# 2019-20 Canada Winner, Grade 9-12 - Topic: Charon

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**Topic: Charon**

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"Science, in many ways, is a lot like a Hydra, a mythical monster from the Greek mythology. In the story of the Hydra, the hero Hercules would cut off a head, but in the place of a head, two more would grow. Science is like that too. You figure out one mystery, and you will get two more. When the New Horizons rocketed passed Charon, scientists expected to see a barren surface. They were shocked to see a complicated network of craters and canyons with patches of red splattering across the North Pole of the moon, a material which was later theorized to be tholin.

When gases such as methane and nitrogen escape from Pluto's atmosphere into space, some of them get pulled by the gravitational field of Charon. The gasses escape anywhere other than the North Pole, and due to temperature differences, the gasses solidify only there too. When Charon faces the Sun, the ice melts, and tholin is formed. Tholin is an organic chain, and the color of it depends on the molecular concentration and the types of solar radiation it is exposed to.

Carl Sagan, the astronomer who originally discovered tholin, created tholin whilst trying to recreate the chemical conditions of the early Earth, which gives us the idea that tholins likely existed in abundance during the creation of life on Earth. If we sent a mission to Charon, collected samples, brought them back home and had them match with the samples created by Sagan, then it would be a likely sign that Charon was or still is inhabited by life which went through processes similar to creation of life on Earth. This evidence would give insight not only into potential life on Charon, but also the roots of our very own existence. Tholins can vary; even though tholins exist on other celestial bodies, such as Pluto, and some may argue that a mission to Pluto might have more merit, the composition and creation of tholins can differ, and it is a big possibility that the tholins on Charon differ from the tholins on Pluto.

Finally, Charon is riddled with many cracks and canyons, most of which are many kilometers deep. The sheer amounts of them, however, has got many scientists and science enthusiasts wondering about the origin of these canyons. The most popular theory states that a long ago there existed an internal ocean underneath the surface of Charon. It froze, and since ice takes up more volume than water, the planet was pushed from the inside out, cracking it.

Charon is very far from Earth, and a mission there might take years to fly to. Pluto is currently located in a very favorable position of orbit for us, a position in which it hasn't been in since 1986, which brings it much closer to us than if it was at any other spots in its orbit. However, Charon is leaving this spot, and if a mission is to be sent there, the time is now.