



2024 Balzan Prize Subject Areas

Literature, Moral Sciences, and the Arts

Restorative Justice

Around the world, restorative justice is developing as a complementary approach to traditional criminal justice. Whereas the latter concentrates on punishment for crimes, the former gives victims of crime an active role instead of leaving them on the sidelines of conventional criminal trials. Starting with the concept that the offence refers to the victim and involves the community, the purpose is to reestablish bonds between people, thus regenerating the connective tissue that binds them to their living environment. The restorative goal is to pacify conflicts as a complement to the traditional criminal response. Thus, fundamental issues for restorative justice are no longer (or no longer only) “who should be punished” and “with what sanctions”, but rather “who suffers” and “what can be done to repair the damage”, where restore does not take on a reductive meaning of economically compensating the damage caused.

Restorative justice has been the subject of United Nations resolutions and European Union directives since the early 1980s, thus as an increasingly mature, current field of study with marked interdisciplinary aspects, it is particularly relevant to the Balzan Prize.

History of Modern and Contemporary Science

This year, the Balzan Prize once again recognizes the history of science, and in doing so creates a line of chronological development with past awards. The first was Otto Neugebauer (1986) for his studies on the exact sciences in the ancient world, from Egypt and Mesopotamia to classical Greece. Paolo Rossi Monti (2009) made his most significant contributions interpreting scientific development between the end of the Middle Ages and the early modern period, while his predecessor Charles Coulston Gillispie (1997) more specifically and innovatively concentrated on the following period to the end of the *ancien régime*.

The 2024 Balzan Prize for the History of Modern and Contemporary science comes at a time when the sciences are changing even more radically because of their relationship with technology, which has always been close, but is now becoming an inextricable bond. Because of this, it should also be noted that the history of science, technology, and medicine (as well as the more circumscribed areas like the history of mathematics, physics and chemistry) are established fields of study taught in the world’s leading universities. Moreover, specific national societies are active in many countries. The thousands of scholars who belong to them are mainly (but not exclusively) affiliated with universities and institutions of higher learning. This could assist in finding an answer to a question (actually an exhortation to the world of science) raised by Paolo Rossi Monti in 2010 as he opened his *lectio magistralis* on the occasion of the announcement of the Balzan Prize: «Scientists – they know that science has a history, don’t they?».



2024 Balzan Prize Subject Areas

Physical, Mathematical, and Natural Sciences, and Medicine

Biological Mechanisms of Ageing

Whereas once upon a time people thought that ageing was inevitable and that life together with a state of good health could not be prolonged, in the past few decades this idea has been overturned as research on ageing has entered a new era. In the first place, it has been shown that calorie restriction followed by mutations in certain genes slows ageing down. At present, over 800 genes are known to modify the life span in nematodes, microscopic worms that are invisible to the naked eye. Scientists have identified key pathways to longevity that are remarkably conserved among species, including the insulin and mTOR signaling pathways. Mitochondrial damage resulting from oxidative stress is also associated with ageing, although it remains controversial as to whether it is the cause or the result. Sirtuins, NAD⁺ supplements, chronic inflammation and the gut microbiome are all elements that affect the ageing process. Recent studies indicate the loss of epigenetic information as a reversible cause of ageing in mice, and it is possible to speed up, slow down, or even reverse ageing by manipulating the epigenome.

Nanoporous Materials for Environmental Applications

Although nanoporous materials occur in nature (for example, the zeolites first identified in volcanic rocks in 1756), nowadays they are obtained synthetically and represent a promising development for numerous processes. By virtue of their porosity in molecular and nanometric dimensions, they are like molecular sieves, selective adsorbents, and ion exchangers. Consequently, they have various applications in separation technologies, both in the laboratory and on an industrial scale. The processes of catalysis, or the ability to vary the speed of a chemical reaction, benefit from nanoporous materials as they combine intrinsic catalytic properties with the ability to act selectively on certain molecules.

These findings have numerous advantages for environmental applications ranging from mechanical energy storage for renewable sources to energy recovery, and from gas storage to water purification. Recent research and discoveries like the synthesis of hybrid materials and the discovery of fullerenes and carbon nanotubes (for which Sumio Iijima was awarded the 2007 Balzan Prize) have made it possible to obtain nanoporous materials with new and diversified properties, thus increasing potential applications.