The homogeneity of each histone fraction is most consistent with models which suppose that each protein is controlled by a single genetic locus. Although, of course, it is possible to construct models for the organisation of the genome which reconcile unifactorial genetic inheritance with gene multiplication, experiments with messenger RNAs purified for other gene products suggest that the presence in the genome of a single structural gene for each protein may be the more general phenomenon. The histone system at present poses more problems than it resolves, for the striking conservation of histone sequences in disparate organisms remains inexplicable; clearly, the whole sequence of (at least) histone IV is critical for the organism, variation of even a single amino acid being prohibited, which implies that there may be important similarities in chromosome structure in all eukaryotes. But although it is obvious that conservation of histone structures conveys an important message about the organisation of the genetic apparatus, the nature of this message remains elusive.

Diapause regulation by juvenile hormone

from our *Insect Physiology Correspondent*

WHEN the hormonal control of moulting and metamorphosis in insects was defined about forty years ago it was suggested that the periodic arrest of growth, or reproduction, that occurs in many insect species and which is called 'diapause', was the result of an arrest of hormone secretion—since a state closely resembling natural diapause could be induced by the experimental exclusion of the growth hormones. Experiments on a wide range of insects have largely substantiated this idea. Sometimes it is the neurosecretory cells in the brain which are inactive; sometimes the prothoracic glands. In adult insects the failure of egg development during diapause results sometimes from a failure in the secretion of the juvenile hormone by the corpora allata, as in the potato beetle *Leptinotarsa*; sometimes from an arrest in the neurosecretory cells of the brain, as in overwintering mosquitoes.

But in this story the juvenile hormone has come to occupy a somewhat equivocal role. It was noted by the Japanese workers Fukaya and Mitsuhashi that in the caterpillar of the rice stem borer *Chilo*, exclusion of the corpus allatum induced the diapausing insects to resume their development. These authors therefore inferred that the juvenile hormone was acting as a 'diapause factor'.

Yin and Chippendale (*J. Insect Physiol.*, **19**, 2403; 1973) have now re-

investigated this problem in another caterpillar, the southwestern corn borer *Diatraea*. It has been known for some years that in certain Lepidoptera the juvenile hormone experimentally applied may serve as a stimulus to the prothoracic gland to induce secretion of ecdysone and thus to bring about moulting in caterpillars deprived of the brain. This happens in *Diatraea*; and when sufficient juvenile hormone is present the insect undergoes a 'stationary moult', that is, it retains its larval form. Whereas, if only a very small amount of juvenile hormone is present the caterpillar changes to a pupa when it moults.

It has long been known that in Lepidoptera and other insects with a complete metamorphosis a high titre of juvenile hormone causes retention of larval characters, a lower titre signals the evocation of pupal characters, and in the absence of juvenile hormone adult characters appear. Yin and Chippendale produce good experimental evidence to support their novel hypothesis that the diapause state in this particular insect, *Diatraea*, is evoked by yet another defined level of the juvenile hormone titre, slightly lower than that required for a larval-larval ecdysis. In some of the diapause larvae the juvenile hormone titre is apparently high enough to activate the prothoracic gland and thus to promote stationary ecdyses from time to time.

Liquid crystals at Bangalore

from a *Correspondent*

To commemorate the twenty-fifth anniversary of the founding of the Raman Institute at Bangalore in India and to highlight the present role of the institute as a centre for liquid crystal research, Professor S. Chandrasekhar organised an international conference on liquid crystals from December 3 to 8. The conference was preceded by a week's winter school on liquid crystals led by four guest speakers—P. G. de Gennes (College de France, Paris), G. W. Gray (University of Hull) and G. H. Brown and A. Saupe (Liquid Crystal Institute, Kent State University, Ohio).

P. G. de Gennes opened the meeting by reviewing developments in the mixed elastic behaviour of smectics A phases. He dealt with continuous deformations, singular lines and dynamical aspects of smectic A to nematic transitions. This contribution and that by G. Durand (Orsay Liquid Crystal Group) on Rayleigh scattering in smectic and nematic materials reflected the high degree of interest in smectic phases and their polymorphism. A. de Vries (Kent State University) in his paper on X-ray

studies of thermotropic liquid crystals then expounded his classification of smectic polymorphs based on X-ray diffraction patterns. This system of classification obviously does not satisfy everybody, and it is clear that there is not yet adequate structural information about the eight smectic polymorphs, for the existence of which experimental evidence has been proposed, to form the basis of a thoroughly satisfactory classification scheme. As yet uncategorised smectics probably exist, for example, the smectic phase of 4'-n-octyl-4-cyanobiphenyl described by Gray.

Areas of research which may contribute to solving the problems of smectic polymorphism are those concerned with elucidating molecular motion and diffusion in mesophases. Such investigations featured in presentations by B. J. Bulkin (Hunter College of the City University of New York) on infrared optical activity as a probe of nematic order, by J. M. Schnur (Naval Research Laboratory, Washington) on Raman spectroscopy of nematic and smectic mesophases, by R. Blinc (University of Ljubljana) on soft modes in nematic and smectic liquid crystals and by J. A. Janik (Institute of Nuclear Physics, Cracow) on estimations of rotational correlation times for nematic phases.

Several contributions were made by Chandrasekhar's liquid crystal group at Bangalore, and the following titles reflect the range of physical studies being made at this centre: determination of twist elastic constants of nematic liquid crystals; pressure induced mesomorphism; theory of reflection and transmission by cholesteric films; anomalous transmission in absorbing cholesteric liquid crystals; circular dichroism in absorbing mixtures of right and left handed cholesterics; role of permanent dipoles in nematic order; statistical thermodynamics of the nematic liquid crystal surface; new types of electrohydrodynamic flow patterns in nematic liquid crystals and nuclear magnetic resonance spectra of molecules oriented in thermotropic and lyotropic nematics. Several of these contributions represented joint investigations with the National Aeronautical Laboratory, Bangalore or the Bhabha Atomic Energy Centre, Bombay.

Other presentations of importance were given by Saupe on electrohydrodynamic instabilities—a valuable review illustrated by striking photomicrographs—by D. Demus (Martin Luther Universität, Halle) on calorimetric investigations of liquid crystals, by F. M. Leslie (University of Strathclyde) on a theoretical analysis of distorted twisted orientation patterns in nematics and by E. J. Ambrose (Chesster Beatty Research Institute, London)