PUBLIC LECTURES

DIPC hosts a number of events promoting social awareness of science and the wider implications of scientific activity.

Public Lecture

Science and Its Frontiers

NOVEMBER 13-14, 2003

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Science, in its different areas, has a great importance in today's culture, not only from an economic and strategic point of view but also in the advancement of nature's knowledge. Teacher's of Secondary Education play an important part in transmitting scientific concepts and values to the youngest generations. We organize these lectures on "Science and its frontiers" to help teachers in their daily task, showing them the latest advances in Physics, Chemistry, Biology and Medicine. Speakers are internationally known researchers. These lectures have been included in Basque Government's Education Council's GARATU program.

PARTICIPANTS

There were 140 participants that came from diverse disciplines:
· 20 university teachers
· 60 Highest Formative Cycles and Secondary Education teachers
· Researchers
· Fellows
· Experts in varied areas of science
· Others interested in scientific activity

CONTRIBUTING LECTURES

J. Rodés
Research in Biomedicine
In this talk, the evolution of medical care since the beginning of the 20th century is explained through the changes observed in a reference center such as Hospital Clínico in Barcelona. The needs of this type of center are justified, including a strong research unit driven to provide fast and effective responses to changing sanitary requirements.

J. M. Pitarke
Powers of ten. On the size of components on the Universe
Powers of ten are used to discuss the relative size of the components of the Universe, from the inside of a proton to the farthest reaches of the Universe. The fundamentals of matter and force are discussed, as well as the history and fate of the Universe.

J. Colmenero

The world of "Soft Condensed Materia"

The concept of "soft matter" subsumes a large class of molecular materials, including e.g. polymers, thermotropic liquid crystals, micellar solutions, microemulsions and colloidal suspensions, and also includes biological materials, e.g. membranes and vesicles. These substances have a wide range of applications such as structural and packaging materials, foams and adhesives, detergents and cosmetics, paint, food additives, lubricants and fuel additives, rubber in tires etc., and our daily life would be unimaginable without them. In spite of the various forms of these materials, many of their very different properties have common physicochemical origins. The structural units of soft matter systems are large molecules or aggregates of molecules showing different structural and dynamical properties depending on the length scale of observation. The main goal of this talk is to give a general introduction to this class of important materials, including a historical perspective of the scientific development of this rather new field.

H. Ostolaza

The basis of life

Since the experiment of S. Miller and H. Urey , in 1953, where small inorganic molecules yielded organic compounds including amino acids, a new understanding of the workings of RNA and DNA, the building blocks of life, have emerged. The recent discovery of prebiotic conditions on other planets and the announcement of a bacterial fossil originating on Mars has brought new attention to the study of life's origins.

G. Morata

DNA. First 50 years

The discovery of the structure of DNA is one of the most important scientific findings of the 20th century and one that has shaped biological research during the last 50 years. Two basic problems of Biology, the nature and the replication of the genetic information, were solved at once by the discovery of the DNA double helix. The realization that the genetic information is encoded in the lineal arrangement of the four bases (A)denine, (T)imine, (C)itosine and (G)uanine, that form the backbone of DNA, changed completely the approach of experimental biology. The focus in the study of the intimate structure and properties of DNA has resulted in a profound insight as to the basic mechanisms of life. It has also made possible the development of extraordinarily powerful methods to manipulate the genetic information. These methods already have applications of social and economical interest in the improvement of live stocks and cultivated plants. They are also potentially very important in Biomedicine as they offer the possibility of new and revolutionary treatments for genetic and degenerative diseases.

M.A. Peña

Hydrogen fuel cells. Future Power

Fuel Cells and Hydrogen are words that go together when someone wants to talk about the future of energy: Fuel Cells as high efficiency systems, and Hydrogen as its most suitable environmentally friendly fuel. But a lot of scientific and technological work is still required. The developing of new technology for the mass production of Fuel Cells, and the implementation of the Hydrogen economy, from the fossil feedstock to renewable sources, will be the driving force of the energy world during the next years.

E. Ortega

Nanotechnology: At the frontiers of the Atom

Nanotechnology, or the technology made at the atomic scale is becoming a reality. In order to accommodate to the nanotechnology era, the microlectronics industry will undergo a thorough conceptual transformation, a revolution. The reason is that the behavior of the matter completely changes at the atomic scale, which is governed by quantum mechanics. In this lecture we will review the fundamental limits of current technologies when scaling down to the atomic limit, as well as the more exciting perspectives of nanotechnology.

F. Cossio

XXI Century's Chemistry: Molecular and supramolecular worlds

In this lecture a concise analysis of the origins and present situation of chemistry was presented, as well as the perspectives of chemical sciences for the XXIth century, both in the scientific and social contexts. The main topics discussed concerned the impact of chemical problems on what remains to be discovered. As outstanding examples, the problem of chemical synthesis of high-value molecules such as taxol and the productivity gap of pharmaceutical industry were presented. Finally, the main aspects of information storage and transmission using the concepts and tools provided by supramolecular chemistry were briefly discussed.

J. Marcaide

Young universe

The expansion of the Universe and the cosmic microwave background (CMB) suggest a singular episode about 14 billion years ago, a leviathan explosion dubbed the Big Bang, with extremely high temperatures and densities. A new cosmology has arisen from the combined efforts of physicists and astronomers. The acoustic peaks in the CMB angular spectrum and the large-scale power spectrum have provided rich information on the cosmological parameters. A wealth of data on the apparent brightness of type Ia supernova favor an accelerating Universe, and mysterious attractive dark matter and repulsive dark energy seem to dominate the matter/energy budget.

M. Delibes

How did Nature's preservation develop to Biology

Human concern in the face of Nature's deterioration probably dates back several thousand years. Plato was attributed the comparison of the barren mountains of Attica with the "bare bones of a consumed body". Throughout the 18th century, arguments accumulated postulating an undesirable influence of human activity on the natural wealth, which clashed with the idea that our species was little less than the administrator of God's designs. The tight connection between the interest to know the environment and the concern for conservation, which gave rise to conservation biology started in the 19th century, supported by the evidence that all living beings occupy a finite world (eg. Humboldt) and shared a phylogenetic history (Darwin). Two different approaches tied to conservation and protection have emerged since 1980 called conservation biology, which has combined modern population ecology with traditional disciplines which in turn are separated from each other. Perhaps the most innovating of conservation biology has been to integrate conservationist theory and practice, dispersed under the cover of the neodarwinist paradigm. That achievement has converted old conservation into biology, as Dobzhansky would say: "nothing in biology makes sense outside the light of evolution". The evolutionist framework affects traditional conservationist arguments, as we have sketched out.