Canadians audit stars for evidence of life

By LYDIA DOTTO

Next month, two Canadian radio astronomers will begin a search for intelligent life on other planets in the galaxy.

In the first scientific experiment of its kind in Canada, Paul Feldman of York University and Alan Bridle of Queen's University plan to use the 150-foot Algonquin radio telescope to monitor selected stars for signals that might indicate advanced technological civilizations on planets circling those stars.

The observations are scheduled to begin May 8, for an initial round of five days. Mr. Bridle described the project as "very exploratory."

Similar searches have been made by other astronomers, the most famous being Project Ozma in the United States in 1960. Astronomers have traditionally looked for signals in the radio range of the electromagnetic spectrum, on the assumption that the ability to send and receive radio signals would be a characteristic of technically advanced species. Earth, for example, has become one of the most powerful radio sources in this solar system, because of man's activities.

Moreover, interstellar space is very "transparent" to radio waves. Mr. Bridle said that the best of today's radio telescopes could detect "an average run-of-the-mill TV signal 100 light-years away. The difficulty is knowing where to point the telescopes and what frequencies to look for."

Most scientists have chosen to search for a frequency that is characteristically given off by the hydrogen atom because hydrogen is the most abundant element in the universe.

It is also in a band of frequencies that suffers minimum interference from the natural background "noise" of the universe.

However, the Canadian scientists have decided to try something different. They will be searching for a higher frequency—one given off by water vapor. This decision is based on the assumption that life may have evolved chemically on other planets as it did on earth.

In a sense, the astronomers are trying to second-guess the kind of reasoning extra-terrestrial beings might use on constructing radio beacons. "Water is such an important chemical compound for life as we know it," Mr. Bridle said. "Our rationale is that if water-based life elsewhere attempted to construct beacons, one possible choice is the frequency of water itself."

However, he said, this does not mean the astronomers are assuming that this is the only logical choice or that life with a different kind of chemistry cannot exist.

He added that Canada has "particularly good equipment for exploring this frequency." The National Research Council recently developed sensitive new devices for other astronomical studies.

There are natural sources of this kind of signal, but scientists have so far only detected them near very young stars in the process of forming out of clouds of interstellar gas and dust. They would not expect to see any naturally caused signals of this kind from an older star which might be expected to have a solar system with inhabited planets.

If they detect such signals, it does not, of course, rule out "a natural source of a type not known to astronomy," Mr. Bridle said.

Scientists would try to exhaust all natural explanations first, but they would also look for signal patterns that could not be attributed to natural causes.

Even if they find a signal they are convinced has come from another world, it may not be easy to interpret. "Decoding or deciphering is quite different from being sure you've got a signal," Mr. Bridle said.

He noted the "lack of progress which has been made in communicating with another intelligent animal on earth. If the dolphin is anything to go by, it may take a long time before we extract the information from the signal once we find it.

The Algonquin experiment will necessarily be directed toward civilizations much superior technically to that on earth. "We would not be capable of sending the signal our own experiment could detect over interstellar distances," Mr. Bridle said.

Mr. Feldman described the experiment as a "passive listening" endeavor. No attempt to deliberately transmit signals from earth will be made, although the earth is constantly sending electromagnetic radiation into space and has been doing so for a couple of decades.

Mr. Feldman and Mr. Bridle will monitor a small number of stars—about six—extensively with highly sensitive instruments and a much larger number of stars for shorter periods of time. They hope to survey 300 to 500 stars during the next couple of years—the nearest, about five light-years away.

There are well established scientific criteria for choosing target stars. Basically, astronomers are looking for stars like the sun—non-variable, slowly rotating, single stars in the middle of their lives. (Scientists believe that slow rotation indicates the possibility of a planetary system. The theory is that the planets carry off the great rotation the sun possesses as it condenses from a cloud of gas.)

Generally, astronomers are interested in stars that have remained stable for more than one billion years, because it took so long for intelligent life to evolve on earth.

Estimates of the number of possible planetary systems in the galaxy vary, but guesses run into the billions. Many scientists believe there could be hundreds of millions with earth-like planets, and that a substantial portion of them would be suitable for the evolution of intelligent life. These are guesses based on the assumption that this solar system is not the result of unique processes, but of an evolution that has occurred countless times in the universe.

But it is not just a question of how many civilizations might exist in the galaxy. It is also a question of the state of their technology and, more important, the total time-span of their history as a technological civilization.