allweddol er mwyn inni ddeall y byd o’n hamgylch. Er mwyn cadw planhigion, eu cynefinoedd a’u hecosystemau, mae rhaid inni allu adnabod a monitro rhywogaethau. Mae adnabod cywir hefyd yn angenrheidiol er mwyn inni allu defnyddio’r planhigion fel bwyd, meddyginiaeth neu i greu defnydd. Er mwyn adnabod rhywogaethau planhigion, fel arfer mae angen archwilio morffolegol, ond weithiau mae’r dull yma’n anodd neu yn amhosib ei ddefnyddio. Os mai dim ond darn bychan o feinwe, pail, gwraidd neu hadyn sydd gennym ni, neu hyd yn oed gymysgedd neu esiampl wedi ei brosesu, fe all adnabod morffolegol fod yn anodd.

Mae llunio codau bar DNA yn ddull ar gyfer adnabod rhywogaethau gan ddefnyddio darnau byr o DNA fel adnabyddwr unigryw. Yn gyntaf, mae rhaid creu cronfa ddata DNA gyfeiriol gyda phlanhigion wedi eu hadnabod yn gywir, yna gellir cymharu patrymau DNA anhysbys gyda’r rheiny er mwyn ceisio eu hadnabod. Mae Gwyddoniaeth Agored yn allweddol, dylai codau bar DNA a’r wybodaeth gysylltiedig fod ar gael i bawb. Mae mentrau ledled y byd yn codio DNA pob math o greaduriaid byw, o anifeiliaid i blanhigion, microbau a ffyngau.

### Codau Bar Cymru a Codau Bar Prydain

Yn 2008, bu i Ardd Fotaneg Cymru ddechrau prosiect uchelgeisiol aml-sefydliad i lunio côd bar DNA ar gyfer pob planhigyn blodeuol cynhenid i Gymru. Mae 1143 planhigyn blodeuol Cymreig ac ein nod oedd canfod côd bar ar gyfer o leiaf tri phlanhigyn unigol o bob rhywogaeth. Dros y blynyddoedd, bu inni gasglu esiamplau, echdynnu eu DNA a chwyddo a threfnu’r codau bar DNA craidd, sef: rbcL a matK. Yn 2012 fe fu cwblhau’r prosiect yma a daeth Cymru i fod y wlad gyntaf yn y byd i fod â chronfa gyflawn o godau bar DNA ei blodau cynhenid. Bu inni gyhoeddi’r canlyniadau yn llyfr PLoS ONE <sup>1</sup> agored i bawb ac mae’r codau bar i gyd ynghyd â’r wybodaeth gysylltiedig ar gael yn gyhoeddus i bawb ei defnyddio. Ers hynny, rydym ni

wedi bod yn canfod codau bar ar gyfer blodau cynhenid i weddill Prydain.

Rydym ni’n defnyddio ein codau bar DNA i ddeall a chadw natur. Mae pryfetach sy’n peillio yn allweddol. Rydym ni’n dibynnu ar wenyn mêl a phryfetach peillio gwylltion i wasgaru pail y cnwd sy’n ein cadw ni’n iach. Ond mae niferoedd y pryfetach peillio yn gostwng ar draws y byd. Fe allwn ni ddefnyddio codau bar DNA i adnabod grawn pail ar glud ar gyrff y pryfetach neu mewn peillgodau neu fêl. Mae hyn yn rhoi dull unigryw inni ymchwilio dewis fannau chwilota. Os allwn ni ddarganfod pa blanhigion ydy’r rhai pwysicaf ar gyfer y pryfetach peillio, fe allwn ni helpu sicrhau bod y planhigion hyn ar gael yn eu hamgylcheddau.

### Celf a Gwyddoniaeth DNA

Mae dinistrio cynefinoedd, newid hinsawdd a gor ymelwa yn bygwth difa llawer o rywogaethau a’u cynefinoedd. Er mwyn deall a helpu atal hyn, mae rhaid inni weithio gyda’n gilydd. Petaem ni’n gallu dod ag arbenigedd, sgiliau a phrofiad amrywiaeth eang o bobl at ei gilydd, fe fyddem ni’n gallu meddwl am atebion mwy arloesol a grymus i’r problemau hyn.

Fe ddechreuodd y prosiect pan fu artistiaid Sculpture Cymru yn treulio amser gyda gwyddonwyr yng Ngardd Fotaneg Cymru tra roedden nhw’n gweithio ar y codau bar DNA. Bu’r artistiaid a’r gwyddonwyr yn trafod y gwaith a’r hyn roeddem ni’n ceisio ei wneud ac yna creodd pob artist ei waith ei hun fel ymateb i hynny. Roedd y cerfluniau yn arddangosfa Cerflunio Côd Bar yn gipolwg o waith yr artistiaid a’r gwyddonwyr. Dyma ddechrau ar gyfer trafodaethau a dechrau taith ymchwiliol.

