LINDAU
NOBEL LAUREATE
MEETINGS

EDUCATE. INSPIRE. CONNECT.

IMPACT

64th Lindau Nobel Laureate Meeting dedicated to Physiology & Medicine

5th Lindau Meeting on Economic Sciences

Outreach Projects & Mission Education

ANNUAL REPORT 2014

LINDAU NOBEL LAUREATE MEETINGS

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64th Lindau Nobel Laureate Meeting Physiology & Medicine

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Outreach Projects & Mission Education

Annual Report 2014

Contents

64 Throughout this report, a "64" and the light brown colour indicates that contents are distinctly related to the 64th Lindau Nobel Laureate Meeting.
5 In contrast, a "5" and the blue colour marks contents related to the 5th Lindau Meeting on Economic Sciences.
In case contents are not further specified, neither with a "64" nor with a "5", they do not refer to one of the 2014 Lindau Meetings in particular.

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Outreach Projects & Mission Education

Articles, Interviews & Contributions

Impact

Preface

"You can be fortunate in your teachers." Oliver Smithies attributes his excellent career in science to this sort of fortune, at least partly. Many of his fellow Nobel Laureates will certainly agree that teachers matter. In essence, the dialogue between generations – as in student and instructor – usually has a meaningful impact on both parties. But this fact that both sides are stimulated by each other is often forgotten. This two-way process also applies to perspectives: Whereas the older generation's focus is often on the long-term outcomes, the younger generation usually prefers a short-term approach – and is challenged when confronted with a different perspective. But a strategic focus on the long-term may alter priorities, and may also help to prevent future mistakes – if this happens on a grand scale, it could even be beneficial for mankind. We can consider ourselves fortunate in Lindau to have accessible teachers and mentors, sharing both their personal and professional growth with us, and helping young scientists to reflect their own approaches, and opening new horizons to them.

Learning shapes our lives and indeed never ends. It is not only directed towards the creation of knowledge and skills, but most importantly towards one's growth. It provides a compass and enables one to act independently and responsibly. Just as freedom and responsibility are inextricably connected, so are learning and trusteeship. Passing on knowledge is a part of every individual's duty, but it holds even more significance for scientists.

Scientists, according to Robert Solow, "bring organised reason and systematic observation to bear on both large and small … problems". In other words, they adhere to scientific method in order to discover the hidden secrets or underlying patterns of the world we live in. Scientists explore a terra incognita that lies within, or rather behind, the surface of our world. Getting to know this terra incognita helps us sharpen our understanding.

Scientists thrive by creating knowledge, but they need inspiration to discover and develop their ideas. This inspiration may come from many sources, but more often than not, it is communicating with fellow scientists that leads to new thoughts. A Master Class can proffer feedback to enhance theories, or become a catalyst for new hypotheses. The language of science is universal and reaches beyond national, cultural, religious, and gender differences. It provides a common ground on which personalities from different backgrounds can come and work together. It is this dialogue across and among generations, culture and disciplines that creates a genuinely sustainable impact on our world.

In Lindau such a process of learning and inspiration has been taking place since 1951. The motive was to create a European forum for post-war reconciliation, but the underlying precepts of the meetings are of timeless relevance and have generated impact on a global scale. They encompass multiple forums, both formal and informal, providing ample room for candid debates. Generations of Nobel Laureates have embraced the opportunity to interact with a younger generation of scientists – not just to teach, but also to learn themselves. Today we have the privilege to welcome Laureates in different stages of their lives. Some are still engaged in cutting-edge research; others may no longer spend each day in the lab. But each and every one of them is a source of valuable advice and illumination.

This year's two meetings in physiology/medicine and in economic sciences assembled around 1,000 young scientists from around the world. They attended lectures, exchanged views with the Laureates and participated in special sessions, like the science breakfasts and master classes. On the International Day they learned more about Australia, and in a lecture by Mario Vargas Llosa, about both the actual and intellectual history of Latin America. There has not been a programme more multifaceted than this year's. It has been accomplished by the tireless work of the Executive Secretariat led by Nikolaus Turner, Wolfgang Huang and Susanne Wieczorek, to whom our sincere thanks are due.

Since 1951, about 30,000 young scientists have attended the meetings. They return home as ambassadors of our Lindau dialogue. It's an experience they hold dear, and which is exceptional. Our mediatheque invites many more to virtually experience the Lindau Meetings and to join this process of learning. Bringing "organised reason and systematic observation", as Robert M. Solow said, serves as an antidote to both the prejudices and short-termism that characterise much of our present-day lives. One hallmark of the Lindau Meetings is considering the long-term effects of scientific development and working toward sustainable solutions for our shared global problems.
Such reasoning builds on the insights of our intellectual ancestors, making us humble in the face of both their merits and their failures. They have handed us the very same torch we are about to convey to the following generations. In this respect, learning and teaching are two sides of the same coin. It is an interplay that never stops and which everyone can join in our Mediatheque. The various projects of our Mission Education aim at sparking curiosity, just as the "Sketches of Science" do, literally at first sight. For aspiring scientists there are mini-lectures, introducing pupils to important research topics in an easily accessible format.

Educate. Inspire. Connect. This is the leitmotif of our Mission Education and it covers this very particular spirit of learning. It creates an impact which is not easily quantifiable, but sustainable, as all participants involved contribute to it: our partners in the public, private and non-profit sectors; our academic partners; and most importantly, our alumni. Our partners are committed to the further development of the Lindau dialogue in order to sustainably realise its full potential. Thanks and appreciation are due to all of them.

We are looking forward to the 65th Meeting in Lindau, the 4th Interdisciplinary, from 28 June to 3 July, 2015.

Countess Bettina Bernadotte af Wisborg and Wolfgang Schürer

Countess Bettina Bernadotte af Wisborg, President of the Council, and Wolfgang Schürer, Chairman of the Board of the Foundation

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64th Lindau Nobel Laureate Meeting
Physiology & Medicine
29 June – 4 July 2014

5

5th Lindau Meeting
on Economic Sciences
19 – 23 August 2014

The Origin of Ideas

In his lecture at the 64th Lindau Meeting, Oliver Smithies opened up a multiplex panorama of ideas, thoughts, and advice. In this interview, he let the scientific community have yet another share in his intellectual experience.

"At many times in your scientific lives, you will hopefully have ideas – good or not so good – that will determine what you will do next..."

Oliver Smithies

Mohit Kumar Jolly: Your lecture at the 64th Lindau Nobel Laureate Meeting got you standing ovations. You ended it drawing a parallel to your experience as a glider pilot, saying "you have to overcome your fears to reach new heights". This was one of the many advices you had for young scientists who are at the beginning of their career. Flying really is a major source of inspiration to you, isn't it?

Oliver Smithies: Indeed! When flying my glider, I turn off the engine at some altitude. The glider then needs upwards thrust to maintain itself. I often spot a hawk and try to fly in the direction it is flying, because the hawk is also looking for that essential upward thrust. So, if I follow it, I'll also get the thrust. Thus, my flying experience also makes me think.

MKJ: You have been in science for a very long time. How, in your opinion, has the culture of science changed over time?

OS: Not much actually. Scientists then as well as now want to be known as "the first one to do something". When Galileo discovered Jupiter's moons he was worried about not being the first, and even today, scientists are afraid of the same.

MKJ: But hasn't the scientific misconduct gone up significantly nowadays?

OS: Yes. But it must be understood that scientists are not different from other communities – of course, you'll find many dishonest scientists.

MKJ: Science is to a large extent conducted with taxpayer's money. Do you agree that more dialogue between science and the public is needed to prevent the anti-science movements we have seen earlier, probably due to lack of proper communication?

OS: That's very much required. I haven't done as much in this aspect as I should have done, but I'd like to share one anecdote. When we were doing experiments on cloning genes, the community in Cambridge, Massachusetts revolted against our plan, due to various fears associated with cloning. In Wisconsin though, we invited the media and explained to them in detail what experiments we were exactly planning; because we listened to their fears and finally clarified them, they finally allowed us happily to do those experiments.

MKJ: What's your opinion of Professor Randy Schekman's criticism of the dominance of the three big scientific journals – Science, Nature, and Cell?

OS: I used to publish in Nature and Science, because they were quick. Later, at a time when I had two post-docs working on two genes connected to anti-inflammatory drugs, I wrote to the editor of Cell, whom I knew, and asked her to publish my two post-docs' findings as two papers – because I wanted to be fair to both of them. When she refused, I told her that I'd not publish with Cell; and suddenly they agreed. So, they actually do listen to some authors. But, I believe that what matters more is not where you publish, but what you publish. A good scientist is a global citizen, and I support open access and the sharing of ideas.

MKJ: How has your experience been at Lindau over the years?

OS: I love to come to Lindau to listen to others about what makes them excited. Also, I enjoy interacting with young scientists and sharing ideas.

MKJ: What message you'd like to give to the young scientists?

OS: Find something that you enjoy doing, and then pursue it. It need not be science, but must be something that excites you.

Mohit Kumar Jolly

The Importance of Scientific Advice

Federal Chancellor Angela Merkel gave a much-noticed keynote address at the 5th Lindau Meeting on Economic Sciences.

Recalling the turbulences of the economic and financial crises of recent years, Federal Chancellor Merkel emphasised the significance of a close collaboration between policymakers and scientists. Experience had shown that the complexity and dynamics of the real world demand for a division of labour between science and politics in the quest of solutions to existing or arising problems. While expressing her gratefulness and appreciation for expert input in economic matters, Chancellor Merkel also raised the question what form economic policy advice should ideally take. She stressed that both sides should take account of existing realities and interdependencies, societal developments and cultural contexts in a complex, globalised world. Moreover, her plea was to listen carefully to one another and – in a sense as a prerequisite for exchange – develop a mutually comprehensible language.

"The Lindau Meeting on Economic Sciences is, in the best sense of the word, an institution with a long tradition. It can look back on a success story spanning more than 60 years, during which it has developed into a unique forum for scientific dialogue. As Chancellor of the Federal Republic of Germany I can tell you that we are proud of these annual meetings, for they are an excellent flagship for us as a location for science and research as well as for the culture of dialogue we encourage in Germany. For here in Lindau you, the Laureates and young scientists, build bridges of inspiration and motivation as well as bridges spanning generations, countries and also scientific disciplines. [...]

The theme of this year's meeting is: 'How useful is economics – how is economics useful?' That is a good question to ask. I can provide you with only very limited help in finding the answers. But of course we also have to ask how economic sciences benefit society. That takes us almost into the realm of politics, which allows us to apply scientific insights in a practical context. The basic question of what use research is for society therefore leads to another question. And that is: What form should economic policy advice ideally take? [...]

To be honest, it is better to listen once to the sound advice of an expert than subsequently to have to deal with and iron out major problems in an entire society. That is why it is good and absolutely desirable that scientists live up to the expectation that they keep building bridges between theory and practice and providing guidelines for policymakers. [...]

I want to add something else, something that I, as a former scientist, very often find is missing in these discussions with advisors. We should also be honest enough to mention the rate of error and the uncertainties in cases where we are not entirely sure. That also sometimes helps to avoid disappointment, and we can certainly live with these uncertainties. [...]

We are now emerging from years in which – and in this erudite company I will phrase this very carefully – we did not always have the impression that the economic sciences already knew everything about what was heading our way. Of course, we can now ask why some of the things we assumed in our statistics and forecasts – not just we as politicians but also those in leading expert organisations – were so different from the reality that then came to pass. There are various possibilities. Probably they all played a role.

One reason is that the underlying theories were inadequate, and specifically that we failed to accurately predict changes in quantities which resulted in completely new qualities. Yet we can also say that from time to time there were voices from the field of science which predicted almost everything that came to pass. So we could also say that we didn't listen properly. Or we could say that we listened to the wrong people. In any case we didn't get the impression that the majority were right in their predictions. [...]

I would therefore point to three causes which we need to work on overcoming if we are to avoid a repeat of the crisis. Firstly, we need to remedy the structural flaws in the economic and monetary union. That will be no small feat. We may have a single market, but we have very little coordination on economic

“Let me encourage you then, especially the younger members of the audience, to make your voices heard in political and social debate.”

Angela Merkel

Chancellor Merkel met with 15 young economists from 13 countries for a discussion.

Federal Chancellor Angela Merkel and Wolfgang Schürer

policy, never mind a binding and sanctioned mechanism by which we might be held to account if we break our word. I am firmly convinced that the common-currency area needs to see this change – as regards not only budgeting but also competitiveness.

Secondly, we are in possession of a burdensome legacy, if I may put it that way, in the form of very high levels of sovereign debt. Thirdly, we have banking systems with altogether too many problems and not enough transparency. Work has already gone into each of these issues – but more needs to be done. [...]

In your research, ladies and gentlemen, you examine what happens in the markets; you look for new theories, new explanations. Demographic change or climate change, globalisation or digitisation – there is seemingly nothing left that economists haven't taken an interest in. I believe that makes your theories better, not worse, although I would guess it also makes them more complicated.

Scientific input can be helpful when decisions need to be made in politics. Politicians know that you can't take the decisions for us. To be honest, we wouldn't want you to – otherwise, we would be in the wrong job. The world of research is very much shaped by its own assumptions and priorities. Politicians always need to be aware of that. We need to balance the interests of all sections of society. I therefore want to end by reaffirming academic freedom and the independence and pluralism of research. These are essential prerequisites to ensure that scientific advisers can supply decision-makers with unprejudiced assistance, for all that we may not always like the results. Only then can science really provide counsel.

Let me encourage you then, especially the younger members of the audience, to make your voices heard in political and social debate. Contribute your expertise and your experience, independently of your regional or cultural origins and regardless of which movement within economics you adhere to. It may sometimes be uncomfortable to engage in an open and free exchange of views, rather like engaging in competition in the economy, but it will benefit us all. I am quite convinced of that.

I have one request of you scientists before I go: please express yourselves comprehensibly. Even the most complicated of matters can be explained in simple language. It really is essential that we be able to understand each other for a start! I hope, at any rate, that I have managed to make myself understood.”

Excerpts from the speech of Federal Chancellor Angela Merkel. Please find a video of the full speech in the Lindau Mediatheque.

The Sages of the Future

The Economist editor Geoffrey Carr distinguishes the intergenerational dialogue as the unique characteristic of the Lindau Meetings. It is precisely because young scientists are at the centre of attention here, that Lindau works as a catalyst for new ideas that can help steer humanity through the challenges of the future.

I first came to Lindau in 2009, to chair the meeting's closing discussion on Mainau Island – which that year was on climate change. I have returned every year since then, bar one, and have had the pleasure – and privilege, obviously – of chairing subsequent discussions on energy and sustainability, global health, the future of energy supply and storage and, most recently, science for the benefit of mankind.

The perceptive may notice something of a theme, here. Global health aside (and that is a big enough problem by itself, of course), the topic under discussion has been some variant of "how can science save the world?" Of course, science cannot save the world, or, at least, cannot do so by itself. The actual world saving will be done, or not, by politicians, who wield the power, and businessmen, who make the money. But they will certainly fail to save it without the ideas of sages to guide them. And scientists are the premier sages of our times.

I once wrote in a blog for "The Economist" that the Lindau Nobel Laureate Meetings are "certainly not Bilderberg. Nor, quite, are they Davos. But they [...] are probably, in the long run, as influential as either of these more famous meetings of the great and good. They are intergenerational get-togethers par excellence."

Bilderberg and Davos are, of course, the stamping grounds of politicians and businessmen, not of sages. But the main reason Lindau is different is not so much who attends, but its inter-generational nature. It is not about successful people bestriding the world, but about the successful passing on their world-bestriding skills to others.

It is also, of course, an opportunity for the sages of tomorrow to meet their peers from elsewhere, and from disciplines beyond their own – and thus to broaden their intellectual and geographical horizons. Moreover, because those up-and-coming scientists are the meeting's true reagents, while the laureates are mere catalysts whose presence helps these reagents to react, Lindau is also different from other scientific conferences the youngsters will have attended. In those, the spotlight will have shone on laboratory heads and principal investigators. Mere PhDs and post-docs will have been lucky to be allowed to present a poster in a sweaty gallery hidden away at the back of the conference centre. At Lindau, by contrast, they are the centre of attention. But in return for that attention, they have entered into an implicit bargain to do something useful with the experience.

Alfred Nobel's prizes – it is sometimes forgotten – are awarded not for extreme cleverness (though this is usually part of a prizewinning formula) but "to those who [...] shall have conferred the greatest benefit to mankind". Nobel was an industrialist, a practical man, and he wanted to better humanity's lot. And it is in that spirit that the Lindau Meetings should seek to encourage their participants to solve important problems as well as interesting ones. Which brings us back to "how can science save the world?"

To the extent that science, working hand in glove with the Bilderbergers and the Davosites, can save the world at all, it will be the Lindauists and their contemporaries who do so. These sages of the future, some of them at least, will have to help steer humanity through the transition that is now happening from the Pleistocene epoch, in which people have been present but not environmentally dominant, to what is becoming known as the Anthropocene, in which human effects on the Earth are so significant that the geological record will reflect them into the far-distant future.

Because those human effects will be so large, it will fall to humanity to manage its home planet with deliberation, or suffer consequences that will make the lives of future generations less pleasant than those already enjoyed by many people. Yet it will not do (and would be impossible anyway) to achieve this by stamping on the aspirations of people now alive who enjoy lives far less pleasant than those of pretty well everyone who comes to Lindau.

"To the extent that science, working hand in glove with the Bilderbergers and the Davosites, can save the world at all, it will be the Lindauists and their contemporaries who do so."

Geoffrey Carr

The Lindau Nobel Laureate Meetings thus provide wonderful opportunities to debate such matters, particularly as many participants, though fortunate themselves, come from precisely those places whose economies still have to satisfy the aspirations of much of the population. With luck, the links the meetings forge, as well as the topics discussed, will help in two ways. In the broad sense, they will set the direction of participants' thinking about what needs to be done. In the narrow one they will trigger ideas that will lead to discoveries and inventions that will do it.

Some of the problems mankind faces do look hard to deal with, and politicians and businessmen often fail to see far enough ahead to tackle them by themselves. They are but two legs of the stool that supports humanity's future. The third leg, the one that can keep the stool upright, is science. And Lindau, and its attendants, are among the carpenters responsible for making it.

Geoffrey Carr

A video of the panel discussion "Science for the Benefit of Mankind" can be watched in the Lindau Mediatheque

Geoffrey Carr moderating the closing panel discussion of the 64th Lindau Meeting, "Science for the Benefit of Mankind" (see p. 56)

Different Generations – One Passion

Young economist Fabiola Gerpott takes a stand for mutual respect between generations for age-diverse teams.

In my research, I study how different generations work with each other within a company. My focus is on learning: how they learn from each other, what they learn about each other, and how they best learn together. That sounds much more complicated than it really is: we have all experienced inter-generational learning in our childhood in our own families – it is a natural part of family life. Children learn from their parents and vice versa – nowadays, young people often know more about new technologies than their parents.

Christopher Sims with young participants of the 5th Lindau Meeting on Economic Sciences

While this kind of learning is taken for granted in family situations, companies are only just realising that age-diverse teams offer new opportunities, especially if they were formed with some ideas and tools of age-management in mind. In situations like this, a huge obstacle can be the so-called seniority principle that can also be found in academia: it postulates that any older team member is automatically the "teacher" of the youngsters, due to larger experience and presumed larger knowledge. But if intergenerational teams are supposed to present innovative results, each team member has to be able to contribute something from his or her individual background.

Laboratory of different generations

The consequences of an ageing society are widely discussed in the public. For companies, one of the most relevant facts is that the workforce is shrinking in many Western societies. Germany's working population will have about 7.5 million fewer people by 2030, while the pensioner numbers will rise accordingly. Another important fact is the shifting age pattern in the remaining workforce. In the next ten years, the number of employees between 54 and 60 will grow by about twenty percent. Companies now face the challenge to attract, promote and keep young and older employees alike. As a consequence, more and more teams will have high degrees of age-diversity. New questions arise: will youthful carelessness meet tradition-bound stubbornness? What are the needs of age-diverse teams, and what kind of help do they expect from their employer? What are the risks and opportunities of this trend for a company as a whole?

Different backgrounds

The attempt to describe and label the various contemporary generations has filled popular websites and magazine pages. In Germany, younger generations were alternately described as "Generation Golf" (referring to the popular Volkswagen model), "Generation Internship", or Generation X, Y and Z – these names are just as manifold as the attributed characteristics. Some say that the youngest generation in the work force is looking for a new work-life-balance and for more meaningful work. On the other hand, this generation is described as "generation vacuum" due to its lack of perspective, or even as "petty bourgeois". In his book "The Broken Elite", Benedikt Herles portrays streamlined careerists and predicts a bleak future when this generation will be in charge.

But not only the younger generation is the target of stereotyping. Older employees are alternately described as resigned to their fate – or eager for a second career after 50. At the end of the day, it's hard to say which descriptions are the most accurate for any given generation. But it is irrefutable that different generations have had different formative experiences in their youth. For instance, the post-war generation has often experienced serious deprivation, explaining their preferences for job and material security. On the other hand, today's youngsters are growing up in a world that is changing all the time – this might explain their need for security, or their "petty bourgeois" predilections, in order to counter their insecure circumstances. In summary, it's fair to say that the preferences and values of different generations are indeed different. These differences can lead to inspiration and innovations in age-diverse teams, but they can also result in communication problems and, ultimately, in team conflicts.

Age-management is necessary

State-of-the-art research declares age-diversity as a risk factor for a company's overall success. Meta-studies that draw upon numerous scientific results show lower performance levels for teams with a great degree of age-diversity, at least in cases where the cooperation between younger and older employees was not very respectful. But it is crucial for a successful team that every contribution is welcome, from all team members of all ages. Furthermore, it doesn't make sense for an employee to share results if this means that his colleague will receive a reward and his own performance assessment will be inadequate. In order to avoid status struggles, it would thus make sense to have a reward system for entire teams, not for individual players. Cohesion in age-diverse teams also depends on enough time for the exchange of ideas, plus some team building activities. Current studies show that joint activities have a positive impact on intergenerational respect.

This also requires some rethinking on the management level: "soft" skills will become even more important in employee management. The opportunities of demographic change can only be fully utilised if mutual respect between the generations will be established, and this in turn should be encouraged by modern tools of personnel management.

Nobel Laureates meet young economists

During the 5th Lindau Meeting on Economic Sciences, 18 prize-winning economists met more than 450 young scientists from over 80 countries. This unique framework fostered inter-

Martin Chalfie with young participants of the 64th Lindau Nobel Laureate Meeting

generational inspiration – a positive example of the opportunities of age-diverse teams, as I discussed earlier. First of all, there is a common goal to discuss relevant open questions of economic science, among them: "What makes a good economist?", and "What are the challenges for the next generation?". Secondly, to answer these questions, the viewpoints and perspectives of both generations are needed. The Nobel Laureates contribute their knowledge and experience to predict future challenges – but the shaping of this future will be in the hands of the young scientists. This fact stresses the importance of discourse: both sides need to hear out the other side, and need to find inspiration in what the other has to say, in order to formulate a common vision for the future of economics. This is why I really enjoyed the fruitful discussions, inspiring lectures and controversial talks at the Lindau Meeting.

Fabiola Gerpott

The Fascination of How Things Work

Neuroscientist and participant of the 64th Lindau Meeting Stefano Sandrone talked with Erwin Neher about dreams, the exploration of his childhood garden and winning the Nobel Prize.

Our body is made of cells, and the cells are surrounded by membranes separating the space inside the cell (i.e. intracellular space) from the external one (i.e. extracellular space). However, this separation is more similar to a wall with small and big gates than to a never-ending fence with no openings. Every gate is called channel, and each of these gates allows the passages of ions, namely charged atoms. The right functioning of these channels is pivotal to the functioning of cells, and therefore to the right functioning of the whole body. Erwin Neher, along with Bert Sakmann, has refined the so-called patch clamp technique allowing scientists to record very small electrical currents passing through each single ion channel. Neher and Sakmann were therefore jointly awarded the Nobel Prize in Physiology or Medicine in 1991 for "their discoveries concerning the function of single ion channels in cells".

Stefano Sandrone: Professor Neher, let's talk about neuroscience and start with a simple question: What is the earliest memory of your life?

Erwin Neher: My earliest memory comes in pictures: it is a picture of a terrace by a house where someone is lifting me up in the air.

StS: What was your dream job when you were a kid?

EN: I have changed several dream jobs, from being a priest to becoming a forester up to a scientist.

StS: In your autobiography on nobelprize.org, you wrote that your family home was situated in a big park-like garden, in which you spent hours by yourself, watching plants and animals, and where you knew almost every pebble. Can you please tell us more about that?

EN: I remember I explored that park-like garden a lot. I knew every little corner of it. I enjoyed just watching and observing what surrounded me as well as disassembling instruments and putting them to work again. I was fascinated by how things work – from the functioning of a clock to the mechanism that help snails find their way in the garden.

StS: How would you describe the excitement of a discovery?

EN: Very often you do not really grasp what the consequences of a certain discovery are. In science, you have questions and you want to get the answers: sometimes you get them, sometimes you don't. It is a mixture of nice feelings, a sequence of events and of reactions to these events. This excitement comes step by step. You have a goal, you are convinced of something when you get your first evidence, and then you have to further prove it, gradually.

StS: What are the most promising neuroscientific challenges of contemporary and future research?

EN: I would divide them into two categories: First, better understanding, and second, fighting neural and psychological disorders. These two categories are linked with each other. Specifically, the new optogenetic methods can provide us with a promising approach, therefore optimising the way these tools work is a challenge. Synaptic plasticity is a great research area: Seminal findings on this topic were made by pioneering studies by Nobel Laureate Bernard Katz in the 1950s, but even sixty years later we still do not have a complete biophysical understanding of what is going on. Important discoveries will come from a combination of experiments and computational neuroscience.

StS: What were you doing when you received the call from Stockholm?

EN: I remember it was a Monday morning. I had just come back from a conference in Spain and was about to analyse some data from a collaboration with a colleague in the US. I started to have a look at them, but then... the telephone rang – and the data eventually had to wait for one more year before being analysed!

"Science is about following your own ideas, being part of an international community with a common goal."

Erwin Neher

Erwin Neher at a discussion session with young scientists

StS: Did your life change after the Nobel Prize?

EN: Yes, it changed – but I think this is not very different from what other scientists who are leaders in their research field have to deal with. You have to subdivide your time and reserve some of it to run the lab and follow up on your ideas, but you are also subjected to many external forces leading you towards many directions. Also, the Nobel Prize is awarded for the specific ability to find associations between previously separate phenomena, but many people think a Nobel Laureate should be almost "capable of doing everything", such as being good in politics, delivering speeches, convincing people, and all these things. Moreover, you learn to say "No" in many cases as you always have to weigh your responsibilities. Society expects you to do good research, so you have to keep doing what you are good at.

StS: What is your advice for young researchers?

EN: You need curiosity to solve problems. Find something that catches your mind and let that thing make you think intensively about it. Look constantly for answers to your questions. Science is about following your own ideas, being part of an international community with a common goal, having a job that is at the same time your hobby, and being very well organised. Time management is crucial.

Stefano Sandrone

"I am delighted to be here to see all these bright young faces and to have my first opportunity to speak at a Lindau Meeting – I hope the first of many as years go on."

Randy Schekman, Nobel Laureate in Physiology or Medicine 2013

Retrospect on the 64th Lindau Nobel Laureate Meeting

Moderator Adam Smith, Klas Kärre, and Stefan H.E. Kaufmann at the opening of the 64th Lindau Meeting

How can you bring together 600 young scientists – most of them under the age of 35, at an early stage in their careers, and coming from different cultures and regions of this globe (almost 80 countries) – with 37 Nobel Laureates, highly esteemed and recognised for their specific research achievements, covering a broad area of scientific expertise? And how can you accomplish this in a little less than one week? Sounds like a big challenge, notably if you want to stimulate a vibrant atmosphere for dialogue rather than monologue. Sounds like a difficult task, but it has been managed successfully ever since by the highly experienced staff of the Lindau Nobel Laureate Meetings. Yet, as a scientific chairman you still feel a little bit nervous how everything will work out. Soon you realise that it works extremely well, and indeed the strong interactions across generations, nations and cultures serve as a fertile soil for the inspirational spirit of the Lindau Meetings – summarised best by the leitmotif "Educate. Inspire. Connect.".

Each morning was filled with excellent lectures, which were followed by discussion sessions in the afternoon to allow young scientists to closely interact with the Nobel Laureates and raise challenging questions. The 64th Lindau Meeting was dedicated to Physiology and Medicine, as reflected in the topics of the lectures: cellular machineries, innate immunity, stem cells and cancer, infections. There were not only Nobel Laureates in Physiology or Medicine participating – almost half of them represented chemistry, thus mirroring the strong multidisciplinary development within life sciences. For the young scientists, the wide range of speakers also meant diversified content – from structural biology and innovative imaging techniques, and personal reflections on life experiences, to motivation for outstanding scientific work.

