INTRODUCTION

Curiosity aroused

What makes a Nobel laureate tick? What advice can they offer? And who's asking?

BY MICHELLE GRAYSON

"It has been said that democracy is the worst form of government except all the others that have been tried."
Winston Churchill (1874–1965)

It may seem odd to open an article ostensibly about science with a quotation from a politician, especially a wartime leader. Yet Churchill was the most quoted — or at least most paraphrased — person in this series of Q&As. Many Nobel laureates compared science — especially the peer-review system — with democracy. The system may have problems; some people may try to cheat it; but no one has come up with a better way to do science.

The questions put to the laureates came from another small exercise in democracy — the lindau.nature.com website. Established as a portal connecting the social-media coverage of the 60th Lindau Nobel Laureates Meeting in 2010, the website carries links to related blogs, the Facebook group, the YouTube channel, the Twitter feed (Tweets carrying the #lnlm10 hashtag), Flickr and a new page: Nobel Questions — Lindau Answers.

On this page, anyone could register and submit a question. Other visitors to the site were then able to vote for their favourite questions, helping us to identify the most interesting. By the time submissions closed, 14,304 votes had been cast overall for 205 submitted questions, and the most popular question — "What will be the fate of HIV in the next decade?" — had received 1,511 votes.

From the most popular questions, we at *Nature* chose around 10 to put to the laureates. Questions ranged from scientific queries about current research and theories, to more general considerations about life, politics, funding, inspiration and epitaphs.

The answers we received from the laureates were equally diverse. Some were long and considered, some were short and to-the-point. Some were equivocal, some were objective, and some clearly pushed an agenda. There was a mix of optimism and pessimism. And, apart from a fondness for quoting Churchill, the only other common feature was a love of science — of asking questions and seeking the truth.

WHO QUESTIONS THE QUESTIONERS?

When we contacted the people who submitted the top questions we discovered a diverse bunch, not all of them attendees of the 2010 Lindau meeting. Each had their own reasons for posing their question, which tended to fall into two broad categories: either they sought advice relevant to their own research, or they hoped to be inspired by the laureates.

Many questions reflected interests outside the laboratory. Markita Landry, a full-time doctoral student in chemical physics at the University of Illinois, asked a question that received nearly 700 votes: "Do you believe scientists are under-represented in politics across the globe? If so, have established scientists a duty to become more active in politics and science policy?" In the United States, she explained, "fewer than 1.5 percent of members of Congress are scientists. By maintaining a strong divide between science and politics, it seems inevitable that scientific issues will end up being poorly addressed in political circles." And, on the whole, the laureates were in agreement, although with widely different reasons and solutions.

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Funding was another popular subject. The amount of financial support that scientists have access to varies widely across the world. Christoph Göbl, a PhD student of biomolecular NMR spectroscopy in Austria, was interested to know if the laureates had experience or knowledge of any particular country where the science funding was ideal — or at least very well handled. Having come into scientific academia late, following spells as an apprentice cook, waiter and then chef, Göbl was motivated by his own experience at the mercy of the Austrian funding system. "In Austria, it is almost impossible to get a position," he explained. "It is even hard to finance your science through grants: you are only allowed to receive grants for six years, after that you need a position at a university." Some of the laureates cited specific countries as good examples, including Singapore, Germany, the United States, the United Kingdom, Switzerland and the Netherlands. However, many doubted that such a country existed. Luc Montagnier, co-recipient of the 2008 Nobel Prize in Physiology or Medicine for the discovery of HIV, went so far as to declare: "There are none. Management and funding of research have become highly bureaucratic in the US and Western Europe."

The thoughts of Winston Churchill, a literature laureate, on peer review are unknown.