### *Gardd Fotaneg Cymru*

- de Vere et al. 2012 PLoS ONE 7(6): e37945

## Osmunda regalis: 'Living Fossil'

Glenn Morris



Kilkenny Limestone

Recently, in southern Sweden, scientists discovered some astonishingly well preserved fossils within volcanic remains. It was found that these fossilised remains of the Royal Fern, *Osmunda regalis*, were preserved in such detail that even the process of cell division could be seen. Further investigation revealed that the plant's genome had not changed in 180 million years.

The Royal Fern that we see in the National Botanic Garden of Wales or in the wild today is the same as the plant that would have been growing during the Jurassic Period - the time of the dinosaurs.

It is, perhaps, easy to forget that the complex processes that we associate with modern science were occurring hundreds of millions of years ago - long before the arrival of human beings. The wonderful achievement of barcoding plant DNA is the most modern method of recording plant species; the earliest method is the fossil.

*Living Fossil* is an attempt to capture the moment that a stone or pebble, worn by ages, is broken open to reveal something of beauty that existed in the distant past, something that may have been seen by creatures unknown to us, yet is now revealed to us as they would have seen it at that time.

Yn ne Sweden yn ddiweddar, bu i wyddonwyr ddarganfod ffosilau wedi cadw'n arbennig o dda mewn olion folcano. Darganfuwyd bod y ffosilau Rhedyn (*Osmunda regalis*) wedi eu cadw mewn cymaint o fanylder fel bod proses rhannu celloedd i'w gweld. Darganfuwyd wedi mwy o ymchwil nad oedd gemon y planhigyn wedi newid mewn 180 miliwn o flynyddoedd.

Mae'r rhedyn sydd i'w weld yng Ngardd Fotaneg Cymru neu yn tyfu'n wyllt heddiw'r un planhigyn a oedd yn tyfu yn ystod y cyfnod Jwrasig - oes y dinosoriaid.

Mae'n hawdd anghofio efallai bod y prosesau cymhleth yr ydym ni'n eu cysylltu â gwyddoniaeth fodern eisoes yn digwydd gannoedd o filiynau o flynyddoedd yn ôl, ymhell cyn bodolaeth dyn. Creu codau bar ar gyfer DNA planhigion ydy'r dull diweddaraf o gofnodi rhywogaethau planhigion, y dull hynaf wrth gwrs ydy'r ffosil.

Mae *Ffossil Byw* yn ymgais i ddal yr eiliad pan mae carreg, wedi ei gwisgo drwy'r oesau, yn hollti ac yn dangos prydferthwch rhywbeth a fu'n byw yn y gorffennol pell, rhywbeth y byddai creaduriaid na wyddom ni amdany'n nhw wedi ei weld a ninnau nawr yn ei weld yn union fel y bydden nhw wedi.

# Spiked Pollen Form

Dilys Jackson



*Bronze*

I work in series that are nonetheless connected. I derive my abstracted forms from shapes I see in nature, from vast landscape formations to tiny organic elements of plants. I work in stone, bronze and iron and use paper as sculptural media.

I have been working on plant forms recently and was thus fascinated to see pollen through an electron microscope. An aspect of pollen that is intriguing is that individual pollens are invisible to the naked eye, so they and their processes exist normally in a sphere invisible to us, in a secret world. The technology and power of electron microscopes, however, means that these microscopic objects are not only made visible, but also appear in virtual three dimensions. This is of particular interest to me as a sculptor.

The spikes and protuberances, hollows, cavities and elements nestling inside one inside another present the formalities of male and female. This is one of the themes which has preoccupied me throughout my career. The 'hidden sexuality' of pollens is one aspect of their extraordinary range of forms. Images from the book *Pollen* by Rob Kessler and Dr Madeline Harley of Kew Gardens have been a source of inspiration.

Mae'r ffurfiau a'r siapiau haniaethol rydw i'n eu creu yn dod o'r hyn a welaf mewn natur, yn amrywio o dirweddau eang i elfennau organig bychain planhigion. Rydw i'n gweithio gyda charreg, efydd a haearn ac yn defnyddio papur fel cyfrwng cerflunio.

Rydw i'n gweithio gyda ffurfiau planhigion yn ddiweddar ac felly roedd hi'n hynod ddifyr gen i weld pail trwy chwyddwydr microsgop. Mae'n ddifyr iawn nad ydy'r peilliau unigol i'w gweld gan lygaid felly mae eu prosesau yn digwydd mewn byd nad ydy'n weladwy inni, rhyw fyd cudd. Fodd bynnag, gyda thechnoleg a microsgopau electron, mae'n bosib inni weld y darnau bychain yma, yn ymddangos mewn tri dimensiwn. Mae hyn o ddiddordeb arbennig i mi fel cerflunydd.