Equally fascinating were the master classes, at which selected young scientists presented their own work to a group of young colleagues under the mentorship of a Nobel Laureate who chaired the class. We, the scientific chairmen, envied the young researchers for the intimate atmosphere and the opportunity to present and discuss their most recent data under the critical but encouraging eyes of their mentor and the audience.

Also challenging and interesting were the high-profile panel discussions. One of them focused on changes in scientific approaches fueled by the increase of data sets in a research climate that favours hypothesis-driven science. Not surprisingly, the conclusion of this panel was that the two aspects are not contradictory but highly synergistic if applied in the right way. Big data can generate new hypotheses, and hypothesis-driven science increasingly produces big data sets. With more and more excellent young researchers wondering whether they should pursue a career in academia or in industry, the pros and cons of both career tracks were the topic of another panel discussion. Again the outcome was that both paths have their respective advantages, and that everyone should base their decision on their own particular needs. The final panel discussion, held at the closing day, focused on the important question of how to harness science for the benefit of mankind. This clearly is an enormously important issue for biomedical researchers, who have to decide whether they will pursue purely academic research to elucidate novel general principles, or move into research areas that can make a difference to society, notably in resource-poor areas. Already at the opening of the meeting, the Swedish statistician Hans Rosling had impressively illustrated how easily we can be tempted to mis-interpret questions in everyday life as well as of global dimension. In this context, the final panel discussion was an excellent conclusion to a week of inspiration at the Lindau Nobel Laureate Meeting.

It is difficult, if not impossible, to give credit to all the vibrant presentations by Nobel Laureates, who covered so many different aspects of biomedical research and also touched upon the interface with physics and chemistry. All the presenters also did an outstanding job advising the young researchers on how to approach scientific questions beyond their specific field of studies. After all, it is not mere data generation, but increase in knowledge and eventually an in-depth understanding of a scientific problem that qualifies someone for the Nobel Prize. Amongst all of the excellent presentations, one clearly deserves special mentioning: the lecture by Oliver Smithies, who – with a sense of humor – revealed to the young audience how to approach problems that had not yet been solved or even tackled before.

Even the best event must come to an end. It is rewarding to receive such overwhelmingly positive feedback from young scientists and Nobel Laureates alike. Indeed, it may have been exhausting making it all happen, but it also was a lot of fun. The activities did not end at sunset but continued in the collaborative and interactive spirit of "Educate. Inspire. Connect." during evening social functions, thereby fostering the exchange among young researchers. And due to the balanced gender ratio (with 52%, there was actually a small majority of female scientists at Lindau for the first time), finding partners to dance with was no issue either.

Klas Kärre and Stefan H. E. Kaufmann

SCIENTIFIC CHAIRMEN OF THE 64th LINDAU NOBEL LAUREATE MEETING

Klas Kärre
Chairperson, Nobel Assembly for Physiology or Medicine at Karolinska Institutet, Stockholm
Professor in Molecular Immunology, Department of Microbiology, Tumor and Cell Biology, Karolinska Institutet

Stefan H. E. Kaufmann
Director, Max Planck Institute for Infection Biology, Berlin
Professor for Microbiology and Immunology, Charité University Clinics, Berlin

A video of the complete opening ceremony can be watched in the Lindau Mediatheque.

64th Lindau Nobel Laureate Meeting Physiology & Medicine

At A Glance

37 NOBEL LAUREATES
609 YOUNG SCIENTISTS FROM 80 COUNTRIES
35 LECTURES
34 DISCUSSION SESSIONS
3 PANEL DISCUSSIONS
3 MASTER CLASSES
6 SCIENCE BREAKFASTS

Opening of the 64th Lindau Meeting: Klas Kärre, Johanna Wanka, Wolfgang Schürer, Countess Bettina Bernadotte, Ilse Aigner, Hans Rosling, Stefan Kaufmann, Ulrich Wilhelm, Adam Smith

Top row:
Johann Deisenhofer, Peter Agre, Ada Yonath, Arieh Warshel, Martin Chalfie, Thomas Steitz, Tim Hunt, Hartmut Michel, Brian P. Schmidt, Barry J. Marshall, Randy W. Schekman, Hamilton O. Smith

Bottom row:
Roger Y. Tsien, Aaron Ciechanover, Ferid Murad, Elizabeth Blackburn, Oliver Smithies, Countess Bettina Bernadotte af Wisborg, Martin J. Evans, Erwin Neher, Edmond H. Fischer, Bert Sakmann, Kurt Wüthrich, Harald zur Hausen

Missing:
Werner Arber, Françoise Barré-Sinoussi, Bruce A. Beutler, J. Michael Bishop, Steven Chu, Walter Gilbert, Jules A. Hoffmann, Robert Huber, Brian K. Kobilka, Walter Kohn, Jean-Marie Lehn, John E. Walker, Torsten N. Wiesel, Rolf M. Zinkernagel

Participating Nobel Laureates

	NATIONALITY	NOBEL PRIZE DISCIPLINE	YEAR	RATIONALE
Peter Agre	USA	Chemistry	2003	for discoveries concerning channels in cell membranes
Werner Arber	Switzerland	Physiology or Medicine	1978	for the discovery of restriction enzymes and their application to problems of molecular genetics
Françoise Barré-Sinoussi	France	Physiology or Medicine	2008	for the discovery of human immunodeficiency virus
Bruce A. Beutler	USA	Physiology or Medicine	2011	for discoveries concerning the activation of innate immunity
J. Michael Bishop	USA	Physiology or Medicine	1989	for the discovery of the cellular origin of retroviral oncogenes
Elizabeth H. Blackburn	Australia/USA	Physiology or Medicine	2009	for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase
Martin Chalfie	USA	Chemistry	2008	for the discovery and development of the green fluorescent protein, GFP
Steven Chu	USA	Physics	1997	for the development of methods to cool and trap atoms with laser light
Aaron Ciechanover	Israel	Chemistry	2004	for the discovery of ubiquitin-mediated protein degradation
Johann Deisenhofer	Germany	Chemistry	1988	for the determination of the three-dimensional structure of a photosynthetic reaction centre
Sir Martin J. Evans	United Kingdom	Physiology or Medicine	2007	for research on embryonic stem cells and the switching off of individual genetic information in mammals
Edmond H. Fischer	USA	Physiology or Medicine	1992	for discoveries concerning reversible protein phosphorylation as a biological regulatory mechanism
Walter Gilbert	USA	Chemistry	1980	for the contributions concerning the determination of base sequences in nucleic acids

Participating Nobel Laureates

	NATIONALITY	NOBEL PRIZE DISCIPLINE	YEAR	RATIONALE
Harald zur Hausen	Germany	Physiology or Medicine	2008	for the discovery of human papilloma viruses causing cervical cancer
Jules A. Hoffmann	France	Physiology or Medicine	2011	for discoveries concerning the activation of innate immunity
Robert Huber	Germany	Chemistry	1988	for the determination of the three-dimensional structure of a photosynthetic reaction centre
Tim Hunt	United Kingdom	Physiology or Medicine	2001	for the discoveries of key regulators of the cell cycle
Brian K. Kobilka	USA	Chemistry	2011	for studies of G-protein-coupled receptors
Walter Kohn	USA	Chemistry	1998	for the development of the density-functional theory
Jean-Marie Lehn	France	Chemistry	1987	for the development and use of molecules with structure-specific interactions of high selectivity
Barry J. Marshall	Australia	Physiology or Medicine	2005	for the discovery of the bacterium Helicobacter pylori and its role in gastritis and peptic ulcer diseas
Hartmut Michel	Germany	Chemistry	1988	for the determination of the three-dimensional structure of a photosynthetic reaction centre
Ferid Murad	USA	Physiology or Medicine	1998	for discoveries concerning nitric oxide as a signalling molecule in the cardiovascular system
Erwin Neher	Germany	Physiology or Medicine	1991	for discoveries concerning the function of single ion channels in cells
Bert Sakmann	Germany	Physiology or Medicine	1991	for discoveries concerning the function of single ion channels in cells
Randy W. Schekman	USA	Physiology or Medicine	2013	for the discoveries of machinery regulating vesicle traffic, a major transport system in our cells
Brian P. Schmidt	USA/Australia	Physics	2011	for the discovery of the accelerating expansion of the Universe through observations of distant supernovae
Hamilton O. Smith	USA	Physiology or Medicine	1978	for the discovery of restriction enzymes and their application to problems of molecular genetics
Oliver Smithies	United Kingdom/ USA	Physiology or Medicine	2007	for discoveries of principles for introducing specific gene modifications in mice by the use of embryonic stem cells
Thomas A. Steitz	USA	Chemistry	2009	for studies of the structure and function of the ribosome
Roger Y. Tsien	USA	Chemistry	2008	for the discovery and development of the green fluorescent protein, GFP
John E. Walker	United Kingdom	Chemistry	1997	for the elucidation of the enzymatic mechanism underlying the synthesis of adenosine triphosphate, ATP
Arieh Warshel	Israel/USA	Chemistry	2013	for the development of multiscale models for complex chemical systems
Torsten N. Wiesel	Sweden	Physiology or Medicine	1981	for discoveries concerning information processing in the visual system
Kurt Wüthrich	Switzerland	Chemistry	2002	for the development of nuclear magnetic resonance spectroscopy for determining the three-dimensional structure of biological macromolecules in solution
Ada Yonath	Israel	Chemistry	2009	for studies of the structure and function of the ribosome
Rolf M. Zinkernagel	Switzerland	Physiology or Medicine	1996	for discoveries concerning the specificity of the cell mediated immune defence

Lectures

Peter Agre: Aquaporin Water Channels – From Atomic Structure to Malaria

Werner Arber: Biological Evolution in the Context of Cosmic Evolution and of Cultural Evolution

Françoise Barré-Sinoussi: On the Road Towards an HIV Cure

Bruce Beutler: Deciphering Immunity by Making it Fail

J. Michael Bishop: Forging a Genetic Paradigm for Cancer

Elizabeth H. Blackburn: Adventures at the Ends of Chromosomes

Martin Chalfie: Tickling Worms: Surprises from Basic Research

Steven Chu: You Can See a Lot by Watching: Optical Microscopy 2.0

Aaron Ciechanover: The Revolution of Personalised Medicine: Are We Going to Cure All Diseases and at What Price?

Johann Deisenhofer: Structural Studies on Cholesterol Transport

Martin J. Evans: Inheritance from Teratocarcinomas

Edmond H. Fischer: Cell Signaling by Protein Phosphorylation

Harald zur Hausen: Infections Linked to Human Cancers: Mechanisms and Synergisms

Jules A. Hoffmann: Innate Immunity: From Flies to Humans

Robert Huber: Structural Biology and Its Translation into Practice and Business: My Experience

Brian K. Kobilka: G Protein-Coupled Receptors: Challenges for Drug Discovery

Walter Kohn: Macular Distortation – Diagnosis and Correction

Jean-Marie Lehn: Perspectives in Chemistry – Towards Adaptive Chemistry

Barry J. Marshall: Man versus Helicobacter

Hartmut Michel: Membrane Proteins: Importance, Functions, Mechanisms

Ferid Murad: Discovery of Nitric Oxide and Cyclic GMP in Cell Signaling and Their Role in Drug Development

Erwin Neher: Short-Term Synaptic Plasticity

Bert Sakmann: Cortical Circuit and Decision Making

Randy Schekman: Genes and Proteins that Control Secretion and Autophagy

Brian P. Schmidt: Cosmology: An Example of the Process of Discovery

Hamilton O. Smith: Synthetic Biology for Genetic Engineering in the 21st Century

Oliver Smithies: Where Do Ideas Come From?

Thomas Arthur Steitz: From the Structure of the Ribosome to the Design of New Antibiotics

Roger Y. Tsien: Molecules against Cancer or for Long-Term Memory Storage

John E. Walker: Generating the Fuel of Life

Arieh Warshel: Multiscale Simulations of the Functions of Biological Molecules

Torsten N. Wiesel: A Homage to David Hubel: Early Days in Our Studies of the Visual Cortex

Kurt Wüthrich: A Personal View of the History of Nuclear Magnetic Resonance in Biology and Medicine

Ada Yonath: Towards Control of Species-Specific Antibiotics Resistance

Rolf M. Zinkernagel: Why Do We Not Have a Vaccine Against HIV or Tuberculosis?

Master Classes

Approaches to Molecular Drug Discovery, chaired by Jean-Marie Lehn

Biology in the Service of Medicine, chaired by Aaron Ciechanover

Pandemic Threats, chaired by Rolf M. Zinkernagel

Lecture by Roger Y. Tsien

"I think it is a scientist's responsibility to learn how to communicate effectively with the broader public. This also has a positive effect to science itself."

Randy Schekman

Lecture by Ada Yonath

Master Class chaired by Rolf Zinkernagel

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Nobel Laureates at the 64th Lindau Nobel Laureate Meeting

Peter Agre · Werner Arber · Françoise Barré-Sinoussi · Bruce A. Beutler · J. Michael Bishop · Elizabeth H. Blackburn · Martin Chalfie · Steven Chu · Aaron Ciechanover

Johann Deisenhofer · Sir Martin J. Evans · Edmond H. Fischer · Walter Gilbert · Harald zur Hausen · Jules A. Hoffmann · Robert Huber · Tim Hunt · Brian K. Kobilka · Walter Kohn · Jean-Marie Lehn · Barry J. Marshall

Hartmut Michel · Ferid Murad · Erwin Neher · Bert Sakmann · Randy W. Schekman · Brian P. Schmidt · Hamilton O. Smith · Oliver Smithies · Thomas A. Steitz · Roger Y. Tsien · John E. Walker · Arieh Warshel

Torsten N. Wiesel · Kurt Wüthrich · Ada Yonath · Rolf M. Zinkernagel · Robert J. Aumann · Peter A. Diamond · Lars Peter Hansen · Finn E. Kydland · Eric S. Maskin · Daniel L. McFadden · Robert C. Merton · Sir James A. Mirrlees

Roger B. Myerson · Edmund S. Phelps · Edward C. Prescott · Alvin E. Roth · Reinhard Selten · William F. Sharpe · Christopher A. Sims · Vernon L. Smith · Joseph E. Stiglitz · Mario Vargas Llosa

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Nobel Laureates at the 5th Lindau Meeting on Economic Sciences

Retrospect on the 5th Lindau Meeting on Economic Sciences

In the presence of H.M. Queen Silvia of Sweden (not in the picture), Wolfgang Schürer and Peter Englund received a farewell gift by Countess Bettina Bernadotte for having chained the meeting on economics for the last time; they chaired all economics meetings since their establishment in 2004.

Just as the "Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel" has a shorter history than the Nobel Prizes, so do the Lindau Meetings on Economic Sciences in comparison with the Lindau Meetings dedicated to natural sciences. This year's meeting was the 5th since their start in 2004, and we were very happy to see 17 Economics Laureates participating, more than in any previous meeting. Together with 460 highly qualified young economists from all over the globe, the stage was set for four days of intensive dialogue.

The format of the meeting is ingeniously simple. The Laureates get half an hour each to address a topic of their own choice and a further couple of hours for informal afternoon discussions with the young economists. From what we hear from Laureates and students alike, these afternoon discussions are the highlights of the meetings; as scientific chairmen we are not allowed in, so we can only go on what the participants tell us.
The Laureates are completely free to choose their own topics. As in previous years, this resulted in a stimulating mixture ranging in style from the highly technical to the broadly accessible, and in topics from basic issues in theory and methodology to discussions that directly confronted the big policy issues of the day. Some talks were highly topical, like Eric Maskin and Joseph Stiglitz analysing trends in inequality from different angles, Peter Diamond discussing matching in labour markets and Vernon Smith talking about the recent financial crisis. Others raised fundamental, almost existential, questions such as why some markets are repugnant (Al Roth); whether collectives like nations can be treated as individuals in game theoretic analyses (Aumann); and how individual well-being ("happiness") can be measured (McFadden).
While the structure of the programme was by and large unchanged from earlier meetings, we tried a little innovation this year, inspired by our colleagues in the natural sciences. Lars Hansen and Roger Myerson held a "master class" each on the topics of macro finance and applied game theory, respectively. Here, selected students got a chance to try out their research ideas on the Laureates with other students listening to the dialogues. As a first attempt, the master classes were quite successful, and we are motivated to develop them further in future meetings.
Another way to learn from the Laureates is to listen to the story of how they developed their prize-awarded contributions. As in the 2011 meeting, there was a panel session on the intellectual history of a particular prize, this time the 2007 prize that Eric Maskin and Roger Myerson shared with the late Leonid Hurwicz for the theory of mechanism design. Now they were joined on a panel on this topic by James Mirrlees, who shared the 1997 prize with William Vickrey for his work on incentive theory, a topic that is closely related to the theory of mechanism design.
A second panel considered the challenges that the digital revolution poses for empirical work in economics. Two aspects of the digital revolution are particularly important: increased computation power and the availability of ever larger and more integrated sets of individual data. "Big data" hold large promises for widening the scope of empirical work, but it also raises new questions for economic analysis and statistical inference.
A recurring theme in the panel on big data, which drew a lively interest from the audience, was the importance of learning

Martin Hellwig (second from right) at the science breakfast discussion hosted by UBS AG

across academic disciplines. In fact, part of the new methodological development in the field seems to take place outside of economics, in computer science, or even outside academia, in firms like Google.
How useful is economics and how is economics useful? This double-edged question was the topic for a panel held on a cool and rainy Mainau Island on the final day of the meeting. Economists are often asked, and in many cases also willing, to make pronouncements on a wide range of policy issues. For some issues, well-established models backed up by empirical evidence exist that provide sound guidelines; for other issues this may not be the case. How can economists handle this balance? The Laureates stressed the importance of being explicit about the empirical support for advice given, and noted that one thing that economists can bring to the table concerning many problems is an understanding of behavioural responses and second-round effects. Several questions from the young economists dealt with resource allocation in research. Shouldn't more time and effort be directed towards solving the big questions of mankind? The Laureates on the panel pointed out that good research must be driven by curiosity and that the curiosity of a social scientist naturally tends to be attracted by socially important questions. On that note, we bid farewell to each other just as the sun was breaking through the clouds on the beautiful Mainau Island.

Peter Englund and Martin Hellwig

SCIENTIFIC CHAIRMEN OF THE 5th LINDAU MEETING ON ECONOMIC SCIENCES

Peter Englund, Department of Finance, Stockholm School of Economics, member of the Committee for the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel

Martin Hellwig, Director, Max Planck Institute for Research on Collective Goods, Bonn

Wolfgang Schürer, Chairman of the Board of the Foundation Lindau Nobel Laureate Meetings, Vice-President of the Council for the Lindau Nobel Laureate Meetings

5th Lindau Meeting on Economic Sciences

At A Glance

17 LAUREATES OF THE SVERIGES RIKSBANK PRIZE IN ECONOMIC SCIENCES IN MEMORY OF ALFRED NOBEL

MARIO VARGAS LLOSA, NOBEL PRIZE IN LITERATURE 2010

458 YOUNG ECONOMISTS FROM 86 COUNTRIES

18 LECTURES

17 DISCUSSION SESSIONS

3 PANEL DISCUSSIONS

2 MASTER CLASSES

6 SCIENCE BREAKFASTS

Opening of the 5th Lindau Meeting on Economic Sciences: Wolfgang Schürer, Martin Hellwig, Countess Bettina Bernadotte, Federal Chancellor Angela Merkel, Lars Heikensten, Peter Englund, Walter B. Kielholz

Back row:
Finn E. Kydland, Peter A. Diamond, Alvin E. Roth, Edward C. Prescott, Roger B. Myerson, Lars Peter Hansen (hidden), Christopher A. Sims (hidden), Joseph E. Stiglitz (hidden), Edmund S. Phelps (hidden), James A. Mirrlees

Front row:
Eric S. Maskin, Daniel L. McFadden, Reinhard Selten, Federal Chancellor Angela Merkel, Countess Bettina Bernadotte af Wisborg, Vernon L. Smith, William F. Sharpe, Robert Aumann

Missing:
Robert C. Merton, Mario Vargas Llosa

Participating Nobel Laureates

	NATIONALITY	YEAR	RATIONALE
Robert J. Aumann	Isreal	2005	for having enhanced our understanding of conflict and cooperation through game-theory analysis
Peter A. Diamond	USA	2010	for the analysis of markets with search frictions
Lars Peter Hansen	USA	2013	for the empirical analysis of asset prices
Fynn E. Kydland	Norway	2004	for the contributions to dynamic macroeconomics: the time consistency of economic policy and the driving forces behind business cycles
Eric S. Maskin	USA	2007	for having laid the foundations of mechanism design theory
Daniel L. McFadden	USA	2000	for the development of theory and methods for analyzing discrete choice
Robert C. Merton	USA	1997	for a new method to determine the value of derivatives
Sir James A. Mirrlees	United Kingdom	1996	for the fundamental contributions to the economic theory of incentives under asymmetric information
Roger B. Myerson	USA	2007	for having laid the foundations of mechanism design theory
Edmund S. Phelps	USA	2006	for the analysis of intertemporal tradeoffs in macroeconomic policy
Edward C. Prescott	USA	2004	for the contributions to dynamic macroeconomics: the time consistency of economic policy and the driving forces behind business cycles
Alvin E. Roth	USA	2012	for the theory of stable allocations and the practice of market design
Reinhard Selten	Germany	1994	for the pioneering analysis of equilibria in the theory of non-cooperative games
William F. Sharpe	USA	1990	for the pioneering work in the theory of financial economics
Christopher A. Sims	USA	2011	for the empirical research on cause and effect in the macroeconomy
Vernon L. Smith	USA	2002	for having established laboratory experiments as a tool in empirical economic analysis, especially in the study of alternative market mechanisms
Joseph E. Stiglitz	USA	2001	for the analyses of markets with asymmetric information
Mario Vargas Llosa	Peru/Spain	2010	for the cartography of structures of power and the trenchant images of the individual's resistance, revolt, and defeat

Lectures

Robert J. Aumann: Collectives as Individuals

Peter A. Diamond: Unemployment

Lars Peter Hansen: Uncertainty and Valuation

Finn E. Kydland: Economic Policy and the Growth of Nations

Eric S. Maskin: Why Haven't Global Markets Reduced Inequality in Developing Economies?

Daniel L. McFadden: The New Science of Pleasure

Robert C. Merton: Measuring the Connectedness of the Financial System: Implications for Systemic Risk Measurement and Management

James A. Mirrlees: Some Interesting Taxes and Subsidies

Roger B. Myerson: Moral-Hazard Credit Cycles with Risk-Averse Agents

Edmund S. Phelps: Bringing Dynamism, Homegrown Innovation and Human Flourishing into Economics

Edward C. Prescott: The Revolution in Aggregate Economics

Alvin E. Roth: Repugnant Markets and Prohibited Transactions

Reinhard Selten: How Does One Learn by Experience?

William F. Sharpe: Economic Analysis of Retirement Income Strategies

Christopher A. Sims: Inflation, Fear of Inflation, and Public Debt

Vernon L. Smith: Rethinking Market Experiments in the Shadow of Recessions: The Good and the Sometimes Ugly; Propositions on Recessions

Joseph E. Stiglitz: Inequality, Wealth, and Growth: Why Capitalism is Failing

Mario Vargas Llosa: Confessions of a Latin American Liberal

Master Classes

Game Theory and Mathematical Economics, chaired by Roger B. Myerson

Macro Finance, chaired by Lars Peter Hansen

Lecture by William F. Sharpe

Lecture by Finn E. Kydland

"I am truly proud to say that the Oesterreichische Nationalbank supports this unique forum for informal debate and knowledge transfer, which provides great inspiration to aspiring young scientists and seasoned economists alike."

Ewald Nowotny, Governor Oesterreichische Nationalbank

Master Class chaired by Roger B. Myerson

Discussion session chaired by Peter A. Diamond

Academic Partners

Nikolaus Turner, Member of the Board of the Council and the Foundation, addresses academic partners of the 64th Lindau Nobel Laureate Meeting.

The Lindau Nobel Laureate Meetings interact closely with some of the most renowned research institutions worldwide to identify highly-talented young scientists and to nominate them for participation in the meetings. These academic partners include leading universities, academies of science, research institutions, foundations, innovative enterprises, and central banks.

The Lindau Nobel Laureate Meetings continue to build on the cooperation, support and assistance of more than 200 academic partners worldwide, representing more than 70 countries so far. These institutions organise the first stage of the selection process for young scientists. Promising young scientists can submit their applications to the academic partners. Based on the specified selection criteria of the Lindau Council, the partners then carry out a preliminary evaluation which is forwarded to the review panel of the council.

The international network of academic partners is continuously expanding. By means of memoranda of understanding, both sides commit themselves to connect and promote young scientists and thus disseminate Lindau's "Mission Education" worldwide. The participants of the 64th Lindau Nobel Laureate Meeting were nominated by 141 partner institutions from 54 countries, while the young economists attending the 5th Lindau Meeting on Economic Sciences were nominated by 139 partners from 52 countries.

64th Lindau Nobel Laureate Meeting

Academia Nacional de Ciencias del Uruguay
Academy of Finland
Academy of Sciences Malaysia (ASM)
Academy of Sciences of Cuba
Academy of Sciences of the Czech Republic
acatech – National Academy of Science and Engineering
Accademia Europea Bolzano
Alexander S. Onassis Public Benefit Foundation
Alexander von Humboldt Foundation
Australian Academy of Science
Austrian Academy of Sciences
Bangladesh Academy of Sciences
Bavarian Academy of Sciences and Humanities
Bavarian State Ministry of Education, Science and the Arts, Elite Network of Bavaria
Boehringer Ingelheim GmbH
Brazilian Academy of Sciences
Canadian Student Health Research Forum (CSHRF)
CERN European Organization for Nuclear Research
Charité Universitätsmedizin Berlin
Chilean Academy of Science
CNRS – National Center for Scientific Research, France
Croucher Foundation
Department of Science and Technology (Government of India)
Department of Science and Technology South Africa
Deutsche Forschungsgemeinschaft (DFG)
Deutsche Telekom Stiftung
Eberhard Karls Universität Tübingen
Else Kröner-Fresenius-Stiftung (EKFS)
Embassy of Timor-Leste, Brussels
Ernst-Moritz-Arndt University of Greifswald
Estonian Academy of Sciences
European Commission
European Molecular Biology Laboratory (EMBL)
European Molecular Biology Organization (EMBO)
European Research Council
European Science Foundation (ESF)
European Students' Conference of the Charité Berlin
Fondazione Cariplo
Foundation for Polish Science
Fraunhofer-Gesellschaft
Friedrich-Alexander Universität Erlangen-Nürnberg
Friedrich-Schiller-Universität Jena
Gerhard C. Starck Stiftung
German Academic Exchange Service
German Environmental Foundation
German National Academy of Sciences Leopoldina
Global Young Academy (GYA)
Goethe University Frankfurt am Main
Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (GGNB)
Government of Romania
Heinrich-Heine-Universität Düsseldorf
Helmholtz Association
Human Frontier Science Program Organization
Hungarian Academy of Sciences
International University of Lake Constance
Irish Research Council
Jacobs University Bremen
Japan Society for the Promotion of Science
Johannes Gutenberg University Mainz
Jordan University of Science and Technology/JUST
Justus Liebig University Gießen
King Abdullah University of Science and Technology, Saudi Arabia
King Saud University, Ministry of Higher Education, Saudi Arabia
Klaus Tschira Stiftung gGmbH
Körber Foundation
Leibniz Association
Leipzig University
LMU Munich
Lomonosov Moscow State University
Mars, Incorporated
Martin Luther University Halle-Wittenberg
Max Planck Institute for Biophysical Chemistry
Max Planck Society
McKinsey & Company, Inc.
Medizinische Hochschule Hannover

64th Lindau Nobel Laureate Meeting

Mexican Academy of Sciences

Microsoft Corporation

Ministry of State for Higher Education and Scientific Research, Egypt

Ministry of Tertiary Education, Science, Research and Technology of the Republic of Mauritius

National Academy of Sciences of the Republic of Armenia

National Fund for Scientific Research, Belgium

National Research Foundation (NRF), Singapore

National Research Fund Luxembourg

National Science and Technology Development Agency, Thailand

National Science Council Taiwan

Natural Sciences and Engineering Research Council of Canada

Oak Ridge Associated Universities, USA

Organization of Islamic Cooperation (OIC), Ministerial Standing Committee on Scientific and Technological Cooperation (COMSTECH)

Otto von Guericke University Magdeburg

Pakistan Institute of Engineering and Applied Sciences

Philipps University Marburg

Robert Bosch Stiftung GmbH

Royal Netherlands Academy of Arts and Sciences

Ruhr-Universitaet Bochum

Ruprecht-Karls-Universität Heidelberg

RWE AG

RWTH Aachen University

Saarland University

Saint Petersburg State University, Russia

Siemens AG

Sino-German Center for Research Promotion, China

Slovenian Academy of Sciences and Arts

Spanish National Research Council (CSIC)

Suedwestmetall – The Baden-Wuerttemberg Employers' Association of the Metal and Electrical Industry

Swiss Reinsurance Company Ltd

Technische Universität Darmstadt

Technische Universität Dresden

Technische Universität München

The Association of German Engineers

The Danish Council for Independent Research

The Korean Academy of Science and Technology

The Lithuanian Academy of Sciences

The Mongolian Academy of Sciences

The Nobel Foundation

The OPEC Fund for International Development (OFID)

The Royal Society

The Scientific and Technological Research Council of Turkey (TÜBİTAK)

The Weizmann Institute of Science

TU Dortmund University

TWAS, The World Academy of Sciences – for the advancement of science in developing countries

Ulm University

University Medical Center Hamburg-Eppendorf

University of Bonn

University of Cologne

University of Duisburg-Essen

University of Freiburg

University of Göttingen

University of Kassel

University of Konstanz

University of Latvia

University of Liechtenstein

University of Malta

University of Potsdam

University of Regensburg

University of Rostock

University of Würzburg

Volkswagen Foundation

Volkswagen Group

Westphalian Wilhelms University of Münster

Wilhelm Sander-Stiftung

Witten/Herdecke University

5th Lindau Meeting on Economic Sciences

Aalto University

Aarhus University

Academy of Finland

Academy of Sciences Malaysia (ASM)

Alexander von Humboldt Foundation

American University of Beirut, Lebanon

Australian Academy of Science

Banco de la República, Colombia

Banco de México

Bangko Sentral ng Pilipinas

Bangladesh Academy of Sciences

Bank Indonesia

Bank Negara Malaysia

Bank of Canada

Bank of England

Bank of Estonia

Bank of Finland

Bank of Italy

Bank of Japan

Bank of Korea

Bank of Spain

Bank of Thailand

Banque centrale du Luxembourg

Bavarian State Ministry of Education, Science and the Arts, Elite Network of Bavaria

Bogazici University

Bulgarian Macroeconomics Association

Bulgarian National Bank

Central Bank of Chile

Central Bank of Ireland

Central Bank of Kenya

Central Bank of the Republic of Austria

Central Bank of the Republic of Turkey

Centre for European Economic Research

CNRS – National Center for Scientific Research, France

Cologne Institute of Economic Research

Cornell University, USA

Czech National Bank

De Nederlandsche Bank

Deutsche Bundesbank

Eberhard Karls Universität Tübingen

ECARES, Université libre de Bruxelles

EnBW Energie Baden-Württemberg AG

Estonian Academy of Sciences

ETH Zurich

European Bank for Reconstruction and Development

European Commission

European University Institute

Federal Reserve System, USA

Fondazione Cariplo

Forman Christian College, Pakistan

Foundation for Polish Science

Fraunhofer Center for Central and Eastern Europe

Freie Universität Berlin

Friedrich-Schiller-Universität Jena

Gerhard C. Starck Stiftung

German Academic Exchange Service

German Institute for Economic Research

Goethe University Frankfurt am Main

Hamburg Institute of International Economics

Harvard University

Heinrich-Heine-Universität Düsseldorf

Indian Council of Social Science Research

International Monetary Fund

International University of Lake Constance

Irish Research Council

Jacobs University Bremen

Japan Society for the Promotion of Science

Justus Liebig University Gießen

Karlsruhe Institute of Technology (KIT)

KfW Group

Koc University

Laureate Education, Inc.

