

The Genius of Genetics, a celebration of Gregor Mendel through science and art' Press Kit

Content

Press Information

History and Art Revive Origins of Genetics in Czech Republic 2

Speeches

Kim Nasmyth: *Overview of the Project* 6

Marina Wallace: *Turning the Idea into Reality* 7

Christine Borland: *The Artistic Interpretation of Inheritance* 9

Eva Jiricna: *Creating the Environment for the Exhibition* 10

Abbot Lukas Evzen Martinec: *The Importance of the Project to the Abbey and Brno* 11

The Artists 12

Background information 14

Fact Sheets

Life of Gregor Mendel – Johann Gregor Mendel (1822-1884) 21

Mendel's Experiments – The Dawn of Genetics 22

The Augustinian Abbey of St. Thomas in Brno 23

Brno City – A Modern Town With a Great History 24

HISTORY AND ART REVIVE ORIGINS OF GENETICS IN CZECH REPUBLIC

Brno, 15 May 2002 - Artists, scientists, architects and curators from around the world have joined forces with the abbot of the Abbey of St Thomas' in Brno, Czech Republic, in a unique venture that honours the father of modern genetics. The exhibition, *'The Genius of Genetics, a celebration of Gregor Mendel through science and art'*, tells the story of the life and work of the Augustinian friar who, in the 1860s, experimented with peas and discovered the laws that govern heredity. It opens to the public on Tuesday May 21, 2002 and will last for one year.

The exhibition marks an era in history when gene research is poised to revolutionise medicine – and, already, is relevant to everybody's daily life. It is the first phase of a major initiative to reinstate the abbey as an international symbol for genetics. Speaking at the launch (15 May 2002), Ms Marina Wallace, the curator and director of Artakt, the London-based art-science company, said, "There is no greater legend in the history of science than the experiments of Gregor Mendel." The exhibition combines historical items and documents belonging to Mendel with contemporary works of art on the theme of genetics and an interactive website. In what Ms Wallace describes as 'a united nations' of cultural heritage, the project has been thoroughly and accurately researched with the help of world-wide experts to reflect the origins of genetics combined with the excitement and importance of current research. "Another highly significant historical event linked to this project was the restitution of much of the surviving Mendel-related material returned by the Moravian Museum in Brno to the Abbey of St Thomas", said Ms Wallace.

The Genius of Genetics is in three sections focusing respectively on Mendel's biography: his background and motivations; his research interests and methodology; and his experiments within the historical context of the enigma of generation and the development of cell theory. These sections are illustrated by a rich historical documentation, which includes scientific instruments, Mendel's annotated books, letters, photographs and the plans for the glasshouse in the abbey garden where he conducted his experiments.

Christine Borland, an artist whose work developed from an interest in family trees, has spent much time with doctors, scientists and patients. Her contribution to *The Genius of Genetics*, is a large three-dimensional representation of the brain disorder, Huntington's disease, entitled *A Treasure of Human Inheritance* and installed in the final exhibition room in the Abbey alongside material relating to Mendel's experiments on inheritance. "Through art, in particular, work made in consultation with those involved in genetics, we can provide a forum for dialogue for the difficult issues that arise from our knowledge. Ultimately, people will respond to the art according to their own experiences," she said.

Other artists include Susan Derges,UK, herman de vries, The Netherlands, Cornelia Hesse-Honegger, Switzerland, Matilda Downs,UK, Rob Kessler,UK and Gerhard Lang, Germany. "The artists share a fascination with the patterns

observed in nature and with the scientific search for explanations of physical and biological systems," said Ms Wallace.

The exhibition is housed in an environment designed by the renowned Czech architect, Eva Jiricna. "The setting and the personality of Gregor Mendel made this a very special project," said Ms Jiricna. She has designed it in the context of the abbey and incorporated a great many different objects. "It was, above all, our aim to give the exhibition the atmosphere of respect which Mendel's story deserves," she said.

A fully-illustrated catalogue in English and Czech accompanies *The Genius of Genetics* detailing the life of Mendel, the works of art and the historical items. The introduction is by the curators, Marina Wallace and Dr Caterina Albano. The geneticist, Professor Kim Nasmyth, director of the Institute of Molecular Pathology in Vienna has written the forward and the geneticist, Professor Luigi Luca Cavalli-Sforza from Stanford University, USA, is the author of an essay on 'Mendel's Greatness.'

The driving force behind the entire project is Professor Nasmyth. "Mendel's work gave us a new outlook on the nature and causes of our very inheritance. The Abbey of St Thomas, therefore, must be considered a key part of mankind's intellectual heritage." The plans for the future include the restoration of his experimental garden and the apiary. In 2004, the team are aiming for a Mendel Museum of Genetics and Mendel Life Science Centre within the abbey, which will be a forum for discussion on genetics for scientists, artists and the public alike.

The organising body behind the exhibition is the Vereinigung zur Förderung der Genomforschung in Vienna (an organisation that promotes genetic research). The initiative is supported by leading international figures in the world of genetics including Nobel prize winners, Dr James Watson from the USA and Sir Paul Nurse from the UK, as well as the City of Brno and the president of the Czech Republic, Vaclav Havel.

Speaking about his vision for the development of the abbey, the present abbot of the abbey of St Thomas, Lukáš Evžen Martinec, said, "The significance of this exhibition, now in the first phase called the 'Brno Initiative,' is greater than the area of our abbey and the city of Brno. This work demonstrates the victories of good over evil and of intelligence over human foible and the false claim that faith, science, and religion are at odds."

From 16 – 19 May 2002, nearly 100 leaders in the field of genetics from around the world will attend an inaugural conference entitled the European Molecular Biology Organisation Workshop, "Genetics after the Genome," co sponsored by EMBO and the Vereinigung zur Förderung der Genomforschung. Among the delegates will be Nobel prize winners Christianne Nüsslein-Volhard from Germany and Eric Wieschaus from the USA. For some, it will serve as a pilgrimage, to exchange ideas on the progress in gene research in Mendel's home that he himself could never have conceived in those early days of experiments with peas. "It will be a memorable experience for this group of scientists yet just the beginning of a lasting testimony to this extraordinary man," said Professor Nasmyth.