Mae pigau, chwyddiannau, tyllau, gwagfeydd a'r pethau sy'n trigo yn y naill a'r llall yn nodi p'un ai gwrywaidd ynteu fenywaidd ydy'r pail. Mae hyn yn thema sydd wedi fy niddori drwy gydol fy ngyrfa. Mae 'rhywioldeb cudd' pail yn un o briodweddau eu hystod ffurf hynod. Bu lluniau o lyfr *Pollen* gan Rob Kessler a Dr Madeline Harley, Kew Gardens yn ysbrydoliaeth i mi.



# Tread Gently

Sarah Tombs



Portland Stone, Plant DNA, Resin

*Tread Gently* comprises seven leaf-shaped 'stepping' stones set into the ground. Each 'leaf' represents an endangered plant species from the Rare Welsh Plants Project led by Dr Natasha de Vere, National Botanic Garden of Wales and Dr Tim Rich, National Museum of Wales.

The stones are inscribed with information found in herbarium specimens. Herbaria are collections of preserved plant specimens containing pressed plants along with information to indicate provenance, collector, date and identity <sup>1</sup>. The *Barcode Wales* project has catalogued all of the Welsh native flowering plants and conifers, creating a DNA barcode for each herbarium voucher <sup>2</sup>. This information is now accessible on the Barcode For Life Database (BOLD) for use by researchers and the public to identify plant species <sup>3</sup>.

The stones are inscribed with drawings, Latin and common names of each plant; and the date and place of collection, or collector. Part of the plant's actual DNA sequence is also inscribed on the stem of each leaf, using the abbreviations A,T,G,C to indicate the complementary nucleotide base pairs: adenine-thymine and guanine-cytosine.

A real DNA sample from each plant is embedded into the stone. Since DNA binds to silica, the DNA will be encapsulated in each stone 'herbarium' for posterity. The stones were designed using Computer Aided Manufacture and made using a water-jet cutter to reflect the computer technology used in the Barcoding process.

1. [www.kew.org/science-conservation/collections/herbarium](http://www.kew.org/science-conservation/collections/herbarium)
2. [www.gardenofwales.org.uk](http://www.gardenofwales.org.uk)
3. [www.boldsystems.org/](http://www.boldsystems.org/)

Saith carreg lamu siâp deilen yn y ddaear ydy *Ysgafndroedio*. Mae pob 'deilen' yn cynrychioli planhigyn sydd mewn perygl o ddiifa ym Mhrosiect Planhigion Cymreig Prin gan Dr Natasha de Vere, Gardd Fotaneg Genedlaethol Cymru a Dr Tim Rich, Amgueddfa Genedlaethol Cymru.

Mae gwybodaeth o sampl herbariwm wedi ei naddu i'r cerrig. Mae'r herbaria yn gasgliadau o blanhigion wedi eu cadw, yn cynnwys planhigion wedi eu gwasgu ynghyd â gwybodaeth yn nodi eu tarddiad, y casglwr, dyddiad a'r enw <sup>1</sup>. Mae prosiect *Codau Bar Cymru* wedi cofnodi holl blanhigion blodeuo a chonifferau Cymreig a chreu côd bar DNA ar gyfer pob tocyn herbariwm <sup>2</sup>. Mae'r wybodaeth yma bellach ar gael yng Nghronfa Ddata Côd Bar am Byth (BOLD) y gall ymchwilyr a'r cyhoedd ei defnyddio er mwyn adnabod rhywogaeth planhigion <sup>3</sup>.

Mae lluniau, enwau Lladin ac enwau cyffredin y planhigion, dyddiad a man casglu neu enw'r casglwr wedi eu naddu i'r cerrig. Mae rhan o batrwm DNA'r planhigyn hefyd wedi ei naddu i goesyn pob deilen, yn defnyddio'r byrfodau A,T,G,C i ddangos y parau niwcleotid sylfaenol cyflenwol: adenin-thymin a guanin-cytosin.

Mae sampl DNA o bob planhigyn wedi ei osod ym mhob carreg. Gan fod DNA yn glynu at silica, fe fydd DNA wedi ei amgáu ym mhob herbariwm carreg ar gyfer y dyfodol. Fe ddyluniwyd y cerrig wrth ddefnyddio cyfrifiadur (CAM) a defnyddiwyd jet-dwr i'w torri fel atsain o'r dechnoleg a ddefnyddir yn y broses o lunio codau bar.

1. [www.kew.org/science-conservation/collections/herbarium](http://www.kew.org/science-conservation/collections/herbarium)
2. [www.gardenofwales.org.uk](http://www.gardenofwales.org.uk)
3. [www.boldsystems.org/](http://www.boldsystems.org/)



# Finding Flowers

Mandy Lane



## Finding Flowers

She waits for Winter's last gasp  
with impatient impudence.  
Black-coal-soil on white fingertips -  
inverted phototropic delving  
reveals her whorl-identity,  
a swirled barcode stamp of self.