Leibniz Association

LMU Munich

Maastricht University

Max Planck Institute for Research on Collective Goods

Max Planck Institute for Tax Law and Public Finance

5th Lindau Meeting on Economic Sciences

Max Planck Society

McKinsey & Company, Inc.

Ministry of Tertiary Education, Science, Research and Technology of the Republic of Mauritius

Monetary Authority of Singapore

National Bank of Belgium

National Bank of Denmark

National Bank of Poland

National Bank of Slovakia

National Bank of Tajikistan

National Bank of the Republic of Belarus

National Research Foundation, Singapore

National Research Fund Luxembourg

National Science Council Taiwan

Norges Bank

Norwegian School of Economics

Oak Ridge Associated Universities, USA

Otto von Guericke University Magdeburg

Pakistan Institute of Engineering and Applied Sciences

Paris School of Economics

Reserve Bank of New Zealand

Robert Bosch Stiftung GmbH

Royal Netherlands Academy of Arts and Sciences

Saint Petersburg State University, Russia

Saudi Arabian Monetary Agency

Sino-German Center for Research Promotion, China

Social Sciences and Humanities Research Council of Canada

South African Reserve Bank

South Asia Institute - Heidelberg University

Stockholm School of Economics

Sveriges Riksbank

Swiss National Bank

Swiss Reinsurance Company Ltd

Technische Universität Berlin

Technische Universität München

The Central Bank of Hungary

The Central Bank of Iceland

The Lithuanian Academy of Sciences

The OPEC Fund for International Development (OFID)

The Scientific and Technological Research Council of Turkey (TÜBİTAK)

The University of Warwick

UBS International Center of Economics in Society

Ulm University

University College London

University of Augsburg

University of Bremen

University of Cambridge

University of Cologne

University of Copenhagen, Denmark

University of Duisburg-Essen

University of Göttingen

University of Kassel

University of Konstanz

University of Liechtenstein

University of Oxford

University of St. Gallen (HSG)

University of Wuppertal

Uppsala University, Sweden

Volkswagen Group

Walter Eucken Institute

Westphalian Wilhelms University of Münster

Witten/Herdecke University

Zeppelin University

Memorandum of understanding with the Korean Academy of Science and Technology: Tae Hyun Kim, Director General, Kyu-Tek Park, Executive Vice-President, Burkhard Fricke, Nikolaus Turner

"The Lindau Meetings in recent years have become more meaningful especially because of the large numbers of students from all over the world. It might be beneficial to conceive plenary sessions with junior scientists, who could serve as role models for their peers."

Torsten Wiesel, Nobel Laureate in Physiology or Medicine 1981

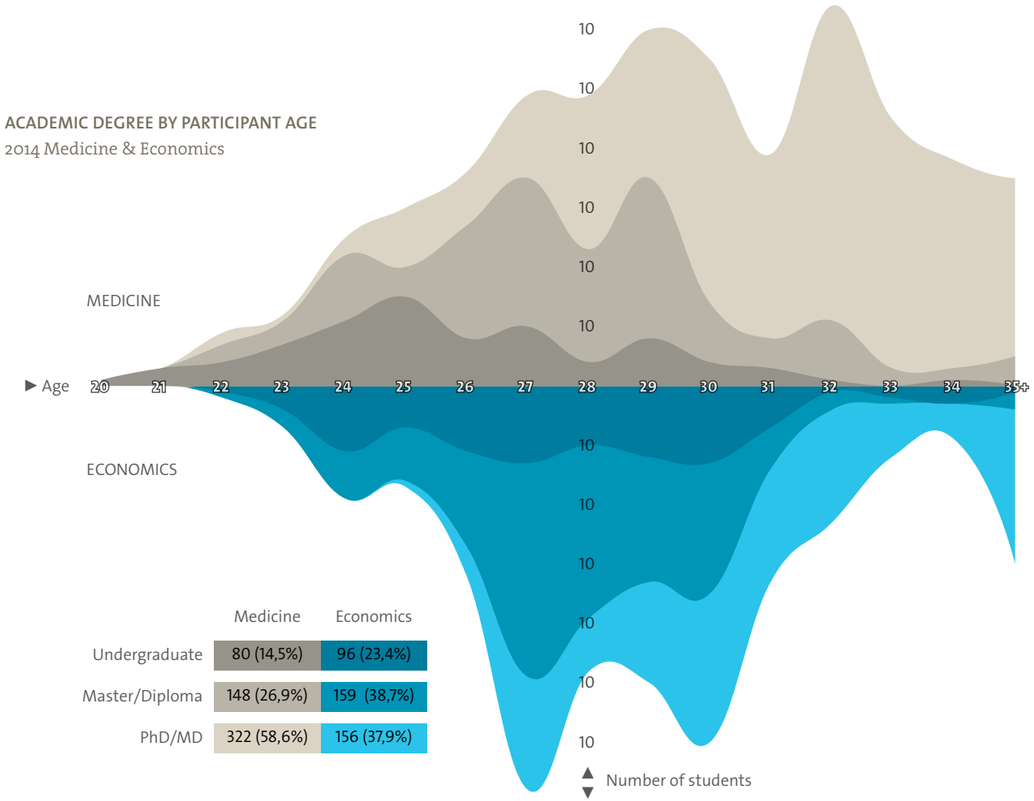
Burkhard Fricke, Vice-President of the Council, Nadine Gärber, Head of Young Scientist Support and Academic Partner Relations, and Michael Ickowitz, Group Manager, International Science Education Programs, Oak Ridge Associated Universities, USA

José Franco, then President of the Mexican Academy of Sciences, Suzanne Cory, Immediate Past President of the Australian Academy of Science, and Asma Ismail, Vice-President of the Academy of Sciences of Malaysia

Young Scientists at Lindau – A Glance at the Figures

609 participants from 80 countries at the 64th Lindau Meeting, and 458 from 86 countries at the 5th Lindau Meeting on Economic Sciences – a profound analysis of the participant and evaluation data has unearthened some interesting figures.

ACADEMIC DEGREE BY PARTICIPANT AGE
2014 Medicine & Economics

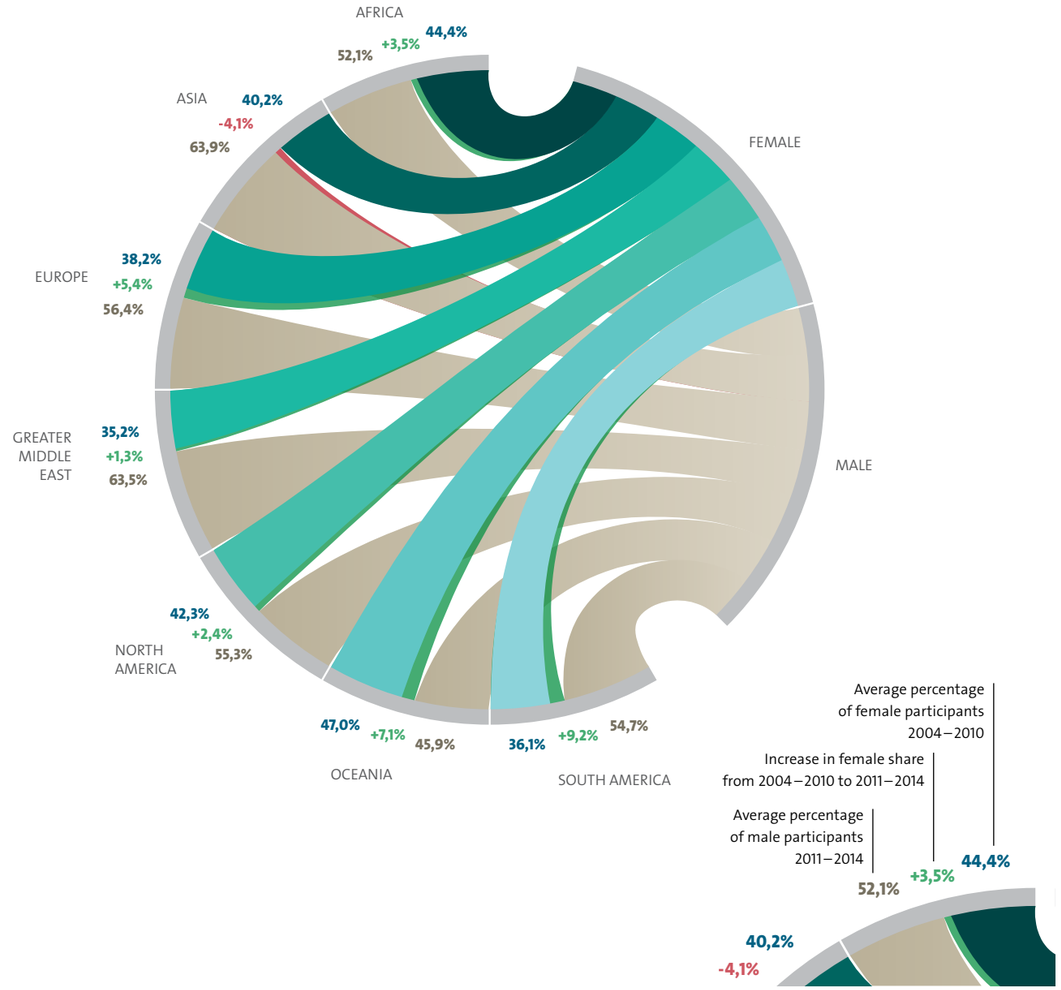


	Medicine	Economics
Undergraduate	80 (14,5%)	96 (23,4%)
Master/Diploma	148 (26,9%)	159 (38,7%)
PhD/MD	322 (58,6%)	156 (37,9%)

What academic degree do the participants have? How old are they? The stacked values of this stream graph show how many participants of which age hold a certain degree. For example: At the 64th Lindau Meeting (Medicine), 4 students aged 28 were still undergraduates, 19 held a masters degree, while 23 had a PhD/MD..

The total set of data in this chart supports for example the conclusion that there are more PhDs/MDs in the scientific discipline of medicine than in economics, but that economics students obviously tend to obtain these degrees earlier in their academic career.

GENDER RATIO OF PARTICIPANTS BY CONTINENT
Comparison of 2004–2010 to 2011–2014

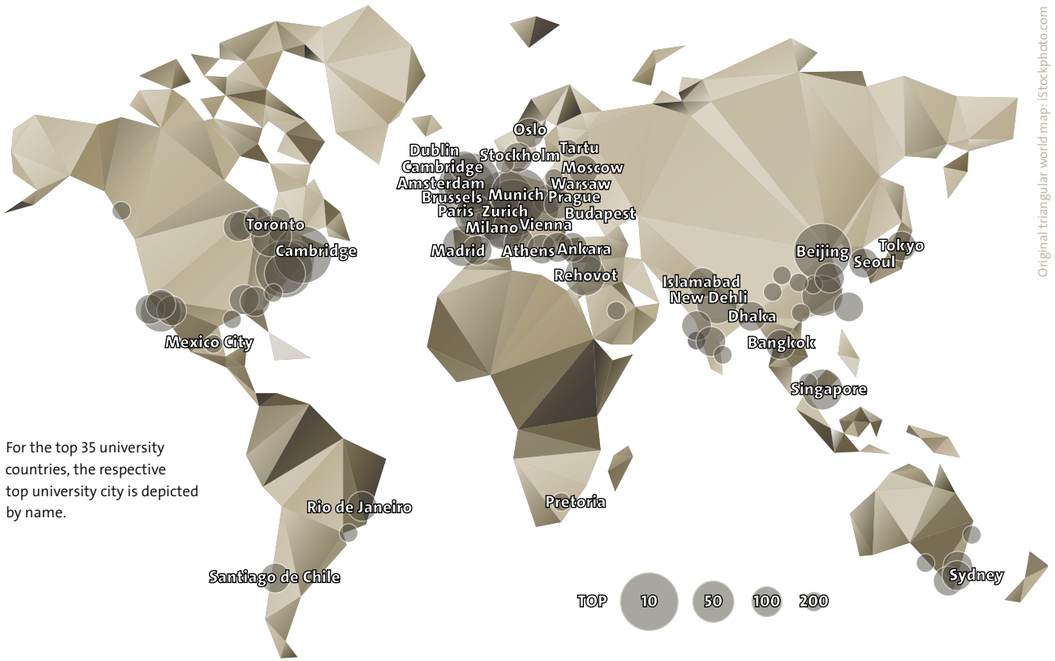


For this chord diagram, data from the meeting years 2004–2010 and 2011–2014 were compared. The chart illustrates the gender ratio of the participants, grouped by the continents of the institutions that nominated them for participation. Please refer to the adjoinig key for explications.

As was to be expected, the female share has increased in all continents – except for Asia, where the female share has decreased by 4,1 %. Notable is that Oceania has the highest female share with 54,1 %; equally interesting is that South America has experienced the highest increase in the female share with 9,2 %.

TOP 200 UNIVERSITY CITIES OF LINDAU PARTICIPANTS

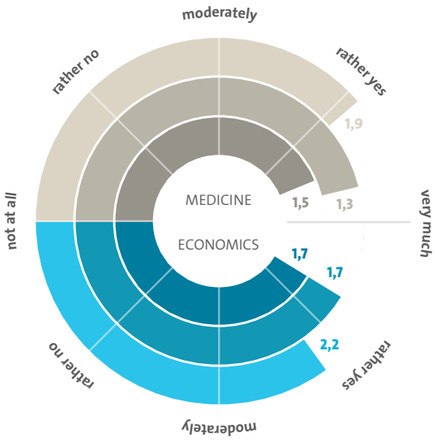
2004–2014



Original triangular world map: iStockphoto.com

For the top 35 university countries, the respective top university city is depicted by name.

Where do most of the Lindau participants study – which are the top university cities? The above bubble graph reveals the scientific hubs on the US East and West Coast, in Central Europe, and in Asia. There are significantly fewer university cities of Africa and South America depicted, but the number of Lindau participants studying on these continents is constantly rising. For more details, please refer to our extended analysis posted in the Lindau Blog: **blog.lindau-nobel.org.**



LINDAU'S IMPACT

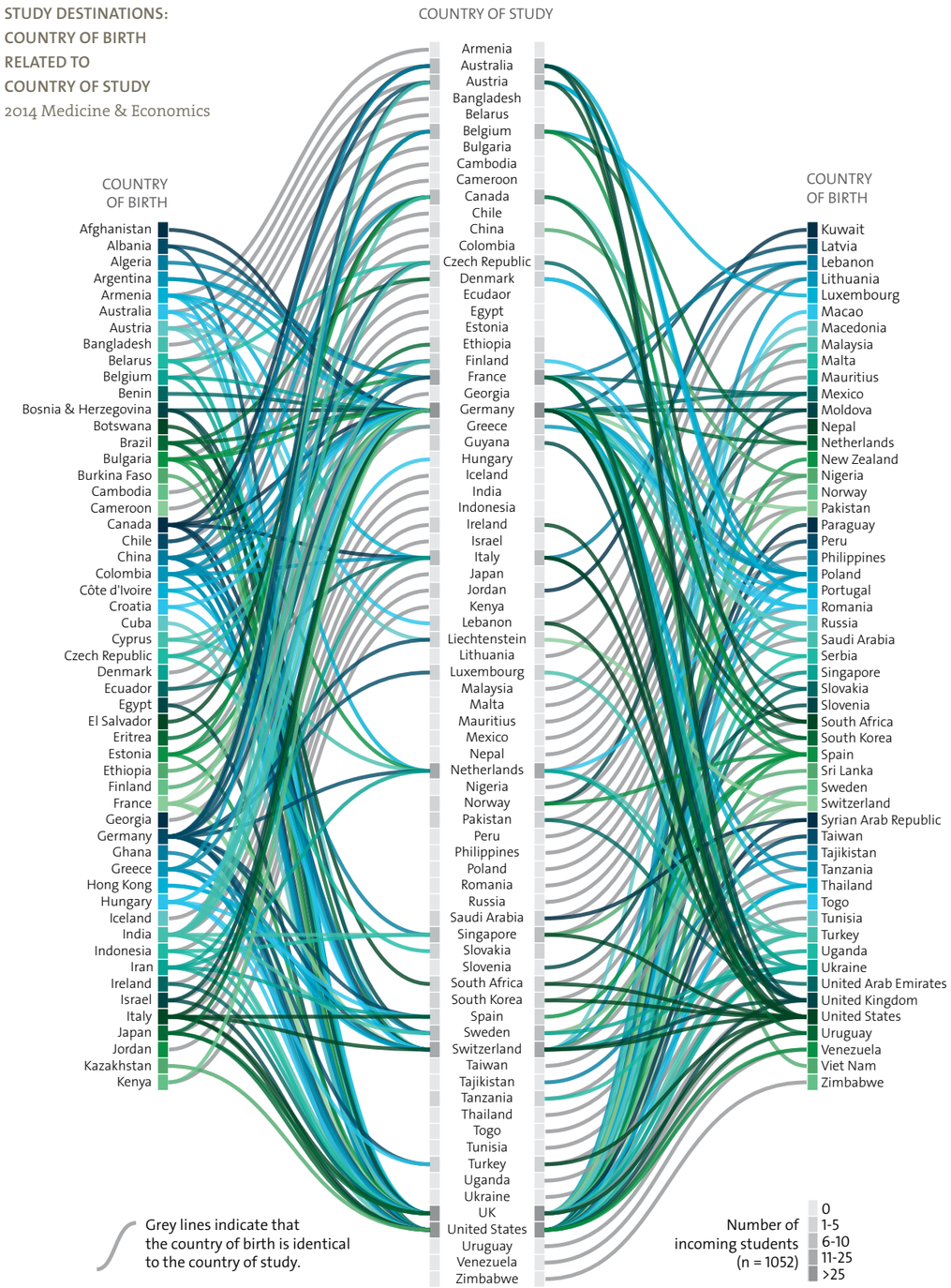
2014 Medicine & Economics

The questions below were raised in the 2014 participant surveys. The participants had five answer options on a scale from 1 (very much) to 5 (not at all).
All answers were affirmative, thus underlining Lindau's lasting impact.

Outer Circle: Will the Lindau Meetings positively influence your career?
Middle Circle: Do the Lindau Meetings motivate you?
Inner Circle: Do you consider yourself as an Lindau alumni?

STUDY DESTINATIONS: COUNTRY OF BIRTH RELATED TO COUNTRY OF STUDY

2014 Medicine & Economics



This diagram relates the Lindau participants' country of birth to their country of study. It shows, for example, that the US and UK are among the most popular study destinations (more than 25 incoming students) for the Lindau participants.

Also interesting: There are countries from which Lindau participants originate but where none of the Lindau participants study (e.g. Afghanistan), and then there are countries whose entire Lindau "delegation" studies at home (grey line only).

“Scientific Exchange on Highest Level.”

Neue Zürcher Zeitung, Switzerland

The Immunology Summit

The 64th Lindau Nobel Laureate Meeting brought together some of the pioneers of immunology and has thus provided the ideal platform for a vital exchange of expertise in this crucial discipline.

Bruce A. Beutler, Jules A. Hoffmann, J. Michael Bishop, Stefan H.E. Kaufmann, Brian P. Schmidt

Flies that are infected with bacteria or fungi produce anti-bacterial peptides called diptericins. In principal, this single sentence describes the scientific work of Jules Hoffmann, Nobel Laureate in Physiology or Medicine 2011.

Hoffmann, born in Luxembourg and professor at the University of Strasbourg, found the recognition sequence of the transcription factor "NF-kappaB" in the diptericin genes. This factor is responsible for the correct transcription of the target genes. It constitutes the final stage in two distinct signal transduction pathways that start with the detection of different trespassing microbes: first, the so-called "Toll pathway", which is activated by a protein with the droll name "Spätzle" (Spätzle is a noodle speciality from Southern Germany), and second, the "Imd pathway", which reacts to components in the bacterial cell wall.

The discovery that flies possess effective mechanisms to fight various infections is without doubt quite remarkable. However, for laypeople the question might arise if it was appropriate to award a Nobel Prize for these findings; for if one takes Alfred Nobel's last will literally – that the prize should go to the researchers "who, during the preceding year, shall have conferred the greatest benefit on mankind" – the benefit of these findings for human medicine is not obvious at first sight. Yet this was indeed more than appropriate, because Hoffmann had actually detected the mechanisms of our innate immune system. He was able to show that what happens in flies closely resembles the immune response of the human body. Shortly afterwards, Bruce Beutler was able to prove that mice (and men) possess similar mechanisms.

Considering the complexity of the entire human immune system, the factors and pathways mentioned above are only the proverbial tip of the immune iceberg. Why are certain vaccines more effective in some patients than in others? Can allergies or autoimmune diseases be predicted? Most cancers are prevented by our own bodies without the patient ever realising it – so how does the body's immune system fight tumour cells?
Bruce Beutler, co-laureate of Hoffmann in 2011, tackles questions like these by systematic screening approaches. He explains: "We neither know the total number nor the names of all genes responsible for an immune response. And if we do know the gene, we can only partially deduce its function."

In his lecture at the 64th Lindau Nobel Laureate Meeting, Beutler presented recent findings from his laboratory: results from a novel analysis platform where mice are genotyped and their phenotypical differences studied. "If we have a mouse with a phenotypical characteristic that differs from other mice, we can usually tell within one hour which gene is mutated and thus might be responsible for this difference."

Based on his earlier findings, Beutler assumes that 200 to 400 further genes might be identified which are directly related to the immune system. The immunologist from Texas isn't the only researcher trying to understand the immune system by systematic analysis. Stefan Kaufmann, founding director of the Berlin Max Planck Institute for Infection Biology, and scientific chairman of the 64th Lindau Meeting, stresses the importance of these approaches: "In the next years, we have to start understanding the immune system in the context of systems biology", he explains, referring to the molecular and functional diversity

Jules A. Hoffmann

of immune cells, and to their complicated interactions with endogenous or exogenous cells and substances, like for instance the intestinal microbiome.

Kaufmann is convinced that this knowledge will lead to novel therapies against infections, and will help us better understand allergies and autoimmune diseases. Furthermore, the body's own defence mechanisms against cancer will be better understood and further utilised.

Emil von Behring had been awarded the very first Nobel Prize in Physiology or Medicine in 1901 for the development of serum therapies against diphtheria and tetanus. Paul Ehrlich and Robert Koch received the prize for their contributions to immunology, just like Peter Doherty and Rolf Zinkernagel did in 1996. The latter gave a lecture at Lindau on the topic "Why do we not have a Vaccine Against HIV or Tuberculosis?" while the former unfortunately had to cancel his participation in Lindau on short notice. This list of famous immunologists is completed by Jules Hoffmann, Bruce Beutler and the late Ralph Steinman, who shared the Nobel Prize in 2011. If eminent authorities are to be believed, these will not have been the last Nobel Prizes on immunological topics.

Tobias Maier

Cross-Country Differences in Perceptions of Inequality

Perceived rather than actual inequality is what drives a nation to support redistributive measures, according to research by meeting participant Judith Niehues.

Eric Maskin; his lecture was entitled:
“Why Haven’t Global Markets Reduced Inequality in Developing Economies?”

Whereas Americans are not very concerned about the large income inequalities in their country, Germans view considerably smaller differences much more critically. My research group’s newly developed indicator of perceived inequality – the “subjective Gini coefficient” – can explain up to two-thirds of such cross-country differences in concerns about inequality and willingness to support policies to do something about it.

For example, more than half of all Germans strongly agree that differences in income are too large, according to the module on Social Inequality of the 2009 International Social Survey Programme. This helps to explain why debates about social justice and redistribution are recurring topics on the political agenda in Germany, reflected in the current introduction of redistributive policies such as a minimum wage and additional pension benefits for mothers.

The French worry even more about their inequalities: 69 per cent of the population regard income differences as far too large and, correspondingly, the country has one of the highest minimum wages in Europe and has discussed some sharp increases in income taxes recently. In Switzerland, in contrast, people are generally not so concerned about income differences: accordingly, initiatives to restrict managerial salaries or increase the minimum wage have failed.

But it is striking to note that these three countries have one thing in common: they share more or less exactly the same degree of measured income inequality. On the other hand, in the United States – which is characterised by far higher income inequality – people do not see any reason for redistributive state intervention.

The missing link between inequality and its assessment is not specific to this set of countries. In a larger sample of 24 countries, there is virtually no empirical relationship between the actual size of inequality within a country and how concerned people are about income differences. Of course, there are a number of other individual and national factors that may explain cross-country differences in critical views on income differences and related redistributive preferences. For example, formerly socialist countries may view already small income differences much more critically, while Americans may just accept certain inequalities.

But my fellow researchers at the Cologne Institute for Economic Research and I argue that it is not the actual but the perceived size of inequality within a country that matters for the formation of redistributive preferences. By summarising subjective views on the type of society into a new measure of ”perceived inequality”, we reveal that misperceived inequality can explain a large fraction of the missing link between actual inequality and critical views on income differences.

In most countries, the population exaggerates the degree of inequality. This is particularly true for formerly socialist countries such as Hungary, Slovenia and the Czech and Slovak Republics. In Hungary, the ”subjective Gini coefficient” exceeds the regular Gini coefficient of income inequality by almost 80 per cent. Thus, the population is just not aware of their small level of inequality.

