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## 18 OPTOGENETICS

### Light Switch in the Brain

#### 18 Single-celled Organisms Shed Light on Neurobiology

The discovery of a visual pigment in the cell membrane of an archaeobacterium in the early 1970s is owed solely to a researcher's curiosity. Now, four decades after Dieter Oesterhelt's pioneering work at the Max Planck Institute of Biochemistry, bacteriorhodopsin and channelrhodopsin are gaining ground as new tools in neurobiology.

#### 26 Custom-Tailored Molecules

*Chlamydomonas reinhardtii*, a single-celled green alga, can't see much at all with its eye composed solely of photosensitive rhodopsin molecules. Yet there is more to algal rhodopsin than one would expect. In recent years, it has triggered a revolution in neurobiology. Ernst Bamberg from the Max Planck Institute of Biophysics helped make it famous.

#### 32 Guided by Light

A zebrafish larva that is only a few days old isn't yet very mobile – at this age, it is capable of a few vigorous tail movements and not much else. For Herwig Baier at the Max Planck Institute of Neurobiology, however, that's enough. He wants to discover how the brain controls movement and behavior.

**ON THE COVER** Beyond specialist circles, the discovery of light-sensitive channel proteins in the 1970s and 1980s hardly made a ripple. Initially, no one suspected that these ion channels would become a popular tool for neurobiologists. Today, neuroscientists can use light to switch individual neurons on and off and, in this way, investigate their role in the brain's networks.

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Photos: ESA/Rosetta/MPG for OSIRIS Team MPG/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA, Fotolia, Sven Döring (from left to right)

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