

ENTDECKUNGEN
/DISCOVERIES

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Exhibition
**“Discoveries 2011:
Health”**

Isle of Mainau
20 May – 4 September 2011
www.mainau-entdeckungen.de

20.05–
04.09
2011



“Discoveries 2011: Health”
Exhibition of the Foundation
Lindau Nobelprizewinners
Meetings at Lake Constance

PRE- FACE



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COUNTESS
BETTINA BERNADOTTE
PROF. DR. H.C. WOLFGANG
SCHÜRER

PREFACE

Health is a valuable asset, of vital importance to every person and to humankind as a whole. It means much more than the mere absence of disease and infirmity; other important aspects include a sense of wellbeing and unrestricted actionability.

The exhibition "Discoveries 2011: Health" focuses on the contributions of science and research. Entertaining, visually engaging and interactive, it presents today's research for tomorrow's health. In 18 pavilions, the exhibitors show technologies and procedures for improved treatment, present the current status of research on widespread diseases such as diabetes and cancer, and reveal strategies for disease prevention and healthy living. A specially designed "Info Tour", reveals ancient knowledge about herbal remedies, which is still applied today in modern medicine, while an art installation is devoted to the "orphans" of medical research: rare diseases. Hands-on exhibits and comprehensible background information ensure that all topics are easily accessible for both children and adults.

The "Discoveries" exhibition series on sustainability topics has been made possible through the generous support of the German Federal Ministry of Education and Research (BMBF) and is an important part of the Years of Science 2009 to 2011. In the "Year of Science 2011—Research for our Health", a whole range of events draw attention to the conscientiousness and focus of scientists in their quest to maintain and restore health. "Discoveries 2011: Health" helps initiate a necessary social dialogue on the goals, challenges and fields of action of modern health research. The Council and Foundation of the Lindau Nobel Laureate Meetings are delighted that Federal Minister Professor Annette Schavan has taken on the patronage of the "Discoveries" series.

At the start of the series, an exhibition on water commemorated Count Lennart Bernadotte, the guiding light behind the Lindau Nobel Laureate Meetings and pioneer of the concept of sustainability. Last year, the series focused on the future of energy, and this year's exhibition completes the cycle.

We are grateful to all participants for their dedication and outstanding teamwork in implementing this joint project, as well as to the members of the Scientific Council for their professional assistance in "Discoveries 2011: Health". Special thanks are due to Professor Bernhard Graf, Chair of the Scientific Council, who has provided prudent support and guidance for the "Discoveries" series from the outset. His valuable advice has contributed enormously to the coherence and clarity of all three exhibitions.

Together, we invite you to visit the exhibition on the Isle of Mainau and hope that you will enjoy making new discoveries, being amazed and inspired, and trying out the interactive elements.



Countess Bettina Bernadotte

President of the Council for the Lindau Nobel Laureate Meetings, Managing Director of Mainau GmbH



Prof. Dr. h.c. Wolfgang Schürer

Chairman of the Board of Foundation Lindau Nobel-prizewinners Meetings at Lake Constance

GREET- ING



PROF. DR.
ANNETTE SCHAVAN, MdB



Federal Ministry
of Education
and Research

GREETING OF THE PATRON OF THE EXHIBITION

More and more people today can enjoy a healthy and independent life to an advanced age. This is thanks to many major breakthroughs in health research and the consequent improvements in diagnosis, therapy and preventive medicine. Research for our health is a matter that concerns us all. It plays an essential role not only in the saving of lives and the relief of suffering, but also in the prevention of disease and illness. It improves the quality of life for people of all ages.

It is our intention to make health research a part of our daily lives, with the help of the Year of Science 2011. Throughout the course of a whole year, we will be making it possible for young and old, men and women, families and school classes to experience the numerous aspects of health research. We are looking to generate enthusiasm for research in the minds of our children and young people in particular, in the hope that they may write future chapters of this story of success.

In a joint action with the *Science in Dialogue* initiative and partners from the worlds of science, business and the arts, we are revealing the everyday work of scientists, reporting on the latest developments in health research and discussing the opportunities and possibilities opened up by these research results with the public.

Together with partners from the worlds of science, business, the arts and politics, the Year of Science 2011—Research for our Health initiates a broad, nationwide, spectrum of fascinating programmes and events. The exhibition 'Discoveries 2011: Health', on the island of Mainau, is one of the highlights of the Year of Science. Here, visitors of all ages have an opportunity to explore the fascinating and amazingly varied facets of health research. As the patron of this exhibition, I wish all visitors to the island of Mainau many hours of enjoyment and an interesting look behind the scenes of the fascinating world of science.



Prof. Dr. Annette Schavan, MdB
Federal Minister of Education and Research

INTRODUCTION

“Discoveries 2011: Health” Join in and Discover!

Will blind people see again with a retina chip? What types of cancer can be prevented by immunisation? How can people prevent getting diabetes? How much healing power is there in plants? Answers to these and many other questions about our health can be found at the interactive exhibition “Discoveries 2011: Health”.

The three-month exhibition on central fields of health research is one of the highlights of the initiative “Year of Science 2011—Research for our Health”. Eighteen pavilions, an “Info Tour” on herbs and natural remedies and an art installation about rare diseases can be discovered by visitors of all ages. Comprehensible texts full of interesting facts and many interactive exhibits convey the fascination of the innovations of medical science and health research.

The topics of the participating exhibitors range from the prevention and treatment of diabetes and newest applications of modern biotechnology to sports and healthy nutrition as the most effective preventive measures. Other exhibition contributions deal with infectious diseases, cancer and rare diseases. Furthermore, visitors get explained how the brain works and how hormones function. They learn more about the use of herbs and natural remedies in medicine and about the properties of secondary plant components.

“Discoveries 2011: Health” is the third exhibition in the “Discoveries” series, which started with “Water” in 2009 and continued successfully with an exhibition focussing on energy in 2010. The series is organised by Foundation Lindau Nobelprizewinners Meetings at Lake Constance in collaboration with Mainau GmbH, and receives considerable funding from the German Federal Ministry of Education and Research.

People are at the centre of the initiative “Year of Science 2011—Research for our Health”, which covers issues around the prevention, detection, treatment and curing of diseases. The following pages introduce the key topics, goals and main activities of the campaign. The article “Medicine of the Future” gives an overview of the opportunities and challenges of health research in the nearer future. The children’s bumper pages featuring the articles “Die Gesundheitsforscher” (“the health researchers”) and “Simply GENE-ius!” give a fascinating introduction to genetics. The centre pages of the catalogue list the themes and contents of the 20 exhibition parts of all exhibitors of “Discoveries 2011: Health”.

It is thanks to the commitment of all participating institutions, organisations and businesses that “Discoveries 2011: Health” can offer such a wide range of information and entertainment to children, young people and adults alike.

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RESEARCH FOR OUR HEALTH

EXHIBITION “DISCOVERIES 2011: HEALTH”— PERSPECTIVES IN HEALTH RESEARCH



Medicine of the Future by Clara Steffens

Images from inside cells are becoming more and more detailed, as is our understanding of the molecular causes of diseases and their interaction with the environment. With regard to our health, this means better prevention, earlier diagnosis and targeted treatment.

There are many diseases but only one state of health, and it is subjected to new challenges every day. Bacteria and viruses keep our immune system on its toes with new strategies of attack, while the climate, environment, food, exercise and movement leave their mark on the human body. Those who are getting on in years have accumulated more than just positive life experience: Sunlight, environmental toxins, food components and others constantly impact on our genes and our metabolism. The hundred trillion-odd cells in our body work hard every day to repair damage, but the repair systems become defective with the years, which promotes the onset of cancer and other age-related diseases.

Most people want to live a long life, while remaining active and enjoying excellent health at the same time. Improved food and hygiene habits, along with medical advances, have continuously pushed back the natural limits of “old age”. Average life expectancy rises by three months every year, and has been doing so for a good 160 years. By 2050, women in Germany will reach an average age of 88.2 years, and men 83.7. For the first time, there will be more senior citizens than young people in the world. It is quite clear that this demographic change will bring about radical societal changes. For health research, this means that the older our society becomes, the greater the occurrence of diabetes and cardiovascular, pulmonary and infectious diseases will be. Consequently, scientists from different disciplines are working feverishly to discover the causes of these common diseases and create new treatments. If we can understand the diseases better in future, it may be possible to prevent them, or at least to detect and treat them at an early stage.

Complexity, however, is not limited to individual diseases: Even the human aging process is highly complex. Its dynamics are determined by different factors like smoking, lack of exercise and an unhealthy diet. Some 25 to 30 per cent of our lifespan seems to be genetically determined. Every single cell in our body ages — some more, some less, depending on their function. Human skin, for example, renews itself completely every 30 days. Brain cells, on the other hand, last a whole lifetime — with some exceptions. If those cells die before their time, neurodegenerative diseases such as Parkinson’s and Alzheimer’s result.

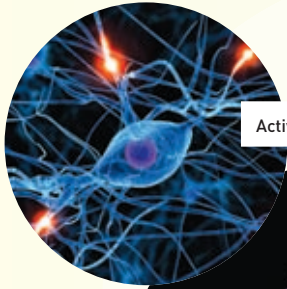


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Neurodegenerative Diseases — Earlier Detection of Cell Death

For example, in progressive Parkinson's Disease, up to 90 per cent of cells in a particular area that produce the neurotransmitter dopamine die, with the result that patients can hardly control their muscles — their body trembles. There is no cure for this nervous disorder to date, but there are substances that can partly compensate for the shortage of dopamine in the brain.