There is a misperception in the same direction in Germany and France, but less so in Switzerland, where the people are significantly more realistic about their inequality levels. Scandinavians are also comparatively aware of their small levels of inequality. But the United States reveals a completely different picture: Americans substantially underestimate the extent of inequality in their country. This rosy view of inequality is not new – but it is new to find that in European countries it is rather the other way round.

Our results provide an explanation of why redistributive policies are more successful in some countries than in others – and why we regularly observe debates on social justice in European countries and not in the United States.

Judith Niehues

Academia and Pharmaceutical Industry – Strange Bedfellows?

Sooner or later, we all rely on the results of clinical trials. Susanne Dambeck ponders on the panel discussion "Academia and Industry" held the 64th Lindau Meeting.

If we're middle-aged, we might take blood pressure medicines, if we ever get seriously ill, we definitely need therapies that have been thoroughly tested. But until a few years ago, only the outcomes of about half of all clinical studies have been published – usually the positive outcomes that make a target substance look really good. As Peter C. Gøtzsche, Director of The Nordic Cochrane Centre, put it during a panel discussion at the 2014 Lindau Meeting, "Doctors cannot practice evidence-based medicine today unless we get access to all data from all trials that have been conducted."

From the start, the discussion "Academia and Industry – Exploring the Collaborative Landscapes of the Future" focused on drug research. The participants reflected this focus, ranging from medical researchers and industry managers to critical voices like Gøtzsche. The discussion soon centred on the controversial topic of data publication. Should all data, negative and positive, be published? Maybe this topic arose because everybody present could identify with the need for academic publications, or because everyone will be affected by this sooner or later in their health care decisions. But certainly because in recent years there has been a veritable movement putting pressure on industry and regulators to publish all data – NGOs like the Cochrane Collaboration as well as numerous individual academics are the main campaigners. And they have made huge headway in the last years: more and more "big pharma" companies have agreed to publish all their data, despite "screaming and kicking", as Kemal Malik, Member of the Board of Management of Bayer AG, Innovations, admitted during the discussion.

The European Medicines Agency EMA has announced it would publish all future data that was submitted for drug approval. But the catch is in the details: Who will be allowed to receive the data? And who will decide this? Can some results be blackened out? If yes, by whom? And to what extent? This debate is still in full swing. EMA had planned to announce practicalities by last July, but they postponed their decision to October 2014.

If collaborations between academics and the pharmaceutical industry seem to be so difficult and fraught with tension – this tension was even palpable between some panelists – why pursue them in the first place? The answer is very simple: Both sides need each other desperately.

Academics need external funding urgently, and many pharma companies don't have research and development departments anymore, they only do "search and development", as Malik pointed out: they search for possible drug targets at universities, institutes and small companies. So whenever these very different partners start a project – what should they be mindful of? Bruce Beutler, 2011 Nobel Laureate, talked about "trust" and personal chemistry. Michel Goldman, Executive Director of the Innovative Medicines Initiative IMI, and Malik pointed out that the priorities for both parties should be made clear from the start, including all contracts and questions like who gets the intellectual property, or IP – including publication rights.

Fortunately, a lot is changing in this field. Kemal Malik talked about open innovation platforms where academics receive industry funding but retain all IP, Goldman explained about pre-competitive research projects in industry: fierce competitors on the market collaborate in an early stage to tackle intractable diseases like Alzheimer's. Yes, academia and industry are very different and often have different goals – academics want papers published, industry formerly withheld data. But not only scientific research is moving forward, novel collaborative models like the ones mentioned, and many more, develop as well.

Susanne Dambeck

Adam Smith, Kemal Malik, Peter C. Gøtzsche, Renata Gomes, Bruce Beutler, Stan Wang, Michel Goldman at the panel discussion "Academia and Industry – Exploring the Collaborative Landscapes of the Future"

Panel Discussions at the 64th Lindau Nobel Laureate Meeting

"ACADEMIA AND INDUSTRY – EXPLORING THE COLLABORATIVE LANDSCAPES OF THE FUTURE"

Panellists
- Bruce A. Beutler, Nobel Laureate in Physiology or Medicine 2011, Center for the Genetics of Host Defense, UT Southwestern Medical Center at Dallas
- Michel Goldman, Executive Director of the Innovative Medicines Initiative
- Peter C. Gøtzsche, Director of the Nordic Cochrane Center
- Renata Mota Gomes, University of Oxford, Cardiovascular Regeneration & Vascular Disease
- Kemal Malik, Member of the Board of Management of Bayer AG, Innovations
- Stan Wang, University of Cambridge, Department of Surgery & Gurdon Institute

Moderator
Adam Smith, Chief Scientific Officer, Nobel Media AB

"LARGE DATA AND HYPOTHESIS-DRIVEN SCIENCE IN THE ERA OF POST-GENOMIC BIOLOGY"

Panellists
- Bruce A. Beutler, Nobel Laureate in Physiology or Medicine 2011, Center for the Genetics of Host Defense, UT Southwestern Medical Center at Dallas
- J. Michael Bishop, Nobel Laureate in Physiology or Medicine 1989, The G.W. Hooper Research Foundation, University of California
- Jules A. Hoffmann, Nobel Laureate in Physiology or Medicine 2011, Molecular and Cellular Biology Institute, Université de Strasbourg
- Brian P. Schmidt, Nobel Laureate in Physics 2011, The Research School of Astronomy and Astrophysics, The Australian National University

Moderator
Stefan H.E. Kaufmann, Scientific Chairman, Director, Max Planck Institute for Infection Biology, Berlin

"SCIENCE FOR THE BENEFIT OF MANKIND"

Panellists
- Françoise Barré-Sinoussi, Nobel Laureate in Physiology or Medicine 2008, Département de Virologie, Institut Pasteur, France
- Ghada Bassioni, Associate Professor and Head of the Chemistry Department, Ain Shams University, Cairo, Egypt, Lindau 2012 alumna
- Charles Mgone, Executive Director, European and Developing Countries Clinical, Trials Partnership (EDCTP)
- Brian P. Schmidt, Nobel Laureate in Physics 2011, The Research School of Astronomy and Astrophysics, The Australian National University
- Georg Schütte, State Secretary, German Federal Ministry of Education and Research

Moderator
Geoffrey Carr, Science Editor, The Economist

Bruce Beutler, J. Michael Bishop, Stefan Kaufmann, Brian Schmidt, and Jules Hoffmann at the panel discussion on large data

Panel Discussions at the 5th Lindau Meeting on Economic Sciences

"STRATEGIC BEHAVIOR, INCENTIVES, AND MECHANISM DESIGN"

Panellists
- Eric S. Maskin, Nobel Laureate 2007, Department of Economics, Harvard University
- James A. Mirrlees, Nobel Laureate 1996, The Chinese University of Hong Kong
- Roger B. Myerson, Nobel Laureate 2007, Department of Economics, University of Chicago

Moderator
Martin Hellwig, Scientific Chairman, Director, Max Planck Institute for Research on Collective Goods

"THE FUTURE OF ECONOMETRICS: STRUCTURAL RESTRICTIONS, PARAMETRIC METHODS AND BIG DATA"

Panellists
- Lars Peter Hansen, Nobel Laureate 2013, Becker Friedman Institute for Research in Economics, The University of Chicago
- Daniel L. McFadden, Nobel Laureate 2000, The G.W. Hooper Research Foundation, University of California
- Christopher A. Sims, Nobel Laureate 2011, Department of Economics, Princeton University

Moderator
Peter Englund, Scientific Chairman, Department of Finance, Stockholm School of Economics

"HOW USEFUL IS ECONOMICS – HOW IS ECONOMICS USEFUL?"

Panellists
- Peter A. Diamond, Nobel Laureate 2010, Department of Economics, Massachusetts Institute of Technology
- Robert C. Merton, Nobel Laureate 1997, Sloan School of Management, Massachusetts Institute of Technology
- Alvin E. Roth, Nobel Laureate 2012, Department of Economics, Stanford University

Moderator
Torsten Persson, Institute for International Economic Studies, Stockholm University

Questions from the audience at the panel discussion "How Useful is Economics – How is Economics Useful?"

Torsten Persson, Peter Diamond, Alvin Roth, and Robert Merton

Strategic Behaviour, Incentives, and Mechanism Design

Scientific Chairman Martin Hellwig on an insightful panel discussion that took place at the 5th Lindau Meeting on Economic Sciences.

Panel Discussion "Strategic Behaviour, Incentives, and Mechanism Design": Martin Hellwig, moderator of this panel discussion, with Roger Myerson, Eric Maskin and Sir James Mirrlees (from left to right)

The panel on "Strategic Behaviour, Incentives, and Mechanism Design" at the 5th Lindau Meeting on Economic Sciences explored the ideas behind the 1996 and 2007 prizes, which had been awarded to Sir James Mirrlees and the late William Vickrey for their work on "the economic theory of incentives under asymmetric information" and to the late Leonid Hurwicz, Eric Maskin and Roger Myerson "for having laid the foundations of mechanism design theory". Sir James Mirrlees, Eric Maskin and Roger Myerson explained the main ideas behind their research and behind that of Vickrey and Hurwicz.

Though very theoretical, the research of Sir James Mirrlees and William Vickrey was driven by applied questions such as how to design an income tax schedule for the purpose of redistribution if the abilities of income earners are not known or how to sell a valuable object if the willingness to pay of potential buyers is not known. Sir James Mirrlees explained the difficulties involved in even thinking about such problems. He also discussed the implications of different theoretical formulations for redistributive tax policy, especially for dealing with people at the bottom of the income distribution.

Leonid Hurwicz's work was motivated by the claim that market systems are ideal for coordinating economic activities when people's tastes and abilities are known only to themselves. To make this claim amenable to serious analysis, Hurwicz introduced the notion of an abstract "incentive mechanism" as a system where the different participants submit messages, and "the mechanism" translates these messages into outcomes, for example a specification of consumption and productive activities for each participant. The question is under what conditions people have appropriate incentives to send messages conveying their information so that this information is properly used. For the market system as an incentive mechanism, Hurwicz found that people usually want to distort the information they transmit, so the outcomes in fact are not ideal.

Building on Hurwicz's concept of a mechanism, Eric Maskin and Roger Myerson studied what can be achieved by policy makers who have certain normative ideas of what economic outcomes should be, but do not have the information about the participants' tastes and abilities that is needed to implement these ideas. On the panel, they showed how they built on the work of Hurwicz and Vickrey and explained the conditions under which a given social choice function indicating how desired outcomes vary with the underlying "state of the world" can at all be implemented by "some" mechanism, Eric Maskin for settings in which the participants know each other's information, Roger Myerson for settings in which participants only have probabilistic knowledge about each other.

"Impossibility" results figured prominently in the presentations, mathematical results showing that, no matter how a mechanism might be designed, certain outcomes that might seem desirable cannot be implemented because they would require agents to divulge information against their own interests. Thus, the use of taxation for redistribution is limited by the need to maintain some incentives for work. Or the efficiency of trading arrangements is limited by people's ability to dissemble their preferences to achieve a better price. Failures to achieve desirable outcomes often reflect such fundamental impossibilities, rather than a lack of imagination or competence.

The panellists' presentations were followed by a lively discussion, with questions ranging from the highly theoretical topics of the panellists' presentations to very applied issues such as the use of incentive theory for banking regulation.

Martin Hellwig

On Man and Microbes

Upon his first participation in a Lindau Meeting, Barry J. Marshall gave an intriguing account of his ground-breaking research on Helicobacter pylori – Hanno Charisius draws the picture of a scientist by passion.

In the summer of 1984, the Australian scientist Neil Noakes took some bacteria from a petri dish, mixed them with lukewarm beef extract – the normal nutrient solution for bacteria in the lab – and filled a little more than one cup into a beaker. Then he handed this mix to his colleague, the gastroenterologist Barry Marshall, who downed it without complaining. Three days later, Marshall felt nauseated, and his mother told him he had bad breath. Next he started vomiting. But he still waited a few days before taking the antibiotics that were supposed to kill the bacteria in his stomach. A gastroscopy not only clarified his diagnosis, but ultimately resulted in his winning the Nobel Prize in Physiology or Medicine about twenty years later.

With his famous self-experiment, Marshall was able to demonstrate that Helicobacter pylori bacteria can cause acute gastritis which in turn may cause ulcers. He had asked neither an ethics commission nor his wife for permission to conduct this experiment. His colleagues thought him completely insane to take a risk like that.

Back in the 1980s, the prevailing theory was that gastric ulcers were mostly a psychosomatic affliction caused by too much stress. Accordingly, patients were treated with tranquillisers, anti-depressants, psychotherapy or antacids. Young doctor Marshall though treated them all with antibiotics, and his results were impressive. From his clinical practice, he developed the theory that the spiral-shaped Helicobacter bacterium causes gastritis, painful stomach ulcers and even stomach cancer. Because he had had no suitable test animals at hand, he used his own body for the described experiment. From this moment on, the only good Helicobacter was a dead one. Loads of antibiotics were used to combat this germ. Some experts even wanted to eradicate Helicobacter as a precautionary measure. And Marshall received the Nobel Prize in 2005, together with his former co-worker Robin Warren. In the meantime, even Marshall has become more sympathetic when he talks about the germ that made him famous – almost as if it were an old friend. During his lecture at the 64th Lindau Nobel Laureate Meeting, he pointed out that this single-cell organism might even help to fight some diseases.

Indeed, H. pylori is one of humanity's old friends and companions: the germ has been with us for at least 50,000 years, and probably longer. Roughly 50 percent of all humans carry it around in their stomachs. Interestingly, the percentage of infected people has been decreasing since the 1950s, with richer countries having much lower rates than the rest of the world. In the U.S., less than 25 percent of adults and only about 5 percent of all school children are infected. Marshall states that better hygiene and clean drinking water are responsible for the bacteria's eviction.

Doctors claim that Helicobacter is responsible for three out of four stomach ulcers, two thirds of all gastric tumours and practically all duodenal tumours; the duodenum is the part of the small intestine that comes directly after the stomach. So its extermination should be a good thing – shouldn't it? But at the same time as the germ was retreating, other health problems occurred. Since the 1950s, the number of patients with allergies, asthma or autoimmune diseases has sky-rocketed. Children without Helicobacter in their stomachs are more likely to suffer from skin allergies or hay fever. The bacteria also seem to provide a certain protection against coeliac disease, also known as wheat gluten intolerance. The bacteria might even manipulate our appetite: the New York based doctor Martin Blaser assumes a connection between its eradication and the growing obesity problem worldwide.

Blaser was in fact one of the first scientists who noticed that the germ is not only causing harm. He first thought about its positive aspects when he saw data on patients with stomach ulcers, who seldom suffered from heart burn or esophageal cancer. On the other hand, people without Helicobacter in their system don't develop many ulcers, but are much more likely to have heart burn and reflux problems, sometimes even resulting in cancer.

Nowadays, even Barry Marshall sees the germ's two faces – the dangerous and the helpful. Many studies suggest that H. pylori is an important training partner for our immune system: it seems to be able to contain the immune response. If the bacteria are missing, our immune system overreacts when confronted with pollen, wheat gluten or peanuts. Marshall thinks that this connection was a vital mechanism during human history: when groups of Homo sapiens left Africa in prehistoric times, these bacteria prevented them from developing severe allergies against all new plants they encountered on their long journey. If they had stayed in Africa and only eaten plants and animals from their immediate vicinity, no slow down switch for the immune system would have been necessary. "One theory says that only with the help of these bacteria, we humans were able to adapt to a varied diet," Marshall explains.

So now, instead of fighting his favourite germs, Marshall focuses on studying the effects of reinfections of humans. But not with a gulp from some meat extract, as he did in the past. There are many different H. pylori strains that vary greatly in aggressiveness. Only the more harmless should be used for experiments like that, says Marshall, who already secured patents in this area of interest.

Although Marshall talks in a more friendly way about his former opponent now, in one situation he remains uncompromising: "If the bacterium causes trouble, it has to go." As long as it makes no problems, it may stay. But there are very effective antibiotics to get rid of it. Besides Helicobacter pylori, more than 1,000 other types of bacteria live on and in the human body, resulting in a total number of about 100 trillion bacteria. So there should be no lack in substitute training partners for our immune system.

Hanno Charisius

Barry J. Marshall as portrayed by photographer Peter Badge for the series "NOBELS"

Rethinking Economics: A Classical Perspective

“Who are we to blame for the great recession?” is one of the questions Vernon L. Smith discusses in his essay for the book “Economics for the Curious” that tackles the big issues in the age of austerity. This excerpt encourages further reading.

Economic research has traditionally relied on observations of real economies, with research revolving around a nominal “homo oeconomicus” capable of rational decision-making and motivated by self-interest, leaving no room for laboratory-style experiments.

The 2002 Nobel Prize in Economics, however, was shared by two men who took a more academic approach to the subject. Daniel Kahneman integrated economic science with psychological research into human judgment and decision-making. Vernon Smith developed a variety of experimental methods, demonstrating the importance of alternative market institutions, and instigated “wind-tunnel” tests of new market designs in the lab before putting them into practice. His work has established experiments as a vital tool in empirical economic analysis. As a result of their efforts, there is now a growing body of research devoted to modifying and testing economic assumptions, using data collected in the lab and psychological analysis. […]

The Great Recession has a simple explanation: with abandon people widely violated the basic rules of what Adam Smith would have called “propriety” in his first and much neglected book, The Theory of Moral Sentiments (1759). The rule violations were stated crisply in Shakespeare’s maxim in Hamlet:

“Neither a borrower nor a lender be;
For loan oft loses both itself and friend,
And borrowing dulls the edge of husbandry.”

Similarly, the sentiment from Adam Smith’s second book (An Inquiry into the Nature and Causes of the Wealth of Nations, 1776): “being the managers rather of other people’s money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which […] (they) […] frequently watch over their own.”

Shakespeare expresses a truth with a poet’s flare for hyperbole, while Adam Smith is acidly commenting on a “bubble”. And indeed in the USA the Great Recession was launched on the heels of the collapse of the massive housing-mortgage market bubble that began in 1997; by 2001 the median price of a home had already achieved its previous all-time (inflation adjusted) high established in 1989. Instead of moderating, prices continued their ascent, halting abruptly in 2006, and then collapsing. Excessive credit financing of new home expenditures had driven house prices far above any semblance of equilibrium relative to all other prices and income.

As I write toward the end of 2012, we still await solid signs of a housing recovery; stay tuned. We finish our fifth year since the recent economic downturn that began at the end of 2007. For a sobering perspective, I want to note that the Great Depression began c.1929; so, measured in Depression time, we are near the end of 1934 when output grew by 7.7 percent.

In monitoring the state of our economy with unusual interest since 2007, I have learned a great deal. So, surely, have all the recognised policy and economic experts in these matters: if your views and understanding are not changing, you almost certainly are not learning. This is why it could be said that: “The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design” (Friedrich August von Hayek, The Fatal Conceit, 1988).*

*I knew little of Hayek’s work until after finding that contemporary equilibrium economics was incapable of dealing with what I was learning from laboratory market experiments in the 1950s and 1960s, and I was launched on a broader search for better understanding. Similarly, I began studying Adam Smith (1759) after realizing that the two-person experimental game results we were getting in the 1980s could not be comprehended within the framework of game theory, but this last story is much beyond the scope of what I will write here. I will say only that I felt it necessary to re-examine and rethink first principles. Most of my colleagues in experimental economics were, I think, automatons in changing only the utility function – supplementing “own” with “other” payoffs in a routine fix that allowed all findings to be superficially reconciled with theory. Results that had not been predicted were rescued ex post by refitting the model with the utility function that would have made it predictive.

Vernon L. Smith

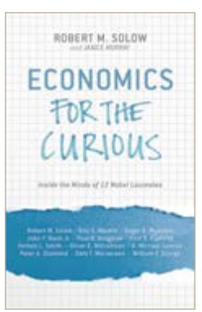
“The fundamental goal of economics as a discipline is to bring organised reason and systematic observation to bear on both large and small economic problems (and to have some intellectual fun on the way).”

Robert M. Solow, Nobel Laureate in Economic Sciences 1987, editor of “Economics for the Curious”

Candace Smith, Vernon L. Smith and Joseph E. Stiglitz

“ECONOMICS FOR THE CURIOUS”

This book, published in 2014 by Palgrave Macmillan, is an accessible and informative display of the kinds of questions economics can illuminate. It will appeal to anyone who has an interest in economics and the world around them. Written in the plainest possible language, 12 Nobel Laureates in Economic Sciences confront some of the key issues challenging society today. The range of topics include how economic tools can be used to rebuild nations in the aftermath of a war; financing retirement as longevity increases; the sustainable use of natural resources; and what governments should really be doing to boost the economy.



What a Ball of Wool Can Tell You About Healthy Ageing

Seeking for objective measures that indicate how healthy you are – Christine Gorman on a lively panel discussion with Elizabeth Blackburn at a Science Breakfast supported by Mars, Incorporated.

Doctors can perform plenty of tests to tell you how sick you are. There are certain agreed-on measurements of blood pressure, glucose levels or biomarkers to define illness. But what are the objective measures that indicate how healthy a person is? For that matter, what sort of test can you do to reliably indicate that someone is a healthy 60-year old, 70-year old or 90-year old – other than listing all the diseases that they don’t have?

This seemingly philosophical question – how do you define healthy ageing? – became something of a running theme at the 64th Lindau Nobel Laureate Meeting, and especially at a science breakfast sponsored by Mars, Incorporated.

“When we think of biomarkers, a lot of us trained as we are, we think of molecules like cholesterol,” said Elizabeth Blackburn, who shared the Nobel Prize with two other researchers in 2009, “for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase.” In the years since then, a growing amount of research has linked the shortening of telomeres to the ageing process—as either a cause or an effect.

But biomarkers include the term “bio”, Blackburn pointed out, which covers more than just molecules. Many clinicians use “grip strength”, for example to test how frail an older person is. “That’s a biomarker; it’s measurable,” she said. But of course, it is used more often to identify frailty (illness) rather than strength (health).

Telomere length is one possible, quantifiable marker for defining healthy age. But although Blackburn didn’t say this in so many words, researchers still need to know a lot more before doctors can start performing telomere tests on their patients.

Among the scientific obstacles that investigators need to consider is the fact that luck plays a not-insignificant role in how long anyone lives. Okay, she didn’t actually use the word “luck.” What she actually said was that any reasonable definition of ageing would have to include “a stochastic notion of the process.” But basically, that’s equivalent to saying you have to account for the fact that some events in life are random.

To illustrate the point, Blackburn asked the group to consider a particular species of worm that scientists use to study ageing in the laboratory.

“If you take a group of C. elegans, all genotypically identical, allow them to grow and then ask ‘When do they die?’, they don’t all die on Tuesday three weeks from today.” Some die earlier, some die later. But they don’t all drop dead at the same moment—and yet no one currently can reliably predict which of these genetically identical worms raised in identical environments will perish first.

Another knotty problem: you cannot simply extrapolate the timing of key molecular events from the life of the laboratory animals that typically are used to study aging—the worm (C. elegans), fruit fly, yeast mother cell and mouse. You also have to account for the passage of time; for the fact that people can live eight or nine decades or more.

Blackburn then surprised everyone by tossing a skein of black yarn into the audience that had been proportionately tagged to show the longest lifespan of C. elegans, fruit flies, yeast mother cells and mice. Amidst lots of laughter as participants continued to throw the unraveling ball of wool around the room, the nature of the problem became abundantly clear.

This article originates from Scientific American’s blog “Observations” by courtesy of Christine Gorman.

THE LONG GOODBYE

At the 64th Lindau Nobel Laureate Meeting a new series of films was produced by Nature Video with the support of Mars, Incorporated: “A Picture of Health” consists of four films. Nature Reporter Lorna Stewart travelled to the meeting in quest of answers to some of the most profound questions in medicine. Discussing with Nobel Laureates and aspiring young scientists, Lorna gets to grips with the realities of an ageing global population, she delves into the past 40 years of cancer research, she wonders if we’ll ever eliminate side effects when we take medication, and she receives a reality check on the battle against HIV.

Growing old is inevitable and across the world average life expectancy is increasing. With the prevalence of age-related diseases following suit and a limited pot of resources, where should scientists be targeting research? In the film “The Long Goodbye”, super-star statistician Hans Rosling sets the record straight about the cause of the world’s ageing population and Nobel laureate Oliver Smithies, now 89, gives his opinion on medical research priorities. But when reporter Lorna Stewart talks to young researchers, they disagree with their role models on where scientists should be focusing their efforts.

Along with the past series from the Nature Video Lindau Collection – produced since 2008 – the new films can be watched in the Lindau Mediatheque.

Hans Rosling using coffee cups to explain the ageing world population in “The Long Goodbye”

A ball of wool played a major role at the Science Breakfast “Adressing the Challenges of Ageing Research through Cross-Disciplinary Collaboration”, presented by Mars, Incorporated (p. 80). In the picture: Adam Smith, Claudine Gauthier, Elizabeth Blackburn, Hagen Schroeter.

The HIV Adversary

Françoise Barré-Sinoussi, the co-discoverer of HIV, was interviewed by young scientist Iria Gomez-Touriño about the latest strategies to combat the virus. Their “Q&A” session was published in the Nature Outlook “Medical Research Masterclass”.

Iria Gomez-Touriño: HIV was discovered more than 30 years ago. How far have we come since then?

Françoise Barré-Sinoussi: The main achievement after the discovery of HIV was the diagnostic test, which meant that we could prevent transmission of the virus by blood and blood derivatives. The next big steps were the prevention of mother-to-child transmission using the antiretroviral treatment AZT in 1994 and the advent of potent combinations of antiretroviral therapies in 1996. These are both good examples of what we call translational science, whereby basic knowledge is used to develop tests and treatments for the benefit of patients.

IGT: It is estimated that for every HIV-infected person starting therapy two individuals are newly infected. What are we doing wrong?

FBS: People are still really scared about being tested for HIV, even if they know that there is a treatment for it. In my experience, people worry that others could think they are drug users or sex workers and are afraid about being rejected by society. Unfortunately, this stigma still exists not only in resource-limited countries but also in countries such as France.

IGT: Does the solution lie in better education or further research into treatments?

FBS: Education is part of prevention, care and treatment. We can’t say prevention is more important than treatment or vice versa. If we do not treat the 35 million people who are already infected, the epidemic will continue. The treatment itself is also prevention, as we can reduce the transmission to others. We should also campaign for the use of existing preventative tools, such as the condom, but also for the development of new ones. Earlier this year there were some encouraging preliminary results based on a single injection of long-lasting antiretrovirals, monthly. This kind of technology could certainly be a breakthrough.

IGT: To what extent is religion the cause of more people becoming infected?

FBS: Religion is one of many factors, but it is an important one. When Pope Benedict XVI claimed [in 2005] that condoms are not the solution for HIV, this had a really bad impact on African Catholic countries and this is really a shame. We also have some countries drawing up homophobic legislation under the influence of religious dogma, but such measures will not reduce HIV infection. However, I have been in many places where local religious leaders are doing a remarkable job informing people about the risks and encouraging them to protect themselves.

IGT: What is the most promising route towards a cure for HIV infection?

FBS: In my opinion, remission, which means that the virus is still present in a patient’s body but controlled so it does not replicate, is more likely to be achievable than a complete eradication. We already have examples in which very early treatment after the infection has led to such remissions. The VISCONTI patients [a group of 14 patients in France who were all given antiretroviral drugs soon after becoming infected] maintained a tight control of HIV replication several years after treatment was stopped. Also, the ‘Mississippi baby’ [an infant treated immediately after she was born with HIV] was able to maintain virological control of her infection for more than two years after the medication was stopped. Sadly, in this case the infection rebounded recently. We need to develop better tools to detect and measure the persistent virus.

IGT: Why is a vaccine for HIV proving so elusive?

FBS: There are lots of reasons. One is that the development of broadly neutralizing antibodies is very slow. Being highly variable, the virus can escape easily from the control of the immune system and the infection is very rapid, resulting in abnormal alteration of the immune defence. Vaccines are efficient and very often you still have very low levels of replication, which is good because it re-stimulates the immune system. In the case of the HIV antigen, re-stimulation can also be bad because trace amounts of antigens that are harmful to the immune system will prevent the vaccine from working. We have a list of antigens that can be harmful, but we don’t know which antigens initiate the abnormal signalling in immune cells.

A real breakthrough was the use of an SIV [simian immunodeficiency virus – the nonhuman primate equivalent of HIV] vaccine candidate using cytomegalovirus (CMV) as a vector. This CMV-based SIV vaccine is able to induce very efficient immune responses and to clear SIV infection in macaques. Recent results also show that a cocktail of broadly neutralizing antibodies in mice and macaques can efficiently suppress HIV plasma viraemia and reduce proviral DNA.

IGT: In 2012 the International AIDS Society published seven priorities for HIV research. What has been the impact of this strategy?