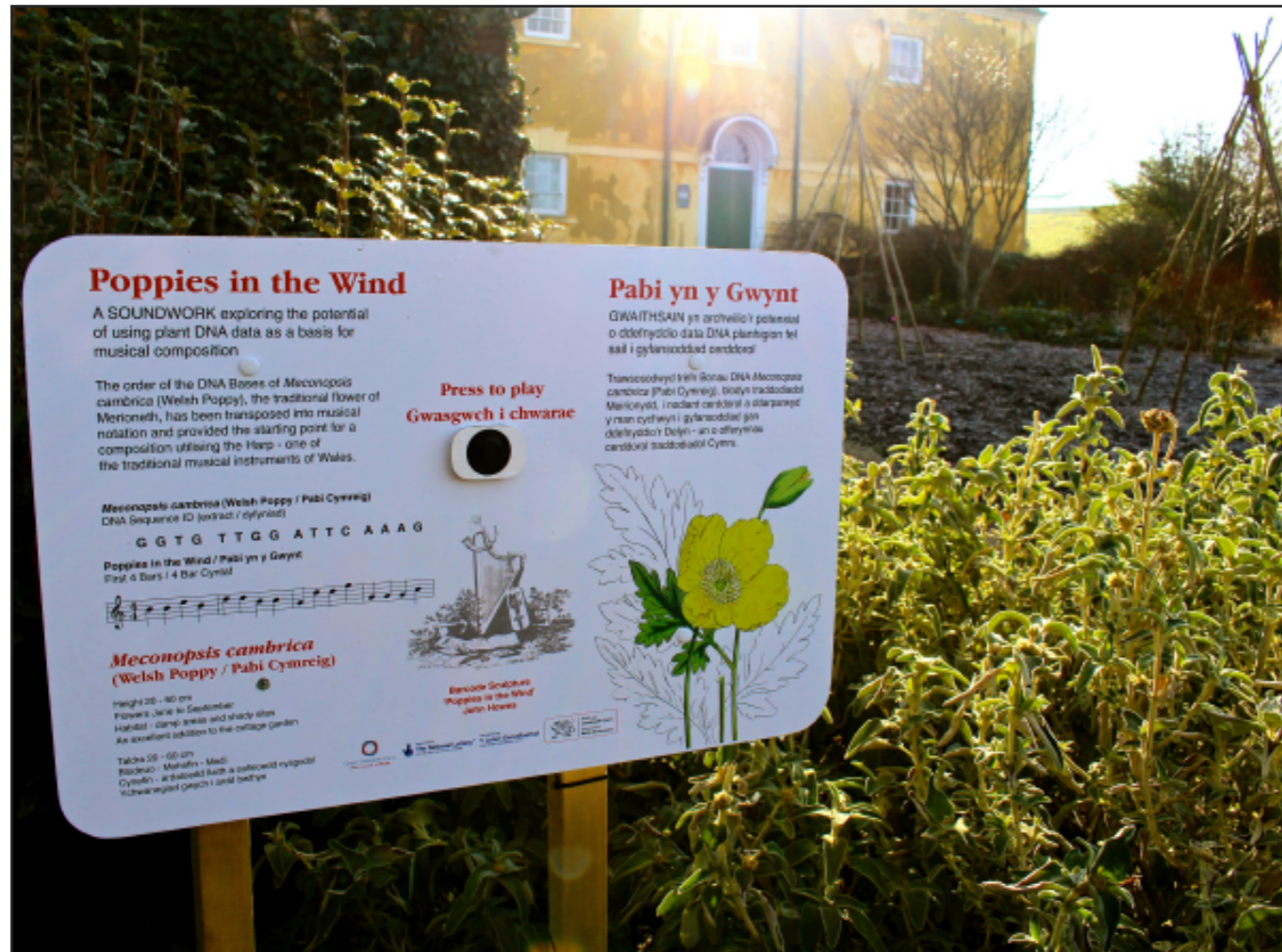
With dirty fingers smudged green  
from this shoot-rummaging,  
and skin a puddled summer sky; she lies  
among broom, meadowsweet and caraway whorled too,  
Blodeuwedd au natural -  
floating ethereal.  
A lone explorer finely detailing finds of indigenous origin  
with a smile of simple joy

*Steve Kettle*

*Jesmonite*

# Herba Musica

John Howes



*Poppies in The Wind* - a Soundwork for *Meconopsis cambrica* (Welsh Poppy) Traditional flower of Merioneth Harp - Harriet Earis

I have long been inspired by the notion that many disciplines can share common fundamental structures that govern the way they are composed and that these similarities are worth exploring. In addition, I have always had a fascination for the many ways in which data and technical information is often displayed both symbolically and graphically.

On visiting the laboratory at the Garden my thoughts about 'common structures' and 'data displays' were brought to mind by seeing the various computer-based displays and print outs of the DNA sequences. In this instance, the information appeared to look like some kind of musical or digital recording notation and immediately fired my imagination.