The modern procedure of deep brain stimulation can help get the movement disorders under control. Electrodes are implanted in the brain through a tiny hole in the skull and regular pulses of electricity paralyse the overactive nerve cells.



Active nerve cell (neuron)

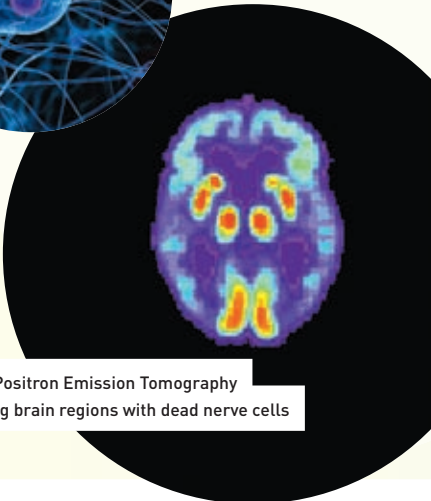


Image from Positron Emission Tomography (PET) showing brain regions with dead nerve cells

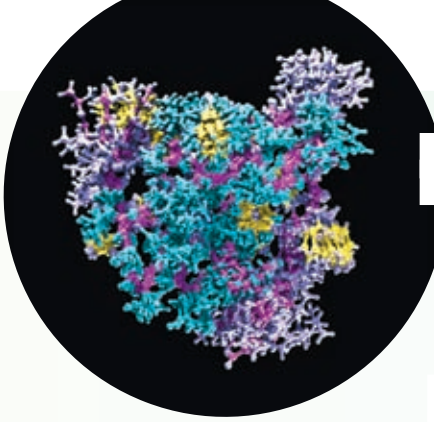


“We no longer see the brain as static tissue, but rather as an organ with plastic and dynamic changes. Our understanding of the behaviour of brain cells is now very good, and we are at the stage of transferring our experimental knowledge into possible therapeutic interventions in humans to enable repairs from the inside out.”

Prof. Dr. Jürgen Winkler

Since there is as yet no satisfactory treatment for common diseases of the nervous system such as Parkinson's, Alzheimer's or even paraplegia, Prof. Jürgen Winkler has devoted his research to these neurodegenerative diseases. In his current projects at Erlangen University Hospital, he is studying cells in the human brain that still have the capacity to divide. If it were possible to stimulate these cells in the brains of Parkinson's patients in a targeted way, they could replace lost neurons. Treatment concepts like this one belong to the field of regenerative medicine.

Photo © Bayern Innovativ GmbH / Thomas Geiger / Stefan Hippel



A model of human insulin from the islets of Langerhans in the pancreas

Diabetes — Preventing the Epidemic of the 21st Century

Many hopes are pinned on cell replacement therapy: New nerve cells could replace those which have been lost. These new cells could be grown in the laboratory from stem cells, that is, from cells that still have the potential to specialize for different functions. Best of all, though, would be to detect the slow death of neurons in time and halt the process. To this end, scientists around the world are studying the molecular mechanisms that lead to neurodegeneration in Parkinson's Disease. Alzheimer's and other dementias could have similar causes. Some evidence has already been uncovered, such as the misfolding and aggregation of certain protein molecules.

While the development of new drugs will take years, Michael Hüll of the Centre for Geriatrics and Gerontology at Freiburg University Hospital remains positive. "New findings in molecular biology deepen our understanding of the causes of dementia", he says. Time is an essential factor here: There are already hundreds of thousands of Alzheimer patients in Germany today, and their number could double by 2050, according to the dementia report issued by the Berlin Institute for Population and Development. Five recently discovered gene variants that are yielding new clues play a role in lipid metabolism, inflammation and the movement of molecules inside the cell.

Studies have shown that Type 2 diabetes is a risk factor for neurodegenerative diseases, so a working group led by Philipp Kahle of the German Centre for Neurodegenerative Diseases is examining the molecular link between diabetes and neurodegeneration. Ninety per cent of diabetics have the type 2 form of the disease, and more than half of them are over 65 years of age. Their bodies are less responsive or even completely unresponsive to the insulin hormone, which regulates the uptake of sugar — and therefore energy — from food. Some 285 million people around the world are affected by this metabolic illness, six million of them in Germany. Estimates indicate that the number of diabetics in Germany will double in the next ten years and the International Diabetes Federation describes the disease as "the epidemic of the 21st Century".

Experts take the view that unhealthy diets and lack of exercise are the main factors leading to diabetes, so the search for countermeasures has a strong emphasis on improved prevention. Working closely together, nutritionists and sports scientists hope to reduce the risk and thereby cut the costs to the health system, since this is considered one of the costliest chronic diseases: The annual treatment costs alone for a single diabetes patient are about as high as the total annual costs for an average citizen. And then there is the expense relating to concomitant diseases and complications. Over time, the high blood sugar damages the blood vessels, increasing the risk of heart attack and stroke. The kidneys, eyes and nerves are often affected too.

In addition to prevention, however, health research attaches great importance to the search for new diabetes treatments. "The few active substances we have for diabetes treatment today only address the symptoms of the disease", says Günther Wess, head of the Helmholtz Centre in Munich. He believes that the future of diabetes treatment lies in personalised therapy, i.e. in drugs and treatment procedures that are adapted to the individual metabolic profile of each patient.

Revolution: Targeted Therapies in Personalised Medicine

The general trend towards personalised medicine will revolutionise the medicine of the future. Since it was decoded in the year 2000, we can read the human genome like a series of letters. The genome contains genes, and with them, the blueprint for life, but the protein molecules are the real building blocks, since they are responsible for the different cell functions. They produce the individual pattern of a cell, its molecular fingerprint.

If the patterns of different tissue samples in biobanks are successfully catalogued in the future, it would be possible to draw better comparisons between sick and healthy cells. The volume of data from such biobanks is so huge that only mathematical modelling procedures can analyse the patterns and detect dependencies. The Max-Planck-Institut für Informatik (Computer Science) is already working on a project to collect and analyse data on the human immunodeficiency virus (HIV) and its carriers, thereby facilitating improved personalised treatment for AIDS patients.





“In order to also resist opposition to their own ideas and convictions, health scientists need not so much a large number of fellow campaigners as a very good knowledge of the scientific literature, preferably in conjunction with medical training.”

Prof. Dr. Harald zur Hausen

A viral infection as the cause of a tumour? When Prof. Harald zur Hausen published the daring hypothesis in 1976 that an infection with papilloma virus, the agent that causes warts, could trigger cervical cancer, his medical colleagues were sceptical. Today, we have a vaccine against cervical cancer. Zur Hausen received the Nobel Prize for Medicine in 2008 for his groundbreaking work in the field of tumour prevention. Since prevention is better than cure and also saves the healthcare system money in the long term, zur Hausen, who is now Emeritus Professor of Medicine at the German Cancer Research Centre, concentrated on prevention from the very start of his research. Whether prevention or treatment, however, he believes much work is still to be done in both fields of tumour research.

Photo © DKFZ

Cancer Must Become a Controllable Disease

Cancer patients, too, are set to benefit from treatments that are tailored to specific tumours. Even now, researchers and medical doctors from different fields at the German National Centre for Tumour Diseases consult one another about the individual treatment of every single patient. “Increasingly, it means individual research, which helps us select the most appropriate treatment from the large portfolio of current developments”, says Christof von Kalle, spokesman for the Board of Directors. The active substances are also progressively better tailored to individual tumours. Since about 1998, doctors have been using the antibody trastuzumab, better known by the trade name Herceptin, to treat breast cancer when a specific target molecule is present on the surface of the tumour cells. This is the case of about one in four patients. Axel Ullrich, currently Director of the Department of Molecular Biology at the Max Planck Institute of Biochemistry, was a key researcher in the development of this targeted agent. In the meantime, a range of additional biomolecules with specific tumour docking points has been approved for use.

Despite all the successes of personalised medicine to date, however, one thing is clear: Before drugs can target individual molecules, cell biologists must understand their function in the larger protein network of the cell. Much information is still needed from basic research in systems biology. Disappointment is widespread not only among patients, but also among successful pioneers: “To date, the targeted approaches generally extend the life of patients with common tumours such as breast cancer or lung cancer by just a few months”, laments Axel Ullrich. The biochemist likes to compare tumours with independent organisms that are constantly developing. “The onset and

progression of cancer are ludicrously complex — more complicated than I would ever have thought possible”, summarises the 67-year-old. Still, neither he nor the other scientists will surrender in their quest to slow the advance of cancer, because their goal is clear: “Cancer must become a chronic, controllable disease that permits a normal quality of life, like diabetes and AIDS.”



Trend towards Regenerative Treatment using Biotechnology

Another reproach made of the new personalised therapies is that the production of drugs such as Herceptin by means of genetic engineering is complex and often overly expensive. After all, it costs between €30,000 and €50,000 to treat one patient with Herceptin for one year. Still, the crucial advantage of these therapies could also help prevent unnecessary expenditure: The use of targeted drugs is generally approved by the authorities only in conjunction with a matching diagnosis, meaning that they are only used in patients who will actually benefit from them. This also helps prevent severe side effects and saves precious time in the treatment of life-threatening diseases. Consequently, scientists around the world are now working on new agents to treat not only cancer, but also autoimmune diseases such as multiple sclerosis and rheumatoid arthritis. Using templates identified in the human body and applying the principle of modular design, they create new, targeted molecules for therapeutic use.