FBS: We decided to launch the Towards an HIV Cure initiative to stimulate and coordinate international efforts, and also to advocate for more research in the area. Several consortiums in the United States have been established to develop a cure for HIV, with experts coming from fields such as immunology, genetics, virology and also the private sector. Our knowledge of HIV persistence under antiretroviral treatment has progressed in past years. Strategies being investigated include reactivating the latent virus to flush it out of the cells and then to kill the virus with immune agents or a vaccine. Gene therapy to make cells resistant to HIV infection is also being explored.

IGT: For the first time, this year’s Lindau meeting boasts more female young researchers than male. How can more women be encouraged to take scientific posts?

FBS: When I first started work in the 1970s at the Institut Pasteur in Paris, France, there were no more than five female professors; today, the same institution has close to 50 % female professors,

which is wonderful. One way forward is to better recognise the work of women, although I think that this is already progressing. Another issue is children. I made the choice not to have children because I thought it was too difficult at that time to have a career and a family – although it might not be the best solution and many other women scientists do choose to have a family. Certainly we can better organise research institutions to offer childcare, for instance. While we all can agree that equity is a good thing, women shouldn’t be selected just because they are women.

Nature, Vol. 514, No. 7522 (16 October 2014), S8-S9

The Nature Outlook was produced with support of Mars, Incorporated.

“If we do not treat the 35 million people who are already infected, the epidemic will continue.”

Françoise Barré-Sinoussi

Women to Women: Science and Family

What measures need to be taken to improve the compatibility of family and career for female scientists? Kathleen Raven echoes the panel discussion “Women in Science: Fixing the Leaking Pipeline”.

Kirsty Renfree Short is not surprised. She shrugged her shoulders at the fact that female young researchers outnumber their male counterparts at the 64th Lindau Nobel Laureate Meeting, marking a first-time event in the storied meetings’ history. “Women outnumber men in grad school, so why not?” the University of Queensland, Australia, postdoctoral student said. Short, along with five other female young scientists, stood round a tiny table before the start of the science breakfast on 30 June hosted by Australia. “What I want to know is why there are so many female researchers at the graduate-school level, but not high up in leadership?” asked Tracy Norman, a doctoral candidate at the Georgia Institute of Technology, USA.

I myself then followed up the statement with a question about family. Did the women plan to have children? Three raised their hand in the affirmative. The other three? Undecided.

In her opening remarks at the science breakfast panel discussion, co-moderator Suzanne Cory, immediate past president of the Australian Academy of Science, recalled the scarcity of female speakers at the earliest scientific conferences she attended. “I expected everything to be totally transformed by now, and it’s not,” she said. The panellists nodded their heads in agreement. The three female panellists – Emma Johnston, director, Sydney Harbour Research Program, Sydney Institute of Marine Science, Elizabeth Blackburn, Nobel Laureate in Physiology or Medicine 2009, University of California, San Francisco, and Suzanne Cory – chose science as their career path at a time when even the thought of such pursuits seemed preposterous to most. A common theme soon emerged from their stories. From the start, each female scientist adopted the attitude “I’ll show them!”.

Blackburn recalled a school teacher’s reaction to her career goals. “Why would a nice girl like you want to go into science?” she said, repeating the teacher’s words. In this situation Blackburn pursed her lips, but then doubled down with even more determination. Johnston described the deep scepticism she faced after declaring her passion for science. “You should study law instead,” her critics said. With these stories on their minds, the panellists then turned to possible solutions to fixing this leaky pipeline.

Avoid the drop-off in interest

Girls and boys seem equally engaged in biological and other sciences until about year 6 of schooling, panellist Brian Schmidt, Nobel Laureate in Physics 2011 observed. Blackburn and Cory, having both attended the same all-girls high school in Australia, agreed with the observation. This drop-off could be partly explained by social pressures young women face – consciously or unconsciously – in the junior and high school years. “Women may get intimidated about how to go on with their interests,” Blackburn said. The solution could be to ensure that science clubs and activities especially for women remain well-funded and supported through years 6-12, Schmidt said. At every stage in academics, women need confidence, Cory agreed. To the mostly female audience, Cory said: “You are at a crucial age now. Don’t drop off.”

The impact factor of family

One of the hazards of modern science and academia is the intense focus on tracking, Schmidt said. Citations, papers, symposiums or patents can all be considered part of the formula. But this formula overlooks the fact that a single great paper can have up to three times the impact of an average paper, Schmidt said. “We need to single out really great papers and provide those researchers with resources,” he said. After all, those who worry about the impact factor are “bottom feeders”, Blackburn said, to laughter from the audience. She went on to emphasise that women need to look at raising children – if they choose to do so – as a temporary impact on an overall scientific career that may span 40 or more years. “It’s only 18 or so years of your life,” Blackburn said, as chuckles erupted again. But a family and a successful career are not exclusive of the other, all women agreed. “Putting off children until much later is not biologically the smartest thing,” Blackburn said. Raising children requires “first and foremost a partner who is willing to make sacrifices as well”, the panellists said.
When co-moderator Adam Spencer – a self-described celebrity mathematician – asked if female scientists should consider taking an extended break of two or three years, the answer was a resounding “No”. “Science is really a fast-moving world,” Cory said. “If you get out, even for three years, it becomes very difficult to get back in. And you lose self-confidence, connections with your peers and knowledge.” The women agreed that the key to the early child-rearing years is to be well-organised with a laser-like focus. Blackburn gave up dinners out and socialising. “My life was research and family,” she said.

Take a chance on women

Toward the end of the talk, Cory gave the analogy of the young boy who dives into the deep end of the pool without thinking

Adam Spencer, Elizabeth Blackburn, Suzanne Cory, Emma Johnston, Brian Schmidt

and just learns to swim. The young girl, by contrast, stays in the shallow end until she is certain that she will stay afloat, then moves deeper. To the women scientists, Cory said: “You’ve got to jump into the deep end.” Schmidt disagreed a little. “I would say that there are cases when the person who jumps into the deep end needs to be rescued,” he said, to audience laughter.
He encouraged mentoring of both genders and better awareness of the situation. Structural changes need to occur in academia and industry, he said. One of these could be extending the tenure clock for female researchers who choose to start a family early in their career, Schmidt said. Another option is to create childcare programmes akin to what Princeton University offers, Blackburn said. When parents at that institution suddenly have a sick child who cannot attend day-care, the university provides a fully vetted babysitter immediately. Above all, the panellists agreed, women must step forward at every turn in their careers and say, “I am the person for this job. Choose me.”

Kathleen Raven

» All hosts, presenters and panellists of the Australian science breakfast are listed on page 90. Information on all the other science breakfast sessions is provided on p. 80.

Bavarian Evening at the 64th Lindau Nobel Laureate Meeting, presented by the Elite Network of Bavaria and the Free State of Bavaria

"Science today is global. There is no local science."

Dan Shechtman, Nobel Laureate in Chemistry 2011

Understanding Better How People Make Choices

The way our brains work is key to understanding how consumers really make choices, Nobel Laureate Daniel McFadden argued at Lindau.

“Challenges for the next generation? How to cope with the well-known fact that people do not think and act entirely rationally or entirely in their own best interest.”

Sir James A. Mirrlees

Some consumers suffer from a fear of markets, in a sense of “agoraphobia”, according to new research presented by Nobel Laureate Daniel McFadden that throws doubt on the classical idea that people are driven by relentless and consistent pursuit of self-interest to maximise their well-being.

Professor McFadden entitled his respective paper “The New Science of Pleasure”, to purposefully play on a phrase coined by Anglo-Irish political economist Francis Edgeworth some 130 years ago.

Daniel McFadden and Callum Williams, The Economist. All films are available in the official YouTube channel of the Lindau Nobel Laureate Meetings.

McFadden told the audience of young economists and fellow laureates at the 5th Lindau Meeting on Economic Sciences in August 2014 that new studies of consumer behaviour which drew on psychology, sociology, biology and neurology gave economists a deeper understanding of how consumers make choices.

Rational analysis says that we should relish choice and the opportunities offered by markets. “Yet we are in fact challenged by choice and we use all kinds of ways such as procrastination to avoid having to make choices. One of the reasons is that there are risks associated with making choices,” he said.

Market agoraphobia

McFadden highlighted an experiment he carried out some time ago at his university where half of the students were given a chit saying they were entitled to a pencil, and half were not. The two groups could trade as buyers and sellers. While traditional economic theory says the market should clear with half the pencils sold at close to a median value, in fact less than a fifth of the pencils were actually traded. “One answer is that people have agoraphobia – they don’t like markets, and that influences resource allocation,” McFadden stated.

He said that there was evidence that people were far more rational when decisions were immediate and had major implications compared with choices that were remote or minor. “That’s when things fall apart.” He argued that sociology, psychology and brain science had thrown new light on this issue. Social networks are important because they are sources of information, and social approval or disapproval is very important in guiding people’s choices. “You get market equilibriums that are markedly different across different social networks so there is no unique equilibrium,” according to McFadden. Cognitive psychologists such as fellow laureate Daniel Kahneman have done decades of research into this area and highlighted patterns of behaviour that influence how we make decisions.

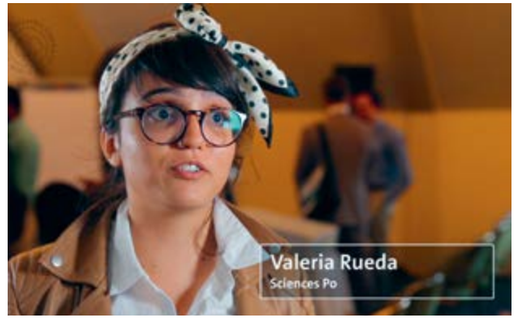
Happiness of pursuit

Brain science – or what economists call neuro-economics – is perhaps the liveliest area. In particular it has identified reward structures and neurotransmitters in the brain, and the impact of choice problems on the brain in the presence of experimental treatments. McFadden: “The hedonic treadmill we are on can be characterised as not the pursuit of happiness, but the happiness of pursuit. That’s what people really care about.”

Interestingly, pleasure and pain are in different circuitries in the brain while decisions involving gains or losses take place in separate parts of the brain. Hence, the net result is that there is a physiological basis for the cognitive anomalies such as loss aversion, the endowment effect and hyperbolic discounting that psychologists have identified.

The classical economic theory of choice is therefore far too simple as it does not capture what goes on in people’s brains when they make choices. “It is also much too static to capture the sensitivity and dynamics of the process,” Daniel McFadden concluded. However, he said that welfare economics based on neurological measures of utility and brain functioning was on the rise. “But we are not there yet. Wait for it. But even better: get involved in the types of research and the bridge between economics and other disciplines, and play a role in making this come true.”

Phil Thornton



HOW USEFUL IS ECONOMICS?
WHAT MAKES A GOOD ECONOMIST?

These questions – central to the 5th Lindau Meeting on Economics Sciences – initiated a series of videos produced by Econ Films, that received much attention on YouTube. Laureates and young economists alike presented their views on the future development of their scientific discipline – a discussion that will certainly have an impact beyond this year’s Lindau Meeting.

Innovation and Human Flourishing

Nobel economist Edmund Phelps is concerned that a loss of dynamism threatens our prosperity.

One of the themes of the 5th Lindau Meeting on Economic Sciences was the importance of innovation. Writing in the Financial Times just prior to his departure for Lindau, Edmund Phelps worried that there had been a loss of dynamism in the western world, which was stalling innovation, reducing productivity growth and threatening our future prosperity.

At Lindau, Phelps developed this argument both in his lecture and at the science breakfast presented by Mars, Incorporated, exploring what is needed to restore the grassroots dynamism that can drive transformational innovation for better lives – or what he calls "mass flourishing". His view is that most innovation is not driven by a few isolated visionaries, but rather by dynamism on a mass scale: millions of people empowered to dream up, develop and market new products and processes.

According to Phelps' analysis, expounded in his 2014 Lindau lecture, prevailing values or felt needs are basic to an economy. In any nation, there are people who feel the need for individual expression to exercise their curiosity, ingenuity or creativity; whose vitalism stirs them to "act on the world" and make a difference; and who need careers that are a journey into the unknown – a voyage in which, as they form ideas, create and discover outcomes, they also test, discover and create themselves.

Such needs fuel a desire to innovate. The extent and intensity of this desire, together with the capacity and talent of people to hit on new products that will be adopted, and the latitude that society is willing to give to innovations, constitute a nation's dynamism – its ability to innovate. This dynamism largely determines the nation's homegrown innovation while various market forces influence the actual innovation achieved. A nation's rate of innovation is the main source of its prosperity.

By the 1800s, the accretion of modern values gave birth to the dynamism that sparked the epoch of innovation in Britain and America, and little later in Germany and France. But now, Phelps believes, losses of dynamism have cost us much of our prosperity. So what has been responsible for this loss?

In his Financial Times article, Phelps blamed "the spread of corporatist values, particularly solidarity, security and stability". These dangers of "corporatism" were the focus of his 2011 Lindau lecture (see Lindau Mediatheque), which included an examination of the prospects for the countries of North Africa that were then enjoying the "Arab spring".

He noted that the former dictatorships of Egypt, Tunisia and Libya were described as capitalist economies. But in reality they were "corporatist" economies, where privileges and connections were the key to personal success, and where open competition and meritocracy were absent.

Phelps asked whether the positive political change of the "Arab spring" could be followed by equally positive economic developments. The answer, he said, is certainly not "cathedrals in the desert", the vast infrastructure projects promoted by the International Monetary Fund in Tunisia. Nor necessarily is it education: huge unemployment among educated Tunisians was a driver of the revolution.

The only solution, Phelps concluded, is to do everything possible to promote enterprise and innovation. That means establishing the right for people to start up their own businesses, enabling new entry and entrepreneurship, and encouraging a more meritocratic way of hiring people in existing businesses. And it means ending support for sclerotic state-backed businesses and removing blocks on people's initiative in pursuing even the humblest enterprise.

These ideas, applied to Europe and North America as much as to the developing world, are discussed in detail in Phelps' recent book "Mass Flourishing: How Grassroots Innovation Created Jobs, Challenge, and Change".

Romesh Vaitilingam

Edmund S. Phelps at the Innovation Forum, 5th Lindau Meeting on Economic Sciences

INNOVATION FORUMS

The Lindau Innovation Forums have been established in 2010 upon an initiative of Nobel Laureate Martin L. Chalfie. Their aim is to bring together top-level scientists and business executives for an informal exchange of thoughts on current problems and solutions of tomorrow.

» Innovation Forum at the 64th Lindau Nobel Laureate Meeting

Chairpersons
– Aaron Ciechanover, Nobel Laureate in Chemistry 2004, Cancer and Vascular Biology Research Center, Faculty of Medicine, Technion – Israel Institute of Technology
– Michel Pairet, Senior Corporate Vice-President of Research and Non-clinical Development at Boehringer Ingelheim

Participants
9 Nobel Laureates
21 Business Executives
8 Members of the Lindau Council and the Lindau Foundation
(Chatham House Rules apply.)

Keynotes
"THE PERSONALISED MEDICINE REVOLUTION: ARE WE GOING TO CURE ALL DISEASES AND AT WHAT PRICE?"
Aaron Ciechanover

"PHARMA RESEARCH INNOVATION BEYOND OUR OWN R&D FOCUS: THE EXAMPLE OF THE BOEHRINGER INGELHEIM VENTURE FUND"
Michel Pairet

Aaron Ciechanover

Michel Pairet

Christian Wojczewski, Head of Global Business Unit Health Care, Linde AG

» Innovation Forum at the 5th Lindau Meeting on Economic Sciences

Chairpersons
– Edmund S. Phelps, Nobel Laureate in Economics 2006, McVickar Professor of Political Economy, Columbia University
– Kurt E. Karl, Managing Director and Chief Economist, Swiss Re

Participants
11 Nobel Laureates
12 Business Executives
5 Members of the Lindau Council and the Lindau Foundation
(Chatham House Rules apply.)

Keynotes
"HOMEGROWN INNOVATION"
Edmund S. Phelps

"RETHINKING FINANCIAL INNOVATIONS"
Kurt E. Karl

Kurt E. Karl

Cafer Tosun, Senior Vice President, Strategic Research and Innovations, SAP AG

Sir James E. Mirrlees, Arno Mahlert, Chairman of the Advisory Board, GfK SE, Eric S. Maskin, Christopher A. Sims, Karan Khemka, Partner and Co-Head Education Practice, The Parthenon Group, Singapore

A Tough Balance: Cancer Research and Motherhood

Lindau alumna Christiane Opitz studies cancer cell metabolism, treats terminally ill patients, pursues an academic career – and enjoys motherhood.

Jalees Rehman: Welcome back to Lindau! You attended the 61st Lindau Nobel Laureate Meeting in 2011 as a postdoctoral fellow, and you are now an alumna of the extended Lindau family, which encompasses a network of thousands of scientists all over the world who also attended this unique meeting as young scientists. Do you have any specific memories of when you first came to Lindau?

Christiane Opitz: I enjoyed the whole meeting, but there were a few lectures which really stood out and I have continued to think about them. One of the most inspiring talks was that of the late Nobel Laureate Christian de Duve (see Lindau Mediatheque). He was over 90 years old at that time and gave a very enthusiastic talk about the societal responsibilities of scientists. I was very impressed by how he reminded us that we have to be aware of the big picture in terms of our role as members of society and not only focus on our scientific experiments.

JR: What impact did the Lindau meeting have on your work as a scientist?

CO: The interactions young scientists have with the Nobel Laureates at Lindau are quite unique. At standard scientific conferences, we hear talks about the latest scientific data, but what intrigued me about the Lindau lectures was that I got to hear how great scientists tackled the problems they were dealing with, and how they ultimately succeeded. Edmond Fischer's recalling of his discovery of protein phosphorylation taught me the value of paying attention to even small details, perseverance when you face obstacles and the importance of intense collaborations with colleagues if you want to succeed as a scientist. These talks inspired me to become a junior research group leader so that I could pursue novel scientific questions and try to overcome the scientific challenges that would be waiting for us.

JR: You received the Bayer Early Excellence in Science Award in 2012 for your recent work on the metabolism of the amino acid tryptophan in cancer cells. In 2013, you were appointed group leader at the German Cancer Research Center (DKFZ) in Heidelberg, where you now head the junior research group "Brain Cancer Metabolism". In a previous conversation, you discussed the challenges of being a practicing physician and a scientist at the same time. All clinical work has its challenges, but in your case it must be especially tough since you primarily see patients who have malignant brain tumours. It is a fatal condition for which we currently do not have any curative therapies. How do you deal with this emotional burden?

CO: One of the things that I am very grateful for is that when I go to the lab, I get regular breaks from my work as a physician. If I had to see patients with a terminal disease every day, it would be very hard on me psychologically. I have to give my patients terrible news about the extent of their disease or a relapse of their cancer. My job is to comfort them and try to give them strength, even though I often feel powerless. I have to keep my own emotions to myself and take my misery home with me. But the time I spend with my family at night or the time I spend in the lab during the following days allows me to recharge before my next neuro-oncology clinic.

JR: You just mentioned your family. An important ongoing discussion is that women in science struggle with the balance between work demands and the demands of their families. The number of women in science has substantially increased over the past years, but there is still a big gender divide when it comes to leadership positions. There isn't so much of a gender gap at the training stages such as during graduate school or postdoctoral fellowships, but comparatively few women advance to becoming group leaders, professors or directors of academic institutions. What has your experience been in this regard?

CO: Female group leaders are still a minority in Germany. The German Cancer Research Center (DKFZ) is putting a lot of effort into changing this. I benefited from one of the measures introduced by the DKFZ, an initiative to create tenure track group leader positions for women scientists with children.

"I was very impressed by how he reminded us that we have to be aware of the big picture in terms of our role as members of society and not only focus on our scientific experiments."

Christiane Opitz

Stefanie Seltmann, Otmar D. Wiestler, and Christiane Opitz at the DKFZ Science Breakfast

These positions have a duration of ten years instead of the standard five years. My husband is extremely supportive of my career and my parents also help out a lot. We carefully coordinate our work schedules.

JR: You mentioned how grateful you are for the support you receive from the DKFZ which enables you to be a physician-scientist and a mother. But you also mentioned that female group leaders are still comparatively rare in Germany. Is the mind-set still evolving to improve the prospects for women in science?

CO: To illustrate the issues women still face in Germany, I can mention the example of a female physician scientist whose clinical rotations during her residency training were changed because she got married. She was told that she would not need these rotations because married women have children and then drop out from their careers. Nobody bothered to check with her first or ask her about her own career plans. In another instance, a female scientist was asked not to have a second child when she returned back to her research project after the maternity leave for her first child. Her mentor told her that having another child would distract her from her research. But, on the whole, incidents like this are becoming rare and such remarks are made by relics who belong to a culture of the past. There is a gradual increase in the number of women in leadership positions who themselves have struggled with motherhood. There is also an increasing number of male scientists who are actively involved in caring for their families. These colleagues and mentors recognise the importance of building support structures which allow women to become successful scientists.

JR: Is your outlook optimistic in regards to closing the gender gap in leadership positions?

CO: It will take time, but I am optimistic that the overall shift in the scientific culture and the specific initiatives such as those of the DKFZ will ultimately succeed.

Jalees Rehman

Science Breakfasts at the 64th Lindau Nobel Laureate Meeting

"WOMEN IN SCIENCE: FIXING THE LEAKING PIPELINE"
upon invitation of Australia (see p. 90)

"SCIENCE IN CLINICAL MEDICINE"
upon invitation of Else Kröner-Fresenius-Stiftung

Panellists
– J. Michael Bishop, Nobel Laureate in Physiology or Medicine 1989, Director, The G.W. Hooper Research Foundation, University of California
– Stephan Halle, Institute of Immunology, Hannover Medical School
– Christoph Klein, Chair, Department of Pediatrics, Dr. von Hauner Children's Hospital, Ludwig Maximilians University Munich

Moderator
Susanne Schultz-Hector, Member of the Board, Else Kröner-Fresenius-Stiftung

"ADDRESSING THE CHALLENGES OF AGEING RESEARCH THROUGH CROSS-DISCIPLINARY COLLABORATION"
upon invitation of Mars, Incorporated

Panellists
– Elizabeth H. Blackburn, Nobel Laureate in Physiology or Medicine 2009, Department of Biochemistry and Biophysics, University of California, San Francisco
– Hagen Schroeter, Director, Fundamental Health and Nutrition Research, Mars, Incorporated
Adjunct Research Professor, Nutrition Dept., University of California, Davis
– Claudine Gauthier, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig

Moderator
Adam Smith, Chief Scientific Officer, Nobel Media AB

"SCIENTIFIC LEADERSHIP IN THE 21ST CENTURY: RUNNING PRODUCTIVE LABS, LEADING GREAT PEOPLE, LEADING SELF"
upon invitation of McKinsey & Company, Inc.

– Steven Chu, Nobel Laureate in Physics 1997, Physics Department, Stanford University
– Frank Mattern, Director, McKinsey & Company, Inc.
– Céline Vallot, CNRS, Université Paris Diderot

Moderator
Matthias Evers, Principal, McKinsey & Company, Inc.

"PREDICTING PHENOTYPES FROM GENOTYPES – A BRAVE NEW WORLD?"
upon invitation of the Austrian Federal Ministry of Science, Research and Economy

– Katarzyna Niespodziana, Medical University of Vienna
– Sir Michael J. Evans, Nobel Laureate in Physiology or Medicine 2007, Director, Cardiff University School of Biosciences

Moderator
Magnus Nordborg, Gregor Mendel Institute, Vienna

"FROM CANCER RESEARCH TO PERSONALISED MEDICINE"
upon invitation of German Cancer Research Center, DKFZ

– Christiane Opitz, Head of Junior Research Group Brain Cancer Metabolism, German Cancer Research Center
– Stephan Pfister, Head of Division of Pediatric Oncology, German Cancer Research Center
– Otmar D. Wiestler, CEO and Scientific Director, German Cancer Research Center

Moderator
Stefanie Seltmann, Head of Press and Public Relations, German Cancer Research Center

Susanne Schultz-Hector, J. Michael Bishop, Stephan Halle, and Christoph Klein at the Science Breakfast hosted by the Else Kröner-Fresenius-Stiftung

Science Breakfasts at the 5th Lindau Meeting on Economic Sciences

"PATHS TO INNOVATION: RESTORING GRASSROOTS DYNAMISM TO ADDRESS GLOBAL CHALLENGES"
upon invitation of Mars, Incorporated

Panellists
– Ralph Jerome, Vice President, Corporate Innovation, Mars, Incorporated
– Edmund S. Phelps, Nobel Laureate in Economic Sciences 2006, Department of Economics, Columbia University
– François Koulischer, Université Libre de Bruxelles

Moderator
Romesh Vaitilingam, VoxEU.org

"INNOVATION FROM THE EDGE – HOW COULD WE POSSIBLY SOLVE THE "INNOVATOR'S DILEMMA" THROUGH THE POWER OF DIVERSITY?"
upon invitation of SAP SE

Panellists
– Robert D. Austin, Management of Creativity and Innovation, Copenhagen Business School
– Joseph E. Stiglitz, Nobel Laureate in Economic Sciences 2001, School of International and Public Affairs, Columbia University
– Anka Wittenberg, Head of People Sustainability, Chief Diversity & Inclusion Officer, SAP SE
– Hyun Hak Kim, Economic Research Institute, Bank of Korea

Moderator
Vlasta Dusil, HR Director SAP (Switzerland) AG

"BANKING AND BANKING REGULATION AFTER THE FINANCIAL CRISIS"
upon invitation of UBS AG

– Mark Haefele, Global Chief Investment Officer, UBS AG
– Martin Hellwig, Director, Max Planck Institute for Research on Collective Goods, Bonn (Germany)
– Roger B. Myerson, Nobel Laureate in Economic Sciences 2007, Department of Economics, University of Chicago
– Dmitry Kuvshinov, Rheinische Friedrich-Wilhelms-Universität Bonn, Germany

Vlasta Dusil, Joseph Stiglitz, Anka Wittenberg, Robert D. Austin, and Hyun Hak Kim at the SAP Science Breakfast

Roger Myerson at the UBS Science Breakfast

Could a Cow Virus Cause Colon Cancer?

Christine Gorman, Senior Editor for Health, Human Biology, and Medicine at Scientific American, takes a closer look on Harald zur Hausen's warning to avoid red meat.

The remote possibility that I might develop mad cow disease as a result has never stopped me from diving into a nice juicy hamburger (preferably with a generous helping of ketchup and relish). But that was before I heard Harald zur Hausen hypothesise that a cow virus might be responsible for most cases of colon cancer.

And why should anyone pay attention to what Harald zur Hausen thinks? Well, he won a Nobel Prize in 2008 for proving that most cases of cervical cancer are caused by a few strains of Human Papilloma Virus (HPV). Nor is HPV the only viral cause of cancer. Chronic infection with certain hepatitis viruses, for example, is a major cause of liver cancer.

Zur Hausen provided some intriguing factoids to support his idea at the 64th Lindau Nobel Laureate Meeting. But he certainly does not have a smoking gun (nor did he claim to).

Still, he could not resist tweaking the "cancer is genetic misregulation" crowd, including perhaps J. Michael Bishop, who gave a talk the day before, entitled "Forging a Genetic Paradigm for Cancer."

"The common idea is that human cancers occur because of an imbalance between proto-oncogenes and tumour suppressor genes," zur Hausen told the audience of 600 young scientists. "That viral infections can cause cancer is a great disturbance to this beautiful picture."

Of course, zur Hausen concedes that genes play a role – even in cervical and liver cancer. But those tumours will not take hold for the most part without the viral infection having occurred in the first place.

Zur Hausen's intriguing line of evidence consists mostly of provocative questions that take on the received wisdom – questions that he is more than willing to follow with further investigation of the sort that will eventually prove his hypothesis right or wrong.

For example, the received wisdom is that the connection between red meat and an increased risk of colon cancer has something to do with the number of heterocyclic amines that form during the cooking of red meat.

And yet, zur Hausen reported, "fried, grilled or smoked fish or chicken actually have the same or higher concentration of heterocyclic amines as red meat." In other words, why would heterocyclic amines be a problem for one kind of cooked meat, but not another?

Then zur Hausen relayed the curious fact that the country of Mongolia has very low colon cancer rates, but it also has the highest meat consumption per capita of any country in the world. Perhaps the fact that Mongols eat mostly yak, mutton goat, canned meat and horsemeat has something to do with the apparent mystery.

Colon cancer incidence is relatively low in India (where vegetarianism is quite prominent), some Arabic countries (where goat is more common) and Bolivia as well, zur Hausen said. The Bolivian situation is a bit complicated by the fact that so many of the beef cattle there appear to be mixes from different species.