Along with working as an artist and designer, I have played music for most of my life and have been keen to develop ways of integrating musical ideas with the visual arts.

In response to the *Barcode Wales* project, I have taken the order of the DNA Bases of plants associated with the old counties of Wales and transposed them into musical notation as a starting point for data sonification compositions utilising the traditional musical instruments of Wales - the harp, pibgorn and crwth.

*Poppies in The Wind* - a Soundwork for *Meconopsis cambrica* (Welsh Poppy) Traditional flower of Merioneth Harp - Harriet Earis

*Refuge for a Lily* - a Soundwork for *Lloydia serotina* (Snowdon Lily) Traditional flower of Caernarvonshire Pibgorn - Geraint Roberts

*Harum Scarum* - a Soundwork for *Carum verticillatum* (Whorled Caraway) Traditional flower of Carmarthenshire Crwth - Aneirin Jones

Mae'r syniad y gall disgyblaethau gwahanol rannu strwythurau sylfaenol cyffredin wedi fy ysbrydoli ers amser, a bod y strwythurau hyn yn pennu eu cynnwys a bod hyn yn rhywbeth sydd werth ei ymchwilio. Mae gen i ddiddordeb yn y ffyrdd amrywiol y mae data a gwybodaeth dechnegol ar ddangos yn aml yn symbolaidd a graffigol.

Pan fûm i'n ymweld â'r labordy yn yr Ardd, bu i mi feddwl am fy syniadau ynglyn â'r 'strwythurau cyffredin' a'r 'arddangos data' wrth edrych ar yr arddangosiadau cyfrifiadurol a'r patrymau DNA wedi eu hargraffu. Yma, roedd y wybodaeth yn edrych fel rhyw fath o nodiant cerddorol neu recordio digidol a bu i hyn danio fy nychymyg yn syth.

Yn ogystal â gweithio fel artist a dylunydd, rydw i wedi chwarae cerddoriaeth drwy fy oes ac fe fûm i'n awyddus iawn i blethu syniadau cerddorol â chelf weledol.

Fy ymateb i brosiect *Codau Bar Cymru* oedd cymryd trefn sail DNA planhigion yn hen siroedd Cymru a'u troi nhw yn nodiant cerddorol fel man cychwyn ar gyfer cyfansoddiadau sain yn defnyddio hen offerynnau Cymreig - y Delyn, y pibgorn a'r crwth.

*Pabi yn y Gwynt* - gwaith sain ar gyfer *Meconopsis cambrica* (y pabi Cymreig) Blodyn traddodiadol Meirionydd Y delyn - Harriet Earis

*Noddfa'r Lili* - gwaith sain ar gyfer *Lloydia serotina* (Lili'r Wyddfa) Blodyn traddodiadol Sir Gaernarfon Pibgorn - Geraint Roberts

*Harum Scarum* - gwaith sain ar gyfer *Carum verticillatum* (Carwas Troellog) Blodyn traddodiadol Sir Gaerfyrddin Crwth - Aneirin Jones

## Text

Antonia Spowers



*Stainless Steel*

My response to this project relating to DNA and barcodes was to explore the decorative potential of barcodes. I realised that the density of marks in enlarged barcodes arranged in both horizontal and vertical sequences were a visual reminder of ancient texts, hieroglyphics and cuneiform etc. It seemed an opportunity to both display these contemporary patterns of reference while also referring to a wider historical context. It seems that mankind has a special interest in systems of listing and classification.

Originally I hoped to use one hundred native species but space on the steel high column restricted the number of plants and trees. The trees are *Acer Campestre* (field maple), *Alnus Glutinosa* (alder), *Crataegus Monogyna* (hawthorn) and *Fagus Sylvatica* (beech). *Rosa Canina* (dog rose) is the only shrub and the plants are *Arum Italicum* (lords and ladies), *Bellis Perennis* (daisy), *Caltha Palustris* (kingcup), *Digitalis Purpurea* (foxglove) and *Eryngium Maritimum* (sea holly).

The barcodes are sandblasted onto polished stainless steel plates and glued to a stainless steel column 200 cms. high secured to a concrete base. Rather than placing this piece in the cultivated formal areas of the Gardens I felt a landscape setting was more appropriate. Polished metal sits well amongst vegetation with great potential for reflections.

Fy ymateb i brosiect codau bar DNA oedd archwilio posib addurno gyda chodau bar. Fe ddes i sylweddoli bod dyfnder marciau yn y codau bar wedi eu chwyddo, mewn patrymau fertigol a llorweddol, yn fy atgoffa o ysgrifau hynafol fel hieroglyff, cyn-ysgrif ac yn y blaen. Roedd hyn yn gyfle i mi ddangos y patrymau cyfeirnod cyfoes yma yn ogystal â chyfeirio at gyd-destun hanesyddol mwy eang. Ymddengys bod gan ddyn ddiddordeb arbennig mewn systemau rhestru a dosbarthu.