For further information contact

Mag. Ingrid Ladner
B&K Kommunikation
Porzellangasse 35/3
A-1090 Vienna
Tel.: 0043-1-3194378-12
Fax: 0043-1-3194378-20
ladner@bkkommunikation.at

Elaine Snell Public Relations
Tel +44 (0)20 7738 0424 (London UK), mobile +44 (0)7973 953794
Elaine.snell@which.net

Notes to Editors

Sponsors:
Boehringer Ingelheim Austria
Vereinigung zur Förderung der Genomforschung, Vienna
Statutarni mesto Brno

The Genius of Genetics, a celebration of Gregor Mendel through science and art opens to the public on Tuesday 21 May Opening times Tuesday – Sunday 10.00-18.00 (closed on Monday). Admission charge: 80 KC for adults, 40 KC for children under 12 years old. Concessions: 40 KC for students, teachers, pensioners and unemployed persons; 30KC each for groups of school children (minimum 10 children), accompanying teacher free of charge. Guided tours available on request for groups (minimum 5 persons). Call +42 (0) 543 42 40 43 for reservations and details. Disabled access to most areas. Café and restaurant in adjacent Starobrno Brewery
www.mendel-museum.org

Catalogue

The catalogue in English and Czech is available at the exhibition and costs 200 KC (10 Euro)

Gregor Johann Mendel (1822-1884) was born into a farming family. He entered the Augustinian monastery and became a teacher. Between 1856 and 1863 he experimented with and analysed pea plants that were the foundations of the laws of heredity. His work was published in 1866 but the significance of his research was not appreciated until 1900. <http://www.netSPACE.org/MendelWeb>

Artakt is an organisation that generates projects combining art and science researching and mounting innovative exhibitions that illustrate history from a modern perspective and uses the newest technologies. Martin Kemp is Professor of the History of Art at Oxford University. Marina Wallace is Senior Lecturer at Central St Martin's College of Art and Design in London. www.artakt.co.uk

Eva Jiricna Architects is an architectural and design practice based in London with an international portfolio of residential, commercial and retail interiors; furniture, products and exhibitions; private and public buildings. The practice is at the forefront of innovation in form and technology, applying the classic principles of design in a thoroughly modern language. Eva Jiricna, a Czech born architect based in London for over 30 years, founded the practice in 1985, and now has a satellite office in Prague. Her contribution to architecture and design has been recognised over the years with a C.B.E. in the Honours List 1994, election to the Royal Academy (R.A), and designation as an RDI (Royal Designer for Industry)." www.ejal.com

The Vereinigung zur Förderung der Genomforschung (VFG), a charitable society, was founded in Vienna in 2000 to support genetic research and to encourage constructive dialogue between scientists and members of the public. The VFG conducts pioneer research at the Vienna Biocenter (VBC); organises lectures and conferences (co-sponsor of the conference, "EMBO Workshop, Genetics after the Genome" 16-19 May 2002, Abbey of St Thomas, Brno); and is the organising body of the Brno Initiative to establish a Mendel Museum of Genetics and Life Science Centre in the Abbey of St Thomas, Brno.
www.mendel-museum.org
www.univie.ac.at/brno2002

The artists

Christine Borland, UK, *A Treasury of Human Inheritance, Huntington's Disease, Entres Case* 2001. Silver, steel, agates.

Susan Derges, UK, *Vessel*, 2001, ilfochrome transparencies, light boxes; and *Pollen Store*, 1994, ilfochrome photographs.

herman de vries, The Netherlands, *Ilex Canariensis*, 1994, leaves on paper.

Matilda Downs, UK, *Map of Cow Markings*, 2001. Silk screen print with pencil on paper. *Atlas of Cows*, 2001. Screen print, pencil and photo lithography

Cornelia Hesse-Honegger, Switzerland, *Drosophila melanogaster eye-II D*, Heads in natural colour 1986, *Drosophila melanogaster ey.opt*, Heads in natural colour, 1986-87, *Drosophila melanogaster, ey. opt.*, Black eyes, 1987. Mutant of the University of Zürich

Rob Kessler, UK, *On Closer Inspection*, 2001, bone china with printed gold and glass lens. *Mitosis*, 2002, Blown-glass forms.

Gerhard Lang, Germany, *The typical marking of the cow herd in Sch-nthal in Switzerland*, 1994. Photographs and large composite

Pictures of Brno and images of the design concepts are available

Information about **Brno and the Czech Republic** www.visitczechia.cz

Trustees:

Sir Paul Nurse, Cancer Research UK, London
Prof Emil Palecek, Institute of Biophysics, Brno
Sir Richard Sykes, Imperial College, London
Dr James Watson, Cold Spring Harbor, USA
Prof Charles Weissmann, Imperial College, London

Scientific Committee:

Dr Michael Ambrose, John Innes Institute, Norwich
Prof Gustav Ammerer, Institut für Biochemie und Molekulare Zellbiologie, Vienna
Prof Bernadette Modell, Royal Free Hospital and University College London Medical School
Prof Kim Nasmyth, Institute for Molecular Pathology, Vienna
Professor John Parker, Cambridge Botanic Garden
Dr Jan-Michael Peters, Institute for Molecular Pathology, Vienna
Prof Dieter Schweizer, Institut für Botanik de Universität Wien, Vienna
Prof Pak Sham, Institute of Psychiatry, London
Dr Mark Tester, University of Cambridge

KIM NASMYTH, CHAIRMAN

Director, Institute of Molecular Pathology, University of Vienna, A and Member of the Vereinigung zur Förderung der Genomforschung (VFG), Vienna, A

OVERVIEW OF THE PROJECT

Today is an important day for the Czech Republic, the international community of scientists as well as society as we pay tribute to a remarkable man called Gregor Mendel whose experiments with peas in the 19th century has led to a revolution in science and medicine.

We are all interested in our own family histories, by what it is that makes us resemble our parents, grandparents, and great grandparents. Charles Darwin and Alfred Wallace both realised that the tendency of progeny to resemble their parents creates competition between self-reproducing entities. Their theory of evolution, however, had a crucial shortcoming: it provided no explanation for how characters are inherited from one generation to the next. It took the ingenuity of a young friar, called Gregor Mendel, working far away in the city of Brno, to set us on the right track. It was Mendel's work, which eventually led to the discovery of DNA's role in inheritance. Why was the problem of inheritance so difficult? Why did Mendel succeed where others had failed? These are some of the questions addressed by the exhibition currently being shown in Mendel's Abbey of St Thomas in Brno, Czech Republic.

