

A perspective on the complex organic composition of comet 67P/Churyumov–Gerasimenko

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The Philae Lander of ESA's Rosetta Mission landed successfully on, but immediately rebounded from, the nucleus of comet 67P/Churyumov–Gerasimenko. Thereafter the COMetary SAMpling and Composition Experiment (COSAC), a pyrolysis Gas Chromatograph–Mass Spectrometer, on board Philae made, while in resumed flight, unique mass spectral measurements of the organic species thrown upward due to the lander's impact. We here will discuss the several organic species identified in these COSAC data [1]. Further we will extrapolate the identifications to develop a perspective of a conjectural complex organic chemistry occurring on the nucleus. The extrapolation will attempt to fill the void between the unprecedented COSAC identifications and historical macromolecular chemistry models of the nucleus [2]. Our endeavour is: to rationalize the physio-chemical processes that lead to the synthesis of non-volatile macromolecular organic material on the nuclear surface; to assess their background in historical literature [3], and to elucidate how the species detected by COSAC are minor constructs of this complex material.

[1] Goesmann *et al* (2015), *Science* (under review) [2] Jessberger *et al* (1988), *Nature* **332**, 691-695; Lawler & Brownlee (1992), *Nature* **359**, 810-812. [3] Ehrenfreund *et al* (2004), *Comets II*, 115-133.