“Tissue engineering” is the term doctors use to describe large-scale construction at the level of tissues and organs. Biologists and engineers at the Fraunhofer Society have developed a kind of tissue factory to help patients with poor wound healing, among others. The multi-stage process to generate artificial skin models for, say, transplants or testing cosmetics and chemicals, takes three weeks.



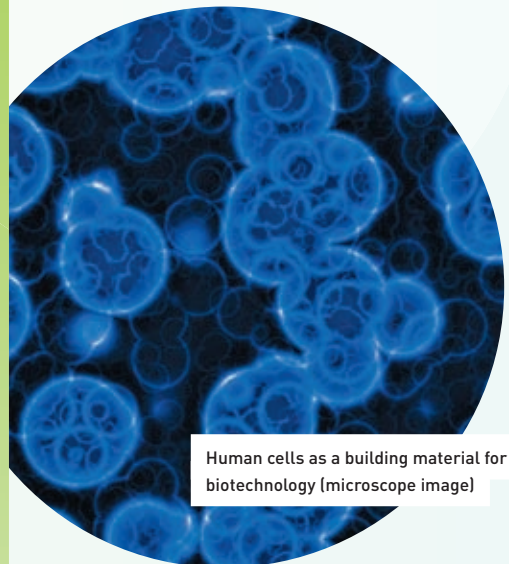
“I would advise all young scientists to devote themselves to what they enjoy in their research work, because enjoyment is the driving force that enables you to push through the dry periods. Especially in basic research, setbacks often open up new paths.”

Prof. Dr. Peter Gruss

Prof. Peter Gruss, President of the Max Planck Society, began his career in science with virus research. Later, he worked with mouse stem cells to find a treatment for diabetes and studied the development of the human brain. Even today, this biologist and enthusiast of basic research continues to be fascinated by the increasingly accurate molecular tools that enable the study of complex structures of living organisms in the laboratory. It was the methods of microbiology that prevented him from abandoning his biology studies and he is glad, in hindsight, that he did not give up. Based on his experience, he advises all young scientists to show patience and staying power.

Photo © MPG

A similar procedure may be used in future for the automated production of other tissue types such as cartilage and bone, given that osteoarthritis and other degenerative processes of the joints increase in an aging population. Therefore, alongside the trends for better prevention, early diagnosis and targeted treatment, yet another trend can be identified: Today's therapeutic interventions lay more emphasis on regeneration than just repair.



Human cells as a building material for biotechnology (microscope image)



Eine Initiative des Bundesministeriums
für Bildung und Forschung

Wissenschaftsjahr 2011

Forschung für
unsere **Gesundheit**



Federal Ministry of
Education
and Research

Year of Science 2011 —
Research for our Health
An initiative of the
Federal Ministry of Education
and Research

YEAR OF SCIENCE 2011

Year of Science 2011— Research for our Health

Health research focuses on people. And that is why the motto chosen for the 12th Year of Science is 'Research for our Health'. This year, the wide range of issues covered will be centred on health research. In other words, how we can stay healthy for as long as possible and how we can recognise, treat and heal illnesses and diseases. In addition to this, discussions will also consider ethical and social aspects and their consequences — all of this in a dialogue between science and the community; because, only in this way is it possible to identify meaningful and affordable solutions.

The Year of Science is an annual event jointly organised and staged by the Federal Ministry of Education and Research (BMBF), the Science in Dialogue initiative (WiD) and numerous partners from the worlds of science, business, politics and the arts. At this year's event, we again welcome the participation of several hundred institutions with their own information stands and hands-on activities, exhibitions, competitions, lectures and discussion forums. A whole range of opportunities for members of the public to find out more about health research and take part in discussions with the scientists involved. Both sides reap the benefits: the general public begins to think about the role of science in the community, while the researchers and scientists must concern themselves with the questions and expectations of other members of that community.

A store of public-interest events and activities

The highlights of the 'The Year of Science 2011 — Research for our Health' programme include MS Wissenschaft, the floating science centre on Ger-

many's and Austrian's waterways and the School cinema weeks 2011, during which schoolchildren can discover the widely varying aspects of health research via the cinema screen in a series of selected films. The research exchange offers schoolchildren an opportunity to meet with and talk to scientists face-to-face. Schools throughout Germany can visit www.forschungsboerse.de and invite scientists to visit their classrooms or arrange a visit to the scientists' institutes to experience research in real life. The touring exhibition 'It's about YOU!' ('Es betrifft DICH!') will visit German science centres from Flensburg to Heidelberg and takes visitors on a journey through their own bodies. Hands-on experiments for young and old will be staged at ScienceStations in German railway stations and bring science to life. Future projects from the world of health research will be presented in the interactive exhibition 'Discoveries 2011: Health' on the island of Mainau. At the 'Science Slam', young researchers will be competing to present their fields as incisively and with as much entertainment as possible, in the hope of being voted the Slam Champion by the audience. Schoolchildren can discover how the decision-making processes of health care policies work in cities in the simulation game 'Healthy City'.

Health research — a key issue for many

More and more people today can enjoy a healthy and independent life to an advanced age — thanks to progress in health research. Only with knowledge of the best possible preventive, diagnostic and therapeutic measures is it possible to identify, prevent, control

YEAR OF SCIENCE 2011

and provide the best possible treatment for widespread diseases like cancer and cardiac, metabolic, infectious, pulmonary or neurodegenerative diseases. For this reason, there is no other field of research that captures the public interest to the extent that health research does. This interest above all concerns the potential uses and benefits of new insights and results — all in the well-founded hope that the laboratory insights of today may save the lives of people tomorrow.

The German government took precisely this course at the beginning of 2011 with the supporting health research programme, based on the concept that in disease research, scientists and researchers must always stay focused on the rapid transformation of their knowledge into practical medical realities. Alongside research into the well-known widespread diseases listed above, the health research programme also focuses on personalised health care, preventive medicine and nutrition research, health care research, the health care system and global cooperation.

Focus issues

The broad spectrum of health research is reflected in the focal points of the Year of Science 2011 — Research for our Health.

Focus on widespread diseases

Anyone born today has a good chance of reaching the age of 100. Demographic change is transforming society as we know it. People are reaching advanced old age but, with increased life expectancy, the number of people who suffer from illnesses such as cancer, cardiovascular, infectious or pulmonary diseases, as well as diabetes and dementia, grows apace. This is the challenge addressed by health research. New health research programmes also involve the development of support concepts that promote interdisciplinary research into these diseases. The most important elements include the recently founded German Centres for Health Research (DZG). University and non-university institutions are networked in these six research centres and bundle the combined knowledge and expertise of theoretical and clinical research. This enables scientists and researchers to transform their latest research results into practical realities more quickly and make them available to patients much earlier.

Focus on prevention, nutrition and activity

The field of health research also develops strategies for the prevention of illness to ensure a better quality of life in old age. As scientists well know, a moderate and healthy diet, physical activity and the environment are important parameters in ensuring a long and healthy life. In future, however, they will be conducting more detailed investigations into how these factors may affect genetic activity. If a further phase of research can reveal just how genetic make-up controls



the occurrence of diseases, it will make it — scientists hope — much easier to develop new diagnostic, preventive and therapeutic measures.

Focus on rare diseases

Brittle bone disease, Dubowitz syndrome or progeria — all these are so called rare diseases, and therefore more or less unknown. These 'rares', as they are known in short, often require special treatments. Health research has a particular significance in such cases in the search for improved diagnostics, therapies, consultancy and care or, in other words, methods for improving the sufferers' lives. There are currently four million sufferers in Germany alone and 36 million throughout Europe. Considering such figures, these diseases are anything but rare.

Focus on health care research and public health

For instance, just how much do general practitioners know about the diagnostic or therapeutic guidelines for the treatment of particular diseases? This and similar questions are the domain of health care research. This field focuses on research with direct links to human health and disease, e.g. methods of treatment, prevention and rehabilitation. The results of research projects in this field may lay the foundations for quality assurance in the health care sector. Above all, however, they provide valuable support for the transfer of results from theoretical and clinical research to the everyday world of medicine. After all, optimum health care is supposed to be a benefit for all — regardless of their age or social background. As it also has a commitment to keep the costs involved within reasonable limits, an efficient and effective health care system promotes innovative lines of research without ignoring the financial aspects.



Focus on personalised medicine

A further focal point of the health research programme is personalised medicine. It has now been scientifically proven that particular medicines may have different effects on different patients. Children and young people need different treatments to adults. Women and men react differently to certain medical treatments. But not only that: people of different ethnic origins also possess different genetic predispositions for disease. These individual variations must be decoded in order to be able to take them into consideration in personalised health care concepts. Today, researchers can already successfully analyse cell mechanisms on the basis of human genetic predisposition. And here lies the chance for the development of individually effective medication, for example in the fight against cancer, or organ transplant techniques that are personalised to precisely match the genetic predispositions of individual patients.

