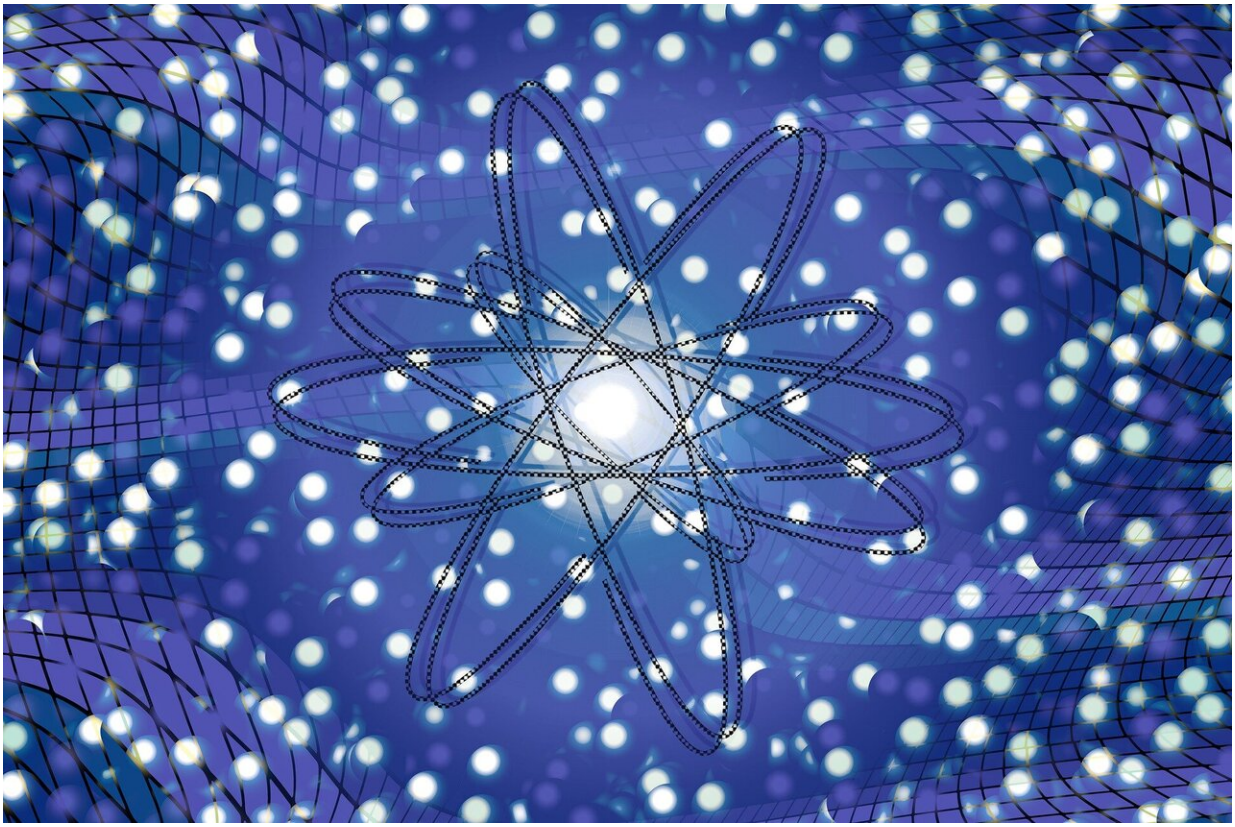
New biochemical compound can break down environmental pollutants

February 18 2020



Credit: CC0 Public Domain

Enzymes with flavin cofactor play an important part in plants, fungi, bacteria and animals: as oxygenases they incorporate oxygen into organic compounds. For instance this allows people to excrete foreign substances

more effectively. Until now scientists were agreed that such flavin-dependent oxygenases use flavin C4a-peroxide as oxidizing agent. This is formed by the C4a-atom of the flavin cofactor reacting with atmospheric oxygen (O_2), before one of the two oxygen atoms are transferred to the compound. A team headed by Dr. Robin Teufel from the Institute of Biology II at the University of Freiburg has discovered that O_2 also reacts to flavin N5-peroxide with the N5-atom of the flavin cofactor. The researchers have published their results in the journal *Nature Chemical Biology*.

The newly-discovered flavin N5-peroxide has different reactive characteristics than the flavin C4a-peroxide. Some bacteria use this to break down stable chemical compounds, including environmental pollutants such as dibenzothiophene, a component of crude oil, or hexachlorobenzene, a plant protection agent. Using X-ray structural analysis and mechanistic studies the scientists were able to clarify how the formation of this flavin N5-peroxide is controlled at an enzymatic level.

In future Teufel and his team want to study how widespread this novel flavin biochemistry is in nature. They also want to improve understanding of the role, reactivity and functionality of the flavin N5-peroxide. With their work they are enabling further studies that will in future allow the prediction of flavin enzyme functionality or modification using biotechnology.

Robin Teufel and his work group are studying enzymatic reactions of the bacterial metabolism at the Institute of Biology II of the University of Freiburg.

More information: Arne Matthews et al. Aminoperoxide adducts expand the catalytic repertoire of flavin monooxygenases, *Nature Chemical Biology* (2020). DOI: 10.1038/s41589-020-0476-2

Provided by Albert Ludwigs University of Freiburg