

The strangest signals reaching earth

A white dwarf is the densest star the existence of which has been confirmed by observation. One cubic centimeter of its matter would weigh some one million grams.

A neutron star would have a much higher density, some million times that of a white dwarf, as well as very high internal and surface temperatures. Its presence has been theorized but none has been detected.

Since about the first of March, however, the search for neutron stars has intensified because of a relatively small area, low in the northern midnight sky, from which the strangest radio signals yet received on earth are being detected. If the signals come from a star, the source broadcasting the radio waves is very likely the first neutron star ever detected. At the very least, its radiation has characteristics that place it half way between a neutron star and a white dwarf.

The concept of a neutron star was proposed by Dr. Fritz Zwicky of California Institute of Technology and the late Dr. Walter Baade of Mt. Wilson Observatory in 1934. Neutron stars have been the subject of theoretical studies by astronomers ever since. A common view of their structure is that most of the protons and electrons combine to form neutrons, with only a thin shell of blanketing electrons. Such a star might have a mass about that of the sun, but a diameter of less than a hundred kilometers.

This would make it difficult to detect in most wavelengths, and even its radio signature is a matter of speculation.

Such a star's extreme density and small diameter, however, would permit its output to fluctuate rapidly, as does that of the present find. This one's strangest feature, in fact, appears to be its very sharp radio pulse, repeating with unflinching regularity every 1.3372795 seconds, with an error of only two-millionths of a second.

The regularity of its emission, in fact, is reminiscent of the signals sought—but never found—eight years ago in Project Ozma, when astronomers turned a radio telescope at Green Bank, W. Va., to the sky in search of extraterrestrial life.

The new source itself is not only nameless but numberless and is known only by its position in the sky: right ascension 19 hours, 19 minutes, 38 seconds (plus or minus 3 seconds), and declination 22 degrees, zero seconds (plus or minus 30 seconds). It appears to be within the Milky Way, between 93,000 million and 200 million million miles from earth.

If the radio waves were audible, the sound would be rather like that of a kitten mewling on a descending pitch every 1.33 seconds, fading down to a remarkably steady frequency before the next pip, perhaps the effect of interaction with interstellar electrons.

The rapidly pulsating radio source was first detected by Dr. Anthony Hewish and four co-workers at the Cavendish Laboratory's Mullard Radio Astronomy Observatory, University of Cambridge, using the interferometric radio telescope brought into operation in July 1967.

The radio astronomers soon noticed signals that first appeared to be weak interference were coming from a fixed location. The tracking requirements however, ruled out terrestrial origin. Systematic investigation starting in November showed that the signals consisted of a series of pulses, each lasting three-tenths of a second and repeating every 1.33 seconds with an accuracy of one part in 10 million; almost nothing short of an atomic clock is that regular.

To make sure their measurements were correct, and to determine as many characteristics of the radiation as possible, the scientists did not make their observations known until publication in the Feb. 24 British scientific journal *NATURE*. The first word to reach California came via a letter from an English scientist, not part of the discovery group, to a visiting English post-graduate student, who presented its gist at a California Institute of Technology seminar.

What a few scientists thought might

PRESSING THE LEVER

Health message: cheaper drugs

The Federal Government, with a \$15.6 billion medical services budget, has in hand the most powerful lever available to drive down drug prices. Last week President Johnson decided to use it.

In his annual health message to the Congress, he threw the weight of his Administration behind efforts, already launched in the Congress, to use Federal expenditure for drugs as a weapon in this fight.

He proposes a two-step process:

- A national compendium of pharmaceuticals, of the type proposed earlier by Senators Russell Long (D-La.) and Joseph M. Montoya (D-N.Mex.) (SN: 5/27/67, p. 494) is to be completed (optimistically) by 1970. This will give physicians and hospitals generally whatever information is available



Site of invisible neutron star.

have been a leg-pulling paragraph in the letter was undoubtedly a soundly based scientific report, although the cause of the unusual signals remains mysterious. The regularity of the signals was—and still is—a puzzle.

That such sources may be relatively common is suggested by the fact that the Mullard group has since found three others "having remarkably similar properties," although they have not yet reported their positions nor determined the exact characteristics of their rapid pulsations.

Dr. Hewish and his co-workers state that the "most significant feature to be accounted for is the extreme regularity of the pulses," which suggests that an entire star is pulsating.

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about the clinical equivalency of costly brand-named drugs and their cheaper generic equivalents.

- The massive outlays for drugs under the Medicare and Medicaid programs will be geared to the compendium, assuring price drops for the beneficiaries. Though physicians can not be forced to prescribe according to it, there will be pressure from patients for them to. And general prescription practices are expected to follow those under Federally supported programs.

Clinical equivalency is a knotty problem (SN: 3/4/67, p. 206). Efforts to find equivalents of chloramphenicol, for instance, have been largely unsuccessful (SN: 12/23/67, p. 608). Nine other presumably identical products have been proved to be less effective. Nevertheless, Food and Drug Administration