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From organic interstellar material of Diffuse Interstellar Bands to comet nuclei: surviving the accretion process.

Jean-Loup Bertaux (1) and Rosine Lallement (2)

(1) LATMOS, Université de Versailles Saint-Quentin, 11 Boulevard d'Alembert, 78280 Guyancourt France
(2) GEPI, Observatoire de Paris, 6 Place Jules Janssen, F-92195 Meudon, France
(3) IKI, Space Research Institute, Moscow, Russia

The analysis of dust grains collected by *Rosetta* spacecraft from comet 67/P Churyumov-Gerasimenko has shown that they are constituted of about the same amount of minerals and large organic molecules (in mass ~45% organic, ~ 55% mineral, Bardyn et al. 2017). We suggest that they are the same organic molecules that produce, in the Interstellar Medium (ISM), diffuse absorption features imprinted on stellar spectra (DIBs, Diffuse Interstellar Bands). The large molecules forming the DIBs are not yet identified, except for fullerene C_{60}^+, but are thought to constitute "… the largest reservoir of organic material in the Universe" (Snow, 2014).
They were certainly present in the parcel of ISM which condensed into our proto-solar nebula. They were conserved during the formation of the solid comet nucleus, within the scenario established by Davidsson et al. (2016) based on many arguments collected by *Rosetta*: a hierarchical scenario of gentle accretion of small interstellar grains to the final size of the nucleus.
We back up our suggestion from both qualitative and quantitative arguments. A statistical analysis of DIBs suggests that in the ISM, the ratio organic/mineral is at least R_{ISM}=0.32, to be compared to R_C= 0.8 for the comet. On the other hand, the sounding of some interstellar nebulae show that, when the Line-of-sight approaches the centre, the DIBs depths are levelling off while the dust extinction is still increasing, suggesting an accretion process for the DIB molecules. These organic molecules would agglomerate to form interstellar grains that will end up in the proto-solar nebula, then in comet nuclei.
This conclusion implies that a comet return-sample mission would not need to be much cooled to keep the double interest for comets and for Interstellar Medium studies.