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EXHIBITION "DISCOVERIES 2011: HEALTH"

20 EXHIBITION PARTS

- 01 Introduction
- 02 Federal Ministry of Education and Research
- 03 Deutsches Hygiene-Museum Dresden
- 04 German Centre for Diabetes Research
- 05 Boehringer Ingelheim
- 06 Interdisziplinäre Diabetes-Fußstation Klinikum Konstanz [Clinical Centre of Constance]
- 07 Institute of Sport-Gerontology, German Sport University Cologne
- 08 Werner Reichardt Centre for Integrative Neuroscience, University of Tübingen
- 09 Max Planck Society for the Advancement of Science
- 10 German Cancer Research Center
- 11 BIOPRO Baden-Württemberg GmbH
- 12 Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
- 13 Department for Plastic Surgery and Hand Surgery, Klinikum rechts der Isar and Faculty of Medicine, Technische Universität München, Research Group CAPS: "Computer Aided Plastic Surgery"
- 14 Weleda AG
- 15 University of Konstanz
- 16 University Hospital and Medical Faculty of Heidelberg
- 17 Mars, Incorporated
- 18 Activity Pavilion
- Info Tour Herbs & Natural Remedies, Schoenenberger
- Art Installation "seltene alphabet", Akademie für Lebenskunst/Galerie im Einstein



Introduction — Foundation Lindau Nobelprizewinners Meetings at Lake Constance

HEALTHY THROUGHOUT LIFE

A life of health — it's what we all hope for, and why we often have great expectations for health research. Yet more than ever, health research is facing immense challenges. Widespread diseases such as diabetes, cancer and cardiovascular disorders are becoming a serious problem in practically all industrialised countries. At a global level and especially in developing countries, the fight against infectious diseases and epidemics continues. Nonetheless, important advances are constantly being made through intensive research. One of the foundations of this progress is the interdisciplinary cooperation and networking of scientists and researchers around the world. The formation of efficient centres of competence comprising different research institutions is another factor, as are the people with vision and innovative thinking who devote their passion and untiring efforts to defending our health and achieving outstanding results.

Foundation Lindau Nobelprizewinners Meetings at Lake Constance invites you to discover exciting areas of health research and prospects for a healthy future. According to the motto, "Know your own body and you can keep it fit and healthy", the interactive body model in the centre of the introductory pavilion gives practical health tips, because there is much that we can do to safeguard our own health. Our exhibitors show many examples of how research supports us in this endeavour.

PAVILION

01



EDUCATE.
INSPIRE.
CONNECT.

RESEARCH FOR OUR HEALTH

Everyone looks forward to enjoying a healthy and independent life for as many years as possible. And more and more people can, thanks to numerous developments and advances in research, diagnostics and therapy. Scientists and researchers work constantly on the many complex questions that are still to be answered. Why does one person suffer from diabetes and another from Parkinson's disease? How can symptoms be identified much earlier? Which course of treatment is best, and for whom? And can ways be found to prevent these illnesses?

The pavilion of the Federal Ministry of Education and Research provides information on health research in Germany and the programme of events and hands-on activities accompanying the Year of Science — Research for Our Health. Visitors can discover background details, focal points and the most important fields of active health research. Simultaneously, the Year of Science — Research for our Health also focuses on dialogue, because the implementation of medical research results is something that affects us all. The pavilion presents these opportunities for discussion. At the same time, visitors to the pavilion can take part in experiments themselves — for instance, they can test their mental capabilities with a brain-jogging game, get to know more about the interplay of bones and muscles by jumping on a force plate system, or test their knowledge of health research with the Year of Science quiz.



Federal Ministry of Education and Research

PAVILION

02

HORMONES: MIGHTY MOLECULES

The vivid illustration of knowledge and science beyond the boundaries of technical disciplines is the focus of this contribution about hormones. These mighty molecules control trillions of cells of the human body and are essential for the understanding of what we call emotions: fear, anger, happiness, and even love all depend on hormone processes.

The Deutsche Hygiene-Museum Dresden is an open forum for everyone who is interested in the cultural, social, and scientific revolutions taking place in our society at the beginning of the twenty-first century. Body and health are at the centre of the permanent exhibition with a popular science slant, "Human Adventure". Young visitors explore "Our Five Senses" in the experience-based children's museum. Temporary exhibitions have contributed greatly to the Museum's national and international reputation in recent years: in 2011, the large sport exhibition, "On Your Marks", will examine the relationship between sports and society and will be followed by another interdisciplinary project, "Images of the Mind in Art and Science".

PAVILION

03



DEUTSCHES
HYGIENE-MUSEUM
DRESDEN

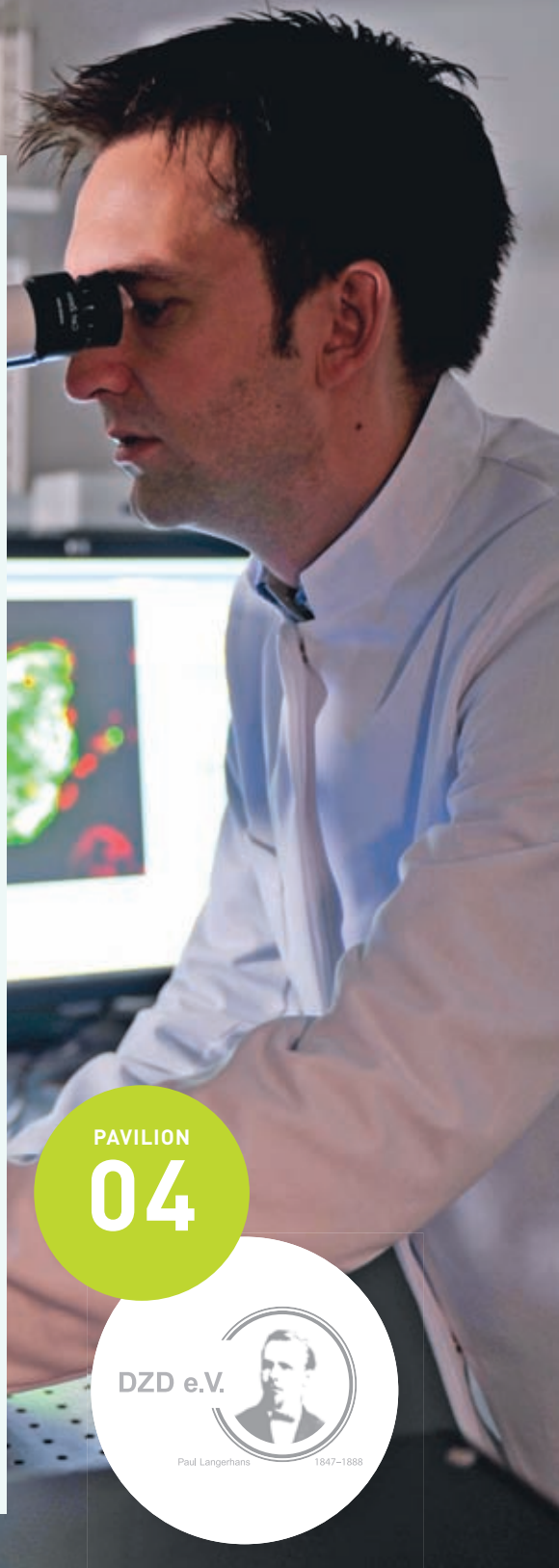
RESEARCH FOR A FUTURE WITHOUT DIABETES

Do you know that

- > nearly six million people in Germany suffer from diabetes,
- > that the number of people with undetected diabetes is almost as large,
- > and that diabetes will further increase in the next few years?

What do we know about diabetes today? Do you know the difference between type 1 and type 2 diabetes? Can diabetes be cured or prevented? You will get answers to these questions in the pavilion of the German Centre for Diabetes Research, a national network of excellent research institutes that aims to improve the prevention, diagnosis, and therapy of diabetes mellitus.

Learn from patients with diabetes how they handle their disease. You can identify your personal diabetes risk with the German Diabetes Risk Score and find out how to lower your risk actively. Self-explanatory illustrations, interactive learning games, interesting videos, and text contributions will introduce the exciting aspects of diabetes research.



PAVILION

04

DZD e.V.

Paul Langerhans 1847-1888

Boehringer Ingelheim

EXPLORE DIABETES: THE TREASURE OF THE ISLETS OF LANGERHANS

In the pavilion of Boehringer Ingelheim, the topic revolves around diabetes mellitus. The exhibits invite you to participate in a journey of discovery and give you the opportunity to become active researchers yourselves and try things out. As ambitious researchers, you will be rewarded with a treasure at the end — something to take along, by which to remember your visit and the things you've learned.

In the centre of the pavilion there is "Sugar Island," a mountain of large sugar cubes, full of interesting background information on diabetes. Discover what's hidden in the white cubes and search for a treasure map to continue your journey. Next, you will have to get physically active — but the foosball table here is special. Depending on which team you're controlling, you will soon understand why obesity is not only obstructive in sports but also a risk factor for getting diabetes. Then, move on and show how high you can jump at the "GI jump platform" — it playfully explains that certain foods cause excessive jumps in your blood sugar level and should thus be avoided. Finally, there is a microscope that unveils brand new research approaches in diabetes care and reveals the treasure of the Islets of Langerhans — a key information for understanding diabetes. Now it's your turn to seize your own treasure: open the treasure chest and get a reward for your discoveries!

PAVILION

05



Boehringer
Ingelheim

Interdisziplinäre Diabetes-Fußstation Klinikum Konstanz
(Clinical Centre of Constance)

THE FOOT: A MARVEL AT RISK?

The foot is a genuine miracle. Thirteen muscle groups control the arch and the basic framework is made up of one quarter of the bones in the human body. The density of the tactile sense receptors ensures that we are able to keep our balance and be aware of imminent dangers.

