IMP Press Release

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The Biology of Emotions

ERC Starting Grant for Wulf Haubensak

Neurobiologist Wulf Haubensak, Group Leader at the Research Institute of Molecular Pathology (IMP) in Vienna, has been awarded one of the prestigious Starting Grants by the European Research Council ERC. The grant is worth 1.5 Million Euros and will support an ambitious project to explore the neural basis of emotions.

Emotions tag our experiences and act as signposts to steer our behavior. Avoiding danger and pursuing rewards is essential for successful navigation through a complex environment, and thus for survival. The search for the neural correlate of emotions has fascinated not only scientists – after all, emotions are a central part of our mental self.

A team of researchers, led by Wulf Haubensak at the IMP, has set out to understand how emotions are generated in the brain. Just like seeing or hearing, our feelings are based on the activity of nerve cells or neurons. Emotions are characterized by the activity of multiple areas of the brain: the neocortex, brain stem and an almond-shaped region in the limbic system called amygdala. Together, these components form a complex network of neuronal circuits whose detailed structure and function are not yet understood.

Cartography of the Brain

The generous ERC funds will support an IMP-project to map the emotional circuitry within this network and to study how activity in these circuits gives rise to emotions. In their experimental setups, the researchers will use mice as experimental model system. Mice are able to show basic emotional behaviors and have a brain-anatomy sufficiently similar to ours, which allows us to draw conclusions that might be relevant for humans as well.

To address the origin of emotions, the neuroscientists use a combination of advanced methods that have been developed in recent years. To visualize neuronal circuit elements, they take advantage of the characteristics of certain viruses, such as the rabies pathogen. These viruses infect specific nerve cells and migrate along them to the brain. A fluorescent protein, engineered into the virus in advance, leaves a visible trace of light. This “viral circuit mapping” is able to highlight networks of interacting neurons with cartographic precision.

For a functional analysis of the tagged circuits, the scientists then employ sophisticated optogenetic technology. These methods make it possible to selectively switch groups of neurons on or off, using visible light like a remote control.

Circuit Therapies for the Future

The IMP-project will also address the question of how genes and pharmaceutical substances affect the activity of neuronal circuits and influence emotions. The researchers hope to gain valuable insights into emotional dysfunctions such as post-traumatic stress

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or anxiety disorders. Ultimately, this could lead to the development of specific "circuit therapies" to treat psychiatric disorders more selectively and with less side effects.

Wulf Haubensak is delighted by the ERC's decision to support his project: "The generous funding will allow us to broaden our studies and to develop new experimental approaches. It also reflects the appreciation of the scientific community for our ideas and will certainly help to attract young, enthusiastic scientists to our project."

The ERC Starting Grants aim to support up-and-coming research leaders who are about to establish a proper research team and to start carrying out independent research in Europe. The scheme targets promising young scientists who have the proven potential of conducting excellent research. In the current call, nine researchers from institutions based in Austria were selected to receive a Starting Grant, out of 91 applications.

About Wulf Haubensak

Wulf Haubensak was born in Tübingen (Germany) in 1972. He studied Biochemistry at the University of Bochum and in 2003 received his PhD in Neurosciences from the University of Heidelberg. He went on to join David Anderson's lab at the California Institute of Technology as a Postdoc. Since 2011, Wulf Haubensak is a Group Leader at the Research Institute of Molecular Pathology in Vienna.

About the IMP

The Research Institute of Molecular Pathology (IMP) in Vienna is a basic biomedical research institute largely sponsored by Boehringer Ingelheim. With over 200 scientists from 30 nations, the IMP is committed to scientific discovery of fundamental molecular and cellular mechanisms underlying complex biological phenomena. Research areas include cell and molecular biology, neurobiology, disease mechanisms and computational biology. The IMP is a founding member of the Campus Vienna Biocenter.

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