Mendel was fortunate that his education at the University of Vienna and the environment in which he worked provided an intellectual framework, without which he, too, would certainly have failed. His discovery of what we now call genes, and the discrete manner in which they are passed from parents to progeny, must rank as one of the greatest discoveries about living systems. Mendel provided a "window" on living systems, which lies at the heart of modern molecular cell and developmental biology. His technique is still very much in use. Witness the recent excitement about the discovery of genes that may help to specify human grammar or those whose mutation causes debilitating mental diseases, such as schizophrenia.

Mendel was so far ahead of his time that chromosomes and their inheritance had not been described or understood. As a consequence, those few of his contemporaries who actually saw his paper could not grasp its significance. Mendel very possibly died not knowing himself that he had made the seminal discovery we now know he had.

The exhibition created by Artakt aims to portray Mendel in the context of the world in which he grew up and worked. Because Mendel's work gives us a new outlook on the nature and causes of our very existence, the Abbey of St Thomas must be considered a key part of mankind's intellectual heritage. The current exhibition is the first phase of the Brno Initiative to establish a Mendel Museum of Genetics and a Mendel Life Science Centre in the Abbey of St Thomas.

MARINA WALLACE

Director of Wallace Kemp Artakt, UK and Curator of the Genius of Genetics: A Celebration of Gregor Mendel through Science and Art

TURNING THE IDEA INTO REALITY

There is no greater legend in the history of science than that of the experiments of Gregor Mendel, how in the 1860s Mendel single-mindedly discovered the laws governing the inheritance of the individual characters, how the scientific world failed to recognise the importance of these findings during his lifetime and how the remarkable rediscovery in 1900 of what came to be called "Mendelism." The importance of this exhibition, "The Genius of Genetics," and the redevelopment of the abbey of St Thomas here in Brno, reflects the importance of the genetics itself.

In the year 2001, an international group of scientists from the *Verein zur Förderung der Genomforschung* in Vienna and our organisation in London, Wallace Kemp Artakt, which specialises in creating exhibitions in art and science, began plans to re-present the legend and its scientific significance in a new light in the context of science and society in the 19th, 20th and 21st centuries.

Much of the surviving Mendel-related material was returned by the Moravian Museum in Brno to the Abbey of St Thomas this year which has made it possible for us to exhibit original Mendel material together with related items and contemporary art objects, some commissioned especially for this exhibition.

Our job as curators, assisted by the Brno-based staff appointed by the Verein, with the help of the Abbot and, initially, the curator of the Mendelianum, Dr Sekerak, was to identify, conserve, document and photograph all the items which over the years have survived the many attempts made to silence Mendel's story. The most sought item, Mendel's original manuscript of the paper. With a number of scholars and scientists, we became a sort of "United Nations" of cultural heritage.

The objects, including tools, books, letters, and documents, guided us in the story-telling process. The site itself played a vital role in this process: the Abbey and its historic library; the site where Mendel's experimental garden used to be; the remains of an apiary, marking the spot where Mendel carried out his own experiments with bees; the town of Brno in itself, the Bank of which Mendel was president, the Brno community and the history of Moravia.

The contemporary artists who have lent their work and their thoughts to the project have visually livened up the exhibition: Gerhard Lang, Germany, Matilda Downs, UK, Susan Derges, UK, herman de vries, The Netherlands, Rob Kessler, UK, Christine Borland, UK, Cornelia Hesse-Honegger, Switzerland.

There are plans to hold a workshop involving artists and scientists next year which will set up a fruitful dialogue between researching artists and geneticists, offering a work-in-progress preview of the artists' work for the next phase of the exhibition. It will start the process of the public and

specialists' debates on genetics, as well as exchanges of ideas and experiences in preparation for the life sciences centre planned for 2004.

CHRISTINE BORLAND

Artist, UK – A Treasure of Human Inheritance

THE ARTISTIC INTERPRETATION OF INHERITANCE

In my work of the last ten years I have evolved a dialogue with numerous, generous individuals researching in scientific, medical and educational institutions. Their workplaces - cutting edge genetic research laboratories, dissecting rooms, offices where patients are counselled for congenital disorders (to name a few) have become my workplaces. As far as I know there are relatively few similar, comparable models of contemporary practice although there are certainly historical ones. Most often the resulting work is large-scale, sculptural or multi-media, installations; sometimes site specific, and occasionally sited out with the gallery environs.

I hope to find a way to deal with potentially overwhelming questions of life and death by focusing, in my research, on the microcosmic. My purpose is not to record, document or illustrate what people do. I suspect that only the label 'artist' could have gained me access to many of the places I have been allowed - this privilege drives my quest. By observing and asking (sometimes inadvertently) simple, incisive questions within an exceptionally complex domain, a dialogue usually develops whereby grey areas can be explored out with bureaucratic ethical guidelines.

Most recently, following on from pieces where genetics were considered in the kind of historical context described above. I became intrigued to find the term 'eugenics' cropping up repeatedly in the press in relation to the so-called 'New Genetics' and the potential applications of the Human Genome Project. I am currently interested in exploring the ethical debates surrounding these new developments, how they relate directly to affected families, particularly in relation to antenatal screening, and their eventual repercussions for contemporary society, as described here by Dr Tom Shakespeare ; "We have medical care which ensures our survival, whether we are born prematurely, or break our backs or develop degenerative diseases ... But at the same time that disability need not be a problem, genetic science if you are to believe the hype, is promising to remove disability from the world."

At best, through art and in particular work made in collaboration or consultation with those involved in genetics and its related fields, we can provide a public forum for dialogue for these difficult issues, away from the hysterical arena of the press. Ultimately, the individuals comprising the 'public' will respond to the art according to their individual backgrounds and personal experiences. It is essential to value and engage with these as they form the guidelines we ultimately rely on to make excruciatingly difficult decisions in the context of the practical applications of Genetics in our day-to-day lives.

EVA JIRICNA

Architect, Eva Jiricna Architects Ltd, London, UK

CREATING THE ENVIRONMENT FOR THE EXHIBITION

Architecture is the response of an architect to what he considers to be his brief. Our task was to design an exhibition in the context of the Old Monastery, the place where Mendel lived and worked and enjoyed life with its positive and negative sides. We have tried to use architectural language to create an environment suitable for the character of this particular space. The display cabinets fill the niches of the window reveals, and the graphic panels follow the slope of the original vaulting. Although we had to incorporate a great many different objects into the exhibition, it was above all our aim to give the exhibition the atmosphere of respect which Mendel's story deserves.