The evidence suggests to zur Hausen that the risk factor for colon cancer in red meat has to do with the Bos taurus species of beef – the most common around the planet. Perhaps, he posits, there is an undiscovered virus that is causally involved in human colorectal cancer with respect to raw or undercooked red meat (beef especially).
So far, his lab has found 18 different genetic sequences that might be evidence of a viral culprit. "But I don't want to talk too much about the identity of these virus or virus isolates because it's under active investigation," he said.

At this point, the bovine virus-colon cancer link is clearly more speculation than science, but zur Hausen wasn't done yet.

Harald zur Hausen lecturing on "Infections Linked to Human Cancers: Mechanisms and Synergisms"

As his talk was winding up, the Nobel laureate added yet another wrinkle to his mix of provocative hypotheses. Breast cancer, he noted, is one of the few cancers in which immune suppression results in a DECREASE in its incidence.

There are plenty of potential reasons why that might be the case—but one possibility is that breast cancer, too, might have a viral component. And sure enough when zur Hausen compared breast cancer and colon rates in Bolivia, Mongolia and India, he found they tracked each other – not absolutely identically – but in a very similar way.

His best guess is that if there is a viral agent responsible for breast cancer, that it may be related to but not the same as the one for colon cancer.

Oh dear, another reason (besides increased risk for heart disease and food poisoning) to avoid hamburgers, especially if they're medium rare.

The Lindau Mediatheque contains an illustrative Mini Lecture as well as a comprehensive topic cluster for an in-depth look into the broad field of cancer research.

This article originates from Scientific American's blog "Observations" by courtesy of Christine Gorman.

How Markets Can Overcome the Yuk Factor

During his Lindau lecture, Nobel Laureate Alvin Roth put two questions to a show of hands that highlighted the confusion many – even intelligent people – have over whether there should be commercial markets in goods or services that some people find repugnant.

Alvin E. Roth giving his lecture:
"Repugnant Markets and Prohibited Transactions"

Professor Roth asked how societies decided when to support and when to ban financial transactions in a range of goods and services from slavery to prostitution, and from kidney transplants to surrogate parenting.

He asked the audience of fellow laureates, young economists and members of the press whether, if there were a carefully regulated market, they would approve of the sale of live kidneys. Around half the audience put their hand in the air. While asking them to keep their hands raised, he changed the questions from "kidneys" to "hearts".

All but one member of the audience put their hands down. "That must be a Chicago economist," Professor Roth joked.

Queue for kidneys

The point was aimed to illustrate a serious debate. Other than the donation of kidneys, their sale is illegal in every country in the world apart from Iran – despite the fact that in the United States alone there are 100,000 people waiting for a kidney.

"As an economist, when I see a long queue of 100,000 people waiting, we wonder whether the prices are not adjusting properly. In this case the price is zero, as you can give one but not sell it."

He said that the answer came down to the issue of repugnant transactions which he described as those some people wanted to engage in but most strongly did not want them to. Interestingly the members of this latter group can change over time.

While same-sex marriage was repugnant to most people 50 years ago, it is something that many western governments have now legalised. In contrast, slavery that was a booming legal business three centuries ago is now banned globally. "The arrow of time points both ways," Professor Roth noted.

Dwarf-tossing bad, wife-carrying good

He said that some less complicated and "more trivial and silly" examples highlighted the issues. In California it is illegal to eat horsemeat but has only been banned since 1998. However in many European countries it is a delicacy.

Another issue that produces different answers in different countries is dwarf-tossing. While this is entirely legal in the UK where a dwarf called Lenny the Giant earns an income this way, it is banned in Ontario, Canada, and France.

Indeed a French dwarf called Manuel Wackenheim took France to the UN Human Rights Committee in 1999 protesting that its ban on dwarf-tossing was a restriction on his right to employment. He told the hearing that there were few jobs for dwarfs in France and that the essence of human dignity is having a job.

However, the UNHRC found for France saying that dignity is a public good and that dwarf-tossing made us all a little less human.

"It can be very hard to predict," he said, "It's not that dwarfs are small – we like horseracing and jockeys are small. There are a lot of sports that look to me a lot like dwarf-tossing but are not illegal – wife-carrying! It's hard to make a model to explain why some are illegal and others aren't."

Professor Roth said the key distinction was often that something became repugnant when money was added in, which might explain the bans on prostitution. He stated that the repugnance came down to three factors: The way it objectifies and commoditises people, that it involves coercion or exploitation, and that it is the top of a slippery slope that might lead to even worse transactions.

Exchanging instead of selling

Professor Roth said that an economic solution that bypassed the need to change the law was the idea of pairing kidney donors and recipients. This enabled a couple who cannot carry out a kidney donation because they are different blood groups to find a couple with matching blood groups and so carry out a kidney exchange.

Roth, who has been involved with this idea, pointed out that the US Congress that legislates to ban kidney sales approved kidney exchanges with no dissenting votes. "Kidney exchange is complex but one of our achievements has been to get long chains of kidney exchanges going," he said.

"For me as a market designer, kidney exchange is a way to get some of the benefits of the market place to people who need kidneys without confronting the repugnance that selling kidneys raises."

Phil Thornton

Collaboration in Research

Marius Zoican, participant in the 5th Lindau Meeting on Economic Sciences, reflects on constraints and benefits of teaming up with peers to produce joint graduate papers.

As graduate students, we spend a great deal of time exchanging thoughts and ideas with each other. Furthermore, completing doctoral coursework is often a team effort. It might seem surprising that relatively few PhD students choose to start joint projects in graduate school. The Lindau Meeting on Economic Sciences in August offered a fantastic networking opportunity for more than 450 young researchers, among them many graduate students. In the same spirit, I decided to share my experience of writing paper with a colleague from the Tinbergen Institute, Lucy Górnicka.

What are the constraints?
Deciding when to write a paper with a fellow student can be difficult. Professional development objectives change over time. During the first year(s), the input of your supervisor is invaluable: a deep understanding on what makes a good topic, expert technical feedback, advice on writing and style, and the occasional insight into department politics. As research skills mature, so does the need for independent work. Since single authored papers are a more accurate signal of scholarly abilities, most PhDs transition directly from working with senior academics into working alone. However, I believe there is great added value in teaming up with a colleague.

Jürgen Kluge, Senior Advisor at the Bank of America Merrill Lynch and management consultant at Kluge & Partner, and his wife discussing with fellows of the Alcoa Foundation.

What are the benefits?
Research improves through detailed discussions. It is easier to understand the pitfalls of an argument when you verbalise it. More often than not, your ideas can be refined or extended. Your co-author will come up with a different way to see the problem. Communicating effectively is a key requirement. Is your argument as clear as possible? Are you open to alternative approaches? The skills required when writing with a colleague subtly differ from your work with the supervisor. Researcher roles become more symmetrical. Instead of receiving feedback from a mentor, you need to offer feedback yourself and accept critical responses from a peer. The process itself is truly fulfilling: you develop together as researchers by relating to each other.

Project management skills are almost equally important. I learned a lot from my supervisor about the complex process of writing a joint paper. It was a useful experience to assume more responsibility. Little details really matter. Working together requires keeping a detailed project log to keep track of ideas and feedback. You need to build a coherent system to organise code files, drafts, and the bibliography. You need to agree on a mutually convenient meeting schedule. You need to research conferences and decide which ones to submit to. All these are important collaborative skills for a future academic career.

Joint work can also lead to new ideas. It is easy to become too involved in details when you work alone, and to ignore the larger picture. Taking a step back at the end of the project and discussing the relevance of your findings can spark new hypotheses.

How to start?
There are probably no rules about it. Most ideas do not start in the university office. My colleague Lucy and I reached the topic of current European affairs on a summer Sunday afternoon in Amsterdam. We couldn't quite agree how the banking union would affect the risk taking behaviour of banks. Within half an hour, the seed of the paper was planted. Six months later, we were flying to Sydney to present our results.

I think the first step is to find somebody who shares your research interests and with whom you might enjoy collaborating. The Lindau Nobel Laureate Meeting is a great place to find like-minded enthusiastic young researchers. Do you have a common view on an interesting economic topic? Do you disagree about a policy? It is probably a good idea to start investigating together.

Marius Zoican

A Sunburnt Country

At the 64th Lindau Meeting, Australia had the privilege of hosting the International Get-Together. This was a unique opportunity to showcase Australian culture, lifestyle, and of course, science.

As an Australian living abroad, the International Get-Together was a chance for me to remember all the things from my home country that I miss. The Master of Ceremonies that night – and in my opinion one of its stars – was Adam Spencer. In his broad Australian accent he conveyed not only his passion for science but he also managed to make everyone laugh and feel quickly at ease. Most importantly, he was able to prevent any buffet associated disasters or riots. We were welcomed to the evening by Countess Bettina Bernadotte and the Honourable Andrew Robb, the Australian Minister for Trade and Investment, who helped highlight the importance of science in Australia and the important role that it will play in our future. It was then time for an Australian cultural performance.

The performance had big shoes to fill, with most of the Lindau participants having been treated to an ensemble of the Vienna Philharmonic Orchestra only one night prior. However, Genevieve Lacey and Marshall McGuire proved more than equal to the task. With the unique combination of the recorder – an instrument in Australia most renowned as a tool for children to annoy their parents – and the harp, they took us on an incredible musical journey. For me, their music invoked all the things that I love about Australia: the subtle sounds of the beaches and billabongs, the summer storm rolling over the hills after a long, dry heat wave, and all the beautiful bird calls that you just cannot find in the forests of the Northern Hemisphere. This was one of the best musical performances I have seen in my life.

Afterwards we were treated to a talk by Professor Emma Johnston. I have to confess that whilst I have often seen her on TV, I have never seen her speak in real-life. This is something not to be missed. Not only did she showcase Australia's beautiful marine environment and impart important pearls of wisdom regarding a career in research, but she even got me re-thinking my own chosen research topic – maybe, as Johnston suggested, we are all just frustrated marine biologists at heart.

After a fulfilling buffet dinner (or in Australian English: a "bloody good tucker") we were all drawn up to the dance floor to participate in a traditional dance: a polonaise. This involved each woman pairing with a man who would give her a flower and then walk around the hall with her. The walk culminated in a waltz in the centre of the hall. For the first time, due to the excess of female scientists, there had to be some all-female couples – a very encouraging sight to see!

I could think of no better way to meet new people, and there is no better way to break the ice with someone then trying to figure out how to do a sort of waltz without stepping on any toes or knocking anyone out. In true Australian fashion the evening ended with a visit to the pub to drink a beer and watch some sport. A fitting end to a beautiful night. Thanks to everyone who helped organise this unique event, and I hope that all the participants enjoyed it as much as I did.

Kirsty Short

"Australia is still quite isolated which makes international networking opportunities like this crucial for young researchers to establish relationships that carry through their careers."

Andrew Holmes, President of the Australian Academy of Science

Countess Bettina Bernadotte and Brian Schmidt head the traditional Polonaise together with Emma Johnston and Lord Mayor Gerhard Ecker.

The International Day by Australia

» Science Breakfast

"WOMEN IN SCIENCE: FIXING THE LEAKING PIPELINE"

Panellists
– Elizabeth H. Blackburn,
Nobel Laureate in Physiology or Medicine 2009,
Department of Biochemistry and Biophysics,
University of California
– Suzanne Cory, Immediate Past President, Australian Academy of Science
– Emma L. Johnston, School of Biological, Earth and Environmental Sciences & Evolution and Ecology Research Centre, UNSW Australia, Director, Sydney Harbour Research Program, Sydney Institute of Marine Science
– Brian P. Schmidt, Nobel Laureate in Physics 2011,
The Research School of Astronomy and Astrophysics,
The Australian National University

Moderator
Adam Spencer, Ambassador for Mathematics and Science,
The University of Sydney

» Get-Together

Welcome Address
Andrew Robb, Australian Minister for Trade and Investment

Cultural Performance
Genevieve Lacey, Recorder Virtuoso, Marshall McGuire, Harpist

Presentation
"DIVING INTO RESEARCH"
Emma L. Johnston, School of Biological,
Earth and Environmental Sciences & Evolution and Ecology Research Centre, UNSW Australia
Director, Sydney Harbour Research Program, Sydney Institute of Marine Science

Master of Ceremonies
Adam Spencer, Ambassador for Mathematics and Science,
The University of Sydney

The Australian International Day has been made possible due to sponsorship and support from the Department of Industry, The Group of Eight Australia, Austrade, Australian Nuclear Science and Technology Organisation, Department of Education, CSIRO, Defence Science and Technology Organisation, the Science and Industry Endowment Fund and the Australian Academy of Science.

Andrew Robb
Australian Minister for Trade and Investment

Barry Marshall discussing with young scientists

The wines served at the International Get-Together were all produced by Australian scientists like Brian Schmidt, who provided the Amungula Creek 2012 Pinot Noir.

Impressions

Explaining the Nobel Prizes: Burkhard Fricke, Vice-President of the Council, illustrates the 2013 prize in physics at the recurring annual kick-off event at Lindau jointly organised with the City of Lindau and regional paper Schwäbische Zeitung

Celebration at Beijing on the occasion of the 10th anniversary of the partnership between the Sino-German Center for Research Promotion and the Lindau Nobel Laureate Meetings

Countess Bettina Bernadotte and Lindau's Lord Mayor Gerhard Ecker presenting a cheque to the "Little Scientists' House". The proceeds of the 2014 "Grill & Chill" – a barbecue with Lindau Meeting participants and locals – benefit the association.

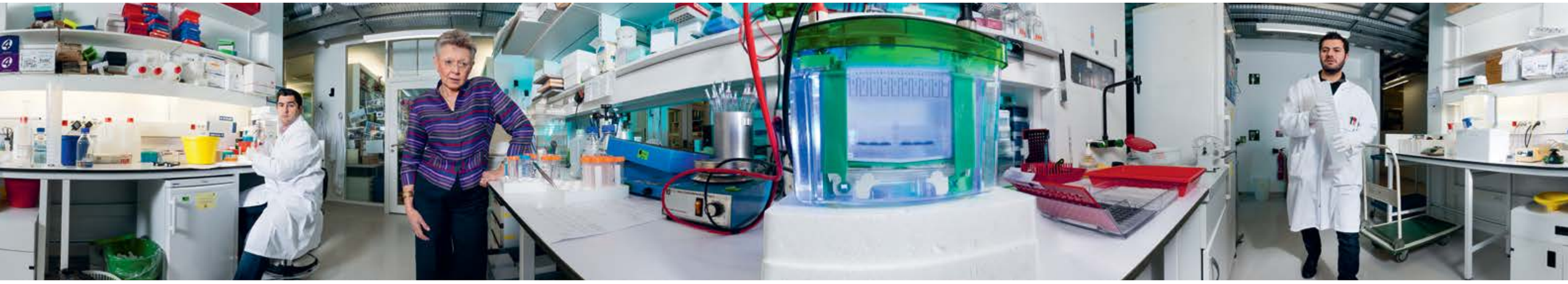
Bavarian Evening at the 64th Lindau Meeting

On the fringes of the 64th Lindau Meeting, Tim Hunt visited a school class of the Valentin-Heider-Gymnasium at Lindau

Virtual Visit at the Institut Pasteur

Being taken on a guided tour through the Institut Pasteur is certainly not a common thing. But “Nobel Labs 360°” open doors to anyone interested: Françoise Barré-Sinoussi is one of eleven Nobel Laureates who have made their workplaces accessible virtually.

Françoise Barré-Sinoussi
photographed by Volker Steger for Nobel Labs 360°



French virologist Françoise Barré-Sinoussi heads the department “Regulation of Retroviral Infections” at the prestigious Institut Pasteur in Paris. She received the 2008 Nobel Prize in Physiology or Medicine for the discovery of the HI-virus causing Aids. As part of the multimedia project “Nobel Labs 360°”, she and her team let us look over their shoulders as they perform their daily tasks. The virtual visitor may browse through 360° panoramic pictures of the laboratories, zoom in to explore details, and watch or listen to recorded interviews with the staff. Snooping around nosily is highly welcome!

The tour starts on the rooftop terrace, from where the “Safe Lab”, the cytometry lab and the “Western Blotting Labs” can be visited. My advice: take your time to explore the surroundings, then click on an embedded video featuring Beatrice Jaquelin, an engineer in the Safe Lab. Amidst the noise of all the machines she illustrates the strict security measures everyone is instructed to obey. In another video, the researcher Hicham El Costa explains how the Western Blot lab studies HIV-transmissions from mother to child. Throughout the tour there are of course many interspersed comments from the boss herself: Barré-Sinoussi supplies background information on central questions of her research. One of her key messages is “We can do better!”, meaning that greater international efforts are necessary to study HIV and to reduce infection rates. It becomes obvious that Barré-Sinoussi is much more than an HIV researcher: She has been the president of IAS, the International AIDS Society, since 2012 and is dubbed “scientist activist”, an inofficial title she seems to enjoy.

One fact that all labs featured in Nobel Labs 360° reveal is that scientific progress nowadays demands team work. It always needs a large team contributing findings from different angles in order to understand complex systems. But at the same time, charismatic researchers are key to explaining to the world the relevance of extraordinary research efforts.

Stephanie Hanel

Alvin E. Roth at the Stanford University Campus
photographed by Volker Steger for Nobel Labs 360°

NOBEL LABS 360°
The labs of the following eleven Nobel Laureates are virtually accessible in the Lindau Mediatheque:

Françoise Barré-Sinoussi
Elizabeth H. Blackburn
Martin Chalfie
Aaron Ciechanover
Theodor W. Hänsch
John C. Mather
Alvin E. Roth
Brian P. Schmidt
Dan Shechtman
Oliver Smithies
George F. Smoot

Mini Lectures and Nobel Labs for Pupils

Select content of the Lindau Mediatheque was recently incorporated into “mebis” – the central source of digital media for educational purposes, provided by the Free State of Bavaria.

Wolfgang Schürer, Countess Bettina Bernadotte, Ludwig Spaenle, Bavarian State Minister of Education, Science and the Arts, and Nikolaus Turner

Making sensible use of teaching materials has always been and will ever be an integral part of quality teaching. But the idea that the ever-increasing content availability due to digitalisation and the internet would automatically lead to better teaching materials, was obviously too simplistic. Nowadays, teachers are not only over-challenged by the sheer quantity and complexity of digital teaching materials available online, but they also have doubts about the materials’ content-related and didactic qualities. Moreover, they worry about copyright issues – and rightly so. These are some of the reasons why the use of digital teaching materials can be very challenging for teachers.

Educational platforms such as “mebis” of the Bavarian Media Centre (Landesmedienzentrum Bayern) help and support teachers by providing an internet source where they can find all activities concerning media literacy in schools; mebis was established by the Bavarian State Ministry of Sciences, Research and the Arts. More than 2,000 final exams and multiple academic assessment tests can be found in the mebis exams archive, together with all relevant teaching materials, for all school types. But mebis is much more: it is also a learning platform with several virtual classrooms, where pupils can cooperate with others, or learn according to their individual pace. Furthermore, the mebis media library offers a wide range of digital educational media – and the use of these media in schools has been officially approved in respect to copyright and licence issues. In this library, teachers and students will find more than 13,000 video, audio and image files, digital maps and simulations.

Recently, select content from the Lindau Mediatheque has been integrated into the mebis database. One of the leading German newspapers, Frankfurter Allgemeine Zeitung, once dubbed the Lindau Mediatheque a veritable “digital treasure trove”; more and more of these treasures could enrich platforms such as mebis in the future. A cooperation agreement between the Bavarian State Ministry of Sciences and the Lindau Meetings sealed the deal.

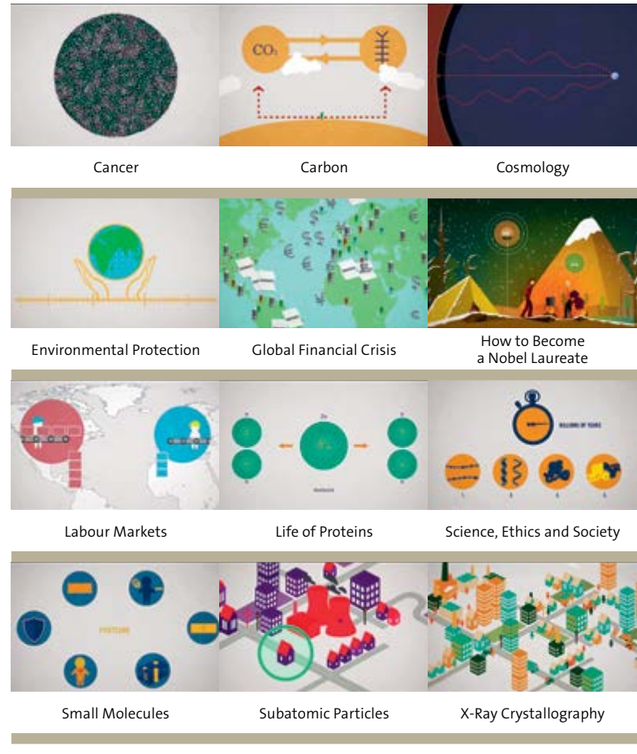
Right from the start of the Lindau Meetings in 1951, it was considered important to document and archive the numerous lectures and scientific contributions of the participating laureates. By going online, the Lindau Mediatheque became accessible to an interested public, providing captivating insights into the scientific discourses of the annual meetings. The lectures by Nobel Laureates are documented either in video or audio. All laureates are by definition scientific authorities and outstanding personalities of their time. The lectures may have a wide range of topics, but they are united by a common goal: to pass on some of the lecturers’ knowledge and experience to the younger generation. In case of the Lindau Meetings, those are usually the young scientists that come to Lindau each year in large numbers.

But we think that pupils who are interested in science – and who are the future participants in the Lindau Meetings – should also benefit. For this younger target group, an additional media format was developed: the Mini Lectures. They are short, lively, and easily understandable presentations of scientifically or socially relevant topics. The Mini Lectures were specifically designed to match the media usage behaviour of young people. The complex topics of selected laureates are explained in a comprehensible way and accompanied by animations. By necessity, each topic had to be simplified, but special care was taken not to distort crucial information. The focus is always on learning effectiveness, while the Mini Lectures remain interesting throughout.

The Nobel Labs 360°, on the other hand, allow for discovery learning. The interactive, multimedia applications invite the viewer to the home laboratories and institutes of the Nobel Laureates: virtual, but still authentic excursions to motivate young people to learn more about science.

Mini Lectures and Nobel Labs will be part of the broad spectrum of digital teaching media and will – through platforms such as mebis – become more accessible to teachers and pupils. Besides the Bavarian State Ministry of Sciences, three other institutions were involved in this initiative: the State Institute for School Quality and Educational Research (ISB), the Academy for Teacher Training and Personnel Management (ALP), as well as the Institute for Film and Image in Science and Education (FWU).

Egon Birner



As of today, the Lindau Mediatheque contains 12 Mini Lectures (each in English as well as in German)

Teaching Spirit 2014: “Inspire and be inspired!”

Swiss biology teacher Markus Ehrengruber, participant in the programme “Teaching Spirit 2014”, describes why it is his personal pleasure as well as a general necessity to spark young people’s interest in science.

Vincenzo Hiemer: Why did you choose to study biology in the first place?

Markus Ehrengruber: I’ve been fascinated by nature since I was a child, especially by animals. My father – a mathematician who works at the Zurich University Hospital – always tried to convince me to study medicine instead of biology. His most important argument were the supposedly dim career prospects for biologists. But my mother – a nature conservationist and a medical technician by training – has always supported my career choice.

VH: What are your personal motives for sparking interest in science topics in your pupils?

ME: To me, nature conservation is existential – ultimately. It’s essential for our survival. In order to prevent the collapse of entire ecosystems, or the extinction of even more animal or plant species, the mere understanding of ecological inter-dependencies isn’t enough. I am deeply convinced that people need emotional ties to nature – a true love of nature – to protect her. Moreover, I find biology infinitely interesting! As a researcher in biology, you can get insights into unknown mechanisms no one has elucidated before. And these results can even be applied, in medicine or food production.

VH: What does “teaching spirit” mean to you?

ME: It’s my mission: “inspire and be inspired”. I don’t want to teach biology only by explaining theoretical concepts – my pupils should also find an emotional access to nature. In school lessons, I try to make use of as many examples and materials as possible from everyday life. My classes span a wide range of subjects, from molecules and DNA to the workings of entire organisms. I find it a great advantage that I have been a researcher in neurobiology for sixteen years, doing basic research in virology, immunology and genetic engineering. My passion for ornithology also helps me to make my lessons authentic and lively. Moreover, I am involved in several extra-curricular activities: an interdisciplinary project week, weekly facultative courses on “dissecting and preparing”, ornithological excursions. I am also the contact person for pupils who take part in contests of the Swiss Youth Science Foundation. I truly enjoy working with young people. My aim is to establish and maintain an open, direct and fair contact. Especially the younger students – the 11 to 12-year-olds – inspire me with their thirst for knowledge.

VH: Nobel Laureates as a source of inspiration – what are your thoughts on this?

ME: Many of the laureates who participated in the 64th Lindau Meeting have worked on the forefront of biological research and have made ground-breaking discoveries. For me, all of them are role-models. But my personal favourite is definitely Werner Arber. During the many years of my career in biological research, I have made strong use of restriction enzymes – probably Arber’s most important discovery. As he is Swiss, I keep introducing him and his research to my students in classes. Arber also seems to be a man without reservations: he is the first non-Catholic to head the Pontifical Academy of Sciences in Rome. Being a modern biologist, Arber seemingly ventured into the lion’s den – that deserves great respect.

“Teaching Spirit” workshop held by the “Leibniz Institute for Science and Mathematics Education” (IPN)

Markus Ehrengruber teaches biology at the Zurich high school “Hohe Promenade” and was nominated for Teaching Spirit by the International Lake Constance Conference (IBK).

TEACHING SPIRIT

In 2014, 20 biology teachers from Germany, Austria, and Switzerland have participated in “Teaching Spirit”, the programme on the fringes of the Lindau Nobel Laureate Meetings that recognises and rewards the role and work of excellent teachers. This year’s participants were initially nominated by nine partner institutions.

NOMINATING INSTITUTIONS IN 2014

Deutsche Telekom Stiftung

Deutscher Verein zur Förderung des mathematischen und naturwissenschaftlichen Unterrichts e.V. (MNU)

Esther und Silvius Dornier Stiftung zur Förderung begabter Schüler

International Lake Constance Conference (IBK)

Prof. Dr. Manfred Prenzel, Technische Universität München

Robert Bosch Stiftung GmbH

Stiftung Haus der kleinen Forscher

Stiftung Jugend forscht e.V.

Verband Biologie, Biowissenschaften und Biomedizin in Deutschland e.V. (VBIO)

Vodafone Stiftung Deutschland gGmbH

Dorothy Crowfoot Hodgkin – The Queen of Crystallography

The year 2014 marks the 50th anniversary of Dorothy Crowfoot Hodgkin's Nobel Prize in Chemistry. A retrospect on the scientific life of a Lindau "veteran" who had already been a living legend when she participated in the meetings.

Dorothy Hodgkin was able to determine the three-dimensional structures of biomolecules with the new technique of X-ray crystallography that she helped to advance. No scientist had achieved this before with comparable precision. But how was she able to accomplish this pioneering work, and why had she become fascinated with this topic in the first place?

First, there were her open-minded parents – it was by no means a given that a girl who had been born in 1910 received a book by William Henry Bragg from her mother when she was just fifteen, wherein he describes how he could "shine X-rays through a crystal to discover the arrangement of its atoms." Both parents had been scientists, and the girl was born in Cairo as Dorothy Mary Crowfoot. Another fortunate coincidence was her early encouragement by Dr. A.F. Joseph, a friend of the family who later played an important role in her move from Oxford to Cambridge where she started to work with the famous scientist John Desmond Bernal.

Reading about this promising point of departure, it becomes clear that her supporters must have felt that she had enormous scientific potential – a young woman who would have a brilliant career no matter what. After this exceptional start, she was able to describe the atomic structure of the enzyme pepsin (1934), of cholesterol (1941), penicillin (1945), vitamin B12 (1956) and insulin (1969) – relentlessly and with growing passion for "her" method. The American chemist and Nobel Laureate Linus Pauling wrote to Hodgkin one year after he had received his 1954 Nobel Prize , "to congratulate you on the wonderful job that you have done on Vitamin B12. I find it hard to believe, although very satisfying, that the methods of x-ray crystallography can be used so effectively on such a complex molecule."

Between these milestone discoveries, Hodgkin not only worked relentlessly on refining her favourite method – she also had three children, whom she apparently fitted seamlessly into her busy life. In the German weekly newspaper "Die Zeit", her assistants were quoted on the occasion of her winning the Nobel Prize, that for her, "crystals and children seem to belong to the same sphere". As if raising a family and having an award-winning career isn't enough, she was afflicted with severe rheumatoid arthritis after the birth of her first child. Still, Hodgkin refused to be seen as a role model, as her biographer Georgina Ferry points out – even if it is hard not to see her as a bright example. She deserves our respect for fighting a crippling disease while pursuing a demanding career, raising a family and being politically active at the same time.

