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Tapping, Ken

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ANYTHING OUT THERE?

Ken Tapping, 5th May, 2015

In 1960 Frank Drake, an astronomer with Cornell University, was the first to use a radio telescope to search for signals transmitted by alien civilizations. His project, which he called Ozma, was the first in an ongoing search for radio transmissions from intelligent beings on other worlds. The big and ongoing problem with this sort of search is that the alien civilizations must be advanced enough to be using radio technology and transmitting signals in our direction. In addition we must be pointing our antennas in their direction at the right time, and just as important, tuned to their frequency.

The other problem is that we do not know how they are encoding the information they are sending us in their radio transmissions. When we are watching TV, listening to the radio or using a wireless computer network, we are simply using the radio signals to carry information from one place to another. We generate a radio signal, impress the information on it (a process called "modulation") and then transmit the result. At the receiving end, we catch the radio signals using an antenna, extract the information and discard the radio wave. There are many encoding methods. Some kinds result in radio signals that are immediately identifiable as artificial, even though we might not be able to understand them. However, there are other techniques that yield a transmitted signal that is hard to distinguish from the naturally-occurring signals that fill space. This can make searching for, finding and identifying alien radio signals far harder. Our chance of success increases if we use a radio system that can search a big chunk of sky, covering thousands of stars and tuning to a wide range of radio frequencies in one go. Of course, we are betting heavily on our alien friends using radio as intensively as we do. That might not be the case. For example, underwater races might have little use for radio. It has been suggested that aliens might be using light in an attempt to communicate with us, employing high-power lasers to send beams of infrared, visible or ultraviolet light in our direction. However, searches for such signals will only find creatures using technologies similar to ours. Now we have another option, one with the potential to discover a wide range of life forms.

We now know of well over one thousand planets out there, orbiting other stars. One of the main ways we detect them is by searching for the minute dimming of a star when one of its planets passes between that star and us. Now we have appropriately sensitive instruments we can go well beyond finding planets, we can detect the planet's atmosphere and what it consists of. This is done by analyzing the light and searching it for signatures of chemical elements and compounds and the nature of their environments.

Stars are too hot for all but the most exotic chemical compounds to exist in them. If we see signatures of chemical compounds when a planet is passing between its stars and us, we are seeing what's in its atmosphere. Something we are searching for very carefully in the atmospheres of these planets is oxygen. This gas does not occur naturally; it is made by living things – plants. Moreover, because it is highly reactive, it vanishes from an atmosphere very quickly. It needs to be continually replaced. If we see oxygen, there is life there. There are other equally or even more reactive substances that living creatures might use, but oxygen is the most common element on Earth, in water and minerals, so it is an obvious choice as a basis for living creatures.

Sadly, if we do detect signs of living creatures or maybe even detect their radio or laser signals, with our communications taking years to thousands of years to get from one party to the other, we cannot anticipate much of a conversation.

Venus shines brilliantly in the west after sunset, like a searchlight, with Jupiter almost as bright, high in the southwest. Saturn rises at about 11pm. The Moon will reach Last Quarter on the 11th.

Ken Tapping is an astronomer with the National Research Council's Dominion Radio Astrophysical Observatory, Penticton, BC, V2A 6J9.
Tel (250) 497-2300, Fax (250) 497-2355
E-mail: ken.tapping@nrc-cnrc.gc.ca