Sunday March 8, 2009
15:30 to 17:00

Lyon Convention Center
France

PROGRESS IN LIFE SCIENCES: NEW DIRECTIONS AND HOPE FOR SOCIETY
Plenary session

Moderator

- **Liz Padmore**, Board member, Independent Consultant and Associate Fellow James Martin Institute, UK

Speakers

- **Peter C. Doherty**, Nobel Laureate, Medicine 1996, St Jude Children's Research Hospital in Memphis, USA and Department of Microbiology and Immunology at the University of Melbourne, Australia
- **Jean-Marie Lehn**, Nobel Laureate, Chemistry 1987, Collège de France in Paris and Université Louis Pasteur in Strasbourg, France
- **Richard J. Roberts**, Nobel Laureate, Medicine 1993, Chief Scientific Officer at New England Biolabs in Beverly, Massachusetts, USA
- **Kurt Wüthrich**, Nobel Laureate, Chemistry, 2002, Scripps Institute in La Jolla, California, USA and Institute of Molecular Biology and Biophysics, ETH Zurich, Switzerland
- **François Gros**, Permanent Honorary Secretary, Académie des Sciences, France

Summary

- This plenary session offered an initial overview of new orientations that have emerged recently in the field of life sciences and technology
- A panel of Nobel laureates shared their views of the theoretical significance of recent evolutions of basic research in life sciences and of the latest developments in their technological applications, and made the link with general theme of the conference 'Life Sciences' challenging role in our expanding cities
- **François Gros** opened the session giving an overview about recent achievements from life sciences since the breakthrough of uncoding the human genome by Craig Venter, Francis Crick and the human genome project who participated BioVision 2001
- He introduced the Nobel laureates by showing the importance of their work for the current science and beyond
- As milestone achievements he pointed out supra-molecular biology, high-resolving physics allowing for resolving the 3D structure of proteins, systems biology to

predict cellular reactions, stem cell technology to presumably cure so far uncured diseases

- Furthermore, life sciences is providing solutions to existing problems like major diseases, to agriculture and food supply, and global warming
- **Jean-Marie Lehn** inspired with a short talk on supramolecular chemistry and how dynamic combinatorial chemistry will serve us to discover new drugs
- He claimed that biology and chemistry are the most complex information which is exchanged around
- Along the simple lock and key model he explained how chemistry technologies for drug discovery evolved from using the trial and error approach to adaptive evolutionary chemistry
- **Kurt Wüthrich** shared his vision of the expanding protein universe and therefore took off his belt to demonstrate that linear sequence information of protein is not enough to identify its 3D structure and function
- Indeed, only the 3D structure of the folded protein (shown with his belt) is the useful information for developing drugs
- The issue is that from over 6 million protein sequences we only know about 50,000 3D protein structures in current databases, but with increasing speed of knowledge gathering through the advances of resolution technologies and creative minds searching for the best resolving algorithms
- These algorithms allow to determine representative structures for large families of proteins in which unidentified structures could be included
- His hope that politicians should continue to invest in basic research and technologies was underpinned by several other panellists sharing his view that there will be no applied science without basic science
- **Peter Doherty** precisely described the global challenges of humanity and the impact of increasing population, urbanisation, and global warming
- Through increasing population density and changing lifestyles, humanity is more exposed to infectious diseases than ever, e.g. HIV, influenza, West Nile fever or dengue
- Life sciences are expected to cope with infectious diseases through development of vaccines against most serious diseases
- Sciences has achieved big progresses, e.g. against HIV/AIDS or influenza virus, however, the solution does not always lie in science, but also in behavioural changes and political work bringing drugs into developing countries
- He stated that the risk is not only present in third world countries, but can spread endemically in developed countries as recently seen with West Nile virus in the USA or dengue in South Asia and North Australia
- Peter Doherty prompted not to ignore the issues with infectious diseases and move forward in vaccination both in developed and developing countries
- Politicians need to open the dialogue with the different political systems and overcome believe barriers to find the best possible solutions to the issues
- **Richard Roberts** continued to show up new technologies from life sciences serving for current global issues like recombinant viruses or GMO (genetically modified organism) plants

- He stated that demand of some European politicians in direction to the third world countries not to cultivate GMO plants is dangerous; in his opinion the developing world absolutely needs the new technologies and GM food although Europe does not need so, because Europe does not suffer from food shortage
- Kurt Wüthrich encountered that we should not recommend things to the third world countries which we don't use ourselves
- In this further talk, Richard Roberts stressed out the impact of life sciences on future energy and health problems
- He sees great opportunities for developing countries using fuel cell fermenters to generate electricity and power households or hybrid cars although the problem of using cellulose material for fuels instead of food is not solved, yet
- Furthermore, he appealed that science should not be influenced by religious fundamentalism as in the stem cell discussion under the Bush administration in the US
- The knowledge from stem cell usage, derived from reprogrammed body cell, will be key for growing new tissues and new organs to get over the immune barrier.
- In a final round of statements, Nobel laureates were asked to state where they would invest money, if they were in a position like President Obama or President Sarkozy
- The Nobel laureates advised to invest the money into the best brains and into the young, creative scientists of the world
- They emphasised the importance of knowledge gathering and sharing to everyone and the value of basic research
- Finally, Peter Doherty request a strategic action plan from politicians in future key issue areas like the solving of energy problems

Quotes

"I am a chemist by to the core of my heart. We are all molecules. At least we are a rather complex structure of molecules, but molecules."
Professor Jean-Marie Lehn

"I have the hope that politicians believe in the power of science and technology and call on them to support basic research."
Professor Kurt Wüthrich

"We cannot ignore infectious disease problems as population is growing. We need to move forward in vaccination and try to make vaccines available to everyone."
Professor Peter C. Doherty

"Religious fundamentalism is dangerous to science. Not using stem cell technologies today would have been the same not using antibiotics after discovery in the early days."
Professor Richard J. Roberts