

Super-complex organic molecules found in interstellar space

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Image of the anthracene band recently identified in the Perseus star formation region by researchers from the IAC and the University of Texas. This molecule is formed by three hexagonal rings of carbon atoms surrounded by hydrogen atoms. Credit: Gaby Perez and Susana Iglesias-Groth

(PhysOrg.com) -- A team of scientists from the Instituto Astrofísica de Canarias (IAC) and the University of Texas has succeeded in identifying one of the most complex organic molecules yet found in the material between the stars, the so-called interstellar medium. The discovery of anthracene could help resolve a decades-old astrophysical mystery concerning the production of organic molecules in space. The researchers report their findings in the journal *Monthly Notices of the Royal Astronomical Society*.

'We have detected the presence of anthracene molecules in a dense cloud

in the direction of the star Cernis 52 in Perseus, about 700 light years from the Sun,' explains Susana Iglesias Groth, the IAC researcher heading the study.

In her opinion, the next step is to investigate the presence of amino acids. Molecules like anthracene are prebiotic, so when they are subjected to ultraviolet radiation and combined with water and ammonia, they could produce amino acids and other compounds essential for the development of life

'Two years ago,' says Iglesias, 'we found proof of the existence of another organic molecule, naphthalene, in the same place, so everything indicates that we have discovered a star formation region rich in prebiotic chemistry.' Until now, anthracene had been detected only in meteorites and never in the interstellar medium. Oxidized forms of this molecule are common in living systems and are biochemically active. On our planet, oxidized anthracene is a basic component of aloe and has anti-inflammatory properties.

The new finding suggests that a good part of the key components in terrestrial prebiotic chemistry could be present in interstellar matter.

Since the 1980s, hundreds of bands found in the spectrum of the [interstellar medium](#), known as diffuse spectroscopic bands, have been known to be associated with interstellar matter, but their origin has not been identified until now. This discovery indicates that they could result from molecular forms based on anthracene or naphthalene. Since they are widely distributed in [interstellar space](#), they might have played a key role in the production of many of the [organic molecules](#) present at the time of the formation of the Solar System.

The results are based on observations carried out at the William Herschel Telescope at Roque de los Muchachos Observatory on La Palma in the

Canary Islands and with the Hobby-Eberly Telescope in Texas in the United States.

More information: The new work appears in the paper “Anthracene cations toward the Perseus molecular complex”, S. Iglesias Groth S., Manchado A., Rebolo R., González J. I., García Hernández A. (IAC); Lambert D. L. (McDonald Observatory, University of Texas), Monthly Notices of the Royal Astronomical Society, in press. A preprint of the paper can be seen at arxiv.org/abs/1005.4388

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