

to molecular biology, but one nevertheless which fails to say much about the mechanisms of nucleic acid metabolism in the uninfected bacterial cell. The tantalizing hint thrown up by the report of Squires *et al.* is that the parallels between phage RNA and messenger RNA may after all show the type of relationship originally attributed to them. If bacterial messengers prove to have the same class of secondary structure and untranslated sequences which prevail in the phages, mechanisms now only dimly suspected may prove to be of critical importance in gene expression.

From our Molecular Genetics
Correspondent

SPINA BIFIDA

Stopping a Second Strike

from a Correspondent

It is distressing for any family to have a child with hydrocephalus or spina bifida—to produce further children with similar defects is a tragedy, yet the likelihood of doing so is variously estimated at 1 in 5 or 10.

Efforts are being made to diagnose the affected foetus so that the parents may be offered termination of that pregnancy. Ultrasound may detect enlargement of the foetal head, and X ray may show an abnormally large head and defects of the spine, but some affected foetuses may remain undetected by both these methods until the pregnancy has proceeded too far for an abortion to be carried out safely. It now seems that the measurement of α -foetoprotein in the amniotic fluid may be the solution to this problem.

A retrospective study published last year suggested an association between α -foetoprotein and congenital abnormalities of the central nervous system. The technique involves obtaining samples of the fluid surrounding the foetus by amniocentesis—introducing a needle through the mother's abdominal wall and uterus into the amniotic sac. This technique is not without hazards. It may possibly induce abortion by irritation of the uterus, or haemorrhage by piercing the placenta, but it is already widely practised for the detection of other disorders such as rhesus haemolytic disease. Technically amniocentesis is not difficult to perform after 10 to 12 weeks, but before this difficulties arise due to the small volume of fluid present.

Now the results of a prospective study have been published (Allan *et al.*, *Lancet*, ii, 522; 1973). It is based on 120 samples of amniotic fluid, mostly collected for other investigations, such as the detection of haemolytic disease

or chromosome abnormalities, but some coming from twenty patients with a history of at least one previous pregnancy involving a gross abnormality of the central nervous system.

The results show a good correlation between high α -foetoprotein levels and affected foetuses, particularly for samples taken between 12 and 20 weeks' gestation. This is the time when amniocentesis is most conveniently performed, and is still sufficiently early for a foetus to be aborted if necessary.

Very high α -foetoprotein levels were found in seven of nine samples from pregnancies in which the foetus turned out to have a gross neural tube defect—the two apparently normal samples from this group were taken at 6 and 39 weeks' gestation so do not detract from the significance of the results since these are outside the normal limits for amniocentesis. Two of the seven samples were from patients with a history of nervous system abnormalities in previous pregnancies. These two patients accepted termination, and the foetuses had abnormalities of the central nervous system.

So of the twenty patients particularly at risk because of their history, two have already had terminations. The remaining eighteen had normal α -foetoprotein levels and six have already delivered normal infants. Unfortunately the work was published before the outcome

of the other twelve pregnancies was known, but it already looks as if this method is going to be the best way of spotting recurring cases of neural tube defects.

PALAEZOLOGY

Ancestry of Chordates

from a Correspondent

ONE of the most controversial questions to have taxed the minds of zoologists is to which of the great invertebrate groups are the vertebrates most closely related. Few people would argue today that the echinoderms fill this role. The evidence for this view is largely embryological: both groups are deuterostomes (those bilaterally symmetrical animals in which the embryonic blastopore becomes the anus). What is still a matter of debate, however, are the relations of two smaller groups of living deuterostomes—the urochordates (sea squirts) and cephalochordates (*Amphioxus*)—to one another, and to the echinoderms and vertebrates. The view currently accepted places *Amphioxus*, derived by neoteny from the tadpole larva of urochordates, close to the origin of the vertebrates.

Jefferies (*Phil. Trans. R. Soc.*, 265, 409; 1973), in drawing attention to the recent findings of other workers, now removes *Amphioxus* from this position.

B-cell Mitogens *in vitro* do not Require Complement

BIOLOGICAL scientists, attempting to wrest order from the materials of their investigations, often adopt unifying hypotheses. With almost the same high frequency, such attempts at formulation of rules are found to have exceptions, often so numerous as to invalidate the original generalization. An instance of such reappraisal emerges from the communication of Janossy *et al.* in *Nature New Biology* for September 26

Janossy and his colleagues used various preparations of bacterial lipopolysaccharides (LPS) to stimulate the lymphocyte populations in mouse spleen *in vitro*, and conclude, first, that various LPS populations have mitogenic activity; second, that the response is predominantly of B lymphocytes (that is, those cells not derived from the thymus); and, third, that the response is polyclonal and not equivalent to the "clonal" responses to specific antigens. They note that although their various LPS preparations differed in their capacity to activate complement there was no correlation between this property and mitogenicity. On this basis their first thought was that complement, and in particular C3 activation, is not necessary for B-cell mitogenicity in these conditions.

Janossy *et al.* then undertook a series of experiments designed rigorously to

remove or destroy the C3 component of complement in their cultures. However hard they tried they were unable by the various exclusion methods to demonstrate significant diminution of the response of B cells to LPS. They conclude that their results provide no support for the notion that C3 activation is a prerequisite for the direct triggering of B cells by LPS (or poke-weed mitogen). This interpretation is in line with other studies which have shown that agents which destroy C3 reduce or suppress T (thymus-derived) cell dependent immune responses but do not affect T independent responses. Other workers, however, have proposed, partly on the basis of the demonstration of C3 receptors on B cells, that C3 is important in the non-specific stimulation of B cells.

It seems that although the importance of C3 in the cooperative activities of B cells with T cells is likely, the direct stimulation of B cells does not involve complement. Furthermore, it is probably coincidental that some B-cell mitogens can activate the alternate complement pathway (by way of C3). Janossy *et al.* maintain that it is the efficient multipoint cross-linking of surface receptors by polymeric ligands which determine B-cell mitogenicity *in vitro*.