

Quasars May Be Abundant in Cosmos

► QUASARS, the tremendously energetic objects in far-distant space that spurred a major controversy in astronomy, may be more abundant in the cosmos than believed until now.

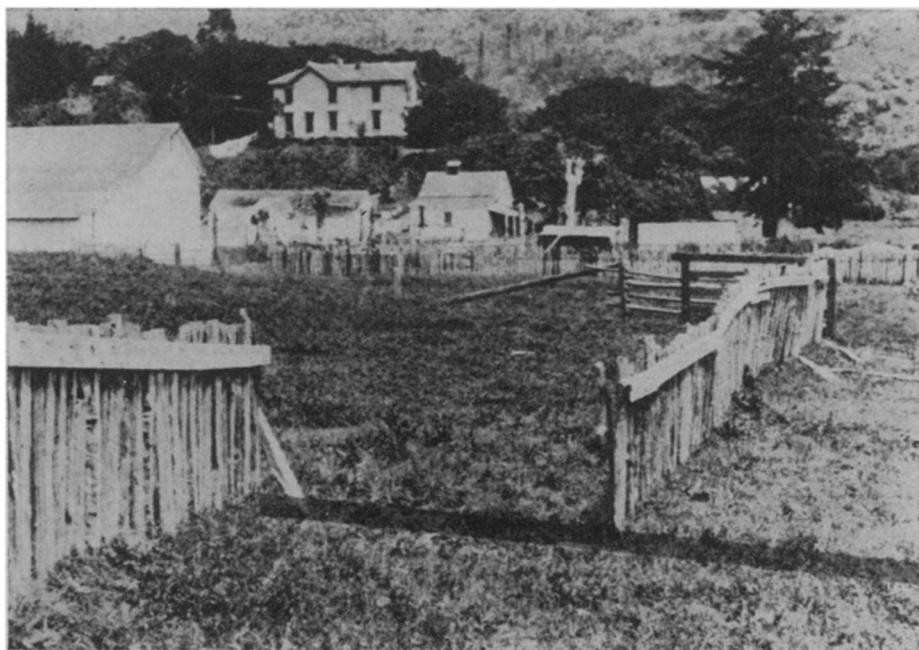
Although quasars had been thought to be very scarce, they were found to make up 28% of the heavenly objects sending out radio waves from beyond the Milky Way galaxy. Dr. John D. Wyndham, research fellow in astronomy at the California Institute of Technology, Pasadena, made a 10-month survey of radio sources in the Third Cambridge Catalog of Radio Objects.

Since there are thousands of radio sources in the universe beyond the Milky Way, his finding that 28% of them could be quasars would make the total number far higher than has been thought possible.

Dr. Wyndham used the twin 90-foot dishes of the Owens Valley Radio Observatory, operated by Caltech and supported by the Office of Naval Research, to locate accurately the position of the radio sources. Then he tried to match their positions with those of optical objects on photographic plates.

If the positions virtually coincided, this indicated the radio signals were associated with the optically visible objects. However, Dr. Wyndham did not list a radio object as identified unless the optical object associated with it was a quasar or a radio galaxy, the two main types of radio objects outside the Milky Way.

• *Science News*, 90:29 July 9, 1966



North American Aviation, Inc.

A HOLE IN THE FENCE—The break in the fence was caused by a break in the earth. Continual earth strain in fault areas can be measured with a twin laser beam being developed experimentally by space scientists at North American Aviation's Space and Information Systems Division, Downey, Calif.

GEOLOGY

Quake Forecast Hopeful

► A NEW GENERATION of instruments is being created to help reduce future casualties caused by earthquakes.

New arrays of equipment for measuring the amount of tilting and strain of rocks and to keep tabs on the rumblings deep inside the earth could predict when an earthquake might hit certain areas, reported Drs. Frank Press and W. F. Bruce of the Massachusetts Institute of Technology, Cambridge.

These instruments could be installed in huge arrays or clusters over areas of from 40 to 400 square miles, the scientists stated in *Science*, 152:1575, 1966. By operating continuously over long periods of time, the instruments would pick up patterns of impending earthquakes as much as a few hours, days or even months before the damaging shock of the quakes hit.

Forewarning of a large earthquake might come from three sources: from tilts and strains in the area directly above the underground focus point where the quake might start, from an increase in small tremors that precede

a major quake, and from changes in physical properties of rocks in the area.

Two of the instruments most used to detect these slight changes are seismographs, which record any shaking of the earth, and tiltmeters, which indicate when the land is tilting as the strain increases.

These instruments could be set up over a large area to feed continuous data into a computer system for monitoring, analyzing and warning.

After a 15-month study, a special panel on earthquake prediction, appointed by the President's Office of Science and Technology, recommended a 10-year program of earthquake research to make these arrays feasible.

The panel recommended that clusters of instruments be set up in Alaska and the California-Nevada region, the most seismic active areas of the United States. U.S. seismologists have become increasingly concerned about the possible catastrophic effects of a major shock in one of the populous Pacific coast states.

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