But this marvel is in danger if a diabetes mellitus is inadequately adjusted. People who suffer from diabetes often develop circulatory and sensation disorders, meaning that they are unaware of injuries, that wounds will heal poorly, and that they are oblivious to strain caused by pressure (often due to improper footwear).

At the clinical centre of Konstanz, surgeons and specialists in internal medicine team up with other experts in an interdisciplinary ward for the treatment of feet and wounds. Each year, approximately one hundred patients who are afflicted with a diabetic foot syndrome—a syndrome 15 per cent of all diabetics develop—receive medical attendance.

The barefoot path created in the pavilion offers an incentive to become more aware of the feet. Information on the causes and hazards of the diabetic foot are provided, as well as possible treatment options. Very essential: we also offer useful advice on prevention to protect the foot and make sure that this marvel will always remain safe and sound.

WISSENSCHAFT
FORTSCHRITT

(Science/Knowledge
Generates Progress)

Klinikum Konstanz
der Spitalsiftung von 1225
Akademisches Lehrkrankenhaus der
Universität Freiburg



PAVILION

06



Institute of Sport-Gerontology,
German Sport University Cologne

PREVENTION— FROM CHILDHOOD TO OLD AGE

The demographic development of our society and the associated increase in life expectancy presents us with new challenges. They are not only social, political, and economic in nature but include, in particular, considerations about health and performance in old age.

Recent research about the effects of exercise and training on physical and mental capabilities provides new approaches for the development of intervention programmes. They contribute to maintaining social participation and independence in old age. They prevent muscle loss (sarcopenia, coordination deficits) and thus risk of falling, as well as declining mental performance, and even have a positive effect on mild forms of dementia. Based on the combination of basic and behaviour-oriented findings, “fit for 100” and “NADia” intervention programmes were developed and tested to serve as starting points for an overall campaign, “Prevention into Advanced Old Age.”

The transfer of this knowledge into practice has already been secured by the Institute for Exercise and Sports Gerontology” of the DSHS Cologne, in the associated MA degree course, and the training of exercise instructors in the represented programmes.

PAVILION

07



Deutsche
Sporthochschule Köln
German Sport University Cologne

Institut für Bewegungs-
und Sportgerontologie
Institute of
Sport-Gerontology

Werner Reichardt Centre for Integrative Neuroscience,
University of Tübingen

A PURE QUESTION OF NERVES—UNDERSTANDING BRAIN FUNCTIONS

Why does each person have an unmistakable personality? Our brain enables a large number of complex functions—such as perception, memory, communication and action—which render each person an individual.

The scientists at Tübingen's Centre for Integrative Neuroscience (CIN) are working on decrypting the reason for the brain's numerous facilities, and thus with their basic research contribute to diagnostics and therapy of movement, memory, and perception dysfunctions.

The CIN will present diverse neuroscientific subjects in its pavilion to acquaint visitors with the fascinating coherence of the brain and its functions: how are our movements coordinated and how do nervous disorders affect our facility for movement? What kind of space perception allows electric fish and bats to find their bearings actively in their environment? How can brain currents be made visible in the application of a brain-computer interface and patients' damaged bodily functions be restored?

Three stands invite you to study your own brain waves, to observe a muscle at work, and to hear the signals of electric fish. Let your nerves enter the game!

PAVILION

08



CIN

Werner Reichardt
Centre for Integrative
Neuroscience

“TO YOUR HEALTH!”— RESEARCH FOR THE MEDI- CINE OF TOMORROW

New insights into human biology over the past decade have created many new possibilities for fighting disease. Medical advances we hope to see in the future depend critically on basic biomedical research carried out today.

Therefore, Max Planck scientists research efforts include the possibilities of personalised medicine tailored to the individual patient’s needs, as well as the development of safer and affordable vaccines. Worldwide, more than thirteen million people per year die of infectious diseases. As SARS and swine flu have shown, limited epidemics can easily become global pandemics—in the “global village”, nobody can avoid them. This is particularly dangerous in the case of pathogens that have become resistant to previously effective drugs.

Get to know one of the most insidious killers in world, and find out how researchers want to end to its reign with a new vaccine. Take a new look at an old, unloved acquaintance. Also discover what role migratory birds play in the spread of diseases.

PAVILION

09



MAX-PLANCK-GESELLSCHAFT

CANCER PROTECTION IS POSSIBLE

The same is true of cancer as of other diseases: prevention is better than cure. The two approaches taken toward that goal by scientists at the German Cancer Research Center (DKFZ) are:

- > risk factor recognition and avoidance
- > the detection of cancer or precancerous conditions at an early, curable stage

DKFZ researchers have had considerable success in cancer prevention in recent years. Harald zur Hausen, for many years Scientific Director of the DKFZ, was awarded the Nobel Prize for Medicine in 2008 for his discovery that certain wart viruses cause cervical cancer. His breakthrough made it possible for a vaccine to be developed to prevent infection through these viruses.

Scientists working on other projects have been searching for risk factors for breast cancer and for ways of detecting bowel cancer as early as possible. The best protection against cancer is not to smoke! The DKFZ takes part in national and international activities aimed at lowering tobacco consumption.

Exercise also provides protection. Many studies, including some done at the DKFZ, show that regular physical activity reduces the risk of both breast and bowel cancer. It is best to get started right away—for example by using the equipment provided in the DKFZ pavilion!

PAVILION

10

dkfz.

DEUTSCHES
KREBSFORSCHUNGSZENTRUM
IN DER HELMHOLTZ-GEMEINSCHAFT

BENEFITING PEOPLE: BIOTECHNOLOGY RESEARCH IN BADEN-WÜRTTEMBERG

Can severed nerves grow back together? Is our immune system able to cope with battling cancer? Can blind patients actually regain vision? These are just some of the exciting topics currently being studied by researchers in Baden-Württemberg—not only in research institutes but also in business companies. BIOPRO Baden-Württemberg GmbH answers these questions by presenting three projects entitled “Nerve guidance channels for severed nerves”, “Innovative cancer immunotherapy”, and “First rays of hope thanks to a retinal chip”.

Biotechnology—i.e., the knowledge of how specific processes occur in cells and cell components—plays a major part in all three projects. How does that work? Visitors can find out for themselves by using interactive models to follow the researchers’ clever approaches. There is still a long way to go until patients can benefit fully from this innovative research but we are well on the way.

BIOPRO Baden-Württemberg is the statewide agency for biotechnology and the life sciences sector. Read about other exciting topics in the field of biotechnology in Baden-Württemberg at www.bio-pro.de.

BIO  **PRO**
Baden-Württemberg GmbH

PAVILION

11

WITH ALL OUR SENSES

An exercise: close your eyes and imagine you are moving about in an unfamiliar room. As even this short thought experiment shows, we experience our surroundings with all of our senses. We make a distinction between the senses we use when we are close to something—touch, smell, taste—and those we use when farther away—hearing and sight. Our senses help keep us healthy and actively involved in life.

What research projects are scientists working on in this area? On “factory-made skin”, for instance: four Fraunhofer Institutes have built the first fully automatic sterile plant to create artificial skin, quickly and in large quantities. “Artificial” skin is still scarce for transplants or to test cosmetics and chemicals. Other projects: Fraunhofer material researchers have developed a biomimetic implant made of plastic that can help blind people see again. Specialists for adaptronics are using piezo-ceramics to protect our ears, by dampening engine noise in cars. Even smell researchers are looking after our health: they are tracking down off odours—such as the odours that are sometimes found in food packaging. In the Fraunhofer Pavilion, you will learn more about these research projects, and about our senses themselves.



Department for Plastic Surgery and Hand Surgery,
Klinikum rechts der Isar and Faculty of Medicine, Technische
Universität München, Research Group CAPS: "Computer
Aided Plastic Surgery"

ENGINEERING MEETS MEDICINE

The research group CAPS—Computer Aided Plastic Surgery (www.caps.me.tum.de)—at University Hospital Rechts der Isar at TU Munich adapts industrial knowledge from the field of modern 3-D technology to the needs of plastic and reconstructive surgery, in order to improve patient care. In medicine, the demand for simulating virtual operations is increasing—comparable with industry applications, where this approach to quality assurance and product development has already been established.

In the pavilion, modern 3-D technology to improve clinical workflow processes and treatment for adults and children is presented. The transition from the established application in industry, to innovative use in medicine on humans is presented. Learn about the importance of innovation for the manufacture of medical products, look at the inside of the human body with the aid of 3-D animations, and discover more about virtual simulation techniques. Examples from medicine and interactive exhibits invite you to explore this topic.

Weleda AG

LIFE IS RHYTHM— RHYTHM IS LIFE

Time cycles determine our lives, the day-night rhythm is just one example. Findings from medical research show that the entire human organism, with all of its organs and systems down to the smallest cell structure, is steeped in diverse rhythms, which are woven together and coordinated like a symphony.

In the Weleda pavilion you gain insight into anthroposophic medicine and its mode of operation. You learn how the rhythms of our bodies directly affect our thoughts, feelings, and actions. This is clearly demonstrated with examples of stress symptoms like palpitations, nervousness, insomnia, and other anxiety conditions. Here you see not only how these disorders impair our physical balance, but also which options anthroposophic medicine holds—with herbal and mineral substances—to restore a healthy balance.

In an interactive station in the centre of the Weleda pavilion, you can experience “first hand” the effect of medicinal plants on the cardiovascular system. Under the motto, “Rhythm is Life,” a heart rate monitor invites you to feel your own rhythm. In addition, three of the central plants for anthroposophic medicine that affect the cardiovascular system—primrose, henbane, and thistle—are introduced. Each of these flowers is presented graphically and reveal by touch in which part of the body they deploy their special harmonising effects.