Looking at the photographs from the Lindau Meetings with young scientists, you can see on their young faces that she must have been a fascinating personality. Hodgkin came to Lindau five times, the last time in 1989, five years before her death. Four of her lectures can be listened to in the Lindau Mediatheque. Because we cannot see her face while she talks, the listeners' concentration seems to become all the more alert. The Lindau Mediatheque also features a comprehensive research profile on Hodgkin's work by Luisa Bonolis. There is much to read and hear to (re-)discover Dorothy Hodgkin.

Naturally, she received many posthumous honours like a research scholarship in her name, and she was remembered in popular culture with a Google Doodle at her 104th birthday on May 12th, 2014. Her research is also well presented in the Science Museum of London. The Google Doodle was followed by many commentaries, and an original obituary with the title "Nobel-winning chemist's inspiring career is ready for its (molecular) close-up with Google Doodle". Recently, Bloomsbury published a new edition of her biography, "Dorothy Hodgkin, A Life".

Stephanie Hanel

HISTORICAL LECTURES IN THE LINDAU MEDIATHEQUE

The mediatheque of the Lindau Nobel Laureate Meetings contains more than 400 video and audio recordings of lectures by Nobel Laureates, dating back to 1952 and thus mapping the rich history of scientific dialogue at the meetings. A team of editors headed by Anders Bárány, formerly professor of physics at Stockholm University and Deputy Director of the Nobel Museum, works continuously to provide a comprehensive picture of the major baselines and developments in science and research. This exceptional endeavour is generously supported by the German Federal Ministry of Education and Research, the Carl Zeiss Stiftung, and the Gerda Henkel Stiftung.
mediatheque.lindau-nobel.org

LECTURES BY DOROTHY HODGKIN

"A Life in Science", 1989
"Insulin", 1983
"History and the X-ray analysis of protein crystals", 1980
"Structure of Insulin", 1970

Dorothy Crowfoot Hodgkin at Lindau 1989

Dorothy Hodgkin together with Lars Onsager, Nobel Laureate in Chemistry 1968, at the opening of the 20th Lindau Meeting (1970).

An Idea With an Impact

Since their beginnings in 1951, the Lindau Nobel Laureate Meetings have evolved into a unique international discussion forum for scientific and societal issues, and have given rise to a wide range of outreach initiatives to involve the broader public.

“And it was all to be so terribly solemn and so academic and so on, but I said, no, people, let us just relax and have a nice, friendly meeting.”

Count Lennart Bernadotte af Wisborg

Descendants of two founders of the Lindau Meetings:
Countess Bettina Bernadotte, Beate Hein-Bennett, and Piet Hein in the exhibition on the history of the Lindau Meetings

It was the two Lindau physicians Franz Karl Hein and Gustav Wilhelm Parade who approached Count Lennart Bernadotte of nearby Mainau Island – a grandson of King Gustaf V of Sweden – to jointly develop and implement the idea that marked the beginning of a long and continuing history of the Lindau Nobel Laureate Meetings. Due to Count Lennart’s efforts and networking in Stockholm, seven Nobel Laureates agreed to participate in the first “European Meeting of Nobel Laureates in Medicine”, held at Lindau in 1951. This extraordinary meeting was conceived as a European initiative of post-war reconciliation among scientists.

The initial success led to the establishment of periodic meetings of Nobel Laureates in Lindau, dedicated alternately to the Nobel Prize disciplines physiology or medicine, physics, and chemistry. Already in 1953, the decision was made to have students, doctoral candidates and post-doc researchers join the dialogue.

“THE LINDAU NOBEL LAUREATE MEETINGS: NOW AND THEN”
A permanent exhibition on the history of the Lindau Meetings was inaugurated at the city museum of Lindau in June 2014. It covers more than 60 years of intergenerational exchange, depicted in original documents, photos, videos and exhibits. The installation of the exhibition was enabled with financial support by the Klaus Tschira Stiftung.
Concept and design: Wolfgang Huang
Scientific advice: Anders Bárány and Bernhard Graf

The exhibition is summarised in text and pictures in the Lindau Mediatheque.

Franz Karl Hein, Count Lennart Bernadotte af Wisborg, Gustav Wilhelm Parade

Communications and Response

The Lindau dialogue is not exclusively for those attending and participating in the meetings. The communications accompanying the Lindau Meetings and their outreach projects are designed to include experts, everybody interested in science, as well as the general public, and can hereby stimulate further debates.

Media Coverage
Attracted by the broad range of topics and by the esteemed Nobel Laureates, as well as by the aspiring young scientists, large numbers of journalists join in the Lindau dialogue year after year – not only as observers but also as discussants, valued for broadening the debates by contributing their views. Renowned print media, TV and radio broadcasters, as well as online news providers based in around 40 countries have covered the 2014 Lindau Meetings. In total, approximately 300 journalists and media staff were accredited for the meetings, and promoted science and research in the global society.

blog.lindau-nobel.org
The many contributions to this annual report that originate from the official blog of the Lindau Meetings testify to the vibrant activity triggered by the relaunch and new editorial concept of this online community platform, commenced in June 2014. As a novelty, the Lindau blog is now established as the central interactive hub for information and exchange throughout the year, incorporating the social media activities on Facebook, Twitter, and YouTube in order to meet the users' demands. Professional science writers, like regular contributors to Scientific American Blogs and SciLogs, are part of the diverse team of bloggers. As of today, already more than 50 people have contributed over 200 posts.

Recommended posts
– Personalised Medicine Changes the View on Disease – and Ourselves
– Paul Dirac – The Quiet Genius Died 30 Years Ago
– Nobel Prize 2014: Lighting Nano
– If Moneylenders Can Do It, Why Not Microfinance Institutions?
– Synthetic Genes, Synthetic Cells – Synthetic Life
– What's Needed to Succeed in Science in Developing Nations?
– Physician-Scientists: An Endangered Species?
– Why Don't Grasshoppers Catch Colds?
– The Stress of Ageing
– Conquering New Frontiers: Lindau in Space
– What Soccer Has to Do With Molecular Biology

Media Partnerships and Cooperations
At the initiative of Ulrich Wilhelm, Director of "Bayerischer Rundfunk" (BR, Bavarian Broadcasting Corporation), BR and the Lindau Nobel Laureate Meetings forged a special partnership. BR played a leading role in covering the Lindau Meetings for the German public service broadcasting sector. The launch of Germany's first national public service educational TV channel "ARD-alpha" in the course of the opening ceremony of the 64th Lindau Meeting clearly marked the highlight of this partnership. ARD-alpha broadcasted the ceremony live.
The longstanding partnership with Deutsche Welle, Germany's international broadcaster, promoting exchange and understanding between the world's cultures and people, was successfully continued and resulted in extensive TV coverage of both Lindau Meetings in German, English, Spanish, and Arabic, thus taking further steps of science diplomacy.
A close cooperation with influential networks of science journalists like the European Union Science Journalists' Associations (EUSJA), the International Journalists' Programmes (IJP), and the US National Association of Science Writers (NASW) has also contributed significantly to the media coverage of the meetings.
The German Academic Exchange Service DAAD – an academic partner of the Lindau Meetings – organised a special press tour to promote the conference among international journalists.

Press conference by Françoise Barré-Sinoussi

Federal Chancellor Angela Merkel and Countess Bettina Bernadotte at the opening of the 5th Lindau Meeting on Economic Sciences

Ulrich Wilhelm, Countess Bettina Bernadotte, Johanna Wanka, Ilse Aigner, and Wolfgang Schürer at the conversion of "BR-alpha" into "ARD-alpha"

TV talk "Alpha forum", broadcasted live from Lindau by "ARD-alpha", featuring Stefan H.E. Kaufmann, Anja Knäbel, moderator Sabrina Staubitz, Johanna Wanka, and Harald zur Hausen

Journalists of the DAAD press tour interviewing Rolf Zinkernagel

"Scientific Exchange on Highest Level"

Neue Zürcher Zeitung, Switzerland


64. LINDAUER NOBELPREISTRÄGERTAGUNG

Eine Woche mit den Besten

Nur eine Revolution

Vorstellungsgespräche enden bei uns oft im Krankenhaus.

Editorial supplement in the German daily newspaper "Süddeutsche Zeitung"

"Joseph Stiglitz: EU and ECB need to wake up – there is little time left to trigger the recovery"

La Repubblica, Italy

Roger B. Myerson interviewed live for CNBC

"Nobel-winning economists challenge conventional thinking on recovery"

The Guardian, UK

"A Week with the Best"

Süddeutsche Zeitung, Germany

Sir James Mirrlees interviewed live for Bloomberg TV news

"Eric Maskin and inequality – Learn, and be less unequal"

The Economist, UK

Convene magazine issue of September 2014

"Coffee with Nobels: A Gift for Young Scientists"

La Nación, Argentina

"Lindau is considered a summit meeting of economists, similar to the famous World Economic Forum in Davos"

Die Welt, Germany

"Nobel economists say policy blunders pushing Europe into depression"

The Daily Telegraph, UK


Was bedeutet Liberalismus?

Double-page spread on Mario Vargas Llosa's lecture at Lindau in German daily broadsheet "Der Tagesspiegel"

Manuela Kasper-Claridge of Deutsche Welle interviewing Alvin Roth

"It's doubtful, however, that in terms of exclusivity – not to mention sheer brainpower – any other event equals the Lindau Nobel Laureate Meetings"

Convene, USA

"A week with 37 Nobel laureates to discuss the new challenges of medicine."

El Mercurio, Chile

Werner Arber, interviewed for "Arte Future"

"There is not much of commendation for free markets at the meeting, there are rather complaints about market failure and inequality"

Frankfurter Allgemeine Zeitung, Germany

"Brainstorming"

Haaretz, Israel

Cover page of "XL Semanal", a supplement to Spanish newspaper "ABC"

Sketches of Science

Why not ask Nobel Laureates to make a sketch of the discovery for which they received the Nobel Prize and then ask them to present their artwork to the camera? This is exactly what the German photographer Volker Steger has done to create the exhibition “Sketches of Science”.

“The result is perfectionism! His sketch presents his discovery in a way that would shame some textbooks. But when the shooting started, I experienced a different Bruce Beutler: quirky!”

Volker Steger

In his photos, Volker Steger captures the spontaneity and creativity of Nobel Laureates; they express the enthusiasm of scientists and researchers for their work.

An exhibition of 50 photos of the series was launched at the Nobel Museum in Stockholm in June 2012, and has been on tour ever since.

Sketches of Science presented at OIST Main Campus, Okinawa, Japan

Opening of the exhibition at Gwacheon National Science Museum, Seoul, in the presence of Youngah Park, President of the Korea Institute of Science & Technology, Evaluation and Planning (KISTEP), and Nobel Laureates Dan Shechtman and Peter Grünberg

Arieh Warshel

Exhibitions 2012 – 2014
Stockholm, Nobel Museum
08.06. – 30.09.2012

Frankfurt, Airport
05.12.2012 – 09.01.2013

Berlin, Landesvertretung Baden-Württemberg
18.01. – 05.02.2013

Heidelberg
Carl-Bosch-Museum
22.02. – 02.06.2013

Mainau Island
Mainau Castle
24.06. – 31.08.2013

Singapore
Science Centre Singapore
16.09. – 22.11.2013

Kuala Lumpur
Galeri Petronas
12.12.2013 – 31.01.2014

Okinawa
OIST Main Campus
13.05. – 06.07.2014

Sendai
Tohoku University
30.07. – 31.08.2014

Seoul, Gwacheon National Science Museum
13.10. – 23.11.2014

Upcoming venues
Davis, University of California, Davis,
05.01. – 28.01.2015

Hannover, Hannover Messe
13.04. – 30.05.2015

Project partner
Nobel Museum, Stockholm

Principal Funder
Klaus Tschira Stiftung

Bruce Beutler as portrayed by Volker Steger at the 64th Lindau Nobel Laureate Meeting

Impressions

Alois, Hereditary Prince of Liechtenstein, Tony Tan, President of the Republic of Singapore, and Countess Bettina Bernadotte

Exhibition of portraits by Peter Badge in the city museum of Lindau: Wolfgang Lubitz, Janice Murray, Assistant to Nobel Laureate Robert M. Solow (depicted in the backdrop), Robert Aumann, Eric Maskin

Johanna Wanka, German Federal Minister of Education and Research, with Reinhold Mitterlehner, Austrian Federal Minister of Science, Research and Economy

Alexander Warmbrunn, Head of the Cultural Office of the City of Lindau, Nikolaus Turner, Ewald Nowotny, Governor Oesterreichische Nationalbank, Amel Karboul, Minister of Tourism of Tunisia, Thomas Ellerbeck, and Friedrich Joussen, CEO TUI AG

Exhibition of photos by Martin Karplus at Berlin: Monika Grütters, Federal Government Commissioner for Culture and the Media, Gerald Uhlig-Romero, Galerie Einstein Unter den Linden, Martin Karplus, Nobel Laureate in Chemistry 2013, and Nikolaus Turner

Walter Kohn and Wolfgang Schürer

Your Big Idea Will Help Small People

In an address on the closing day of the 5th Lindau Meeting on Economic Sciences, H.M. Queen Silvia of Sweden appealed to the next generation of decision-makers in the global economy, not only to strive for business success, but also to assume social responsibility.

Queen Silvia solicited among the meeting participants for support of the World Childhood Foundation, which was founded by her and celebrated its 15th anniversary in 2014. In the context of the Lindau Meeting the children's aid foundation had called for a competition among the more than 450 young economists. In keeping with the motto "Your Big Idea Will Help Small People", several concepts for corporations to take on social responsibility were developed. The winner, Bing Wan of China, was presented a price by the queen at the end of her speech.

"Being among the brightest minds of the world, and I do remember some of you very well from Stockholm from the Nobel Ceremonies, and being among the brightest young economic students from all over the world is just very special. You are the future leaders of the corporate world, of the public sector, of non-governmental organisations or in the academic field. No matter where you will be, your influence in making the difference in the world will be very important. And I specially mean the difference you can make for children in protecting them from exploitation, to making sure that violence against children is a crime and that there is an end to child abuse.

When I started the World Childhood Foundation 15 years ago, it was – and still is – my vision, that every child should have the right to a happy childhood, to thrive and to succeed. Inspired of the 25 years of the 'UN Convention on the Rights of the Child' this year, the global Unicef Report 2014 shows a very serious and depressing reality. Throughout the world, every third girl under the age of 18, some of them are not even seven, are facing a forced marriage.

In territories of war and refugee areas, more than 115 million girls and 73 million boys are subjects to sexual abuse. And if you think that Germany has a population of 80 million, you can imagine what that means. 100 million children are estimated living in the streets, and 15% of the world`s children are forced into child labour, which infringes them on their right to develop, learn and play.

The other day 'Save the children' handed over a world map to me. I saw only water, there were some few islands, 35 to be exact. It was a map, showing the 35 countries who have signed the anti-corporal punishment law. That means that only 5% of all children in the world are protected against corporal punishment.

It is time to act and give children a safe and happy childhood. I'm confident that you, the next generation, would have a more holistic way, and that your business decisions are not merely driven by the return on investment, measured in Euro, Yen or Dollar, but that the return on social investment will be on the top of your private and corporate agendas. Increasing economic value is fine, but it can easily be part of the underlined business ethics, which will be leading to a more sustainable world.

I am grounding this vision on new facts. The number of young volunteers is increasing at global level. When selecting your future employers, you are more engaged in finding opportunities where you can actively contribute with your skills, your creativity and your passion. And finally your response to our call for your 'big ideas to help small people' makes me confident that there is a high potential among you, right here. For the first time, the World Childhood Foundation sent out an invitation to join the global student challenge. This was made possible through the wonderful support of the Lindau Council, who was very helpful in collaborating for this joint initiative. And let me express my sincere thanks especially to Nikolaus Turner, who applauded the idea right from the start and who together with his wonderful team provided ongoing support until today.

So the challenge was not an easy one. And talking about thanking you all for your engagement, allow me to express one wish: On your way home tomorrow, if you have a few minutes with your mobile phone, go to www.thankyou.org. Here you can send a song to someone who made a difference in your childhood, to whom you want to say 'Thank you'. And this will be your first action, and it takes less than 5 minutes. www.thankyou.org. Try it. It`s fun.

We asked you to come up with a cause-related marketing plan, which illustrates how companies could collaborate with the World Childhood Foundation in fighting child abuse in a sector of your choice. After the judges made their selection for the shortlist, I heard there was an energetic final presentation round last evening. Six very interesting and useful ideas were presented and voted by the judging committee alongside with a hundred students in the session. Thanks to the live voting technology which was generously developed and sponsored by Dima Technologies, you all selected the winner.

The team briefed me right after the session last night and shared the results. And the clear winner is Mr. Bing Wan, whose idea convinced strongly in all three criteria dimensions: innovation, impact and sustainability. It is my pleasure to ask Mr. Bing Wan from China to meet me here on stage, and please join me in a warm and heartful applause for an outstanding idea."

H. M. Queen Silvia handing over the World Childhood Award to the young economist Bing Wan

Neurosciences: Bringing the TReND to Africa

The Lindau alumni-founded NGO “TReND in Africa” is dedicated to improve research conditions on the continent.

“Looking back, the Lindau Nobel Laureate Meeting was one of the most meaningful mentoring experiences for my career and it deeply influenced my life. For this reason it still remains in my memory so vividly.”

Yung Bog Chae, former Minister of Science and Technology of the Republic of Korea, Lindau alumnus (participation in 1962)

Whilst studying for her PhD in neurosciences at Cambridge University, Lindau alumna Lucia Prieto-Godino, met Sadiq Yusuf and was shocked to discover “that many East African neuroscientists were still using expensive rat models for their research despite extreme funding shortages”. This prompted Lucia to promote invertebrate models, commencing with the Drosophila fruit-fly, as a relatively inexpensive alternative for neuroscience research and teaching in Africa.

Participants and instructor of the second IBRO school on insect neuroscience and Drosophila neurogenetics organised by TReND in 2013

Through innovative thinking, determination and a willingness to challenge the unknown, Lucia and Tom Baden (also a Lindau alumnus) formed a strategic alliance with Professor Sadiq Yusuf, Head of the Medical School at Kampala International University (KIU) to plan and implement an inaugural three-week course for post-graduates at the KIU campus in Ishaka, Uganda. The course, entitled ”Insect Neuroscience and Drosophila Neurogenetics”, utilised a number of generous donations to fund scholarships and enable researchers from a variety of African countries to participate free-of-charge. Donated equipment and reagents were also utilised and a supportive team of volunteer researchers from Uganda, Europe, and the United States also made the trek to Ishaka to ensure the smooth running of this pioneering course. Unsurprisingly, the course proved to be a great success and Lucia, Tom, and Sadiq subsequently co-founded the “TReND in Africa” charity to conduct similar projects throughout sub-Saharan Africa with the sole aim of improving university-level scientific education and research.

To this date, two more ”Insect Neuroscience” courses have since taken place in Uganda, and the fourth hosted in August 2014 has witnessed the expansion of TReND’s initiatives to Tanzania, now at the University of Dar es Salaam. Lucia’s vision is that “these courses focus on inexpensive ways of doing great science by making use of inexpensive model organisms whenever appropriate and open source technologies, as well as important doses of imagination and improvisation”. Indeed trouble-shooting of unexpected problems on the fly is a very important part of the course, as it builds students’ confidence that despite the extra challenge of doing science in under-resourced conditions, important discoveries can be made with a bit of perspicacity and willpower. Lucia smiles as she talks about an event during one of the courses: “For example, once, in the middle of an experiment, there was a long power cut. Rather than let the experiment get ruined, we troubleshot the problem with the students by first assembling several 9V batteries to be able to finish the experiment in the lab, and then we drove by motorbike with the experiment in our hands to the closest hospital with a powered emergency room and asked them to let us plug the equipment to be able to visualise the result.”

With an ever-growing, world-wide team of volunteers, TReND now runs other courses, including molecular biology (Mekelle, Ethiopia) and bioinformatics (Icipe, Kenya), attracting students from across Africa. According to Tom, “these students are not the only ones who learn a lot; volunteers pick up a wide range of practical skills, from operating back-up generators in electricity outages to hacking and soldering equipment where necessary!”

TReND also continues to support the establishment of laboratories through fundraising and the collection and distribution of donated and, importantly, fully functional equipment. Latest technologies such as 3-D printing and open source technology are being promoted to facilitate lower-cost solutions for teaching materials and apparatuses such as micromanipulators, microscopes and high-precision pipettes.

Adding further strings to their proverbial bow, TReND’s neuroscience outreach programme is another inspiring initiative driven entirely by TReND alumni. This programme aims to introduce the field of neuroscience aspects of brain disease, and the role of neuroscientists in society, to primary, secondary and university students as well as their teachers. To date, seven events across Uganda, Nigeria, and Ghana have reached over 800 students and teachers – and the list is growing!

Most recently, in June 2014, Aderemi Aladeokin, a scientist from Nigeria, was the inaugural recipient of the TReND-AD-Instruments Scholarship to attend a 5-day CrawFly Neurobiology Educators Course at the prestigious Cornell University, USA. According to Aderemi, “the co-sponsorship allowed me to be a beneficiary of a technology-transfer platform that will further lead to much more fruitful collaborations with the world-class neurobiologists that form the faculty that taught the 2014 CrawFly course. These will definitely culminate in improved research and teaching output as far as neuroscience education in Africa is concerned.”

This article was co-authored by Emily Dunne & Peter Parslow, both currently volunteering for TReND in Africa.

Lindau alumna Ghada Bassioni (participation in 2012), Associate Professor and Head of the Chemistry Department of Ain Shams University Cairo, and alumnus Burkhard Kümmerer (1982), Dean of the Department of Mathematics at the Darmstadt University of Technology

LINDAU ALUMNI NETWORK

Approximately 25,000 students have participated in the Lindau Meetings since their beginnings in 1951. Many of them made friends in Lindau or found new collaborators and conveyed the spirit of Lindau. The Lindau Alumni directory aims to cultivate this community. Currently, data and names from the last years are completely available, but the Lindau Meetings continue to approach alumni from earlier years asking them to become part of the community. In that way, every user will be given the opportunity to build up an intergenerational network with Lindau alumni so that the directory will become a connecting platform for scientists from around the world.

“Malaria is my new adventure!”

Peter Agre devotes one third of his year to field work in Southern Africa, the rest of his time he spends in the lab to combat malaria.

After having been awarded the Nobel Prize in Chemistry in 2003, Peter Agre returned to his former passion, haematology. He has been director of the Johns Hopkins Malaria Research Institute since 2008. Already as a young doctor, he had specialised in haematology in order to combat malaria. During his trips to Asia as a young man, he had become interested in this tropical disease caused by a parasite of the genus Plasmodium that leads to severe fever attacks and can be lethal, especially in young children. According to the World Health Organization, an alarming number of about 2,000 young children die of malaria every single day. It is one of the “big three” infectious diseases that haunt developing countries, the others being HIV and tuberculosis. And if malaria doesn’t kill, it can leave children blind or brain-damaged.

Thanks to modern medicine, malaria can be treated, but drug resistance is an enormous problem. There are resistant strains against all medications, even against modern combination therapies. Thus, there is a constant need for new drugs, but as new drugs are expensive, they cannot be afforded by developing countries. It is very difficult to target the parasite because it multiplies in liver cells and in red blood cells during its life cycle. So the hunt is on for antimalarial drugs that either destroy the parasite on a molecular level in order to make resistance formation difficult, or immunise the vector, the Anopheles mosquito.

Agre’s colleagues at the Malaria Institute in Macha, Zambia – a partner institute of Johns Hopkins’ – have knocked down the prevalence of malaria in that area by stunning 95 per cent, through prevention and treatment. To continue this success story, a second institute has been opened in Zimbabwe. Agre spends about one third of each year either in “Zim or Zam”. He himself says: “Malaria is my new adventure!” Back home in Baltimore, his research groups are working on “building a better mosquito” that is resistant to malaria, and they also found a virus that is lethal for Anopheles.

Peter Agre received the Nobel Prize for the discovery of aquaporins. These are proteins in the cell membrane that function as tiny water channels and play an important role in the human body: in the kidneys, the lungs, the brain and the skin, to name just a few. Hundreds of aquaporin proteins (AQPs) can be found in various animals and plants. The Anopheles mosquito has several AQPs – auspicious targets for novel therapeutic strategies. But also the human AQPs are promising. Agre explains: “Our studies showed that glycerol transport is essential for the parasite. When a malaria parasite invades a red blood cell, the glycerol has to cross three membranes. And for this crossing, human Aquaglyceroporin-3 is important.” (Aquaglyceroporins are AQPs that let glycerol pass.) This is yet another weak point that can be exploited to combat this devastating parasite.

Malaria is a “silent disaster” responsible for an estimated one million deaths per year, four-year old victims being the largest age group. An average African rural family spends about one quarter of its meagre earnings on malaria drugs. To complete the misery, malaria often strikes during harvest seasons and causes crop shortfalls, because adults infected with Plasmodium are unable to work. Since Anopheles mosquitoes are common in most populated regions of the world, malaria is not only a problem for the developing world. Due to climate change, mosquitoes may even cause malaria outbreaks in North America or Europe in the future – and the parasite will probably exhibit multiple resistances.

For all these reasons, Peter Agre is conducting vital, inspiring and cutting-edge research in this very important field of public health. In his lecture at the 64th Lindau Meeting – available as a video in the Lindau Mediatheque – he described how he discovered aquaporins in the first place, and what the interpretation of his findings had to do with a family trip to Disney World. He also indicated why the Christian Dior company was interested in his work – and what his mother thought about him seemingly being involved in anti-aging face creams.

Susanne Dambeck

“Aquaporin Water Channels – From Atomic Structure to Malaria”, lecture by Peter Agre in the Lindau Mediatheque

Confessions of a Latin American Liberal

Mario Vargas Llosa gave an intriguing lecture at the 5th Lindau Meeting on Economic Sciences. He was the first Nobel Laureate in Literature ever to participate in a Lindau Meeting.

I am grateful to the Lindau Nobel Laureate Meetings for inviting me to deliver this lecture because they are considering me not only for my literary work but also for my ideas and political views. In the world in which I move most frequently, Latin America, the United States and Europe, when individuals or institutions pay tribute to my novels or literary essays, they typically add an "this does not mean that we accept his criticisms or opinions regarding political issues." After having grown accustomed to this bifurcation of myself, I am happy to feel reintegrated thanks to this institution, which, rather than subject me to that schizophrenic process, views me as a unified being.

But now, to be honest with you, I feel I should explain my political position. I fear it is not enough to claim that I am a liberal. The term itself raises the first complication. As you well know, "liberal" has different and frequently antagonistic meanings, depending on who says it and where they say it. For example, my grandmother Carmen used to say that a man was a liberal when referring to a gentleman of dissolute habits. For her, the prototypic incarnation of a "liberal" was a legendary ancestor of mine who told his wife that he was going to buy a newspaper and never returned. The family heard nothing of him until 30 years later, when the fugitive gentleman died in Paris.

In the United States, the term "liberal" has leftist connotations. On the other hand, in Latin America and Spain, where the word was coined to describe the rebels who fought against the Napoleonic occupation, they call me a liberal – or, worse yet, a neo-liberal – to discredit me, because the political perversion of our semantics has transformed the original meaning of the term – a lover of liberty, a person who rises up against oppression – to signify conservative or reactionary.

