

Trapped in a ring

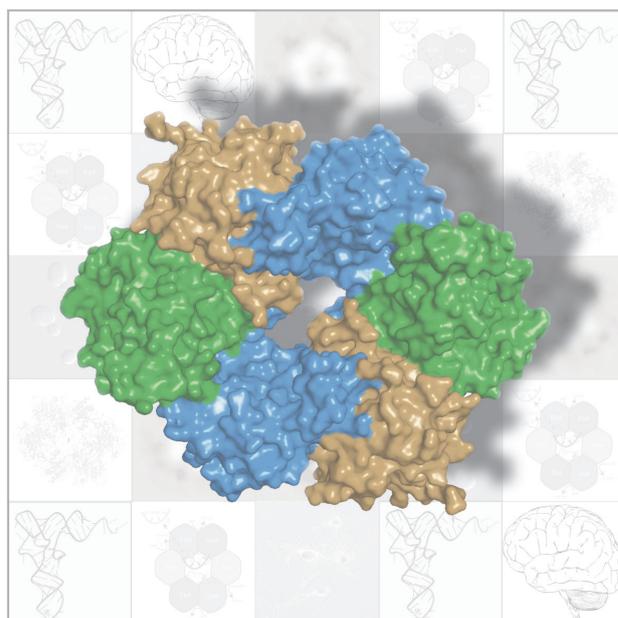
Ring-like protein complex helps ensure accurate protein production

Heidelberg, 19 February 2012 – In fairy tales, magic rings endow their owners with special abilities: the ring makes the wearer invisible, fulfils his wishes, or otherwise helps the hero on the path to his destiny. Similarly, a ring-like structure found in a protein complex called ‘Elongator’ has led researchers at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, and the Institut de Génétique et Biologie Moléculaire et Cellulaire (IGBMC) in Strasbourg, France, in exciting new directions. Published today in *Nature Structural & Molecular Biology*, the first three-dimensional structure of part of this complex provides new clues to its tasks inside the cell and to its role in neurodegenerative diseases.

Changes to the proteins that make up Elongator have been linked to disorders such as familial dysautonomia and childhood epilepsy, and scientists knew that the complex is involved in a variety of processes inside the cell, but exactly what it does has so far remained a mystery.

Elongator is composed of 6 different proteins. Scientists in Christoph Müller’s lab at EMBL and Bertrand Séraphin’s lab at IGBMC looked at three of these proteins, which are known to work together. They discovered that, instead of just clumping together as a trio, these proteins team up in two identical trios to form a ring. This unexpected structure sparked new thoughts. It suggested that the ring’s job in the Elongator complex might be similar to that of other protein complexes, called helicases, which use ring-like structures made out of six copies of the same protein to bind to DNA or RNA.

The researchers found only one molecule that slots into Elongator’s ring: tRNA. tRNA transports amino acids to the ‘factories’ in the cell where they will be stitched together into a protein according to the instructions spelled out in the cell’s DNA. It seems that Elongator’s protein ring holds the tRNA in place while other parts of the Elongator complex work on



The ring-like part of Elongator that holds tRNA in place is formed by three proteins (brown, green, blue) paired up in two trios.

it, introducing a chemical modification which ultimately ensures that the DNA is accurately converted into protein. The findings also suggest that, once work on the tRNA is complete, a different molecule, ATP, is broken down on the outer margin of the ring. This, the scientists believe, would subtly alter the shape of the ring’s proteins, releasing the tRNA and allowing the whole process to start again.

Next, Müller, Séraphin and colleagues would like to investigate what tools and tricks other parts of Elongator employ to help the whole complex perform its tasks inside the cell. ●

Source Article

Glatt, S., Létouquart, J., Faux, C., Taylor, N.M.I, Séraphin, B. & Müller, C.W. The Elongator subcomplex Elp456 is a hexameric RecA-like ATPase, *Nature Structural & Molecular Biology*, published online 19 February 2012. DOI: 10.1038/nsmb.2234.

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About EMBL

The European Molecular Biology Laboratory is a basic research institute funded by public research monies from 20 member states (Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom) and associate member state Australia. Research at EMBL is conducted by approximately 85 independent groups covering the spectrum of molecular biology. The Laboratory has five units: the main Laboratory in Heidelberg, and Outstations in Hinxton (the European Bioinformatics Institute), Grenoble, Hamburg, and Monterotondo near Rome. The cornerstones of EMBL's mission are: to perform basic research in molecular biology; to train scientists, students and visitors at all levels; to offer vital services to scientists in the member states; to develop new instruments and methods in the life sciences and to actively engage in technology transfer activities. Around 190 students are enrolled in EMBL's International PhD programme. Additionally, the Laboratory offers a platform for dialogue with the general public through various science communication activities such as lecture series, visitor programmes and the dissemination of scientific achievements.

About IGBMC

The Institut de Génétique et de Biologie Moléculaire et Cellulaire (IGBMC) is the largest French research unit involving the Institut National de Santé et de Recherche Médicale (Inserm), the Centre National de la Recherche Scientifique (CNRS) and the University of Strasbourg. The 47 research teams working in the Institute conduct research on various topics, ranging from structural analysis of proteins to human genetics, stem cells, biophysics and epigenetics. In addition to its four scientific programs, the IGBMC has developed advanced scientific services and technological platforms for internal use, but also open to the wider scientific community. The Institute aims to develop interdisciplinary research at the interface of biology, biochemistry, physics and medicine, but also to attract students from around the world by offering very high-level education in the field of biomedical sciences through a competitive international PhD program. The IGBMC campus is located on the "Parc d'Innovation d'Illkirch" in the Strasbourg suburbs, which represents an exceptional scientific, academic and industrial environment and largely favors collaborations and technology transfer.

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