

In the Ecology and Conservation Biology category

Peter Reich wins the BBVA Foundation Frontiers of Knowledge Award in Ecology and Conservation Biology for helping to predict the future of our forests on a warmer planet with less biodiversity

- The U.S. ecologist has discovered that the design of a leaf can explain the evolutionary progress of an entire ecosystem
- Reich has conducted pioneering studies on how the loss of some species affects the survivors
- His experiments aim to provide robust measurements of carbon take-up, as a vital input to emissions trading rules
- The breadth of disciplines addressed and their monetary amount - a total of 3.2 million euros - place them among the world's foremost award schemes. Each category carries a cash prize of 400,000 euros.

January 28, 2010.- The BBVA Foundation Frontiers of Knowledge Award in the Ecology and Conservation Biology category goes in this second edition to plant ecologist Peter B. Reich (New York, 1953) for work that “radically improves our understanding of and ability to predict terrestrial ecosystem compositional and functional responses to global environmental change, including climate change (...) and biodiversity loss”, in the words of the award citation.

The jury chose to highlight the importance of Reich's fieldwork over several decades, with pioneering experiments that integrate information from hundreds of species all over the world.

These experiments have come up with two of the new laureate's most salient findings: the discovery of the links forged between leaf design features and the behavior of an entire ecosystem, be it Mediterranean woodland or tropical rainforest; and, secondly, the way that biodiversity losses impact on remaining species. Reich, the jury affirms, has provided “the first evidence that species diversity affects plant productivity and ecosystem stability”.

These results are a wake-up call on the “adverse consequences” of biodiversity loss. They also suggest that the ability of ecosystems to sequester atmospheric carbon dioxide may

have been considerably overestimated. “If this is true” the citation goes on, “atmospheric CO₂ concentrations may rise faster than anticipated, and global climate change may occur faster than predicted”.

FROM LEAF TO FOREST TO THE PLANETARY SCALE

The connecting thread in Reich’s work is his ability to link ecosystem events at the smallest scales with global processes, as he strives to elucidate the relationship between different levels of complexity: from the seedling to the tree, from the cell to the ecosystem and from the stand to the biosphere. In this way, the ecosystem is conceptually assimilated to a single living organism.

It all starts with the leaf. “Leaves only have a few functions they have to provide for plants, and because of that they have a predictable set of characteristics, which allow us to predict a lot about how an entire grassland or forest or crop system will behave physiologically”, explained Reich shortly after hearing of the award. The traits of a leaf and the behavior of an ecosystem are shaped by biophysical and evolutionary factors, so it is possible to “extrapolate or scale or predict from the leaf to the whole canopy”.

For the simple leaf is in fact a complex organ, from which Reich has extracted a series of key characteristics yielding significant predictive power: “so we can understand the evolution of the Mediterranean forest, the rainforest, the Arctic tundra, and how they will respond to climate change or rising concentrations of atmospheric CO₂”.

Reich is leader of a unique ongoing experiment (named BioCON) conducted in open grassland, rather than closed chambers, exploring ways in which plant communities will respond to three environmental changes already occurring on a global scale: increasing nitrogen deposition, increasing atmospheric CO₂, and decreasing biodiversity. The team hope their results will give a more accurate picture of how much CO₂ plants can absorb; a vital input to the international carbon trading agreements now being put in place.

“Thanks to these experiments we are better able - though still not perfectly able - to predict not only what kind of forest and grasslands we will have, but also whether we will have them in a given area and how they will respond in terms of their productivity, nutrient cycle and their health as we change things like temperature and CO₂”.

Reich is author of over 300 peer-reviewed publications, cited on more than 12,000 occasions, and since 2003, has figured among the ten most frequently cited Ecological and Environmental Scientists in the world. He began his scientific career with a B.A. in physics and creative writing at Goddard College (Vermont, United States), which he followed with a master’s degree in forest ecology at the University of Missouri. He later obtained his Ph.D. in environmental biology and plant ecology from Cornell University, and since 2003 has held the Distinguished McKnight University Professorship at the University of Minnesota, where he has also been Regents Professor since 2007.

The award in the Ecology and Conservation Biology category in the inaugural 2008 edition went to biologists **Thomas Lovejoy** and **William Laurance** of the Smithsonian Institute (United States), whose work showed that the degradation of the Amazon rainforest is advancing much faster than predicted.

The jury in this second edition was chaired by **Daniel Pauly**, Professor of Fisheries at the University of British Columbia Fisheries Centre (Canada), with **Gary Meffe**, scientist in the Department of Wildlife Ecology and Conservation of the University of Florida (United States) acting as secretary. Remaining members were **Wilhem Boland**, Managing Director of the Max Planck Institute for Chemical Ecology (Germany), **Joanna Burger**, Distinguished Professor of Biology at Rutgers University (United States), and **Pedro Jordano**, a Research Professor in the Department of Integrative Ecology at Doñana Biological Station, CSIC (Spain).

WINNERS IN OTHER AWARD CATEGORIES

The Frontiers of Knowledge Awards honor world-class research and artistic creation. The breadth of disciplines addressed and their monetary amount, an annual 3.2 million euros, place them among the foremost international award families. However their uniqueness lies in their close alignment with the scientific, technological, social and economic challenges of the present century. In this respect, they are the first to reserve dedicated categories for Climate Change; Development Cooperation; Information and Communication Technologies, and Ecology and Conservation Biology, alongside the awards going to outstanding contributions in Economics, Finance and Management; Basic Sciences; Biomedicine, and Contemporary Music.

The Ecology and Conservation Biology category is the fifth to be decided in this edition of the BBVA Foundation Frontiers of Knowledge Awards. It follows on from the awards in Climate Change (granted to German physicist and mathematician **Klaus Hasselmann** for demonstrating that recent global warming trends are attributable to human activities), Information and Communication Technologies (engineer and mathematician **Thomas Kailath** for a mathematical development enabling the production of increasingly small size chips), Basic Sciences (shared by physicists **Richard N. Zare** and **Michael E. Fisher** for rendering visible individual molecules and describing their collective behavior) and Biomedicine (**Robert J. Lefkowitz** for discovering the receptors targeted by most of today's drugs).

The next award to be decided is Development Cooperation whose winner will be announced tomorrow, January 29.

The BBVA Foundation supports knowledge generation, scientific research and the promotion of culture, relaying the results of its work to society at large. This effort materializes in research projects; human capital investment; and specialization courses, grants and awards. Among the BBVA Foundation's preferred areas of activity are basic sciences, biomedicine, ecology and conservation biology, the social sciences and literary and musical creation.

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