Among other things, the exhibition will hopefully cast some light on the personality of somebody who came from nowhere, started with nothing, had very little support for nor appreciation of his experiments, and virtually no recognition of his achievements until well after his death. He worked without any hope of his efforts being recognised, to be read about or to even be able to demonstrate his findings to the scientific world. He not only died a disappointed man but his work was consequently destroyed in sheer ignorance and spite. He was rejected by those who could have understood the importance of his work yet was loved by those whose lives were enriched by his practical advice and his remarkable ability to be human.

His work - 200 years later - is now amazing the world. Based on Mendel's initial experiments with peas, scientists now work around the clock to stretch the limits of what could result in an irreversible change to the future of mankind and the quality of our lives. And the most remarkable fact is that it is exactly these scientists, who are experiencing the success Mendel never enjoyed, who came up with the idea of paying tribute to him, to put his name on the map, to remind us of the little man behind it all. In the tough professional world where egos come first in the competition to be recognized, this is an extraordinary tribute of man to man, an act of humility and generosity, a truly human gesture.

Let us hope that in architectural terms we have fulfilled the task of celebrating the life of Mendel, as much as celebrating the proof that humanity still plays an important role in our lives.

LUKÀS EVŽEN MARTINEC
Abbot St. Thomas, Brno

WELCOME

Ladies and Gentlemen and All Our Distinguished Guests,

I extend a heartfelt welcome to you to our Abbey, which should rightfully be called the Cradle of Genetics. This is almost unbelievable, but it is really so! Gregor Mendel's associates would surely have felt such a sense of wonder at the magnitude of his discoveries. We, too, felt the same way when we undertook to organise a completely new and innovative exhibition on the Father of Genetics, entirely on the basis of international voluntary co-operation and support.

So, now I shall hand over to the Professor Kim Nasmyth, a geneticist from the Vereinigung zur Förderung der Genomforschung in Vienna who's vision for the birthplace of genetic discovery has turned an idea into reality.

THE IMPORTANCE OF THE PROJECT TO THE ABBEY AND BRNO

Considering what we have just heard, allow me to close with the following observation. Many of you will recall how not long ago certain curious articles appeared in the media. These articles reported the rumour that the Old Brno Abbey would have a new exhibition. Today, everyone can see with their own eyes how the "rumour" has become reality.

Now just who is behind this exceptional achievement? The Genius of Genetics, of course. But so are all of you, those who decided with your pride, selflessness, indefatigability, and generosity to lend your skills to this project, which is so beautiful and so greatly needed.

The significance of this exhibition, the first phase of the so-called "Brno Initiative," is greater than the Abbey and the City of Brno. It is even greater than our entire region and, permit me to say, than European society itself.

Beyond this, we cannot overlook the exemplary international co-operation among those who sought to work together and who showed exceptional personal and intellectual character. This work demonstrates the victories of good over evil, of intelligence over human foible and challenges the false claim that faith, science, and religion are at odds. May this first step in our project not only enrich your understanding but fill you with joy and pleasure in the success we anticipate of this co-operative work.

I wish each and all of you a superb visit and pleasant time in our abbey.

THE ARTISTS

Christine Borland - UK

A Treasure of Human Inheritance, Entres case (2001).

The artist's work developed from an interest in family trees as the starting point for medical explorations of inherited disorders. Successive generations are translated by the artist into a particular three-dimensional configuration in which each person is represented by a section of an agate stone. The different coloured agates represent various symptoms relating to the condition, in this case Huntington Disease - a hereditary degenerative disorder affecting movement, co-ordination and brain function.

Susan Derges - UK

Pollen Store (1994)

Vessel 1-6 (2001)

As artist-in-residence at the Museum of the History of Science in Oxford, Derges became interested in the history of alchemy and early science. Her approach to nature is marked by her longstanding observations and systematic visual representations of ever-changing natural phenomena. Derges' work represents the actual process of change. It is not intended to provide scientific proof but rather to find internal parallels between different phenomena.

Matilda Downs - UK

Map of cow markings (2001)

Atlas of Cows (2001)

The work Matilda Downs falls neatly in a field similar to that of Gerhard Lang's "researches" as a classifier of natural phenomena. Her interest in codes, systems and patterns, which, she believes, represent underlying connections between apparently unrelated things, is akin to that of many of the historical figures of Mendel's time. Her photographs of a herd of Friesian cows are taken with the intention of isolating and studying the markings on the backs of the animals.

Cornelia Hesse-Honegger - Switzerland

Drosophila melanogaster eye - II D (1986)

Drosophila melanogaster ey. opt (1986-87)

Drosophila melanogaster ey. opt (1987)

Cornelia Hesse-Honegger, who trained as an illustrator at the University of Zürich in the department of zoology, began her work with scientific publications on taxonomy. She became increasingly interested in the fruit fly *Drosophila*, used ubiquitously in genetics experiments in the 20C (taking the place held by the *Pisum* in 19C experiments), and started breeding the insect in her own house, where she could observe it and draw it, recording its varieties and mutations. Hesse-Honegger's work raises the sort of ethical issues that are so difficult to deal with in the context of science and human endeavour in general.

Rob Kessler - UK

On Closer Inspection (2000)

'*On Closer Inspection*' draws on the tradition of using botanical imagery as a source for decoration on china and porcelain, the artist produced magnified images of pollen grains as photographed through an electron microscope. The images have been used to develop a series of gilt prints, and they have been applied to a collection of bone china plates.

Mitosis (2002)

'*Mitosis*' comprises a group of blown-glass forms inspired by looking at images of plant cells in the process of dividing and splitting. A series of spheres have been blown and progressively stretched in their molten state until two new forms emerge.

Gerhard Lang - Germany

The typical marking of the cow herd in Sch-nthal in Switzerland (1994)

"The marking of the cow in Schönthal in Switzerland or the current state of crime registration of cows at pasture based on the cow herd of farmer Jenni." With this work Gerhard Lang introduces an element of humour in what is a serious fact of nature – animals and humans carry, on their skin, signs of their genetic make-up.

herman de vries – The Netherlands

Ilex canariensis (1994)

de vries has a collection of more than 2,400 samples of earth, including no less than 300 from Gröningen in Holland and 350 from the volcanic islands of Gomera and El Hierro in the Canaries. They are laid out according to criteria of similarity and difference, but not within rigid categories. The visual differences which are the basis of so much life speak by implication of the manifold variations in the lives themselves, of the wonderful attuning of plant physiology to minute variations in the composition of soils.