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What about the contribution of corporate research? This was the subject of a question from Noy Bassik, a PhD student in chemical and biomolecular engineering at Johns Hopkins University, and 408 other people also thought the question interesting. "Bell Labs and other corporate research sites, which led to many Nobel prizes, are on the decline or have shut down. Is corporate basic research critical, is research in academia sufficient — or has private research just shifted to biology?" Bassik has a strong family history in science and engineering, and was "eating and drinking science everywhere" as a child. He also has academic and industrial experience, and sees himself in the middle of the spectrum that typically runs from academia undertaking "pure fundamental questions with no specific application in mind" to industrial R&D "solving technical problems for a specific project/medication/device". He explains: "I am from New Jersey and have always admired Bell Labs and the research spirit that they represented. In fact, it has always been my dream to work at a place like Bell Labs in their heyday (1960-80s), where budgets and freedom were large and constraints were small." Sadly for Bassik, the consensus was that "times have changed", as Arno Penzias, 1978 co-recipient of the physics prize, stated. With one exception, Penzias added: "Drug companies are a special case. Most have maintained their research laboratories, but face a unique problem: their labs are staffed by brilliant biochemists, ill equipped to provide advantage in a genomics-dominated era."

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PREDICTIONS

The single most popular question, on the fate of HIV, was posed by Prasanna Kumar Santhekadur, a post-doctoral fellow working on tumour angiogenesis, typifying the cross-disciplinary curiosity that drew visitors to the site and Lindau attendees in general. Two of the Nobel laureates for physiology or medicine 2008 — Montagnier and Harald zur Hausen — answered this question, and were pessimistic about development of a long-term solution; anticipating progress in therapeutic development, but also no end to the spread of the virus, "partly because of the insufficiencies of prevention policies, partly because the research is wrongly orientated", Montagnier explained. He then questioned the logic of ploughing money into "an elusive prophylactic vaccine or to the extension of life-long treatments by expensive drugs". zur Hausen, who linked human papilloma viruses with cervical cancer, expects more progress in the therapy of HIV infections, including chemo- or gene therapy, considers 10 years too short a timespan.

Given that the Lindau meeting this year focused on interdisciplinary research, it is no surprise that several questioners asked about collaboration. Adam Goodwill, who is working towards a PhD in cellular and integrative physiology at West Virginia University, acknowledged that interdisciplinary research is important but found that "each discipline is composed of a series of very subtly nuanced phrases", which can have very specific and profound meanings. "How do we accomplish these collaborations when we don't speak that common language?" he asked.

Sebastian Krackl, a chemistry PhD student at the Berlin Technical University who has experienced interdisciplinary exchanges, echoed that view: "I was shocked to see how different the scientific languages of different disciplines are, how hard it is to cross cultural and scientific disparities in order to profit from the others' experience and knowledge." All the laureates agreed that it was important to encourage more collaborative working. As Richard Ernst, recipient of the 1991 Nobel Prize in Chemistry, pithily put it: "There is no fruitful science without interdisciplinarity. When you want to be a narrow-minded nerd, leave science and seek employment in a post office!"

"There is no fruitful science without interdisciplinarity."

Practical solutions ranged from simply organizing monthly cross-department get-togethers — as instituted at Columbia University, said Martin Chalfie, co-recipient of the 2008 Nobel Prize in Chemistry — to advocating a fundamental change in the way that academic departments are organized, proposed by Harold Kroto, co-recipient of the 1996 Nobel Prize in Chemistry.

A personal question rounded off the questionnaire. Ian Harvey Arellano, a chemistry PhD student at the University of the Philippines, asked: "Aside from being a Nobel laureate, how would you want the world to remember you?" His rationale was to challenge the "nerdy-geeky" image of top flight scientists to show their more colourful characteristics. "I believe that my question will reveal the other side of the laureates, which may or may not be distinct from their science, and I am sure that this will be a fountain of inspiration for all who read their statements." However, he did not anticipate the modesty of many laureates, exemplified by the short response from zur Hausen: "I do not have a special desire for remembrance."

Modesty aside, whether you are seeking advice, inspiration, or are just curious, we hope you enjoy this selection of questions and answers associated with the 2010 Lindau Nobel Laureate Meetings.

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