Beat: Health

Emmanuelle Charpentier and Jennifer Doudna, Princess of Asturias Award

For Technical and Scientific Research

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USPA NEWS - The biochemists Emmanuelle Charpentier (France) and Jennifer Doudna (USA) have been bestowed with the 2015 Princess of Asturias Award for Technical and Scientific Research, as made public in Oviedo by the Jury responsible for conferring said Award.

This candidature was put forward by Jerónimo López Martínez, President of the Scientific Committee on Antarctic Research (SCAR), 2002 Prince of Asturias Award for International Cooperation. The research carried out by Emmanuelle Charpentier and Jennifer Doudna has meant a revolution in biotechnology. They have developed a genome-editing technology that enables the genome to be rewritten and defective genes to be corrected very economically with an unprecedented level of precision. Inspired by the antiviral defence mechanism in bacteria, their work thus holds great promise for gene therapy and in the treatment of diseases such as cancer, cystic fibrosis and Severe Combined Immune Deficiency Syndrome, among others.

Emmanuelle Charpentier and Jennifer Doudna have gained international recognition for their joint work on a genome-editing technique based on what are known as CRISPR sequences (clustered regularly interspaced short palindromic repeats). The CRISPR-Cas system is an antiviral defence mechanism in archaea and bacteria based on DNA repeat arrays (CRISPR elements) that function in conjunction with Cas nucleases. The teams headed by Charpentier ““in Sweden““ and Doudna ““in the United States““ had been independently researching these Cas proteins, associated with CRISPR sequences.

In 2012, they published a joint article in Science ““2007 Prince of Asturias Award for Communication and Humanities““, in which they showed that the Cas 9 enzyme in Streptococcus pyogenes is able to carry out site-specific cleavage of double-stranded DNA with enormous precision using an RNA sequence that contains a combination of repeats and spacers which guide the Cas protein.

This genome-editing technology, which has been further developed and improved, has caused a revolution in the field of molecular biology, in which numerous researchers are applying this method to introduce subtle modifications to the genome at specific loci chosen from a wide variety of cells and cell types. In short, it allows gene inactivation or modification with an ease and accuracy never previously achieved, thereby opening up a wide range of possibilities in the fields of biology and medicine. This technique has been applied to human cells in the laboratory and it has been shown in mice that it can be used to correct genetic defects. This method has immediate potential for use as a tool in gene therapy in humans.

For their studies, Emmanuelle Charpentier and Jennifer Doudna have received, among other distinctions, the Paul Janssen for Award Biomedical Research (USA, 2014), the Breakthrough Prize in Life Sciences (USA, 2015) and the International Society for Transgenic Technologies Prize, which will be presented to them in March 2016 in Prague (Czech Republic). Time magazine included them in the list of 100 most influential people in the world in 2015. Emmanuelle Charpentier (Juvisy-sur-Orge, France, 11th December 1968) studied Biochemistry and Microbiology at the Pierre and Marie Curie University in Paris and earned a PhD in Microbiology for her research at the Pasteur Institute.

She furthered her studies at the Rockefeller University, New York University´s Langone Medical Center, the Skirball Institute of Biomolecular Medicine in the same city and the St Jude Children´s Research Hospital, in Memphis. She later established her own research group at the Max F. Perutz Laboratories at the University of Vienna and was guest professor at the Laboratory for Molecular Infection Medicine Sweden, at UmeÃ¥ University. In 2012, she was appointed Professor at the Hannover Medical School and Head of the Regulation in Infection Biology Department at the Helmholtz Centre for Infection Research, in Braunschweig (Germany).

Jennifer Doudna (Washington D.C., 1964) studied Chemistry at Pomona College in Claremont and obtained her PhD in Biological Chemistry and Molecular Pharmacology from Harvard. She carried out postdoctoral research at the University of Colorado, and taught at Yale between 1994 and 2002. She has conducted research at the Howard Hughes Medical Institute since 1997 and has been Professor at the University of California in Berkeley since 2003, where she also heads the Biochemistry, Biophysics and Structural Biology Division and is the Li Ka Shing Chancellor´s Chair in Biomedical and Health Sciences.

As stated in the Statutes of the Foundation, the Princess of Asturias Awards are aimed at rewarding “the scientific, technical, cultural, social and humanitarian work carried out at an international level by individuals, institutions or groups of individuals or institutions“. In keeping with these principles, the Princess of Asturias Award for Technical and Scientific Research shall be conferred on those “whose research findings and/or inventions represent an outstanding contribution to the progress and welfare of humanity in the fields of Mathematics, Astronomy and Astrophysics, Physics, Chemistry, Life Sciences, Medical Sciences, Earth and Space Sciences and Technological Sciences."

The Jury for the Award ““convened by the Princess of Asturias Foundation““ was chaired by Pedro Miguel Echenique Landiríbar and composed of Arturo Ã‍lvarez-Buylla Roces, Juan Luis Arsuaga Ferreras, Lina Badimón Maestro, Juan Ignacio Cirac SasturÃ¡in, Mara Dierssen Sotos, Luis FernÃ¡ndez-Vega Sanz, Cristina Garmendia MendizÃ¡bal, Ã‍lvaro Giménez Cañete, Bernardo HernÃ¡ndez GonzÃ¡lez, Emilio Lora-Tamayo D´Ocón, José Antonio Martínez Ã‍lvarez, Amador Menéndez VelÃ¡zquez, Ginés Morata Pérez, Enrique Moreno GonzÃ¡lez, César Nombela Cano, Marta Sanz-Solé, Manuel Toharia Cortés and Vicente Gotor Santamaría (acting as secretary).

This year a total of 38 candidatures from Argentina, Canada, China, Colombia, Costa Rica, France, Germany, India, Italy, Mexico, Portugal, Russia, Switzerland, the United Kingdom, the United States and Spain ran for the award. This is the fourth of eight Princess of Asturias Awards to be bestowed this year, now in their thirty-fifth edition. The Princess of Asturias Award for the Arts went to American filmmaker Francis Ford Coppola, the Princess of Asturias Award for Social Sciences was given to French-American economist Esther Duflo and the Princess of Asturias Award for Communication and Humanities went to Spanish philosopher Emilio Lledó Iñigo.

Each of the Princess of Asturias Awards comprises a Joan Miró sculpture ““ representing and symbolizing the Awards““, a cash prize of 50,000 euros, a diploma and an insignia. The awards will be presented in the autumn in Oviedo at a grand ceremony chaired by TM The King and Queen of Spain. HM King Felipe VI has been the Honorary President of the Foundation since it was established in 1980.

Following his proclamation as King of Spain on 19th June 2014, HRH Leonor de Borbón y Ortiz, Princess of Asturias, is now the Honorary President of this institution which annually convenes the Princess of Asturias Awards. The Board of Trustees of the Foundation decided at an extraordinary meeting in Oviedo last October to rename the institution and its awards, which are now called the Princess of Asturias Foundation and Princess of Asturias Awards, respectively.

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