THE GENIUS OF GENETICS A CELEBRATION OF GREGOR MENDEL THROUGH SCIENCE AND ART

The Abbey of St Thomas, Brno, Czech Republic

Contents

1. Introduction
2. The Exhibition
3. Contemporary Artists and List of Objects
4. Mendel's Genetics Garden: Peas and Bees
5. Multimedia and Website
6. The Team
7. The Way Forward

1. INTRODUCTION

Gregor Johann Mendel (1822-1884) was born in Silesia, the son of a farmer. He entered the Augustinian Abbey of St Thomas in Brno in the Czech Republic and was a teacher. In 1868 he became Abbot. Between 1856 and 1863 he experimented with and analysed pea plants and his experiments laid the foundations of the laws of heredity. His work was published in 1866 but the significance of his research was not appreciated until 1900.

The aim of this initiative is to reinstate the Abbey where Mendel worked as a centre for genetic discovery. Mendel's Abbey, unquestionably the birthplace of genetics, is crying out to be transformed from a beautiful but largely unused set of buildings into an international symbol for genetics. Within easy reach of Vienna and Prague, Brno is the second largest city in the Czech Republic and is the home of several international universities.

The intellectual roots of the science of genes (genetics) lie with the visionary work of Gregor Mendel. His discovery that the characteristics of different varieties of pea were inherited by their progeny according to defined ratios was the "first sighting" of "genes" being passed down through the generations. As the father of genetics, Mendel is as important a figure as Charles Darwin, not least because he provided a completely new experimental approach to biology. The recent sequencing of the human genome is the first step in deciphering this information stored in our chromosomes in the form of genes, and is leading to a better understanding the function of human genes.

From May 2002 for one year, a unique exhibition at the beautiful 14th century Abbey, pays tribute to the life and work of Gregor Mendel. Bringing science and art together, "*The Genius of Genetics, a celebration of Gregor Mendel through science and art*" combines historical items with interactive computer technology and new works of art by contemporary European artists. The display translates the friar's revolutionary scientific ideas into a stunning visual experience for the visitor.

The long-term plan is that the Abbey site should house a conference centre and a museum of genetics and, eventually, a research institute. It would create a forum for scientific and public discussions on genetics and the wider ethical issues. The City of Brno is keen to use the redevelopment of the site as a focus for urban renewal. President Vaclav Havel has personally given the project his full support.

2. THE EXHIBITION

THE GENIUS OF GENETICS:

A CELEBRATION OF GREGOR MENDEL THROUGH SCIENCE AND ART

I knew that the results I obtained were not easily compatible with our contemporary scientific knowledge, and that under the circumstances publication of one such isolated experiment was doubly dangerous: dangerous for the experimenter and for the cause he represented.

from Mendel's letter to Nägeli 18th April 1867

The Genius of Genetics, a celebration of Gregor Mendel through science and art is an exhibition scheduled for May 2002 to be held in the Abbey of St Thomas. It aims to provide a vivid insight into Mendel the man, and into the reasons which led to the formulation of his laws of heredity.

The exhibition is aimed at a broad audience of specialists in the fields of genetics, biology, social sciences and history of science, and the general public. The specialist will find relevant documentation on Mendel's work, on the background to his discovery and on the development of genetics. Visitors of all ages and nationalities will be drawn into the magic enigma of generation through a variety of visual and interactive media.

A DETAILED OUTLINE

"The Genius of Genetics a celebration of Gregor Mendel through Science and Art" will combine the creative presentation of historical documents and artefacts (including interactive elements) with contemporary scientific imaging and contemporary art. The approach is based upon the integration of different modes of representation and insight.

Structure

The three sections of the exhibition will focus respectively on Mendel's biography, background and motivations; on his research interests and methodology; on the life in the Abbey, and on Mendel's research, the enigma of generation and the development of cell theory.

Section 1: MENDEL: MAN AND MIND

His circumstances decided his vocational choice. He requested and received in the 1843 admission to the Augustinian Abbey St Thomas in Altbrünn. In the spare hours, he occupied himself with the small botanical-mineralogical collection, which was placed at his disposal in the Abbey. His special liking for the field of natural science deepened the more he had opportunity to become familiar with it.

from Mendel's Autobiography (1850)

Who was Mendel? Where did Mendel find the motivation to forge a new method in the natural sciences, especially plant hybridisation?

The approach will be an illustrated journey through the conceptual life of his training, the influences upon him and his own vision and will include items associated with Mendel's daily life.

Section 2: THE MATHEMATICS OF INHERITANCE

Looking at the composition of our experience of nature from its individual elements, we find facts to be subordinated to laws and determined through them. It follows from this that a complete theoretical explanation, in which we explain the interconnection of facts that are subjected to laws in terms of the latter, is possible only on the basis of mathematics.

from M.J. Schleiden Grundzüge der wissenschaftlichen Botanik nach einer methodologischen Einleitung als Einleitung zum Studium (1849-50)

This section will explore the question of what led to the creation of Mendel's original methods of research. Crucial to Mendel's insights are the broad range of his formal studies, which included physics, mathematics and statistics, and his range of general interests which extended from chemistry to astronomy and meteorology. Mendel's innovative application of mathematics to the study of heredity and his use of probability theory to analyse biological processes mark the beginning of classical genetics. His studies in other natural phenomena testify to his keen interest in observation, classification and the definition of organising principles. The visual and interactive display of mathematical patterns in taxonomy and genetics will bring colour and vividness to subjects which can be austere and inaccessible.

Section 3: THE ENIGMA OF GENERATION AND THE RISE OF CELL

If it chance that an egg cell unites with a dissimilar cell, we must then assume that between those elements of both cells which determine opposites characters, some sort of compromise is effected. In the formation of these cells all existing elements participate, in an entirely free and equal arrangement, by which it is only the differentiating ones which mutually separates themselves. In this way the production would be rendered possible of as many sorts of egg and pollen cells as there are combinations possible of the formation of elements.

from Gregor Mendel, Versuche über Pflanzen-Hybriden (1866)

What did Mendel discover? How does his discovery work? What was the connection between Mendel's research, the enigma of generation and the development of cell theory? How did Mendel understand the development of living forms in nature, and what was his attitude to Darwin's theory of evolution? What was the appreciation of Mendel's work by his contemporaries, especially abroad? How does Mendel's discovery relate to us?

