

earliest record of pulses from the Crab so far (*Astrophys. J. Lett.*, **156**, L107; 1969). The exercise was more than curiosity, because a knowledge of the periodicity of the pulsar two years ago shows how the period is changing with time. From an analysis of its radio pulses last year, NP 0532 was the first pulsar to be found to be slowing down (by roughly one part in 2,400 per year). Since then there has been speculation as to whether NP 0532 would show the peculiar speeding-up which afflicted the southern hemisphere pulsar PSR 0833-45 between February 24 and March 3 this year. But as far as can be told from the data of Fishman *et al.*, there has been no discontinuous speeding up of NP 0532 in the two years since June 1967. Their detector picked up photons with energies greater than 35 keV and recorded the secondary pulses between the main pulses of NP 0532 to be more prominent than they are in radio and optical measurements, containing nearly half the power at 35 keV. Fritz *et al.* found the same in the 1 to 10 keV range (*Science*, **164**, 709; 1969).

Goldwire and Michel, also of Rice University, have used the data of Fishman *et al.* to improve the value for the rate of slow-down of NP 0532 (*Astrophys. J. Lett.*, **156**, L111; 1969). They also make use of ten radio measurements of the period between October 1968 and February 1969 by Richards and Comella (*Nature*, **222**, 551; 1969), and find some evidence that the period is a quadratic function of time. Different versions of the rotation theory of pulsars predict different rates of slow-down, but the uncertainties in the quadratic fit are too large for them to be distinguished.

NP 0532 has been examined by the infrared group in California (Neugebauer *et al.*, *Astrophys. J. Lett.*, **156**, L115; 1969) at wavelengths of 2.2 μm and 1.65 μm . They find that the infrared signals fit smoothly to the optical spectrum. Neugebauer *et al.* have also measured the infrared emission from the Crab Nebula around the pulsar, which fits a different spectrum than that of NP 0532. This suggests that the origin of the pulsar emission is not the synchrotron mechanism responsible for the radiation from the Crab. Neugebauer and his collaborators admit that they are baffled by the spectrum of the pulsar. The energy density decreases rapidly with frequency in the radio region, then changes to an increase with frequency in the infrared; there is a peak in the optical region. But the appearance of the main and secondary pulses are the same at radio, infrared and optical wavelengths. Most probably there are different mechanisms of emission in the radio and optical regions, but there must be a common trigger.

REPRODUCTION

Ecology and Endocrinology

from a Correspondent

A SYMPOSIUM on reproductive behaviour and another on ageing and reproduction attracted great interest at the annual conference in Bristol—the best attended so far—of the Society for the Study of Fertility from July 15 to 19. The behavioural studies combined observational and experimental approaches, with ecologists and endocrinologists invading each other's fields to their mutual benefit. Three papers were devoted to field studies of the red grouse, described by A. Watson

(University of Aberdeen), red deer, described by G. A. Lincoln and R. V. Short (University of Cambridge), and roe deer, described by P. Bramley (University of Aberdeen). Work was carried out in the Cairngorms, the island of Rhum and a wood in Dorset respectively. In all these species, dominant males acquire and defend territory and some establish a hierarchical social structure.

It has been established that the status of individuals within the hierarchy has an endocrine basis. For example, oestrogen implants in the cock grouse cause it to lose its territory and "disappear". The important social role of antler growth in the behaviour of red deer has been demonstrated experimentally; when antlers are removed, the animals rapidly lose rank. In the laboratory, attention has also centred on the male because the behavioural patterns are more stereotyped in this sex and are therefore more readily quantified. This is true of the rhesus monkey, as J. Herbert (University of Birmingham) described. In this case, hormones given to the female change the male's behaviour oestrogen increasing the female's attractiveness for him and androgen increasing her receptivity.

The symposium on ageing and reproduction was chiefly concerned with the decline in reproductive capacity with increasing age in several species. In humans the exhaustion of the supply of ovarian oocytes, which occurs around the menopause, is related to the decline in fertility at this time, whereas in some laboratory animals changes in uterine function are more important. The importance of the "age" of gametes at the time of fertilization, that is the delay between their release and fusion, was reviewed by Professor C. R. Austin (University of Cambridge) who showed the effect of various factors on developmental abnormality and infertility. It is suspected that degenerative changes in the oocytes of older women are related to the higher incidence of some types of mongolism among children born to mothers of this age group.

The pattern of mammalian reproduction varies widely between species and that of most living species still remains largely unknown. This was brought home with startling clarity when Barbara Weir (Wellcome Institute of Comparative Physiology, London) described the ovarian cycle of the plains viscacha, a hystricomorph rodent of South America. The ovary has a bizarre structure, and looks and behaves differently from that of any other mammal yet described. It appears to ovulate about 1,000 eggs at each oestrus, although only two young are born.

R. Denamur, J. Martinet (Jouy-en-Josas) and Short described experiments with sheep which have demonstrated the luteotropic activity of prolactin after hypophysectomy. And, also in sheep, R. M. Binns, F. A. Harrison, R. B. Heap and J. L. Linsell (Institute of Animal Physiology, Cambridge) described the retention of normal ovarian activity after denervation associated with transplantation of the ovary and uterus.

B. A. Cross and R. G. Dyer (University of Bristol) have recorded the electrical activity of the rat hypothalamus at different times in the oestrous cycle without the complication of anaesthesia, by using a diencephalic island preparation. Another new technique, described by J. M. O'Donnell and J. C. Ellory (University of Cambridge), has made it possible to count the number of binding sites associated with alkali cation transport in bull spermatozoa.