Yn gyntaf, roeddwn i'n gobeithio defnyddio cant o rywogaethau cynhenid, ond doedd dim digon o le ar y golofn ddir. Dyma'r coed yr ydw i wedi eu cynnwys: *Acer Campestre* (marsanen fach), *Alnus Glutinosa* (gwernen), *Crataegus Monogyna* (draenen wen) a *Fagus Sylvatica* (bedwen). Y *Rosa Canina* (rhosyn gwyllt) ydy'r unig lwyn, a dyma'r planhigion: *Arum Italicum* (pidyn y gog), *Bellis Perennis* (llygad y dydd), *Caltha Palustris* (gold y gors), *Digitalis Purpurea* (bysedd cwn) ac *Eryngium Maritimum* (celynnen y môr).

Rydwn i'n chwistrellu'r codau bar gyda thywod ar blatiau dur gloyw ac yna yn gludo'r rheiny at golofn ddir gloyw 200 centimetr o uchdwyr sy'n sownd i sylfaen goncrit. Yn hytrach na rhoi hwn yn ardaloedd ffurfiol yr Ardd, roeddwn i'n teimlo bod ardal dirlun yn fwy addas. Mae dur gloyw yn edrych yn dda yng nghanol glesni, ac mae potensial adlewyrchu gwyd.

# Tree of Life

Paul Kincaid



*Portland Stone, Wood*

My sculpture is not an obvious representation of a tree nor a stereotypical image for the Biblical idea of the Tree of Life in the Garden of Eden.

It does not have gnarled branches; it does not have boughs bearing clusters of fruit. The tree grows out of a response, a need to respond, out of imaginings, out of imaging, out of the air, out of nowhere. Not of the soil, embryonic, but like and figurative at the same time.

The roots are ordered and aligned and provide a connection in a linear way. This pathway of electronic information is fed into the 'tree'. The stone tree plugged in to receive it, drawing its life from its bar-coded parent, which is made in wood and provides a support for the stone at the same time. It is not a separate plinth but an integral part of the work.

My working processes start with intuitive responses, via collage and drawing. I frequently take photographs of the developmental stages and print them off. These I will draw into, cut out and continually reassemble. I then move on to maquette/model making, which invariably changes and sometimes, by a process of elimination, bears only a faint resemblance to the finished work.

Final work also has to relate to the nature of the material of which it is made. This results in a further development. A model might be made in clay or wax or any other 'plastic' substance or it might be an assemblage using found objects.

Dydy fy ngerflun ddim yn amlwg yn cynrychioli coeden nac yn ddelwedd nodweddiadol o bren y bywyd yn Eden.

Does dim canghennau wedi ystumio, does dim brigau yn dwyn ffrwyth. Mae'r goeden yn tyfu o ymateb, o angen ymateb, o ddychmygu, o lunio, o ddim, o unman. Mae'n rhywbeth nad ydy'n tyfu o'r tir, mae'n embryonig, fel blagur ac yn haniaethol ar yr un pryd.

Mae'r gwreiddiau wedi eu trefnu a'u gosod fel bod cysylltiad llinellol. Mae'r llwybr trydanol yma'n bwydo i mewn i'r 'goeden'. Yna, mae'r goeden garreg yn derbyn y trydan, yn derbyn bywyd gan ei 'riant' pren sydd ag iddo gôd bar. Mae'r 'rhiant' yma'n atgyfnerthu'r goeden, nid ydy'n fôn ar wahân, ond yn hytrach mae'n rhan annatod o'r cyfanwaith.

Mae fy mhrosesau gwaith yn dechrau gydag ymateb greddf, drwy gyfrwng collage a llun llaw. Fe fyddaf i'n tynnu llun ffotograff yn aml o'r gwaith yn ystod y camau datblygu, ac yn eu hargraffu. Fe fyddaf i'n tynnu llun ar y rhain, yn eu torri ac yn eu hailosod yn gyson. Fe fyddaf i wedi yn dechrau creu model, sy'n newid wrth gwrs - weithiau ar ôl newid a dileu, dydy'r model yma'n edrych ddim byd tebyg i'r gwaith terfynol.

Mae rhaid i'r gwaith terfynol fod yn berthnasol i natur y deunydd sydd yn ei gorffori. Mae hyn yn golygu datblygu pellach. Efallai bod y model wedi ei wneud o glai, o gwyr neu o ryw ddeunydd 'plastig', neu fe all fod yn gyfanwaith o wrthrychau wedi eu casglu.

# Invisible Element

Kevin Blockley



*Carrara Marble*

We all recognise plants from their differences of form, colour, and perfume, but the *Barcode Wales* project is identifying an invisible element of the plant - its DNA sequence - and this can only be identified following extensive laboratory tests on a small sample of the plant.