3. CONTEMPORARY ARTISTS AND LIST OF OBJECTS

The exhibition will include works by contemporary artists to re-evaluate the continued relevance of Mendel's foundational concepts. The idea is to bring Mendel alive in our contemporary scientific, artistic and social contexts.

Christine Borland, *A Treasury of Human Inheritance, Entres case*, 2001
Silver, steel, agates
Courtesy of a private collector

Susan Derges, *Vessel*, 2001
Series of 6 photograms
Michael Hue-Williams Fine Art Ltd

Susan Derges, *Pollen Store*, 1994
Series of photograms, light box
Michael Hue-Williams Fine Art Ltd

herman de vries, *Ilex canariensis*, 1994
Leaves on paper
Courtesy of the artist

Matilda Downs, *Map of Cow Markings*, 2001
Silk screen print with pencil on paper
Englands & Co. Gallery

Matilda Downs, *Atlas of Cows*, 2001
Screen print, pencil and photo lithography
Englands & Co. Gallery

Cornelia Hesse-Honegger
Flies (Drosophila melanogaster) X-rays at Zoological Institute at University of Zürich, red eyes, EY-IID, 1986
Flies (Drosophila melanogaster) X-rays at Zoological Institute at University of Zürich, wings growing out of the eyes, EY-OPT, 1986
Flies (Drosophila melanogaster) X-rays at Zoological Institute at University of Zürich, eye painted back, 1986-87
Courtesy of the artist

Rob Kessler, *On Closer Inspection*, 2000
Gilt prints, china plates
Courtesy of the artist

Rob Kessler, *Mitosis*, 2002
Glass
Courtesy of the artist

Gerhard Lang, *The typical marking of the cow herd in Sch-nthal in Switzerland*, 1994
Photographs and large composite
Courtesy of the artist

List of Objects

The historical items and papers for the exhibition are yet to be confirmed, but will include:

- Plans for the glasshouse in the Abbey grounds (property of the Abbey)
- Mendel's certificate of ecclesiastical studies, 1848, (property of the Abbey)
Mendel's meteorological papers, observations- July 1857 (property of the Prague Meteorological Society)
- Printed edition of Mendel's original manuscript, *Versuche über Pflanzen-Hybriden*, (property of the Abbey Library)
- Two fragments of note sheets, Notizblatt I and Notizblatt II (property of the Abbey)
- Photograph of Mendel and other Augustinians (property of the Abbey)
- Key text references for his work
- Darwin's works: *Variation of animals and plants under domestication*, German translation (property of the Abbey) and annotated version of *The Origin of the Species*, German translation
- A range of teaching books and didactical material

4. MENDEL'S GENETICS GARDEN: PEAS AND BEES

The garden in the Abbey with its glasshouse and beehives was Mendel's living laboratory. It was there that he conducted his meticulous procedures of pollination and harvesting. The meticulous nature of his experiments with plants in his garden established the basis for his mathematical analyses of inheritance. The Abbey garden is to be established as an exciting and attractive site for visitors.

5. MULTIMEDIA AND WEBSITE

An essential compound to the exhibition - in all its sections and two phases - is the multi-media element developed. The website will offer an interactive insight into Mendel's discovery and genetics, and information on the project.

6. THE TEAM

The lead body is the **Vereinigung zur Förderung der Genomforschung** in Vienna. The originators of the project are Professor Kim Nasmyth and Anna Nasmyth, with the support of leading international figures in the world of genetics.

Eva Jiricna the renowned Czech architect-designer, who is based in London and has developed a substantial practice in her native country, is the designer for the conversion of the Abbey and of the exhibition spaces. Jiricna's architecture is founded on an elegant and uplifting use of technology to create spaces infused with light and colour.

Wallace/Kemp Artakt are responsible for the conceptual framework and content of the exhibition. Its Directors are Martin Kemp, Professor of the History of Art at Oxford University, and Marina Wallace, Senior Lecturer at Central St Martin's College of Art and Design in London. Formally established in 2000, Artakt combines the international worlds of art and scientific imagery. Its inaugural activity was the acclaimed exhibition *Spectacular Bodies. The Art*

and Science of the Human Body from Leonardo to Now at the Hayward Gallery, London, in 2000-2001. Together Wallace and Kemp span the worlds of academia, art colleges, museums of material culture and science, historical and contemporary art galleries, exhibition spaces, public and private funding agencies, and the commercial sector.

At the centre of Artakt's activities is the conviction that the worlds of art, science and technology need to be nurtured and communicated as clearly, creatively, and accurately as possible to wide and specialist audiences alike.

The Trustees:

Sir Paul Nurse, Imperial Cancer Research Fund, London
Prof Emil Palecek, Institute of Biophysics, Brno
Sir Richard Sykes, Imperial College, London
Dr James Watson, Cold Spring Harbor, USA
Prof Charles Weissmann, Imperial College, London

Scientific Committee:

Dr Michael Ambrose, John Innes Institute, Norwich
Prof Gustav Ammerer, Institut für Biochemie und Molekulare Zellbiologie, Vienna
Prof Bernadette Modell, Royal Free Hospital and University College London Medical School
Prof Kim Nasmyth, Institute for Molecular Pathology, Vienna
Dr Jan-Michael Peters, Institute for Molecular Pathology, Vienna
Prof Dieter Schweizer, Institut für Botanik der Universität Wien, Vienna
Prof Pak Sham, Institute of Psychiatry, London
Dr Mark Tester, University of Cambridge

7. THE WAY FORWARD

...pea hybrids form germinal and pollen cells which, in their composition, correspond in equal numbers to all the constant forms resulting from the combination of traits united through fertilisation

This statement recurs several times in Mendel's seminal article *Versuche über Pflanzen-Hybriden* (1866). It signals his revolutionary approach to biological experimentation and denotes the role of the statistical analysis in genetics. It conveys the essence of Mendelian theory of inheritable traits and represents a key remark in the history of genetics.

The project will develop further with a second exhibition "*Genes and Genetics*" (provisional title) planned for 2003. This will include the history of genetics after Mendel starting from the re-discovery of his work in 1900. The fundamental working processes devised for the first exhibition will be maintained throughout aiming to lead to the establishment of an International Life Science Centre (2004) and a Museum of Genetics. The re-creation of Mendel's experimental garden will be crucial to the second and third phases.

