FONDATION
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EXCLUSIVE
INTERVIEW

Edvard and May-Britt Moser

2006 LILIANE BETTENCOURT PRIZE FOR LIFE SCIENCES LAUREATES

2014 NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE LAUREATES

Nobel Prize awards ceremony • Stockholm, december 10, 2014

NOBEL PRIZE AWARDS CEREMONY, STOCKHOLM, DECEMBER 10, 2014

2014
NOBEL PRIZE
IN PHYSIOLOGY OR MEDICINE
LAUREATES

Edvard and May-Britt Moser

2006 LILIANE BETTENCOURT PRIZE FOR LIFE SCIENCES LAUREATES

3 questions for Edvard Moser, 2006 Liliane Bettencourt Prize for Life Sciences laureate, 2014 Nobel Prize in Physiology or Medecine laureate.

Comments collected by the Bettencourt Schueller Foundation • January 2015

Edvard and May-Britt Moser get married while they're still students at the University of Oslo. Later on, as they direct their own laboratory at the Norwegian University of Science and Technology in Trondheim, they settle on studying the entorhinal cortex. Within that brain region, they discover a new type of neurons, which they dub "grid cells". These cells form hexagonal patterns of activation which create internal maps of the environment.

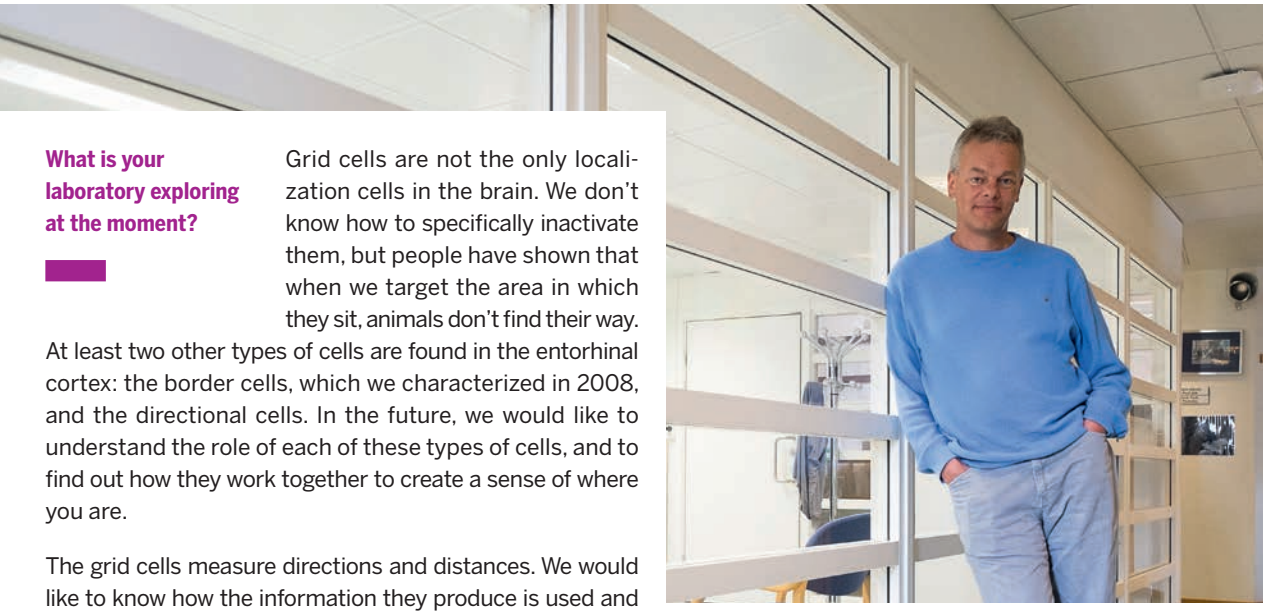
The two scientists demonstrated that these maps have properties that would allow the rats to find their way. As soon as 2006, the Mosers became the recipients of the Liliane Bettencourt Prize for Life Sciences for their discovery of grid cells. As they led their research further, they showed that the entorhinal cortex acts as a computational center for spatial representation. Their achievements were rewarded in October 2014 with the supreme distinction, the prestigious Nobel Prize in Physiology or Medecine.