My piece, *Invisible Element*, looks at another part of a plant - one that holds the key to the plants survival - a pollen grain. Pollen grains can also be DNA sequenced. The grains are invisible to the naked eye, but under a scanning electron microscope come to life in all their glory. Pollen grains come in a multitude of shapes - spiked, ridged, pitted, round, oval, lobed. Size also varies with wind borne pollens grains reaching up to 0.1mm across.

I have been fascinated by microscopic elements of nature for several years working on sculptures influenced by single-cell organisms, such as diatoms, and when the *Barcode Sculpture* project first came to my attention a pollen grain immediately came to mind. The pollen grain that I have carved is round with three furrows and a pitted surface, similar to the hellebore pollen grain, which is more elongated.

Carrara marble, from north-west Italy, is one of my favourite stone types to carve, taking a high level of detail, and being hard wearing. This particular marble has subtle grey veining which gives a level of extra interest to the sculpture.

Rydym ni i gyd yn adnabod planhigion o'u ffurfiau, lliw, persawr ond mae prosiect *Codau Bar Cymru* yn canfod elfen anweledig, sef y patrwm DNA. Dim ond wrth wneud profion helaeth ar sampl o'r planhigyn mewn labordy y gellir canfod y patrwm yma.

Mae fy ngwaith, *Elfen Anweledig*, yn edrych ar ran arall y planhigyn, rhan sy'n allweddol er mwyn goroesi: gronyn paill. Gellir canfod patrwm DNA'r paill hefyd. Mae'r paill yn anweledig i'r llygad ond dan ficrosgop electron sy'n sganio, cawn weld ei wir hyfrydwch. Mae gronynnau paill o bob siâp lliw a llun: mae rhai pigog, crimpïog, tyllog, hirgrwn a rhai clustennog. Mae'r maint yn amrywio hefyd; gall rhai y mae'r gwynt yn eu cludo fod 0.1mm o led.

Mae elfennau microsgopig natur wedi fy niddori ers blynyddoedd ac rydw i wedi gweithio ar gerfluniau wedi eu dylanwadu gan greaduriaid ungel, megis diatom. Pan fu i mi glywed am y prosiect *Cerflunio Codau Bar*, daeth gronyn o baill i fy meddwl yn syth. Mae'r gronyn paill rydw i wedi ei naddu yn grwm ac iddo dair rhych ac arwyneb tyllog, yn debyg i'r gronyn hylithr hirach.

Mae marmor Carrara, o ogledd orllewin yr Eidal, yn un o fy hoff gerrig i'w naddu. Mae'n bosib ei naddu mewn manylder ac mae'n wydn iawn. Dyma'r math o farmor sydd â gwythiennau llwyd drwyddo ac mae hynny'n ychwanegu rhywbeth at y cerflun.

# Replication Fork

Lyndon Mably



*Stainless Steel*

My large-scale stainless steel sculpture captures the moment when a new strand of DNA is about to be formed. The parent strand is about to split and replicate itself.

The scale of the piece is in direct contrast to the reality of the scale of DNA, the simplicity of the representational form in direct contrast to the complex information contained within DNA.

When I started thinking about the DNA barcoding project it was interesting to look at all the applications for the information collated by the process. However, it was the actual mechanism of DNA replication within cells that was inspiring me.

I spent a great deal of time researching the complexity of the process of DNA replication, repair and recombination. I looked at the nucleotides and the DNA synthesis as catalysed by DNA polymerase. However I soon realized that the further my research took me into the science of the mechanism, the further I was getting from an easily accessible visual representation of the process of DNA replication.

In the end, I decided that a sculptural depiction of DNA at the moment of replication would be a strong visual cue about the barcoding project for the viewer and hopefully act as a trigger for further research by the interested audience. I hope that some people will want to discover more about this fascinating biological process as a result of this exhibition.

Mae fy ngerflun dur gloyw graddfa-fawr yn dal yr ennyd pan mae edefyn newydd o DNA ar fin ffurfio. Mae'r edefyn rhiant ar fin hollti a dyblygu.

Mae graddfa'r darn yn gyferbyniad llwyr i wir raddfa DNA. Mae symlrwydd y ffurf yn gyferbyniad llwyr i'r wybodaeth gymhleth sydd yn y DNA.

Pan ddechreuais i feddwl am y prosiect codau bar, roedd hi'n ddiddorol edrych ar yr holl geisiadau am y wybodaeth a gydlynon ni yn y broses. Fodd bynnag, dull o ail-greu'r DNA yn y celloedd oedd yn fy ysbrydoli.

Bu i mi dreulio cryn amser yn ymchwilio cymhlethdod proses ail-greu, trwsio ac ail-gyfuno DNA. Bûm i'n edrych ar niwcleotidau a chyfuniad DNA wedi cataleiddio gan bolymerau DNA. Ond des i ddeall fy mod, wrth fynd yn ddyfnach i wyddoniaeth y dull, yn ymbellhau'n fwy a mwy oddi wrth gynrychioli proses ail-greu DNA mewn ffordd weledol ar gael i bawb.