WELEDA

PAVILION

14



University of Konstanz

“HEALTHY FOR LIFE” — HEALTH RESEARCH AT THE UNIVERSITY OF KONSTANZ

How fit and physically active are children and adolescents in Germany today?

What are the motivations for adults' eating behaviour in different contexts?

What could be an appropriate measurement to identify the biological age of humans?

These and many other questions are investigated in research projects of the University of Konstanz, presented in this pavilion. The selected projects show that health is an important topic for many scientific disciplines at the university and research is done on all stages of life. The major aims and expected benefits of the projects lie mainly in the field of prevention and may be directly or indirectly integrated into the development of health promoting programmes.

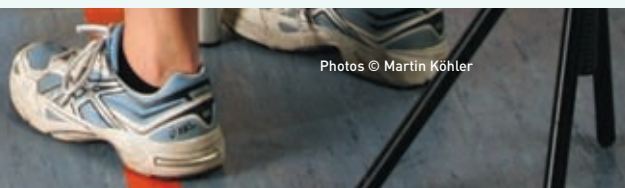
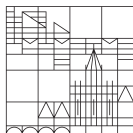
In the pavilion, you can put your flexibility and balance to the test while trying out the original devices of the “MoMo” study. With the aid of other exhibits, you can learn about different areas of the projects “EATMOTIVE” and “MARK-AGE”.

Find out more about your actual biological age or get your activity level professionally analysed on special event days!

PAVILION

15

Universität
Konstanz



Photos © Martin Köhler

RARE DISEASES— WHAT COUNTS IS THE INDIVIDUAL

How can a simple blood test save the life of a newborn? Can we choose our genes? And why have scientists developed an interest in green tea? Rare diseases raise many questions—the pavilion of Heidelberg University Hospital presents answers.

A rare disease affects only a few patients. But altogether about four million people in Germany are suffering from one of the approximately 4,000 different rare diseases. Often, these illnesses are of a serious nature, causing special burden to patients and their families and sometimes death in childhood and adolescence. Since there are not enough specialists and research activities, diagnosis and therapy are often very difficult.

At Heidelberg University Hospital, scientists and physicians of different disciplines have joined forces in a Centre for Rare Diseases—forming national and global networks in their efforts to encourage diagnosis, therapy, and research. The centre is also an important contact point for patients, their families, and physicians, as well as a source for reliable information.

www.seltene-erkrankungen-heidelberg.de



PAVILION

16



UniversitätsKlinikum und Medizinische Fakultät Heidelberg

PAVILION

17

MARS
incorporated

Mars, Incorporated

DISCOVERING THE BENEFITS OF FLAVANOLS FOR HUMAN HEALTH

Flavanols are a group of compounds found in certain plant foods. There is increasing scientific evidence suggesting that a diet rich in flavanols may have a positive impact on cardiovascular health.

Through comprehensive internal research programs and collaborations with international partners from academia, industry and government agencies, Mars, Incorporated is committed to advancing understanding of dietary flavanols.

The Mars pavilion will trace the history of flavanols —from the Ancient Romans in 60-40 BCE to FLAVIOLA, a cross-disciplinary project established in 2009 that pioneers research into the nutritional and biomedical properties of flavanols.

By taking a look inside the human circulatory system, visitors of all ages will be able to discover how flavanols may help improve blood vessel function and lower blood pressure. A hands-on model will also enable you to experience how the blood vessels in our body are able to respond to changes in blood flow.

Photo © Mars, Incorporated

A view of the interactive question and answer game in pavilion 18

Activity Pavilion — Mainau GmbH

WHAT YOU'VE ALWAYS WANTED TO KNOW

The Mainau "Activity Pavilion" is located at one of the two entrances to the exhibition site. Those who start their tour here will still have lots of questions, while those who finish their visit here, will have already made many new discoveries. The pavilion gives visitors the chance to test their knowledge of health issues. "Healthy or ill?"—which factors influence our health? "The history of healing"—what are the traditions of modern medicine? "Global Health"—do we make progress in the fight against infectious diseases? These are just some of the topics presented in an entertaining and informative manner (in German only). A short information trail serves as a bridge between the sustainability and environmental themes of the Isle of Mainau and the scientific focus of "Discoveries 2011: Health".

Here is the start for guided tours and the finish for the Health-Rallye for kids, containing the box for the Rallye answer cards. The activity pavilion will be used for special activities and is the main meeting point for visiting school classes. It is always staffed by qualified and friendly guides, who provide background information on the exhibition.



3 GENETISCH BEDINGT?

Seltene Erkrankungen wie Mukoviszidose oder Progerie (vorzeitiges Altern) sind genetisch bedingt. Gilt das für alle seltenen Erkrankungen?

A: 100 %
B: 80 %
C: 20 %

3 SCHOKOLADE ODER GUMMIBÄRCHEN?

Was ist besser geeignet für Diabetiker: Schokolade oder Gummibärchen?

PAVILION
18

Wie entsteht ein MUSKELKATER?

A: Der Muskel kriegt zu wenig Sauerstoff und übersäuert
B: Der Muskel schmerzt, wenn man zu wenig Süßigkeiten beim Sport isst
C: Kleine Risse in Muskelfasern



ANCIENT HERBAL SCIENCE FOR A MODERN LIFE

“Let food be thy medicine and medicine be thy food.” The saying from the Greek scholar Hippocrates (470 B.C.) serves us today as a guide for a conscious, healthy lifestyle. Knowledge about the healing power of plants was collected over thousands of years and recorded in herbal books.

How can nature help us prevent the diseases of civilisation? Which plant components are effective? What are the differences between wild herbs and tested natural medicines? What scientific evidence does natural medicine offer today?

On the “Info Tour Herbs & Natural Remedies” through the exhibition area, visitors get a glimpse into the world of medicinal plants. Schoenenberger, the natural medicine manufacturer in Swabian Magstadt, specialises in medicinal plant juices and presents examples of twenty-six medicinal plants in single- and mixed-bed plantings. These portraits show a fragment of the diverse effects nature has to offer. In addition, there are useful consumer tips to find out more.



INFO TOUR
HERBS & NATURAL
REMEDIES

Schoenenberger
Heilpflanzensäfte

alphabet

Akademie für Lebenskunst /Galerie im Einstein, Berlin

ART INSTALLATION: “seltenes alphabet”

The art installation “seltenes alphabet” (“rare alphabet”) raises the awareness of rare diseases and invokes science, research, medicine and art to join the debate on the subject. More than four million people in Germany suffer from one of the over 6.000 rare diseases. For now, there treatment options for most of these diseases are very limited — or there is no cure at all.

Even though these diseases each only affect a very small number of people, the fate of each individual must be taken seriously. “The commitment of basic research, doctors and pharmaceutical research to the fight against these disorders must not slacken”, affirmed Nobel Laureate Aaron Ciechanover at the inauguration of the exhibition of the installation in Berlin’s “Galerie im Einstein”.

The installation appeals to the senses to get attention for the “orphans” of medicine and the fates of those affected. The names of rare diseases shine out of 25 olive trees — symbols of life, peace and health. “The installation puts evolution, mutation, sickness and health in one context”, says Gerald Uhlig-Romero, artist and owner of a famous coffee-house in Berlin. He himself is affected by this difficult issue and initiated the project together with the artist Peter Badge.

Akademie für Lebenskunst
AKADEMIE FÜR LEBENSKUNST

is zidose

Tuberkulose

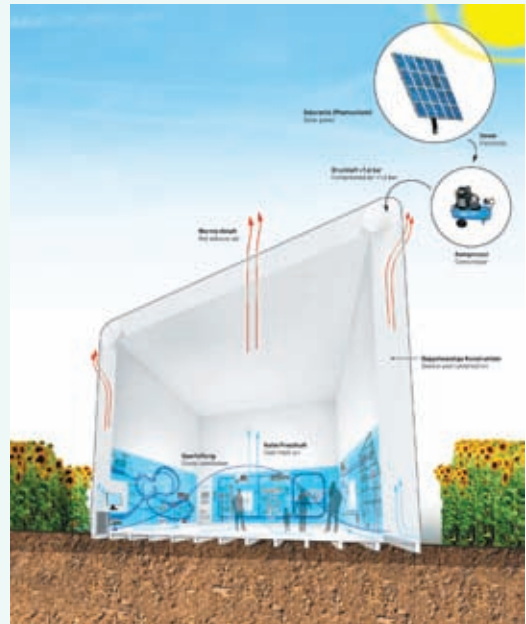
PAVILION ARCHITECTURE

Air_Born(e): Building on Air

The innovative construction of the 17 pavilions of the exhibition "Discoveries 2011: Health" on the Isle of Mainau uses slightly compressed air and is controlled by pressure sensors.

Air — or the atmosphere, rather — has no real shape per se, but instead appears at various levels of water saturation as clouds or as ground fog. When forced into a self-contained system or shape, however, it exhibits a static quality. In the case of the exhibition pavilions, the outer shell combines with pressure to form an architectural symbiosis, as each component needs the other in order to become tangible. Separated by a wall just a few millimetres thick, the interior of the pressure hull forms a synthetic atmosphere that is controlled using simple technical mechanisms. The architecture hereby focuses on the creation of boundaries between a natural and an artificial weather situation. Areas of high and low pressure serve as the prerequisite for creating space.