This whole project will gain momentum through the already proved interest of the international scientific community. It is intended that the Abbey will be gradually refurbished to host both prestigious exhibitions and conferences, functioning as a lively centre for the public, artists and scientists alike.

For further information contact

Elaine Snell, Public Relations Consultant, London, UK

Tel +44 (0)20 7738 0424 or elaine.snell@which.net

Mag. Ingrid Ladner, B&K Kommunikation, Vienna, Austria

Tel +43 1 319 43 78 12

ladner@bkkommunikation.at

LIFE OF GREGOR MENDEL - JOHANN GREGOR MENDEL (1822-1884)

<http://www.netspace.org/MendelWeb>

Johann Gregor Mendel was born on 20 July 1822 in the Czech Republic in the small village of Hyncice u Opavy in Lower Silesia (then known as Heinzendorf in Austria). He eventually became the Abbot of the Abbey of St Thomas in Brno in 1868. He died in 1884 and is buried at the central cemetery in Brno. His father, Anton Mendel (1789-1857), was a farmer. His mother was called Rosine Schwirtlich, (1794-1862). Johann had one older sister, Veronica, two years older than him, and one younger sister, Theresia, born in 1829.

In 1833 at the age of eleven Johann Mendel was sent to the Piarist secondary school in the nearby village of Leipnik. The following year he entered the Gymnasium in Opava, Silesia (formerly called Troppau). Mendel went on to the University of Olomouc (then called Olmütz) in 1840 to study philosophy. He worked as a tutor and, at the same time studied philosophy for the next two years at the Philosophical Institute.

In 1843 Mendel entered the Abbey of St. Thomas at Brno (Brünn) as a novice and took the name Gregor. In 1845 Gregor Mendel began his studies at Brno Theological College. On 4 August 1847 at the age of 25 years Gregor Mendel was ordained a priest. He continued his studies and in June 1848 Gregor received a certificate of completion from the college. In early August he became a parish priest in the collegiate church at Old Brno. Mendel was not a success as a parish priest and after a difficult year, in spite of his inexperience, accepted a school teaching job at the Gymnasium secondary school in Znojmo (Znaim) in 1849. After a year teaching, Mendel took an examination to gain a permanent post, but failed. Baron von Baumgartner, one of the examiners, suggested to Abbot Knapp that Mendel should go to the University of Vienna to study natural sciences.

Gregor studied science at the University of Vienna for the next two years. Amongst other books, he read Carl Friedrich von Gärtner's "Experiments and Observations Concerning the Production of Hybrids in the Vegetable Kingdom" (Versuche und Beobachtungen über die Bastarderzeugung im Pflanzenreiche, 1849), which describes thousands of experiments, including hybridisation, on more than 500 species of plants. From 1854 Mendel taught physics and science at a state secondary modern school. Mendel was appointed Abbot of the Abbey of St Thomas in 1868.

Mendel's pioneering work on breeding garden peas, first published in 1865, was forgotten until after his death in 1884. His work was rediscovered in 1890 when his experimental observations became the foundation of classical genetics and modern plant cultivation. Mendel's laws of inheritance were brought to the attention of the outside world in 1900 when William Bateson, a Cambridge zoologist, revealed their enormous importance in a lecture, later to be reported in the Royal Horticultural Society's journal, *Gardeners' Chronicle*.

In 1910 a committee of 150 scientists from around the world erected a marble statue of him by the Viennese sculptor, Theodor Charlemont, as a monument

to his memory in Brno. In 1965 the father of modern genetics was further honoured by the opening of a memorial to him in the former refectory of his Brno Old Town Abbey.

MENDEL'S EXPERIMENTS - THE DAWN OF GENETICS

<http://www.netspace.org/MendelWeb>

Johann Gregor Mendel's famous garden pea cross-breeding experiments of the 1850's made him the father of classical genetics. His results were originally presented as two papers given in German on 8 February 1865 and 8 March 1865 to the Natural History Society of Brno. Mendel's lectures on "Experiments in Plant Hybridisation" were published in the Proceedings of the Brno Natural History Society in a paper "Versuche über Pflanzen-Hybriden" *Abhandlungen, Brünn* 4, pp. 3-47 (1866).

An English translation of Mendel's paper was prepared by C.T Druery in 1901 and published in the Royal Horticultural Society's journal as "Experiments in Plant Hybridisation". Mendel wanted to be able to predict the appearance of the cross-bred offspring and the numbers of each form which can be expected.

Mendel's work was revolutionary because he looked at seven easily observable characteristics (or traits) of the plants to deduce his laws of inheritance. Mendel started with peas which grew into true-breeding parent pea plants and carefully crossed them. He used pollen from one type and eggs from the other, and also eggs from the first and pollen from the second to see if this made any difference. He then studied the plants which grew from the new peas these produced. Mendel knew from earlier work that all the offspring would look like only one of the parent plants.

For each of his seven pea characters Mendel called the form which appeared in the hybrids (round peas, long stems, green pods) the dominant trait. He called the other, missing form (angular peas, short stems, yellow pods) the recessive trait. Mendel then let the hybrids fertilise themselves, and noted the appearance of the offspring. He found that the first generation grown from the hybrids showed both dominant and recessive forms, roughly in the ratio 3:1, and that no other intermediate forms appeared.

Mendel then let the first generation from the hybrids self-fertilise and observed their offspring - the second generation. He noted that the recessive forms bred true. He concluded that one third of the dominants must be like the true-breeding original parents, while the other two thirds of the dominants must be like the hybrid dominants produced in the previous generation.

Putting his results together Mendel concluded that the 3:1 ratio of dominant and recessive forms previously seen must be made up of three forms - hybrid dominant, parental dominant and parental recessive in the ratio 2:1:1 respectively. Mendel then says that all subsequent generations will show the same inheritance patterns. Mendel developed a mathematical model to show his findings, demonstrating his transition from a simple presenter of experimental results to theoretician.

Mendel deduced from further experiments that each hybrid plant was producing equal amounts of each characteristic inherited from its parents in both its eggs and its pollen. This is called Mendel's "law of random segregation". Mendel went on to show that the various characteristics he was studying behaved independently of each other, although on average, each obeyed the 1:2:1 ratio. This is called Mendel's "law of independent assortment".

Mendel's later experiments showed that his pea results were valid for beans and other plants.

