Astrobiology News April 2015:
Yellow "Space Balls" and the Origin of Our Solar System

Have I got your attention yet? No, Mel Brooks isn't working on a new science fiction satire (at least to the best of my knowledge…) Rather, this month I've chosen to report on a bit of my own research, especially since a recent NASA ScienceCast has developed a pretty cool video about it![1]

The famous 20th century science fiction writer, Isaac Asimov, once commented, "The most exciting phrase to hear in science, the one that heralds new discoveries, is not `Eureka!', but `That's funny.'" Indeed, the research paper my colleagues and I published a few months ago would not have been possible were it not for citizen scientists working on the Milky Way Project[2] who asked the simple question, "What's that?" when they identified and catalogued a curious class of objects in the images they were examining. My colleagues and I recently showed that these objects, which are very prominent in the particular color scheme used to represent invisible infrared wavelengths captured by the Spitzer Space Telescope[3], represent an early stage in the evolution of massive star clusters – environments similar to the environment thought to have produced our Solar System.

One of the most-studied star-forming regions is the Orion Nebula. At a distance of some 1,500 light years from Earth, it is the closest such region that is currently forming very massive stars – stars ten thousand times as bright as our Sun. More than 20 years ago, the Hubble Space Telescope (HST) found nascent planetary systems around stars similar to our Sun in the foreground of the bright gas that is lit up by the luminous stars. By the way, this month marks the 25th anniversary of the HST.[4] Check out the stunning HST views of the Orion Nebula and its `proplyds' (proto-planetary disks)![5] "Yellowballs" are dusty cocoons enshrouding embedded stars before these stars visibly light up their birth clouds like the Orion Nebula.

Since the Sun currently has no siblings, why do we think it formed in the company of luminous stars? Primarily because meteorite studies indicate that a short-lived radioisotope (^{60}Fe), which is only produced when massive stars explode, was present in the early stages of the development of our Solar System. ^{60}Fe has a half-life of "only" 1.5 million years, indicating that the products of the explosion must have been incorporated into the Solar System as it was forming. Young star clusters disperse as they evolve, due to winds and radiation from the young stars, massive star explosions, and the individual motions of stars as they orbit the center of the Milky Way Galaxy. Any solar siblings have long since "left the nest!"

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[1] http://science.nasa.gov/science-news/science-at-nasa/2015/09apr_yellowballs/
[2] http://www.milkywayproject.org/
[3] http://www.spitzer.caltech.edu/
[4] http://hubble25th.org/
[5] http://hubblesite.org/gallery/album/objects-from/pr1994024c

Continued exploration of the "yellowball" stage of star cluster evolution will hopefully lead to a better understanding of our own origins, and will inevitably lead to many more exclamations of "That's funny!" and queries of "What's that?" I hope you watch the YouTube video of our research produced by NASA -- it includes a number of really nice visualizations![6]

Until next month,

Grace

Grace Wolf-Chase, Ph.D. (gwolfchase@adlerplanetarium.org)

[6] https://www.youtube.com/watch?v=blr-qDffIq0&feature=youtu.be