ham. They used the "pre-dose" technique, which depends on the enhanced susceptibility, after heating, to artificial irradiation shown by specimens which have previously had a radiation dose. Most of the samples with negligible initial thermoluminescence showed a small increase in susceptibility to irradiation after simulated re-firing, which suggests that they never had experienced the appreciable dose of radiation received over 7,000 years, in the normal course of things, by the genuine antiquities.

The second investigation, by S. J. Fleming, H. Jucker and J. Reiderer (*ibid.*, **13**, 143 ; 1971), reveals that most or all of the Etruscan wall paintings on terracotta recently on the Swiss and American art markets are very palpable fakes. The museums owning these painted slabs will have paid anything up to £10,000 each for them. Fleming *et al.* used both the fine grain and the inclusion thermoluminescence methods—the inclusion method utilizes the large quartz and other mineral grains present as inclusions in the clay—and a comparison of the results shows that the painted plaques were made some time during the past twelve years.

The layman, of course, always derives a little innocent pleasure from seeing the experts fooled—a pleasure which will not be shared by the museums in Bern, Basel and Munich owning "Etruscan" terracottas, or by the custodians of the Hacilar material around the world. A more serious consequence of such faking activities is brought out in Ucko's discussion. The fakes include a number of variants and ostensibly new types accepted, until now, as genuine by most authorities. Indeed the abundance of new "finds" on the market led Mellaart to propose that looters had discovered the hitherto unknown cemetery at Hacilar, unearthing vases which "probably were used only in ritual functions in shrines and graves". Ucko now suggests that the few genuine pieces could all have come from illicit digging in the settlement itself, so that the whole interpretation of the meaning and function of such genuine pieces as remain becomes very different.

It is a sobering thought too that, for most materials other than baked clay, no method as reliable as thermoluminescence exists for detecting fakes. Luristan bronzes and Cycladic marble figurines are but two more of the fields where collectors and museums have been consistently and profitably defrauded. There are far more of them in the museums of the world than ever were excavated. The obvious moral is that museums should be less eager to encourage illicit excavation by paying large sums for unprovenanced antiquities. By doing so they are supporting, often very generously, looters and fakers alike.

BEHAVIOUR

Displays Analysed

from our Animal Behaviour Correspondent

THE most striking aspects of an animal's behavioural repertoire are often the "displays" it gives in sexual or aggressive encounters. Much is now known about the behaviours which birds and fish show during courtship and aggression, and there has been much speculation as to the underlying physiological mechanisms which give rise to these conspicuous displays. Elements of displays of animals, and sometimes whole behavioural sequences, can now be produced by electrical stimulation of the brain or by injection of hormones. The idea that such displays might be a particularly fruitful meeting ground for ethology and physiology prompted the meeting of the Association for the Study of Animal Behaviour at the University of Sussex from July 26 to 29. As Professor R. J. Andrew (University of Sussex) pointed out, displays have been selected during evolution to provide an accurate "read out" of an animal's internal state to another animal, and so may well be able to do so for the human observer.

The meeting provided an excellent opportunity for the exchange of ideas, but it soon became clear that there is still a long way to go before the physiology of even the most commonly observed displays is elucidated. There were several reports of researches into the role of various brain structures in controlling behaviour, but the precise function of these areas and their interrelations with other parts of the brain are still obscure, possibly because the

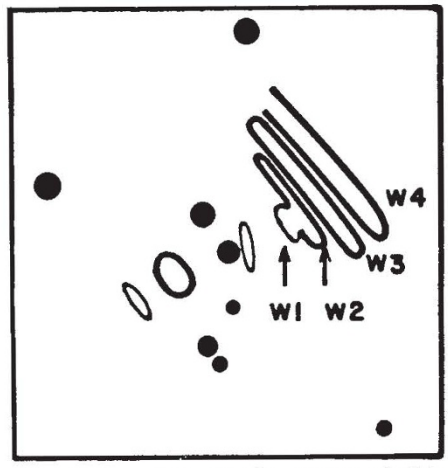
Exploding Magnetosphere May Cause Crab Glitches

BEFORE detailed timings of the Crab pulsar became available, astronomers were concerned to explain the amazing regularity of pulsar pulses. But now it is the small irregularities that have been revealed in the periodicity of the Crab pulsar for which explanations are being sought, in terms of the view that pulsars are rapidly spinning neutron stars which provides a satisfactory explanation of the gross features of pulsars. A review of the considerable data now available on the irregularities of the Crab pulsar—the largest and most sudden of which are called glitches, although an entire spectrum of events of different magnitudes and time scales can occur—is given by Jeffrey Scargle of Lick Observatory and Franco Pacini of the Laboratorio di Astrofisica at Frascati (Italy) in next Monday's *Nature Physical Science*.

The popular view that the irregularities are caused by what are called "starquakes" in a solid outer crust surrounding the neutron superfluid core of a neutron star does not find favour with Scargle and Pacini. Although changes in the internal structure of a neutron star, such as a starquake, would lead to an alteration in the moment of inertia of the spinning star that would be reflected in a change in the periodicity of the pulses, Scargle and Pacini point out that this notion is unsatisfactory on energy considerations.

The reason is that some filamentary concentrations of gas adjacent to the Crab pulsar seem to move in tune with the glitches, requiring more energy than can be provided by the starquake explanation. As an alternative explanation Scargle and Pacini suggest that the gas is excited from time to time by the sudden release of plasma from the magnetosphere of the pulsar, which would also lead to changes in the dynamics of the spinning pulsar that would be reflected in the pulse periodicity.

These occasional outbursts supplement the continuous injection of energy into the Crab Nebula by the escape of particles from the pulsar along open field lines. Much work needs to be done to investigate the kinds of plasma instabilities that can occur in the magnetospheres of neutron stars, but on the face of it this model seems to be a neat way of accounting for several features of the Crab pulsar.



The Crab pulsar, at the centre of this diagram, seems to be associated with a series of wisps of gas, W1, W2, W3 and W4. According to the review by Scargle and Pacini, Wisps 4, 3 and 2 seem to have been generated from Wisp 1, possibly as a result of the activation of Wisp 1 by the explosive release of plasma from the magnetosphere of the pulsar. The impact of this plasma pushes Wisp 1 out from the pulsar until the pressure is balanced by the pressure of the plasma and magnetic field of the Crab Nebula. Wisps 2, 3 and 4 have been generated by the magnetosonic waves which this motion of Wisp 1 produces.