What do grid cells teach us about the way the human mind works?

We get the general principles of how cells work together in the brain thanks to grid cells. It is actually quite frequent that the brain reuses processes in different parts of the brain. Some of the principles used by grid cells might exist in other parts of the brain.

We cannot exclude that we find hexagons in other places of the brain. Actually, neurons compete to fire and hexagons are a resting space. However, it will be difficult to know whether neural systems, that are not involved in localisation, work in hexagons in other parts of the brain: if not in space, it is not easy to see how a pattern would fire. So far, we wouldn't know how to measure it.

We found very early on that locations form regular patterns in grids. But in order to see the hexagons, we had to have the rats walk around in very large boxes. It became clear in 2005 that it was a hexagonal organisation.



What is your laboratory exploring at the moment?

Grid cells are not the only localization cells in the brain. We don't know how to specifically inactivate them, but people have shown that when we target the area in which they sit, animals don't find their way. At least two other types of cells are found in the entorhinal cortex: the border cells, which we characterized in 2008, and the directional cells. In the future, we would like to understand the role of each of these types of cells, and to find out how they work together to create a sense of where you are.

The grid cells measure directions and distances. We would like to know how the information they produce is used and read out by other types of cells. Sometimes, we compare grid cells to a GPS, which knows where the car is only from the distance driven and without using landmarks. Grid cells are part of the way the brain locates itself in space, based on internal maps and feedback from muscle movement.

How did the Bettencourt Schueller Foundation help your team's research these past eight years?

The Liliane Bettencourt Prize for Life Sciences, which we received in 2006, certainly contributed to the development of our research. We used the whole subsidy directly for continuing our investigation and finding out how grid cells work. That was a great part of what earned us the Nobel Prize.

Thanks to the Bettencourt Schueller Foundation, our laboratory earned recognition and a real boost for its research. We also keep a very good memory of the ceremony, even though neither May-Britt or I really speak French!

Paris, december 2006 Liliane Bettencourt Prize for Life Sciences award ceremony

BIOGRAPHY

1995
POST-DOCTORAL RESEARCHERS IN NEUROPHYSIOLOGY, UNIVERSITY OF OSLO (NORWAY)

1996
ASSOCIATE PROFESSORS IN BIOLOGICAL PSYCHOLOGY, NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, TRONDHEIM (NORWAY)

1999
YOUNG SCIENTISTS AWARD, ROYAL NORWEGIAN SOCIETY OF SCIENCES AND LETTERS (NORWAY)

2002
FOUNDERS OF THE CENTRE FOR THE BIOLOGY OF MEMORY, NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, TRONDHEIM (NORWAY)

2005
W. ALDEN SPENCER AWARD, COLUMBIA UNIVERSITY COLLEGE OF PHYSICIANS AND SURGEONS (USA)

2006
BETTY AND DAVID KOETSER AWARD FOR RESEARCH INTO THE BRAIN, UNIVERSITY OF ZURICH (SWITZERLAND)

2006
LILIANE BETTENCOURT PRIZE FOR LIFE SCIENCES (FRANCE)

2007
DIRECTOR AND CO-DIRECTOR OF THE KAVLI INSTITUTE FOR SYSTEMS NEUROSCIENCE, NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, TRONDHEIM (NORWAY)

2008
ERIC K. FERNSTRÖM'S GREAT NORDIC PRIZE, FERNSTRÖM FOUNDATION, LUND UNIVERSITY (NORWAY)

2011
LOUIS-JEANTET PRIZE FOR MEDICINE (SWITZERLAND)

2011
ANDERS JAHRE AWARD (NORWAY)

2012
PERL-UNC NEUROSCIENCE PRIZE (USA)

2013
LOUISA GROSS HORWITZ PRIZE (USA)

2014
KARL SPENCER LASHLEY AWARD (USA)

2014
NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE (SWEEDEN)

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