Radio Galaxy

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In 1899, in the Rocky Mountains of Colorado, electrical pioneer Nikola Tesla listened to the radio emissions coming in from his 200-foot antenna. What he heard was in a repeating rhythmic pattern. But Marconi in Europe was not to make the first long-distance transmission until two years later. What was Tesla tuning into? "The feeling is constantly growing on me that I had been the first to hear the greetings of one planet to another".

He could have heard a pulsar – a rapidly spinning neutron star made from an exploded collapsing sun, destined to become a black hole. Or perhaps it was a quasar – ten billion light years away, a violent growing young galaxy. Maybe it was a maser – an interstellar cloud of gas and dust. We now know that these phenomena generate radio waves. But pulsars weren't discovered until 1967, with highly sophisticated equipment. And the field of radio astronomy itself didn't exist before 1930, when Karl Jansky of the phone company tracked down interference on the line as emanating from the center of the galaxy.

The universe is filled with radio noise, a residual from the Big Bang. It is red-shifted, meaning the Doppler effect shows the stars as moving away from us (the universe is expanding). It's not a pure vacuum in space; there are electrons and atoms floating around out there, thinly spaced. The most prevalent is hydrogen, naturally transmitting at 1420 MHz. Out of all the noises in deep space it stands out like a beacon: Here I Am, a prime component of life, the simplest atom.

Marconi found that radio waves could be bounced off the ionosphere. Later it was realized that frequencies above 10MHz pass through the atmosphere to outer space. Instantaneous global communication would be possible without the labor-intensive laying of cables. Telephone, radio and television could be transmitted on microwave frequencies, beamed up to a communications satellite, and then sent back down to other Earth stations. Telstar, launched by AT&T in 1962, was the first comstat to receive and transmit simultaneously. Now there are thousands of satellites in orbit; most are geo-synchronous at 22,300 miles high, which means they revolve at the same speed as the Earth, stationary to a local focus. One of the newest satellites launched is the Hubble Space Telescope, which some say was damaged by aliens who didn't want to be detected. It is not a radio telescope, but focuses on optical and ultraviolet wavelengths.

Despite Senator Proxmire's "Golden Fleece" condemnation, the U.S. government and private sources have funded research to scan the various radio frequencies for a deliberate signal not of Earth and not of natural origin. The first scientist to actually Search for Extra-Terrestrial Intelligence (SETI) using a radio telescope was Frank Drake, in 1960. No, he wasn't looking for UFOs. That's the domain of NORAD, which monitors any object that crosses the radio fence on the perimeter of U.S. airspace. The men and women who chart interstellar radio noises are concerned with identifying and separating natural phenomena from everything else. But science and imagination have long been bedfellows. Only one year after SETI began, an alien being traveled to Earth electromagnetically in an episode of *The Outer Limits.* The method of transport was radio telescope. And it was none other than Stephen Spielberg, Mr. E.T., who threw the switch that turned on META – Megachannel Extraterrestrial Assay. He had contributed $100,000 to build the eight million-channel receiver, which concentrates on the band between Hydrogen (H) and Hydroxyl (OH). The union of these two elements is H2O, and since we believe that life cannot form without it, the scientific assumption is that the interstellar channel of intelligent beings would be around this ancient oasis: ye olde water hole.

Suppose we intentionally beamed a message into deep space. All electromagnetic waves move at the speed of light, 700 million miles per hour. (Note: from low to high the EM spectrum is radio, microwave, infrared, visible, ultraviolet, X ray, gamma). It only takes ten hours for a radio wave to travel from one end of our solar system to the other. In four light years we'd reach the nearest stars, Alpha and Proxima Centauri. But a radio message from the Earth to the center of our Milky Way galaxy would take 30,000 years: too long to wait for a reply. Likewise, any information we receive from space had to be transmitted in the past because interplanetary distance is measured in the time it takes for light to travel. That is the *known* speed limit. Oddly enough, if a person physically goes trekking into space at even half the speed of light, and returns to Earth, the elapsed time here would be much greater than the real time aboard the spacecraft. The voyager could come back younger than his children. Or find a planet decimated from mutagenic poison gas, the result of a jihad that ended centuries ago.

Nevertheless, in 1974 a radio message was sent from the Arecibo dish in Puerto Rico to the constellation Hercules, 25,000 light years away. It was in binary computer language describing our location, population, what we look like, and our DNA code. Was that indiscreet? They've got our number. But then anyone Out There could learn all about human behavior by tuning into our TV transmissions: reruns of *The Honeymooners* are coursing forever through space. *That* must be why they haven't contacted us.

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