Yn y pen draw, fe benderfynais y byddai cerflun o DNA yn ennyd yr ail-greu yn cynrychioli'r prosiect codau bar ar gyfer y cyhoedd ac efallai'n ysgogi mwy o ymchwilio gan bobl â diddordeb. Rydw i'n gobeithio y bydd yr arddangosfa yma'n codi awydd ar rai pobl i fynd ati i ddarganfod mwy am y broses fiolegol hynod ddiddorol.

# Herba Musica

## John Howes

### Poppies in the Wind

Harp: Harriet Earis

### Refuge for a Lily

Pibgorn: Geraint Roberts

### Harum Scarum

Crwth: Aneirin Jones

Percussion: Rich Thair

**Harriet Earis** has played solo in the Royal Albert Hall and O2 Arena. In 2007 she won an Open Stage prize at *Celtic Connections* in Glasgow and represented Wales in the *Festival Interceltique* in Lorient and she tours regularly across America and Europe.

The Silmaril 36-string lever harp was made in Germany by Frank Sievert. Inlaid in the harp pillar is a piece of the famous yew tree from Strata Florida abbey, Ceredigion where the Welsh poet and harper Dafydd ap Gwylim lies buried.

**Geraint Roberts** plays traditional music, especially Welsh traditional music. He plays bagpipes, whistles and other woodwinds and lives in Ystradgynlais in the Swansea Valley where the last traditional Welsh piper lived some 150 years ago.

Two sets of pibau cyrn (Welsh bag-hornpipes) were used for this recording. One made of cherry wood by John Evans Glennydd from Llanfihangel ar Arth, Ceredigion and the other made of holly by John Tose from the Presellis.

**Aneirin Jones** is from Pontardawe in the Swansea Valley and plays the fiddle amongst other instruments including the crwth. Music has always been a big part of his life and has a great, endless passion for playing traditional music.

The crwth was made by John Howes and based upon a 19th century instrument made by Owain Tudur from Dogellau, North Wales which is in the Leslie Lindsey Mason Collection at the Museum of Fine Arts, Boston, Massachusetts.

**Rich Thair** is a music producer, drummer and founder member of the band Red Snapper. He has released albums for Warner Brothers, Warp Records, Lo Recordings and V2. He also runs music development workshops in the local community and a studio in Pontardawe.

Mae **Harriet Earis** wedi chwarae fel unawdydd yn Neuadd y Royal Albert ac yn ystafell gyngerdd O2 Arena. Yn 2007 bu iddi ennill gwobr Llwyfan Agored yng ngwyl *Cysylltiadau Celtaidd* yn Glasgow yn ogystal â chynrychioli Cymru yng Ngwyl *Ryng-geltaidd Lorient*. Mae hi hefyd yn teithio ar draws Ewrop ac America yn rheolaidd.

Gwnaeth y delyn lifer Silmaril 36-tant yn yr Almaen gan Frank Sievert. Mae darn o ywen enwog Ystrad Fflur, man gorffwys Dafydd ap Gwilym, yng nghorff y Delyn.

Mae **Geraint Roberts** yn chwarae cerddoriaeth draddodiadol. Mae’n canu’r bibgod, y chwiban a chwythbrennau eraill. Mae’n byw yn Ystradgynlais, Dyffryn Tawe ble’r oedd y pibydd Cymreig diwethaf yn byw gant a hanner o flynyddoedd yn ôl.

Defnyddiwyd dau bibgorn ar gyfer y recordiad yma. Mae’r naill wedi ei gwneud o bren ceirios gan John Evans Glennydd o Lanfihangel ar Arth, Ceredigion, a’r llall o gelynnen gan John Tose o’r Preseli.

Daw **Aneirin Jones** o Bontardawe ac mae’n canu’r ffidil yn ogystal ag offerynnau eraill yn cynnwys y crwth. Mae cerddoriaeth wedi bod yn rhan fawr o’i fywyd erioed ac mae ganddo fo ddi-ddordeb mawr mewn cerddoriaeth draddodiadol.

John Howes wnaeth y crwth ac mae wedi ei seilio ar offeryn o’r 19eg ganrif gan Owain Tudur o Ddolgellau, sydd yng nghasgliad Leslie Lindsey Mason yn Amgueddfa Celf Gain Boston, Massachusetts.

Mae **Rich Thair** yn gynhyrchydd cerddoriaeth, drymiwr ac yn un o aelodau gwreiddiol band Red Snapper. Mae o wedi cyhoeddi albymau ar gyfer label Warner Brothers, Warp Records, Lo Recordings a V2. Mae o hefyd yn cynnal gweithdai datblygu cerddoriaeth yn y gymuned leol ac mewn stiwdio ym Mhontardawe.



