Space

Star-timing star-talk

Since efforts to send or receive radio messages between earth and extraterrestrial civilizations cannot try everything at once, earthy researchers have sought common reference points that might be recognizable to both sides. Besides improving the chances for communication, this could help make manageable a statistically overwhelming task. One example is to transmit on a 21-centimeter wavelength, characteristic of hydrogen, most abundant element in the universe, because each party would know this to be a number available to the other.

But *when* to listen *where?* Radio telescopes, the likeliest receivers, have other tasks most of the time, and could not cover the whole sky anyway. Gordon W. Pace of Portland, Ore., and James C. G. Walker of Arecibo Observatory in Puerto Rico suggest that binary stars should get special attention.

There are plenty of them—at least 40 of the 100 nearest stars are binaries, the researchers point out in NATURE (254: 400), and more than 50,000 visual binaries are known—but more important, they can be used to specify certain times. A message sent from a binary system in the direction of the earth might well be timed to coincide with the time when the two stars in the binary appear farthest from each other to an observer in earth's direction.

From a list of 536 binaries with known orbits and dates of maximum apparent separation, Pace and Walker determine that about 300 have one or both stars of suitable spectral class to have habitable planets. Selecting those of the 300 that are closer than 300 light years to earth, the authors calculate that between 1975 and 1980 there are 34 opportunities for detection of thus-timed signals.

Direct satellite broadcasts—almost

An experimental communications satellite powerful enough to reach small terminals in individual automobiles is to be launched as a joint U.S.-Canadian project, possibly as early as December.

Heart of the Communications Technology Satellite will be an extremely high-powered transmitter, said to be capable of providing 240 watts per channel, compared with about 20 watts per channel on typical communications satellites. This could enable the use of ground stations costing as little as $10,000 instead of several million, says Dan Goldin, project manager at TRW Systems in Redondo Beach, Calif., where the transmitter was developed.

"The key technology advancement . . . is increasing [the present transmitter] power level by an order of magnitude and doubling the transmitter's efficiency," Goldin says. Heat pipes are required to keep the hard-working transmitter cool.

Besides aiding such projects as educational television transmissions to small receivers in Alaska and medical education broadcasts to the southwestern United States, the satellite will provide direct voice communications with individual Royal Canadian Mounted Police.

Spaceman looks to earth

Rocco Petrone, associate administrator of the National Aeronautics and Space Administration, is leaving the space agency this month to become president and chief executive officer of the National Center for Resource Recovery. Petrone has served as Apollo program director and director of Marshall Space Flight Center in Alabama.

Natural Sciences

Life under Antarctic shelf ice

British biologists have reported the first direct evidence of life under the ice shelf of Antarctica. The possibility of biomes at considerable distances from the open sea under the vast, permanent ice shelves that fringe many areas of Antarctica is one of the topics of interest to the Ross Ice Shelf Project, a U.S. attempt to drill through 500-meter-thick ice over the Ross Sea.

But R. B. Heywood and J. J. Light of the British Antarctic Survey say they have already obtained, under unusual circumstances, direct evidence of a biome under shelf ice at least 100 kilometers from the open sea. In the April 17 NATURE, they report results of a limnological survey on the coast of Alexander Island, on the western side of the Antarctic Peninsula. The island is separated from the continent by King George VI Sound, which is covered by shelf ice 100 to 500 kilometers thick. In a large lake, 117 meters deep and covered by permanent ice at least 4 meters thick in winter and 2.5 meters thick in summer, the biologists caught four specimens of a common, small Antarctic marine fish, *Trematomus bernachii*. The fish were caught in a trap lying in 70 meters of water, using seal meat as bait. The stomachs of the fish contained the remains of plankton and other small marine organisms. The fish had fed recently. The top 55 meters of lake water are fresh; below that it is saline. The saline level is connected to the seawater of the Sound. Conclude Heywood and Light: "Our evidence suggests that there is a marine biome under the permanent ice" of the Sound, "which lies 100 kilometers (northwards) and 334 kilometers (southwards) from the open sea."

Deformities: Do fetuses fight back?

While studying embryonic development in mice, two biology students at the City College of New York stumbled on a fresh aspect of the fetal deformities question. Until now, no common denominator has been found to explain the physiological mechanism responsible for errors in development. But under the guidance of Max Hamburgh, the students, Mark Erlich and Ginger Nathanson, found unborn mice may be able to repair damages caused by trypan blue dye if they can survive the first 24 hours after exposure to it.

When mice seven days pregnant were injected with trypan blue (a stain used to study living cells), their embryo cells were damaged within a few hours, resulting in dramatic deformities in up to 95 percent of the egg cylinders examined a day after injection. But when biologists allowed embryos to develop for a week after exposure to the dye, they found the frequency of deformities dropped to 18 percent, indicating embryos may have varying capacities to repair damages the dye causes. Their report appears in the April JOURNAL OF EXPERIMENTAL ZOOLOGY.

During the first seven days of gestation an embryo is implanted within the uterine wall. If it survives the first week of life, it develops an encasing yolk sac, which the scientists now think can protect the embryo from direct contact with the dye. It may be, Hamburgh says, that life in the uterus is more hazardous than previously thought, but that "between fetal life and birth the cells may be repaired," resulting in healthy offspring. "Different groups may have differing genetical abilities to repair," he says, possibly explaining why some litter mates in mice, and possibly some humans, are born deformed while others are not.