The structural principle of the pavilions is based on a "table" of pneumatic pressure cylinders. This "table" is tightly anchored to the ground and serves as a frame into which the inner and outer shells are mounted in place. The two shells are the only components given an aesthetic appearance, and are user-definable in terms of materiality, colour, and form. The gap formed between these two thin walls is used to control the climate within the pavilion. Radiating heat from the outside heats the air between the two walls, which rises upward. The rising air pulls up the cooler layers of air near the floor, and this circulation naturally ventilates the pavilion's interior.



Solar cells help convert incoming solar radiation to electrical energy, which is then used by the pressure-sensitive sensors to either inject or extract air to and from the structure as needed. The sun and the air therefore serve as building materials in an ephemeral exhibition structure that can be erected and disassembled within a matter of hours, making it flexible for other applications. The low weight and volume of the dismantled pavilions, which fit into carrying cases, save resources needed for transport and offer diverse opportunities for reuse at other exhibitions or fairs.

It provides for the creation of a gathering space whose physical structure is the embodiment of a sustainable utilization concept.

ENTDECKUNGEN
/DISCOVERIES
GESUNDHEIT
/HEALTH

20
11



BUMPER PAGES FOR KIDS

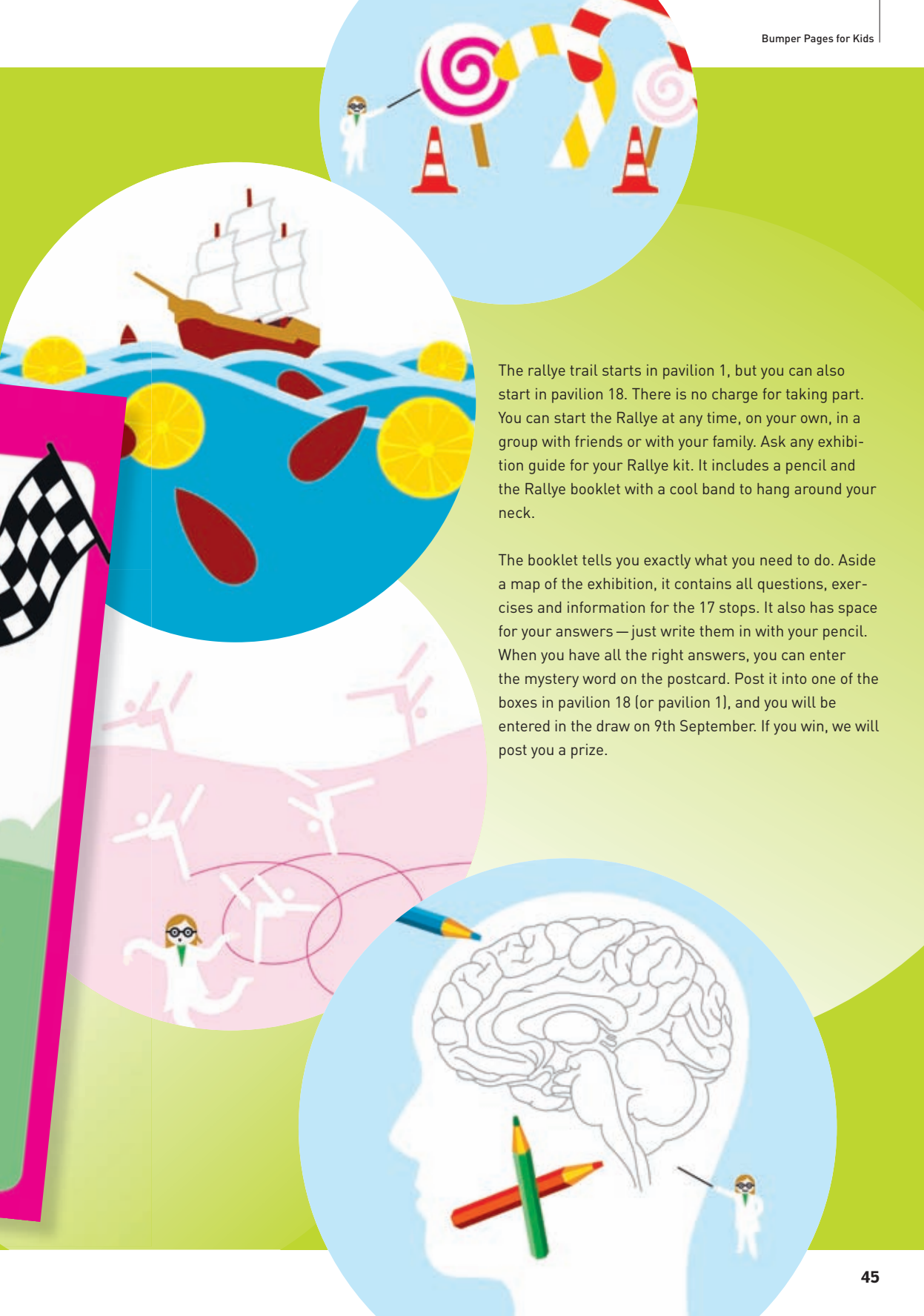
“Discover the Future of Health!” The Health-Rallye

Welcome to the Health-Rallye! It will lead you through all the pavilions of the exhibition and turn you into a discoverer. Along the way, you will find hints for staying healthy, learn real science and have lots of fun.

There are 17 stops on the trail. At each one, you will be asked to answer questions, do exercises or find hidden information. The goal is to discover the correct mystery word. If you do, you can enter in a draw for one of many great prizes.

Please note: The rallye booklet with all questions, tasks and information is in German only.





The rally trail starts in pavilion 1, but you can also start in pavilion 18. There is no charge for taking part. You can start the Rallye at any time, on your own, in a group with friends or with your family. Ask any exhibition guide for your Rallye kit. It includes a pencil and the Rallye booklet with a cool band to hang around your neck.

The booklet tells you exactly what you need to do. Aside a map of the exhibition, it contains all questions, exercises and information for the 17 stops. It also has space for your answers — just write them in with your pencil. When you have all the right answers, you can enter the mystery word on the postcard. Post it into one of the boxes in pavilion 18 (or pavilion 1), and you will be entered in the draw on 9th September. If you win, we will post you a prize.

Die Gesundheitsforscher



Test your knowledge:

Do you have what it takes to be a health researcher?

How much do you know about health research, the Year of Science topic for 2011? Test your knowledge here.



Question 1:
Blushing happens to all of us ...
But what causes our face to go red?

- a. Blood pressure
- b. An unhealthy diet
- c. A lack of sleep

Question 2:
During which of the following activities does the body use the most energy?

- a. Playing table football
- b. Playing football
- c. Going for a walk

a lot. This means you're more likely to sweat a little and get out of breath, unlike when just walking. Playing table football does mean moving around more than going for a walk, but it is still not as demanding as playing real football.

Question 3: Answer C. An implant could be a replacement tooth or an artificial heart, for example. The technical definition is an artificially produced replacement for a body part that is missing or not functioning properly in a patient's body. The word 'implant' comes from Latin and means literally 'to plant into'.



Question 3:
What is an implant?

- a. A medicinal plant
- b. A research institute
- c. An artificial substitute within the body



You can do more research at www.die-gesundheitsforscher.de. The 'Health Researchers' quiz will test your knowledge on nutrition, sport and medical technology. The four health researchers Karla, Lucy, Tom and Paul will guide you through the different levels. Once you have successfully researched all the topics and answered the questions correctly, you will receive a Health Researcher Certificate with your name on it for you to print out.

www.die-gesundheitsforscher.de

Question 1: Answer A. It happens to all of us: something embarrassing happens or you're just really excited about something – and suddenly your face goes bright red! Scientists are still not fully sure about what exactly happens in the body. Though one thing is certain – going red in the face comes from an increase in blood pressure. **Question 2:** Answer B. Playing football means you have to run around

ANSWERS:



Broken window:
Just a single hair
on the window ledge
is enough to give a
robber away.

Simply GENE-ius!

**Securing the scene
of the crime:**
Only the police are
allowed to inspect the
criminal's traces.





In the lab:
Even a tiny drop of saliva contains a great deal of information about a person's genes.

Hunting down criminals, fighting diseases and much more besides — all with the help of genes. They can be found in every cell in our bodies. Researchers are constantly discovering more and more about their secrets and potential..

The crime has been planned meticulously ... In the dark of the night, the thief smashes a basement window, his hands covered by leather gloves. He can't afford to leave a single fingerprint. Silently, he creeps through the house gathering all the valuables he can find, and then disappears without a trace. Or so he thinks! As soon as the police arrive, a team of crime scene specialists get to work. Though they can't find any fingerprints, they do come across a hair on the window ledge. Could it be from the criminal?

In the lab, the forensic scientists begin investigating the genetic material of the hair cells. 'We call it generating a genetic fingerprint,' says the scientist Lutz Roewer from Berlin. He is an expert who works on criminal cases, as genetic fingerprints can provide very useful clues to a criminal's identity ...

Genetic material refers to the genes found in every human being. These genes play a very important role and establish the blueprint for the entire body. They determine what we look like, such as the colour of our eyes, skin and hair. Children 'inherit' genes from their parents. These contain what is known as hereditary information. This hereditary information is found in the core of every cell — in the cell nucleus.

