



The Scientific Legacy of the 20th Century



Address of His Holiness Benedict XVI to the Members of the Pontifical Academy of Sciences on the Occasion of their Plenary Session and Statement by the PAS

Extra Series 36

Vatican City, 2010

pp. 12

Recent activities of the Pontifical Academy of Sciences – The 20th century was an important century in the history of the sciences. It generated entirely novel insights in all areas of research – often thanks to the introduction of novel research methods – and it established an intimate connection between science and technology. With this connection, science is dealing now with the complexity of the real world. In fact, it was in the 20th century that the human being landed for the first time on a heavenly body, the Moon, different from Planet Earth, this marvellous cradle that the cosmos, in its long and patient development, almost seems to have prepared for our existence. By leaving his habitat, man seems to have stepped on the threshold of infinity. The members of the Pontifical Academy of Sciences were deeply involved in this development. In this year's Plenary Session with its subject "The Scientific Legacy of the 20th Century" they gave proof of the revolutionary changes in many areas of the sciences – in particular in physics and biology, but also in astronomy, in chemistry, in the neurosciences and in the earth and environmental sciences – and how they contributed to these changes. In this respect the Academy proved itself again to be the mirror of science and its development. This is particularly true with respect to epistemological and methodological questions as well as to interdisciplinary aspects which become ever more important in scientific research. The Academy deals with these questions and aspects not only in the context of its plenary sessions, for example on predictability in science (2006) or on the evolution of the universe and of life (2008), but also in smaller conferences, workshops and study weeks, for example on the educated brain (2003) and on astrobiology (2009). As it was also shown in the meeting on paths of discovery (2004), the common denominator of the sciences is the notion of discovery, and discovery is an organised mode of observing nature. These meetings put the Academy right in the middle of the ongoing scientific research, especially in relation to the realities of nature, of the human body and of the human brain. From the point of view of cosmology, the results of these meetings demonstrate that 20th century cosmology greatly improved our knowledge of the place that man and his planet occupy in the universe. The "wonder" that Plato and Aristotle put at the origin of thought, today extends to science itself. Questions now arise on the origin and on the whole, also thanks to the reflection of those who study the physical universe, its history and its laws. Physics has enabled us to understand the basic components of matter and we are well on the way to an ever more consistent and unitary understanding of the entire structure of natural reality, which we discover as being made up not only of matter and energy but also of information and forms. The latest developments in astrophysics are also particularly surprising: they further confirm the great unity of physics that manifests itself clearly at each new stage of the understanding of reality. Biology too, with the discovery of DNA and the development of genetics, allows us to penetrate the fundamental processes of life and to intervene in the gene pool of certain organisms by imitating some of these natural mechanisms. Information technology and the digital processing of information have transformed our lifestyle and our way of communicating in the space of very few decades. The 20th century has seen medicine find a cure for many lifethreatening diseases and the beginning of organ transplants. It is impossible to list the many other discoveries and results that have broadened our knowledge and influenced our world outlook: from progress in computational logic to the chemistry of materials, from the neurosciences to robotics. The Academy, however, is not only the mirror of science and research as well as a place where science deals with its problems and insights. It also engages in questions of the institutional role of science in society and issues of great social importance. Scientific research not only gives expression to the strength of rationality in explaining the world and the way in which this is done. The application of scientific knowledge

can induce changes of environmental and thus living conditions. It is these aspects, the interrelations between scientific progress and social development, which together with insights into the epistemological structure and the ethical implications of science play an important role in the life and the work of the Academy. Recent meetings on science for man and man for science (1999), on the cultural values of science (2002), on the signs of death (2005) and on transgenic plants for food security in the context of development (2009) testify to this persistent engagement. Also in this respect, the Academy is unique in its structure, in its membership, in its aim, and in its efforts which are always directed at promoting the progress of the mathematical, physical and natural sciences, the study of epistemological and ethical questions and issues, the participation in the benefits of science and technology by the greatest number of people as well as at the interaction between faith and reason, encouraging the dialogue between science and spiritual, cultural, philosophical and religious questions. The plenary session on the scientific legacy of the 20th century demonstrated afresh the strengths of these objectives and of the way the Pontifical Academy of Sciences in its constitution and activities is realizing them.

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