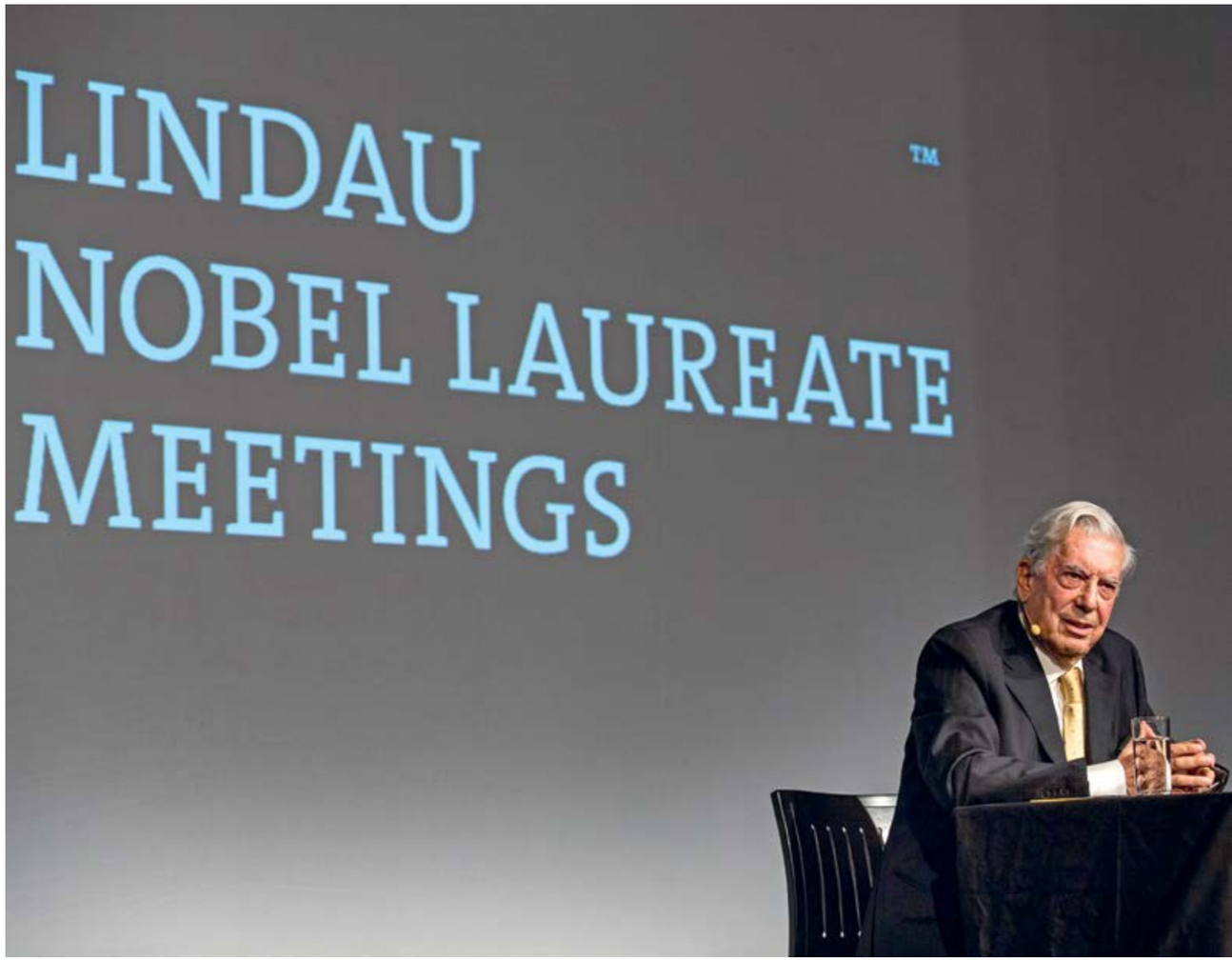
Liberalism, in Latin America, was a progressive intellectual and political philosophy that, in the XIX century, opposed militarism and dictators, wanted the separation of Church and the State and the establishment of a democratic and civilian culture. In most countries liberals were persecuted, exiled, send to prisons or killed by the brutal regimes that, with few exceptions – Chile, Costa Rica, Uruguay and no more –, prospered all over the continent. But in the 20th century, revolution, not democracy, was the aspiration of the political avantgarde, and this aspiration was shared by a great number of young people who wanted to emulate the guerrilla example of Fidel Castro. In this context, liberals were considered conservatives and caricaturised so much that their real political goals and authentic ideas only permeated small circles.

Only in the last decades of the 20th century things started to change and liberalism came to be recognised as something deeply different from the Marxist left and the extreme right, and it is important to mention that this was possible, at least in the cultural sphere, because of the courageous endeavour of the great Mexican poet and essayist Octavio Paz and the magazines that he published, Plural and Vuelta. After the fall of the Berlin Wall, the collapse of the Soviet Union and the conversion of China to a capitalist (though authoritarian) country, political ideas also evolved in Latin American and the culture of freedom made important gains all over the continent.

Because liberalism is not an ideology, but rather an open, evolving doctrine that yields to reality instead of trying to force reality to do the yielding, there are diverse tendencies and profound discrepancies among liberals. With regard to religion and social issues, liberals like me, who are agnostics as well as supporters of the separation between Church and State and defenders of the decriminalisation of abortion, gay marriage and drugs, are sometimes harshly criticised by other liberals who have opposite views on these issues. These differences of opinion are healthy and useful because they do not violate the basic precepts of liberalism, which are political democracy, the market economy and the defence of individual interests over those of the State.

For example, there are liberals who believe that economics is the field through which all problems are resolved and that

Mario Vargas Llosa lecturing at the city theatre of Lindau



"I feel Peruvian, Spanish, Latin American, European, man of the 21st century, man of the world – that is civilisation!"

Mario Vargas Llosa

the free market is the panacea for everything from poverty to unemployment, discrimination and social exclusion. These liberals, true living algorithms, have sometimes generated more damage to the cause of freedom than did the Marxists, the first champions of the absurd thesis that the economy is the driving force of history. It simply is not true. Ideas and culture are what differentiate civilisation from barbarism, not the economy. The economy by itself may produce optimal results on paper, but it does not give purpose to the lives of people. The free market is the best mechanism in existence for producing riches and, if well complemented with other institutions and uses of democratic culture, can launch the material progress of a nation to the spectacular heights with which we are familiar. But it is also a relentless instrument, which, without the spiritual and intellectual component that culture represents, can reduce life to a ferocious, selfish struggle.

Thus, the liberal I aspire to be considers freedom a core value. The foundations of liberty are private property and the rule of law; this system guarantees the fewest possible forms of injustice, produces the greatest material and cultural progress, most effectively stems violence and provides the greatest respect for human rights. According to this concept of liberalism, freedom is a single, unified concept. Political and economic liberties are as inseparable as the two sides of a medal. Because freedom has not been understood as such in Latin America, the region has had many failed attempts at democratic rule. This was either because the democracies that began emerging after the dictatorships were toppled respected political freedom but rejected economic liberty, which inevitably produced more poverty, inefficiency and corruption, or because they led to authoritarian governments convinced that only a firm hand and a repressive regime could guarantee the functioning of the free market.

Political democracy, freedom of the press and the free market are foundations of a liberal position. But, thus formulated, these three expressions have an abstract, algebraic quality that dehumanises and removes them from the experience of the common people. Liberalism is much, much more than that. Basically, it is tolerance and respect for others, and especially for those who think differently from ourselves, who practice other customs and worship another god or who are non-believers. By agreeing to live with those who are different, human beings took the most extraordinary step on the road to civilisation. It was an attitude or willingness that preceded democracy and made it possible, contributing more than any scientific discovery or philosophical system to counter violence and calm the instinct to control and kill in human relations. It is also what awakened that natural lack of trust in power, in all powers, which is something of a second nature to us liberals. We cannot do without power, except of course in the lovely utopias of the anarchists. But it can be held in check and counterbalanced.

Defending the individual is the natural consequence of believing in freedom because it is measured by the level of autonomy citizens enjoy to organise their lives and work toward their goals without unjust interference, that is, to strive for "negative freedom," as Isaiah Berlin called it. Collectivism has survived throughout history in those doctrines and ideologies that place the supreme value of an individual on his belonging to a specific group. All of these collectivist doctrines – Nazism, fascism, religious fanaticism and communism and nationalism – are the natural enemies of freedom and the bitter adversaries of liberals. In every age, that atavistic defect has reared its ugly head to threaten civilisation.

A great liberal thinker, Ludwig von Mises, was always opposed to the existence of liberal parties because he believed that the liberal philosophy should be a general culture shared with all the political currents and movements co-existing in an open society. There is a lot of truth to this theory. In recent past, we have seen cases of conservative governments, such as that of Ronald Reagan, Margaret Thatcher and José Maria Aznar, which promoted deeply liberal reforms. At the same time, we have seen nominally socialist leaders, such as Tony Blair in the United Kingdom, Ricardo Lagos in Chile, and in our days, Jose Mujica in Uruguay, implement economic and social policies that can only be classified as liberal.

Populism more than revolution is today the major obstacle for progress in Latin America. There are many ways to define "populism"; but, probably, the more accurate is the kind of demagogic social and economic policies that sacrifice the future of a country in favor of a transient present. With fiery rhetoric, Argentine President Cristina Fernandez de Kirchner has followed the example of her husband, the late President Nestor Kirchner, with nationalisations, interventionism, controls, persecution of the independent press, policies that have taken to the brink of disintegration a country that is, potentially, one of the more prosperous of the world.

Even the left has been reluctant to renege on the privatisation of pensions – which has occurred in eleven Latin American countries to date – whereas the more backward left in the United States opposes the privatisation of Social Security. These are positive signs of a certain modernisation of the left, which, without recognizing it, is admitting that the road to economic progress and social justice passes through democracy and the market, which we liberals have long preached into the void.

Mario Vargas Llosa

Interdisciplinarity vs. Disciplinarity – Complimentary or Exclusive Approaches?

Does the future in science and research belong to interdisciplinarity? Does this trend induce a loss in specialisation? An attempt to outline the reservations interdisciplinarity has to face in academia.

Interdisciplinarity is defined as creating something new by crossing disciplinary boundaries, as is the case with research projects that equally involve biology, physics, and chemistry. This pertains pretty much to the work of Hartmut Michel, Johann Deisenhöfer and Robert Huber; they shared the Nobel Prize in Chemistry 1988. The three researchers had described the three-dimensional structure of a bacterial membrane protein complex with the help of x-ray crystallography. Bringing to mind the disciplines involved: the initial research question originated in biology (membrane proteins are difficult to crystallise, so their atomic structure is difficult to determine), the method of x-ray crystallography derives from solid-state physics, the Nobel Prize has been awarded in chemistry, and future applications may be in medicine or in other disciplines.

Looking deeper, many Nobel Laureates in the natural sciences actually employed methods from other disciplines in order to gain new scientific insights. Peter Agre also applied x-ray crystallography in his research – to describe the structure of a newly discovered protein even before he knew its function. (Agre commented his findings in his lecture at the 64th Lindau Nobel Laureate Meeting: "A protein without a function is like a scientist without a grant.") He received the Nobel Prize in Chemistry 2003, and now applies his findings in medicine, in particular in malaria research (see page 108). Especially medicine and molecular biology rely heavily on imaging techniques from physics, just as pharmaceutics rely on chemistry, molecular biology and medical research. Another example in which a Nobel Laureate is involved: Hamilton Smith could never have found the restriction enzymes, for which he was awarded the Nobel Prize in Physiology or Medicine 1978, without his in-depth training in mathematics.

However, in order to be successful in academia, even within an interdisciplinary project, you often need to demonstrate your excellence in one specific field first before you reach out to other disciplines. After all, an expert is still a person "who knows very much about very little", and a successful team often consists of many experts in this sense. All researchers mentioned above have had rigorous training in their specific field. But if a scientist becomes an "expert": will he or she still have the open-mindedness and tolerance necessary to accept the language, the approaches and methods of an unfamiliar discipline? The above-mentioned Nobel Laureates obviously had.

If interdisciplinarity stands for the safest bet for scientific success – why do most inter-disciplines try everything to become "real" disciplines? A few examples are nanotechnology, environmental studies or minority studies; neuroscience and biochemistry were obviously already successful. This is because a separate discipline has many advantages: its own professors, its own budget within the university, its own journals. Moreover, a discipline facilitates careers: peer reviewers and evaluators for academic jobs are often from one discipline alone, and might be prejudiced against young colleagues who work with interdisciplinary approaches, judging them as not being "scientific" enough.

Interdisciplinarity always concerns something new: new questions, new solutions, or new technologies. Sometimes it is also about unattended problems (as it happens in the environmental debate) or neglected groups. "Making the method fit the problem" could be its motto – and not the other way round. Interdisciplinary approaches have shown that they can release creative energy in science. But currently, many inter-disciplinary schemes of study for undergraduates are being shut down in the US, while there is an ongoing debate whether interdisciplinary studies are too demanding for the average undergraduates – or whether these shutdowns are the result of "disciplinary hegemony". Then again: something new often has to prove itself, has to survive through times of conflict, before becoming established.

Susanne Dambeck

"Modern science needs to pass the boundaries to other disciplines to find inspiration there, and it also has to overcome the boundaries of generations to keep itself alive – and this happens in a unique way at Lindau."

Johanna Wanka, Federal Minister of Education and Research

Robert Huber shared the Nobel Prize in Chemistry 1988 with Johann Deisenhofer (middle) and Hartmut Michel (bottom) "for the determination of the three-dimensional structure of a photosynthetic reaction centre" – a truly interdisciplinary approach.

65th LINDAU NOBEL LAUREATE MEETING: INTERDISCIPLINARY

Every five years, the Lindau Meetings host an inter-disciplinary forum for exchange among scientists of the disciplines physiology and medicine, physics, and chemistry – as will be the case from 28 June till 3 July 2015 on the occasion of the 65th Lindau Meeting. At the time of printing this report, more than 50 Nobel Laureates had already confirmed their participation. Approximately 600 young scientists will have the opportunity to engage in the intergenerational dialogue. The results of the multi-stage selection process are scheduled to be announced by end of February 2015.

Baden-Württemberg Boat Trip to Mainau Island, presented by the State of Baden-Württemberg at the 64th Lindau Nobel Laureate Meeting and by SAP SE at the 5th Lindau Meeting on Economic Sciences

"This was a unique experience!
Such a pity you cannot participate more than once –
unless you win the Nobel Prize!"

Fabiola Gerpott, participant in the 5th Lindau Meeting on Economic Sciences

The Lindau Institutions

The Lindau Nobel Laureate Meetings are jointly organised, represented and promoted by two institutions, the council and the foundation. They act in concert to warrant the continuity of the meetings and to advance their constant development.

"I have no doubts at all that Alfred Nobel himself would have loved to be here with us at Lindau to discuss the issues of our times."

Lars Heikensten, Executive Director of the Nobel Foundation, Stockholm

The Council
The Council for the Lindau Nobel Laureate Meetings was founded in 1954, three years after the first Lindau Meeting, to secure their existence and shape their future development. Count Lennart Bernadotte, the co-founder of the Lindau Meetings, became the first president of the council.

The purpose of the council is to organise the annual meetings on the basis of an elaborate scientific programme. This includes the establishment and maintenance of close relations with academic partners worldwide.

The council will ensure that eligible and qualified young scientists get the chance to participate in the meetings. In this regard, the council also contributes to securing the financial conditions for the meetings in close collaboration with the foundation. The council maintains an executive secretariat at Lindau.

Bottom row: Klas Kärre, Gabriela Dür, Lars Bergström, Countess Bettina Bernadotte, Wolfgang Schürer, Martin Hellwig, Dagmar Schipanski, Gerhard Ecker, Astrid Gräslund

Top row: Nikolaus Turner, Burkhard Fricke, Stefan Kaufmann, Rainer Blatt, Wolfgang Lubitz, Peter Englund, Walter Schön

Honorary President
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Stefan H. E. Kaufmann
Hartmut Michel
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(as of 10/2014)

Corresponding Members
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Hans Jörnvall
Sten Orrenius
Dagmar Schipanski

Permanent Guests
Gabriela Dür
Gerhard Ecker
Walter Schön

The Foundation
The Foundation Lindau Nobel Laureate Meetings was established in the year 2000 by fifty Nobel Laureates, the Bernadotte family, and council members. Ever since, Wolfgang Schürer has been the chairman of the board. In general, the foundation's objective is to promote science, research, and related social activities.

In particular, its main purpose is to ensure the continuance and further development of the Lindau Meetings. This includes the support of projects and initiatives in the realm of the Mission Education. The foundation is registered on Mainau Island. In the interest of a close cooperation with the council, the office of the foundation is also based at Lindau.

Federal Chancellor Angela Merkel signing the visitors' book of the Lindau Foundation

The designated Council Vice-Presidents: Helga Nowotny (second from right) and Wolfgang Lubitz (right)

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Count Lennart Bernadotte †
Roman Herzog

Board of Directors
Wolfgang Schürer
Chairman

Countess Bettina Bernadotte

Thomas Ellerbeck

Nikolaus Turner
Managing Director

Founders Assembly

The Foundation Lindau Nobel Laureate Meetings was established in 2000 by 50 Nobel Laureates, the Bernadotte family, and council members. By the end of 2014, 282 Nobel Laureates belong to the Founders Assembly, and thus demonstrate their strong support of the Lindau Meetings.

Alexei Abrikosov
Peter Agre
Martti Ahtisaari
George A. Akerlof
Zhores Alferov
Maurice Allais
Sidney Altman
Philip W. Anderson
Werner Arber
Kenneth J. Arrow
Robert J. Aumann
Richard Axel
Julius Axelrod
David Baltimore
Francoise Barré-Sinoussi
Gary S. Becker
Johannes Georg Bednorz
Baruj Benacerraf
Paul Berg
Hans A. Bethe
Eric Betzig
Bruce A. Beutler
J. Michael Bishop
Sir James Black
Elizabeth H. Blackburn
Günter Blobel
Nicolaas Bloembergen
Baruch S. Blumberg
Paul D. Boyer
James M. Buchanan
Linda Buck
Mario R. Capecchi
Jimmy Carter
Thomas R. Cech
Martin Chalfie
Georges Charpak
Yves Chauvin
Steven Chu
Aaron Ciechanover

Ronald H. Coase
Stanley Cohen
Claude Cohen-Tannoudji
Leon Cooper
Elias J. Corey
John Warcup Cornforth
Mairead Corrigan Maguire
James W. Cronin
Paul J. Crutzen
Robert F. Curl jr.
Hans G. Dehmelt
Johann Deisenhofer
Peter A. Diamond
Peter C. Doherty
Renato Dulbecco
Christian de Duve
Gerald Edelman
Manfred Eigen
Robert Engle
François Englert
Richard R. Ernst
Gerhard Ertl
Leo Esaki
Martin Evans
John B. Fenn
Albert Fert
Edmond Fischer
Ernst Otto Fischer
Robert W. Fogel
Jerome Friedman
Milton Friedman
Robert F. Furchgott
D. Caleton Gajdusek
Andre Geim
Murray Gell-Mann
Riccardo Giacconi
Ivar Giaever
Walter Gilbert
Alfred G. Gilman

Vitaly L. Ginzburg
Donald Glaser
Sheldon L. Glashow
Roy J. Glauber
Joseph L. Goldstein
Michail Gorbachov
Clive Granger
Paul Greengard
David J. Gross
Robert H. Grubbs
Peter Grünberg
Theodor W. Hänsch
Lars Peter Hansen
John L. Hall
Serge Haroche
Lee Hartwell
Herbert A. Hauptman
Harald zur Hausen
Richard F. Heck
Alan C. Heeger
Stefan W. Hell
Dudley R. Herschbach
Avram Hershko
Antony Hewish
Peter Higgs
Jules A. Hoffmann
Roald Hoffmann
Gerardus 't Hooft
H. Robert Horvitz
David H. Hubel
Robert Huber
Russel Hulse
Timothy Hunt
Leonid Hurwicz
Andrew F. Huxley
Louis Ignarro
Brian Josephson
Daniel Kahneman
Eric R. Kandel

Charles K. Kao
Jerome Karle
Tawakkol Karman
Imre Kertész
Wolfgang Ketterle
Har Gobind Khorana
Lawrence R. Klein
Klaus von Klitzing
Aaron Klug
Makato Kobayashi
Brian K. Kobilka
Walter Kohn
Arthur Kornberg
Roger D. Kornberg
Masatoshi Koshiba
Edwin Krebs
Herbert Kroemer
Harold W. Kroto
Finn Kydland
Willis E. Lamb
Robert Laughlin
Paul C. Lauterbur
Leon M. Lederman
David M. Lee
Tsung-Dao Lee
Yuan Tseh Lee
Robert J. Lefkowitz
Jean-Marie Lehn
Rita Levi-Montalcini
Michael Levitt
Edward B. Lewis
William N. Lipscomb
Robert E. Lucas Jr.
Alan G. MacDiarmid
Roderick MacKinnon
Peter Mansfield
Rudolph A. Marcus
Harry M. Markowitz
Barry Marshall

Toshihide Maskawa
Eric S. Maskin
John C. Mather
Daniel L. McFadden
Craig C. Mello
Bruce Merrifield
Robert C. Merton
Hartmut Michel
James A. Mirrlees
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Rudolf Mößbauer
Mario Molina
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Douglas Osheroff
Arno Allen Penzias
Saul Perlmutter
Edmund S. Phelps
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John Polanyi

John Pople
Lord George Porter
Edward C. Prescott
Ilja Prigogine
Venkatraman Ramakrishnan
José Ramos Horta
Norman F. Ramsey
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Richard R. Schrock
Reinhard Selten
Amartya Sen
William F. Sharpe
K. Barry Sharpless
Lloyd S. Shapley
Dan Shechtman
Robert J. Shiller
Osamu Shimomura
Kai M. Siegbahn
Christopher A. Sims
Ellen Johnson Sirleaf

Among the most recent members of the Founders Assembly:
Stefan W. Hell, 2014 Nobel Laureate in chemistry. Portrait by Peter Badge for the photo series "NOBELS"

Jens C. Skou
Richard Smalley
Hamilton O. Smith
Michael Smith
Vernon L. Smith
Oliver Smithies
George F. Smoot
Robert M. Solow
Jack Steinberger
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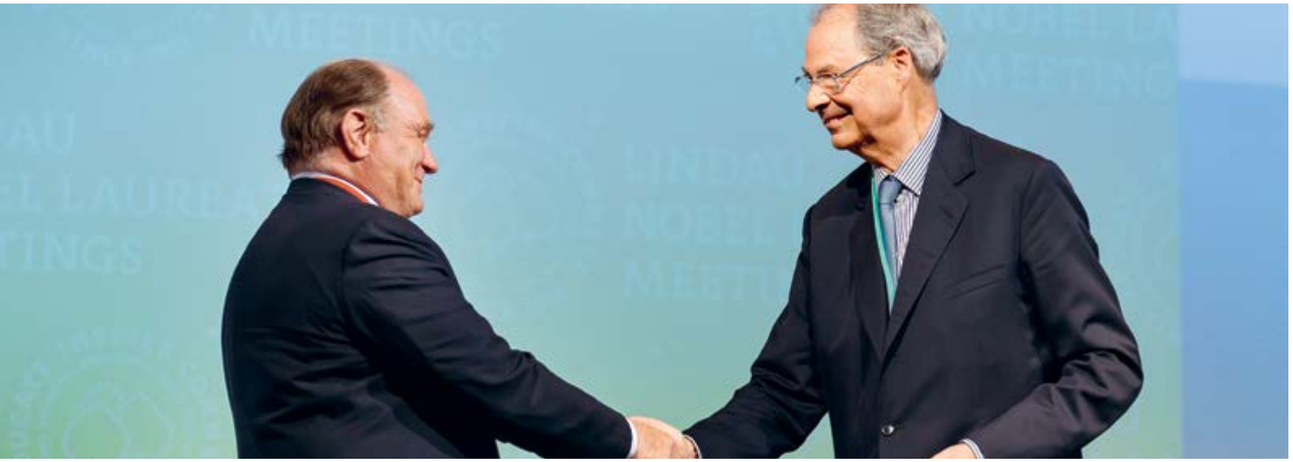
The members of the most prestigious committee of the Lindau Foundation share the values and goals of Lindau's "Mission Education" and are dedicated to further advance it. They are valued advisers to the board and distinguished ambassadors for the cause of the Lindau Meetings.

"I gladly accept the honour of joining such a distinguished group of leaders who promote the important goal of creating dialogue between laureates and the next generation of laureates and who also support the dialogue of scientists with all the stakeholders of civil society and by doing that avoid the ivory tower problematic of science."

Walter B. Kielholz

Walter B. Kielholz and Wolfgang Schürer



During the last 64 years more than 30,000 young scientists from more than 80 countries have had the opportunity to meet, learn from and interact with Nobel Laureates. This would not have been accomplished without the support of science-promoting institutions, companies and foundations as well as private philantropists, such as this year's honorary senators.

As a token of appreciation for their ongoing support, and in recognition of their charitable commitment and lifetime achievements, the Swiss entrepreneur and philanthropist Hansjörg Wyss, and Walter B. Kielholz, Chairman of the Supervisory Board and former CEO of Swiss Re, were inducted into the Honorary Senate on the occasion of the 64th Lindau Nobel Laureate Meeting and the 5th Lindau Meeting on Economic Sciences respectively.

In his laudatio for Hansjörg Wyss, in his role as Chairman of the Board of the Foundation, Wolfgang Schürer said: "Innovators are the driving forces implementing ideas into practice. Innovators recognise opportunities and are willing to take respective risks. They are committed to leadership in a process of managing change. [...] As an innovator, Hansjörg Wyss has played an important role in translating cutting-edge research into sustainable and highly successful applications."

On bestowal of the induction certificate to Walter Kielholz, Schürer emphasised: "Learning is key to sustainable development. Walter Kielholz' legacy gives testimony that in our times of continuous change, life-long learning is more important than ever."

Walter B. Kielholz

Hansjörg Wyss

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Nikolaus Turner

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Klaus Kleinfeld, Chairman and CEO, Alcoa Inc.

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TK Lindau provided computer working places and internet access at both meetings.

At both meetings, the shuttle service limousines were provided by the Volkswagen Group.

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Executive Secretariat of the Lindau Council

Visualisation of the winning design of an architectural competition: Thanks to the significant financial support by the Free State of Bavaria and the City of Lindau, the meeting venue "Inselhalle" will be modernised and expanded after the 65th Lindau Meeting, in summer 2015.

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Preliminary Account 2014: Expenditures

(in Euro)	64th LINDAU NOBEL LAUREATE MEETING	5th LINDAU MEETING ON ECONOMIC SCIENCES
TRAVEL		
Nobel Laureates	167,631	99,505
Young Scientists	21,390	3,849
Media	13,877	5,781
Others	35,395	1,820
LODGING		
Nobel Laureates	64,019	29,633
Young Scientists	260,203	180,588
Media	11,997	4,339
Others	72,725	42,758
BOARDING		
Nobel Laureates	24,240	22,478
Young Scientists	139,255	159,146
Media	9,176	2,703
Others	14,829	3,900
MEETING ORGANISATION		
Scientific Programme & YS Selection	22,596	15,500
Rental Fees Locations incl. Tents	88,769	101,958
Technical Equipment	218,122	202,122
Utilities & Services	24,422	18,693
On-site Staff	56,540	37,847
Transfers	7,884	6,888
Supporting Programme	20,990	9,312
Printed Matters	57,519	41,562
Expendable Items	6,271	19,059
AV Production	104,078	59,676
Science & Media Consulting	58,176	31,563
Website	9,648	4,824
Brand & Trademarks	14,164	7,082
Telecommunications, Postage	17,893	8,947
IT Services, Hardware, Software	74,852	37,426
Accounting, Legal Advice, Insurances	18,615	6,717
EXECUTIVE SECRETARIAT		
Staff	468,571	231,670
Office Operating Costs	32,115	16,058
Office Supplies & Equipment	9,071	4,535
ASSOCIATED PROJECTS	194,827	26,162
OTHER COSTS	16,000	10,095
EXPECTED TOTAL EXPENDITURES	2,356,551	1,454,214

The above expenditure calculation includes 401,829 € of expected costs for October – December 2014.

Preliminary Account 2014: Revenues

Grants, donations, funds and donations in kind from the meetings' principal benefactors (AKB Stiftung, Alcoa Foundation, Audi AG, Australian Academy of Science, BASF SE, Bayer Science & Education Foundation, bayme – Bayer. 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TOTAL REVENUES	3,810,765 €

Note:
The calculated revenues refer only to the meetings and selected outreach projects included in the expense budget for the fiscal year 2014. Deficits have been covered by the Foundation Lindau Nobel Laureate Meetings as guaranteed to the Council for the Lindau Nobel Laureate Meetings.

The Lindau Meetings have also been supported by generous donations-in-kind by several benefactors, e.g. Volkswagen Group and TK Lindau.

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2015
65th Lindau Nobel Laureate Meeting
Interdisciplinary:
Physiology/Medicine, Physics, Chemistry
28 June – 3 July

2016
66th Lindau Nobel Laureate Meeting
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26 June – 1 July

2017
67th Lindau Nobel Laureate Meeting
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25 June – 30 June

6th Lindau Meeting on Economic Sciences
22 – 26 August

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Published by

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as well as Peter Agre, Archiv Hein, Archiv Stuhler, Auer+Weber+Assoziierte, Peter Badge, Bavarian State Ministry of Education, Science and the Arts, Matthias Bazyli, Fabian Biasio, Beat Bühler, Econ Films, Galerie Einstein Unter den Linden, David Knipping for Lindau Tourismus und Kongress GmbH, Korea Institute of Science and Technology, Education and Planning (KISTEP), Nature Publishing Group (NPG), Sino-German Center for Research Promotion (SGC), Volker Steger, TReND in Africa, Nikolaus Turner, The Wyss Foundation

Layout

LIGHTHOUSE Creative Media GmbH, Lindau

Print & Production

Vorarlberger Verlagsanstalt GmbH, Dornbirn, Austria

Publication Date

5 December 2014 ISSN: 1869-3741

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