Astrobiology News March 2017:
Cool Dwarf TRAPPIST-1 and the Seven Earths

I couldn't resist opening this month's news with a "punny" title. I'm sure many of you heard or read NASA's press release late last month regarding the 7 Earth-sized exoplanets that orbit the star known as TRAPPIST-1 (named for the 1st discovery by the TRAnsiting Planets and PlanetesImals Small Telescope in Chile.)[1] TRAPPIST-1 is a "mere" 39 light-years from our Solar System. If you could compare TRAPPIST-1 and the Sun at same distance, the Sun would appear over 200,000 times brighter than this "ultra-cool" M dwarf. There are so many things that make this discovery significant and exciting that it's difficult to know where to begin!

Envisioning the newly discovered exoplanets should inspire the imagination of scientists and artists alike. Even the world furthest from TRAPPIST-1 (TRAPPIST-1h) is more than 6 times closer to its star than blazing hot Mercury is from the Sun. At this distance, TRAPPIST-1h takes only 20 days to complete one orbit. In fact, the orbits of all 7 worlds are so close to each other that a hypothetical being standing on the surface of any one of them could see features on all the others (assuming, of course, that such a being had eyes that work more-or-less like our eyes!) In spite of the proximity of these worlds to their star, TRAPPIST-1e, -1f, and -1g all lie in their star's habitable zone, where temperatures might support liquid surface water.

Of the ~3,500 exoplanets discovered to date, roughly one-tenth are Earth-sized. The fact that so many have been identified around "nearby" stars makes an excellent case that these worlds are common in our Universe. Of course, "Earth-sized" doesn't automatically translate to "Earth-like". The size and mass (and therefore the average density) of 6 of the worlds of TRAPPIST-1 indicate they are likely to be terrestrial (rocky) in nature[2], but we don't yet know whether any of them could (or do) support life.

The James Webb Space Telescope (JWST), currently scheduled for launch next year, will be able to examine the atmospheres of the TRAPPIST-1 exoplanets remotely, from its orbit around our Sun. JWST will search for molecules such as water, oxygen, methane, carbon dioxide, and ozone, in order to assess whether any of these worlds might support life.[3] In the words of astrobiologist Shawn Domalgal-Goldman, "Two weeks ago, I would have told you that Webb can do this in theory, but in practice it would have required a nearly perfect target. Well, we were just handed three nearly perfect targets."

Until next month,

Grace

[1] https://www.nasa.gov/press-release/nasa-telescope-reveals-largest-batch-of-earth-size-habitable-zone-planets-around

[2] We don't yet have an estimate of the mass of TRAPPIST-1h.

[3] https://exoplanets.nasa.gov/news/1422/probing-seven-promising-worlds-with-nasas-james-webb-space-telescope/