

obtained about the menstrual cycle, its pattern and time of the last menstruation before rape. Analysis of these conceptions showed that 33–46% of all conceptions took place during the safe period after menstruation, 10–30% during the safe period before menstruation and about 8% during menstruation itself. Thus fertility seemed to be elevated during most of the first half of the cycle and not only at about mid-cycle. (2) Conceptions resulting from limited exposure. An evaluation of 100 carefully selected cases showed that the risk of conception during the first and last four-day period of the menstrual cycle could be as high as 10% of the risk of conceiving during the mid-cycle period. In an investigation involving 241 British women who were using the basal body temperature method for birth regulation and who were studied throughout nearly 2,000 cycles, the conception risk was highest between days 10 and 12 of the cycle. The risk, however, was still very high at any time from day 5 to day 15 and, although markedly reduced during the luteal phase, the risk could still be up to 5%.

The value of this type of evidence depends on the surety that no other cohabitations took place during the period in question. Conceptions occurring in women with amenorrhoea have also been reported, although such evidence is difficult to evaluate in view of the possible spontaneous ovulation which occurs occasionally in these subjects.

Jöchle, after reviewing the evidence, concludes "the possibility of coitus-induced ovulation in humans should no longer be denied" and consequently it makes one sceptical whether the rhythm method of contraception can ever be completely successful. Most of the evidence quoted, however, is circumstantial; much less doubtful evidence is required before coitus-induced ovulation can be accepted as a reality.

PROTEIN SYNTHESIS

Ribosome Attachment

from a Correspondent

JOAN ARGETSINGER STEITZ has continued her studies on the control of the initiation of protein synthesis in the small RNA bacteriophage called R17. She had previously determined the nucleotide sequence of the three initiator fragments of the RNA, each about thirty residues long, which are responsible for the attachment of the RNA to the ribosome of the infected cell. These three fragments correspond to the three proteins, the coat protein, the replicase protein and the A protein, synthesised by the RNA.

She has now studied the interaction of the short thirty-residue long initiator

fragments rather than the intact 3,300-residue long RNA molecule, with ribosomes (*Proc. natn. Acad. Sci. U.S.A.*, **70**, 2605; 1973.) Surprisingly, only the initiator fragment for the A protein has the ability to bind *in vitro* to either *Escherichia coli* or *Bacillus stearothermophilus* ribosomes. By contrast, the initiator fragments for the coat and replicase protein do not bind significantly. She concludes that the RNA ribosome binding site of the A protein seems intrinsically to be a good initiator, whereas efficient recognition of the short coat and replicase regions requires the participation of some portions of the remainder of the phage RNA molecule.

Steitz suggests in a discussion that the influence of these other parts of the RNA on the specific initiator regions is probably exerted by a control of the exact three-dimensional structure of the binding sites. The inability of the coat protein site to bind, however, was surprising as it is known to form a stable hairpin-looped secondary structure with an A-U-G codon (specifying the first amino acid, formyl methionine, of the coat protein) exposed in the loop. Presumably therefore this loop formation cannot be sufficient for recognition by ribosomes. In fact, as such a stable hairpin-looped structure is unlikely to be present for the A protein site in either the fragment or the intact molecule, Steitz suggests that the function of

the remainder of the R17 RNA molecule may actually be to facilitate opening of looped structures during ribosome attachment.

INSECT PHYSIOLOGY

Juice Extractor

from our Insect Physiology Correspondent
SINCE Léon Dufour in 1833 published his observations on the anatomy of the gut in the Homoptera, it has been known that most members of this group of plant-sucking bugs have a more or less complicated association between the commencement of the midgut and its termination, in conjunction with the Malpighian tubules, in the ileum (the first segment of the hindgut). Dufour named this arrangement the 'filter chamber' in which, as he supposed, the copious watery contents of the plant juices were filtered off directly to the hindgut, while the nutrient material was carried on to the midgut. But there have been no experimental studies carried out to substantiate this idea.

A physiological study of the kind required has now been made by Cheung and Marshall (*J. Insect Physiol.*, **19**, 1801; 1973) on a variety of cicadas in Hong Kong and Australia. Cicadas feed on xylem fluid which is hypotonic to the haemolymph of the insect and contains high concentrations of potas-

Soft Gamma-ray Bursts from Compact Objects

THE energetic soft γ -ray bursts observed by the Vela satellites could result from fleeting episodes of accretion on to nearby compact objects—neutron stars or black holes. The sixteen or so bursts seen so far last typically for 1 to 10 s and show significant structure on time scales as short as 100 ms. The uniform distribution of possible source locations over the sky suggests that the sources are local.

Taking the typical distance as 100 pc, the luminosity during each burst is about 10^{37} erg s^{-1} , with the radiation spectrum peaking at around 100 to 400 keV. In *Nature Physical Science* next Monday (November 26) Lamb, Lamb and Pines emphasise that these time scales and luminosities are characteristic of the compact galactic X-ray sources, which are thought to be neutron stars or black holes continuously accreting matter from their close stellar companions.

The space density of these X-ray sources is less than 10^{-8} pc $^{-3}$. The authors, however, estimate the sources of the γ -ray bursts to have a space density of about 2.5×10^{-2} pc $^{-3}$ and argue that the space density of binary systems containing a compact object could well be comparable.

The amount of matter that has to be accreted in order to liberate the required amount of energy per burst is about 10^{16} g. The largest solar flares, occurring every 5 to 20 yr, eject a mass of about 10^{16} g at a speed of about 1,500 km s^{-1} . Thus if the binary companion of the compact object undergoes similar flaring activity—perhaps on a slightly larger scale, but not necessarily as violently as flare stars—accretion of a part of this ejected material can neatly account for the observed properties of the soft γ -ray bursts. Since the ejection velocity is so supersonic, the accreted material need have little angular momentum with respect to the compact object, and so is able to fall straight on to the surface without having to go through the relatively slow process of forming an accretion disk.

In ordinary X-ray sources with temperatures corresponding to about 10 keV, the energy liberated by the continuously infalling material is more or less thermalised on the surface. It seems plausible that the energy liberated by a single blob of matter falling on to the surface will be less completely thermalised and will, therefore, be radiated at the higher temperature corresponding to soft γ rays.