THE AUGUSTINIAN ABBEY OF ST. THOMAS IN BRNO

www.d-net.cz/opatbrno

The religious order of the Augustinians-Eremites was founded in 1256. Augustinian friars first arrived in Brno in 1346 and their abbey was granted a **founding document** in **1350** by the Moravian Margrave, John Henry of Luxembourg. Due to the lack of suitable space within the walled town, the friars built on a site 'in front of the walls' near the Rhine Gate - now the Moravian Square.

During the reign of **Vaclav IV** the Catholics of Brno resisted the religious reformation movement of the Hussites, successfully defending themselves against **Hussite raids** in 1424 and 1428. However the unprotected Abbey of St Thomas was almost totally destroyed.

Following the Hussite raids the citizens of Brno built a wall with towers surrounding it to protect the rebuilt abbey.

The Augustinians were made to leave St Thomas in 1783 by **emperor Joseph II** and forcibly moved to Brno Old Town, where they took over a former Cistercian monastery following the dissolution of the Cistercian Order. The Brno Old Town Abbey is a unique example of Czech Gothic architecture. The designers used Silesian art forms and its original technology mixes raw bricks with stonework, echoing the Cistercian monastery at Sezemice, which was built in 1280. After their relocation in 1783 the Augustinians undertook an extensive programme of refurbishment of the former Cistercian monastery. In 1796 they built a new barrel-vaulted refectory on the ground floor (now used as Mendel's monument) and a library on the first floor on the site.

It flourished under the Augustinians, becoming a famous **centre of science and education** in Moravia during the **nineteenth century**, thanks to the support of the abbots Cyril Napp (1792-1867) and Gregor Mendel (1822-1884). The Augustinian friars were famed for their learning as much as their culture and their libraries contained the largest collection (27.000 books) of books in Brno. The friars trained many outstanding musicians and singers, including the world famous composer Leo Janacek (1854-1928). Johann Gregor Mendel entered the Abbey in 1843 and carried out his famous botanical experiments on peas during the 1850's.

In **1939** the Czech Republic was **occupied** by the **national socialists**. They arrested many friars because of their resistance against the Nazis. There were also a few friars who had been killed by the Nazis because of their resistance against the regime.

In **1948** the **communist era** started. Religion was to be controlled by politics. The Abbey of St. Thomas was closed in 1950, when soldiers knocked on the abbey's door, told the friars that they had only one hour to pack their personal things and brought them to prison, where they were locked in for many years. The abbey was used as a residential home for students. Rooms – like the beautiful refectory – were rented to companies and institutions.

The **Augustian order** itself went to the **underground** and tried there to continue its work. The present abbot, Lukas Evzen Martinec, became a member of the order in the underground right before starting his theological studies.

After the **turning-point in politics in 1989** the Abbey of **St. Thomas** was **restituted** to the Augustinians. Abbot Martinec started to reconstruct the beautiful rooms of the abbey in 1996.

BRNO CITY – A MODERN TOWN WITH A GREAT HISTORY

www.antor.com/Czech_Republic, www.visitczechia.cz, <http://www.brno-city.cz/main/index-en.htm>

The second largest city in the Czech Republic, Brno today has a **population of 400,000** and is an **important trade centre** on the routes linking Prague, Krakow and Vienna. Brno, was the ancient centre of Moravia and has been inhabited by both German and Czech speaking peoples for hundreds of years.

Slavs arrived in the area about **500 AD** following the Celts and Germanic tribes of the Markomen and Kvads. After 800 AD the Great Moravian Empire was founded. After the turn of the first millennium Moravia joined Bohemia and was then part of the Polish state. Moravia became part of the Czech nation following the invasion of Prince Bretislav who expelled the Polish occupiers between 1018 and 1031.

By the year **1200** churches were springing up across the region including the Church of the Virgin Mary. **Monasteries** followed including Augustinians at the Herbur monastery at the Church of Virgin Mary on Jesuitska. The monks helped to civilise the region, cultivating fields, vineyards and gardens, attracting further settlement.

Between the years 1231 and 1237 the four ethnic settlements at Brno, of Slavic, Jewish, German, and Flemish peoples formally joined to become one city and in **1243 basic city rights** and privileges were established by the Czech King, Vaclav I. The city's wealth increased enormously after an edict by

Charles IV in 1348 ordered all merchants of foreign countries passing through the region to visit Brno with their goods. The next hundred years were a time of political and religious unrest and during the reign of **Vaclav IV** in 1424 and again in 1428 Old Brno was burned as the local Catholics resisted the armies of the **Hussite** religious reformation movement. Over 170 houses were burned, and the Augustinian Abbey of St Thomas practically destroyed.

In the middle of the 16th century Brno started to become a Protestant city. The Protestants also represented the majority in the town council. In 1619 the citizens of Brno joined the so-called "ständischer Aufstand", what does this mean? for which they were punished afterwards. Between 1643 and 1645 Brno was the only city in Moravia, which was able to stand the siege of the Swedish army. During the **Thirty Years' War** Brno became the capital city of Moravia.

The **Napoleonic armies** passed through the city in 1805 and 1809. A polytechnic institute was founded in Brno in 1850, followed by a German language technical university in 1873, and amongst its professors was Victor Kaplan, the inventor of the turbine. The first Czech language technical university was opened in 1899. By 1919 the Masaryk University was founded.

In **1939** the Czech Republic was occupied by the **national socialists**. They set up the so-called "Protektorat Böhmen und Mähren". They devastated the Jewish population in the concentration-camp Theresienstadt, suppressed the resistance movement and closed churches and abbeys. Many priests and friars were arrested and killed because of their resistance against the national socialists.

Czechoslovakia was delivered by the Soviet army in 1945. In 1946 the first free elections took place and the former president of Czechoslovakia came back from his exile.

In **1948 the communists** took over the power in Czechoslovakia. From this moment, the country was a so-called "satellite" of the Soviet Union. People were suppressed again, no one was free speech was abolished and religions were under political control. Churches and abbeys were closed. Priests and orders could only work in the underground. In 1968 students tried to break the power of communism, but were beaten down by the Soviet army.

In **1989** the so-called "**Velvet Revolution**" took place and this was the turning point in politics. The communist government was detached and the former civil rights activist, Vaclav Havel, was elected as the president of Czechoslovakia. Since 1993 Slovakia and the Czech Republic are separate states.