Genes as police aids

'In order to create a genetic fingerprint, first we extract the genetic material from the cell nuclei. It is then cleaned and multiplied,' explains Lutz Roewer. The multiplying process is very important, because the criminal often only leaves very limited traces behind, such as the tiniest scrap of skin or a single hair. Next, miniscule pieces are cut out of the multiplied genetic material. 'We are only interested in those sections of the genetic material that are very different from person to person,' says the expert. A special technique is then used to visualise these sections, giving a kind of zigzag pattern on the computer screen.



Tiny traces of blood, saliva or hairs are examined.



Certain sections of the genetic material are visualised, producing a special pattern.

Every single person has their own individual zigzag pattern. If the police catch a suspect, then they can compare their pattern with the one the criminal left behind at the scene.

If these are found to match, then the criminal has been successfully detected. The genes even provide the experts with information on what the criminal looks like. For example, it is possible to detect whether the criminal is European or Asian. All this information is contained in our genes. Genes can even tell us the colour of a person's earwax! So it's no surprise that gene research has helped to uncover a great number of criminals over the years. The science of gene technology, however, is not just concerned with hunting criminals, but is also used primarily in fighting diseases.

What do we want to know?

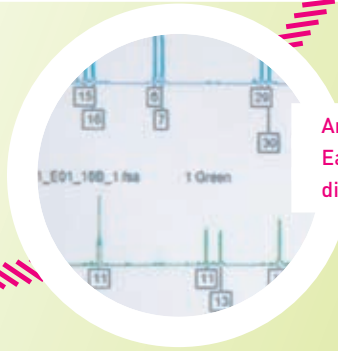
With the help of special gene test, researchers can reveal the entire blueprint of the human body. In the future, this information may even be used in a simple visit to the doctor.

In the past we used to wonder why some babies are born with an illness. Then researchers made a discovery: 'There are some illnesses that are caused by mutated genes, which can be passed on from a baby's parents or grandparents. It is therefore possible to inherit an illness,' says the genetics expert Karl Sperling from Berlin. 'Once we had discovered this, it meant that we were more able to look for ways to treat genetically determined illnesses.'

Sometimes it can be recommended to examine a baby's genes right after birth. This can be done using special gene tests. This makes it possible to treat sick babies straight away. Certain illnesses, for example, mean the baby requires a special diet. This allows us to keep babies healthy. Before we had found out about inherited illnesses, these babies would often later become seriously ill. It is also possible to run gene tests during pregnancy. This can tell us if the baby will be born healthy or whether they will have a disability or incurable illness. Is it a good thing to know something like that before the birth? Tests during pregnancy are often very controversial. There are therefore very strict rules concerning who may conduct them and when. Each couple makes the decision whether they want to carry out such tests or not.



Police:
Many criminal cases have been solved using gene tests.



Analysis:
Each person's pattern is different.

Even a simple visit to the doctor in future could be a totally different experience thanks to gene research. Because of our different inherited information, we are all unique. That means that two people might react totally differently to the same medicine. Whilst it might help one patient, it could be ineffective for another, or even life-threatening, scientists say. That's why a visit to the doctor in future might involve examining the patient's genetic information first, and then writing a prescription for medicine that suits the patient. Similar procedures are already practised for patients with serious illnesses.

Looking into the future

Most of us, however, have no idea what genes we have inside us. Only until recently, examining all of a person's 20,000 genes was a fairly tricky and expensive process. 'It's similar to trying to read every single book in an enormous library. Each book contains the information carried by several genes, and the complete library holds the entire blueprint to the body,' says Sperling. Researchers managed to completely uncover one such blueprint for the first time in 2000, after over ten years of work. Meanwhile, research has moved on so quickly that it can now be carried out very rapidly. Today, it only takes around a week.

This kind of investigation allows scientists to predict how likely it is that a person will develop certain illnesses. For example, if one person might be more likely to develop cancer than another. Such predictions are not certain, however, especially since genetic information is not the only determining factor in many illnesses. 'Still, we have to ask ourselves, do we really want to know things like that? Do we want to know what our genes can tell us about ourselves?' asks the genetics expert Kerstin Kutsche from Hamburg. Would it then be possible to live our lives in a way that will prevent the disease from developing? Or would we just spend our lives worrying about something we can't do anything to change? Scientists are certainly agreed on one issue: the technology exists, but we must think very carefully about how we want to use it.



Visitor Information

Exhibition "Discoveries 2011: Health"
Isle of Mainau, 20 May – 4 September 2011

Opening hours

The exhibition is open daily from 10 a.m. to 6 p.m.
Mainau's park and gardens are open from sunrise to sunset. Subject to change.

Admission fees

Admission to the exhibition is free of charge. The following regular admission fees apply for Mainau's park and gardens: Adults: €15.90, Students: €8.50, Children (up to age 12): free admission; Groups (from 10 people): €12.90 per person. School groups attending with teachers can book their visit in advance in order to gain free admission to the Isle of Mainau. Booking is essential at Tel. +49 (0) 7531 / 303-0.

Guided tours

The exhibition staff offer free guided tours every hour. The tours take about 30 minutes and start from pavilions 1 and 18. Groups (including school groups) should book their guided tours in advance at Tel. +49 (0) 7531 / 303-0.

Health-Rallye

This challenge for children up to age 12 can be started and completed at any time in pavilions 1 and 18. The Rallye booklets are available there and at the information stands of the Isle of Mainau. There is no charge for taking part. All correct answers will be entered in a draw on 9 September 2011 and the winners will receive attractive prizes.





Offers for Schools

With its many interactive exhibits and specially designed contents, "Discoveries 2011: Health" is an ideal destination for school tours. By prebooking the visit, school groups and accompanying teachers will be given free admission to the Isle of Mainau — Tel. +49 (0)7531 / 303-0.

Preparatory Classroom Material

Four teaching units relating to the key themes of the exhibition have been specially developed by www.lehreronline.de to help prepare school groups for their visit. They pick up relevant areas from the biology and chemistry curriculum as well as other subjects, which can then be expanded through the interactive exhibits. Teachers can download the materials and worksheets (in German only) free of charge from the following site:
www.mainau-entdeckungen.de/angebote_fuer_schulen

Guided Tours for School Groups

On application, free guided tours of the exhibition can be planned and discussed with the exhibition team guides on an individual basis. Tel. +49 (0) 7531 / 303-0.

Workshops

As an extracurricular educational institution, Grüne Schule Mainau offers various hands-on educational workshops for school groups around the topic of health (in German only). The specific contents and focus points can be discussed with teachers on an individual basis. Each workshop lasts two hours and costs €7 per student. One accompanying person is admitted free with every ten students; additional adults pay €15.90. Further information is available by telephone at +49 (0) 7531 / 303-0.



EXHIBITION ORGANISATION

Acknowledgements

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Patron

Prof. Dr. Annette Schavan,
Federal Minister of Education and Research

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Organisation

Foundation Lindau Nobelprizewinners Meetings at
Lake Constance
Council for the Lindau Nobel Laureate Meetings
Mainau GmbH

“Discoveries” on the Web

The web portal for the “Discoveries” exhibition series is at www.mainau-entdeckungen.de (German only).

Here, Internet users will find all background information on the current exhibition “Discoveries 2011: Health”, as well as images and texts relating to “Discoveries 2009: Water” and “Discoveries 2010: Energy”.

Links lead from this portal to all contents and events of Year of Science 2011, www.forschung-fuer-unsere-gesundheit.de, and to a dossier at www.lehrer-online.de. There, teachers will find four teaching units related to the exhibition themes for free download.



lehrer-online

Eine Initiative des Bundesministeriums
für Bildung und Forschung

Wissenschaftsjahr 2011
Forschung für
unsere **Gesundheit**

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Foundation Lindau Nobelprizewinners Meetings at Lake Constance

Chairman of the Board: Prof. Dr. h.c. Wolfgang Schürer

Managing Director and Member of the Board: Nikolaus Turner

Lennart-Bernadotte-Haus

Alfred-Nobel-Platz 1

88131 Lindau

Germany

Tel. + 49 (0) 8382 / 277 31-0

Fax + 49 (0) 8382 / 277 31-13

Email: info@lindau-nobel.org

Project Manager: Wolfgang Huang,

Executive Secretariat of the Council for the Lindau Nobel Laureate Meetings

Project Coordinators: Christian Schumacher, Julia Schürer

Editors: Christian Schumacher, Christian Rapp

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Further information on the exhibition series:

www.mainau-entdeckungen.de

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- 01 Introduction
- 02 Federal Ministry of Education and Research
- 03 Deutsches Hygiene-Museum Dresden
- 04 German Centre for Diabetes Research
- 05 Boehringer Ingelheim
- 06 Interdisziplinäre Diabetes-Fußstation Klinikum Konstanz
(Clinical Centre of Constance)
- 07 Institute of Sport-Gerontology, German Sport University Cologne
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- 13 Department for Plastic Surgery and Hand Surgery, Klinikum rechts der
Isar and Faculty of Medicine, Technische Universität München, Research
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-  Info Tour Herbs & Natural Remedies — Schoenenberger Pflanzensaftwerk
-  Art project "seltenes alphabet"







EXHIBITION

“Discoveries 2011: Health”

20 May – 4 September 2011

Isle of Mainau

www.mainau-entdeckungen.de

CONTACT

Visitor information:

Isle of Mainau, Tel. +49 (0)7531 / 303-0

Information on the organisation:

Foundation Lindau Nobelprizewinners

Meetings at Lake Constance,

Tel. +49 (0)8382 / 277 31-0

Media contact:

Christian Schumacher,

Tel. +49 (0)8382 / 277 31-18



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