## NEWS AND VIEWS

# Three More Pulsars

At first sight, the three new pulsating radio sources reported in *Nature* this week by the Mullard Radio Astronomy Observatory at Cambridge University and a group from the Harvard College Observatory do not seem likely to bring any nearer a convincing explanation of what these fascinating objects are. As far as the measurements go, the characteristics of the new objects are very much the same as the first four pulsars, listed by Pilkington, Hewish, Bell and Cole (*Nature*, **218**, 126; 1968) in April this year.

The idea that the pulsating radio signals come from radial vibrations of neutron stars, put forward by Dr A. Hewish and his colleagues just over six months ago when they announced the discovery of pulsars (*Nature*, **217**, 709; 1968), seems now to be out of the running. This is because neutron stars are expected to pulsate too rapidly—possibly with a period of the order of a millisecond—to account for the sort of periodicities which have been measured. The majority view at present is that white dwarf stars offer a better hope of vibrating at periodicities of the order of one second. These are stars one stage earlier in the evolutionary ladder than the hypothetical neutron stars, and until recently were thought to be able to sustain radial oscillations with a fundamental period only as short as 8 s. Recently, however, theoretical work on highly condensed stars stimulated by the Cambridge discovery has shown that white dwarfs can have radial vibrations with periods as low as 2 s (*Nature*, **218**, 734; 1968). When rotation of the star is included in the calculations, even shorter periods are possible, down to 0·9 s for uniform rotation and 0·1 s for non-uniform rotation (*Nature*, **219**, 20; 1968).

The detection of light fluctuations from *CP* 1919, reported at the conference on pulsars held at the Goddard Institute of Space Studies, and which seemed to support the tentative identification of the pulsar with a faint yellow object, now seems less certain. Dr D. Cudaback of California University has withdrawn the statement he made to the conference that he and his colleagues had detected light fluctuations from *CP* 1919 using equipment at Lick Observatory. Their measurements, which seemed to show the light from *CP* 1919 varying by as much as 15 per cent, were in fact caused by variations in the speed of a tape recorder used in a statistical analysis of the data. Many scientists must have breathed a sigh of relief at this news, as the Lick Observatory measurements had seemed to show a wide variety of periods not locked to the radio pulses, including the double period and its harmonics, and would have required no mean ingenuity to explain. On the other hand, the report from the Kitt Peak Observatory by Dr S. Maran that light from *CP* 1919 varies with a period twice that of the radio pulses still seems to hold, although the telescope on Mount Palomar has been used to search for optical fluctuations from *CP* 1919 without success.

This seems to make the identification of *CP* 1919 less certain; the part of the sky around *CP* 1919 is in fact fairly densely packed with stars and so the coincidence between the radio position and the yellow star could well be by chance. None of the other pulsars has been identified with an optical object. This is surprising, because it should be possible to detect white dwarfs at pulsar distances. This may mean that pulsars are old, and faint, white dwarfs, or it may cast doubt on the estimates of distance.

The distribution of pulsars in space, however, tends if anything to support the distance measurements. Although it may be too early yet to talk of statistical studies of pulsars, the seven pulsars so far discovered do not seem to show any preference for the plane of the galaxy. If the pulsars at high galactic latitudes are in fact well outside the galactic disk, their signals would be expected to show less dispersion than signals from pulsars at low latitudes and similar distances, whose paths pass through regions of high electron density. That higher dispersions are not observed in the signals from pulsars at low galactic latitudes suggests that the signals from all the pulsars are passing through regions of similar electron density, so that they are in fact comparatively local objects, at distances of the order of those measured.

## August Meteor Shower

This month sees one of the chief meteor showers of the year, the Perseids, which reaches a peak on August 12, although some Perseid meteors can usually be seen between late July and mid August. The number of meteors seen depends on the sky conditions, but during the maximum of the Perseids an observer in the northern hemisphere may expect to see something like 20 meteors per hour in the early morning. This year, however, some of the magnificence of the shower will be lost because of moonlight, and only the brightest meteors will be seen. Like most meteor showers, the Perseids are named after the part of the sky from which the meteors seem to come—the constellation Perseus. Historically, the shower was the first to be identified with a comet. This was done by the Italian astronomer G. V. Schiaparelli, who in 1866 showed that the orbit of the Perseids is the same as that of Comet 1862 III. Since then, several meteor showers have been associated with comets and a cometary origin for meteors seems likely.

The theory of the formation of meteor streams stems from the comet model put forward by F. L. Whipple. He visualizes comets as made up of a conglomerate of small mineral particles buried in a matrix of frozen gases. As the comet approaches the Sun the ices vaporize, releasing streams of mineral particles which