Astrobiology News November 2014:
Rosetta Mission Update: The Historic Landing on a Comet

Back in August, the European Space Agency's Rosetta became the first spacecraft to orbit a comet. (1) On November 12th, Rosetta's lander, Philae, performed the first touchdown on a comet. Philae's landing reminds me of a quote my pilot husband is fond of repeating, "Any landing you can walk away from is a good landing." Philae's harpoon didn't deploy, which caused more than a little consternation among the mission scientists who worried that the lander would escape the low gravity of Comet 67P/Churuymov-Gerasimenko. Nevertheless, although Philae bounced twice before coming to rest in the shadow of a cliff at least 1 kilometer from where it was supposed to land, its instruments remained operational and performed the science Philae was supposed to do before the probe went into hibernation on November 15th. Of course, it will be many months before the data are fully analyzed, but the experiments are already yielding interesting preliminary results regarding the presence of organic molecules in the comet's atmosphere and the surprising strength of the comet's icy surface.

Although the planned landing site for Philae would have enabled better solar illumination to operate the instruments, it turns out the malfunction that caused the bounces may have been something of a blessing. For one thing, there are the striking images of the cliff that wouldn't have been accessible at the former flat landing site, and an advantage of being partially in shadow is that Philae won't overheat as quickly as the comet approaches the Sun. Before the probe shut down, engineers managed to rotate it so that a large solar panel would be exposed to sunlight. The team scientists hope that it will be possible to resume communications with Philae in the spring of 2015, when temperatures on the comet will allow Philae's battery to be recharged. Meanwhile, the orbiting Rosetta spacecraft is gearing up to study how gas and dust escape the comet as it approaches its closest point to the Sun in mid-August 2015, so stay tuned!

When set in the context of the incredible maneuvers that had to be executed during Rosetta's ten-year journey to Comet 67P/Churuymov-Gerasimenko, the problems with Philae's "rocky" landing seem small indeed. Four planetary flybys provided the gravity assists needed to bring Rosetta into orbit about the 4-kilometer-diameter comet that moves at

speeds as large as 135,000 kilometers per hour. When Philae landed on the comet, it was traveling at walking speed relative to the comet's motion. By all reasonable measures of success, this mission has been a truly remarkable achievement! I highly recommend that you read Dr. Mark Hammergren's op-ed piece on the Rosetta mission in Newsday. (2) Dr. Hammergren leads the asteroid research program at the Adler Planetarium in Chicago.

On another topic, I encourage you to check out Br. Guy Consolmagno's November 18, 2014 public lecture at the Adler Planetarium, which has been archived on our YouTube channel. (3) The recording starts about 6 minutes prior to my introduction, so you might want to fast forward a bit! The lecture was based on Br. Consolmagno's new book, Would You Baptize an Extraterrestrial?... and Other Questions from the Astronomers' In-box at the Vatican Observatory (coauthored with Fr. Paul Mueller, SJ). (4) This book would make fantastic reading material to prepare for Evolution Weekend 2015. The contents are presented as a dialogue between Br. Consolmagno and Fr. Mueller, both of whom have academic training in science, philosophy and theology. Although the provocative title reflects the question considered in the last chapter, as hinted in the subtitle, the book in fact explores diverse questions ranging from the Big Bang and the end of the Universe to the Star of Bethlehem and the "demotion" of Pluto. Adler's theater was packed for Br. Consolmagno's presentation, and Adler's store sold every copy it had of the book!

1. See http://rosetta.jpl.nasa.gov/ and www.esa.int/rosetta
2. http://www.newsday.com/opinion/oped/a-rendezvous-with-a-comet-and-our-origins-mark-hammergren-1.9615421
3. https://www.youtube.com/watch?v=uGAR1JJ4Znw&list=PL0hNDLKmZkf35v5KKH-EHgn01EmzO_Mui
4. http://www.amazon.com/Would-You-Baptize-Extraterrestrial-Astronomers/dp/0804136955

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