instars—a result which supports the view that the morphological changes during development, even before metamorphosis, are controlled by the level of juvenile hormone secretion.

The long delayed effects of hormone treatments during the perinatal period are a matter of concern for clinicians (*Science, N.Y.*, **181**, 189; 1973) because it has been found in vertebrates that steroids and other hormones administered at the time of birth can induce malignant tumours, as well as changes in behaviour, in adult life.

CANCER RESEARCH

Tokyo Meeting

from a Correspondent

THE 4th International Symposium of the Princess Takamatsu Cancer Research Fund, which opened in Tokyo on November 6, discussed differentiation and control of malignancy.

G. Tompkins (University of California, San Francisco) began the meeting by reporting that nuclear sites can distinguish between two cytoplasmic steroid receptors, which bind to DNA or chromatin, but not to RNA. S. Ohno (City of Hope Medical Center, California) demonstrated the simplicity of mammalian regulatory systems with an elegant example from the (*Tfm*) androgen-receptor protein locus on the X chromosome of the mouse. The mammalian embryo, he suggests, has an inherent tendency to develop as a female; male development must be induced by an androgen. Therefore, he says that the X-linked *Tfm* locus is the one and only regulatory locus which determines sexual phenotypes of mammals.

J. Paul (Beatson Institute, Glasgow) described experiments confirming the thesis of a positive regulatory role for non-histone chromosomal proteins. Non-histone proteins from erythroid cells allow brain chromatin to transcribe globin genes. The mechanism of control of transcription was discussed in the light of Paul's recently published model for the structure of chromatin. This proposes that the transcriptional unit in eukaryotes is similar to that in prokaryotes and that non-histone proteins bind to or near promoters to permit the attachment of RNA polymerase which cannot otherwise enter the DNA-histone supercoil.

The new nuclear polymer, poly (ADP-ribose), was introduced by S. Shall (University of Sussex). He described the general properties of this polymer which is made by a chromosomal enzyme; NAD^+ is the substrate, DNA and histone stimulate the activity of the synthetic enzyme, cyclic AMP inhibits the enzyme which hydrolyses the polymer and the polymer seems to be covalently attached to chromosomal proteins. The specific activity of the synthetic enzyme fluctuates markedly in lymphoid cells during the transition from the non-growing to the growing state. Also, it varies during both the cell generation and the growth cycle. There is some evidence that it is involved in the regulation of DNA replication. The physiological function of this chromosomal enzyme system is unknown at present. Shall suggested that these enzymes of nuclear NAD metabolism directly integrate NAD and cellular energy metabolism with DNA biosynthesis both in progression through a single cell generation and in modulation of growth rate. In particular, he suggested that poly (ADP-ribose) may function by regulating the initiation of succeeding sets of replicons.

An explanation for the Pasteur and Crabtree effects was proposed by S. Weinhouse (Fels Research Institute, Philadelphia) who suggested that competition between pyruvate kinase and mitochondrial respiration for available ADP could account for these two phenomena.

A very simple and ingenious technique for the detection of abnormal differentiation of the gastric mucosa has been developed by T. Sugimura and colleagues (National Cancer Centre, Tokyo). It uses diagnostic Test-tapes to detect disaccharides in gastric mucosa. Investigations with cyclic AMP and the differentiation of neuroblastoma cells in culture suggested to K. N. Prasad (University of Denver) that a chemotherapeutic regime worth investigation would be a combination of sodium butyrate, dopamine and a cyclic AMP phosphodiesterase inhibitor.

Induction of functions by 5-bromodeoxyuridine (BUdR) is being increasingly useful. H. Koyama and T. Ono (Cancer Institute, Tokyo) described the induction of alkaline phosphatase for which DNA synthesis is required. Melanoma cells become contact-inhibited and unpigmented in BUdR (S. Silagli, Cornell University, NY). DNA synthesis and cell division seem to be obligatory. Tumorigenicity is also partially or completely suppressed.

Studies with cell hybrids are very informative, but the general tenor of the reports at this meeting called for caution and prudence in interpreting data and in drawing general conclusions about the nature of malignancy and its suppression.

M. Hozumi and colleagues (National Cancer Centre, Tokyo) are studying a protein factor which induces differentiation with a loss of tumorigenicity in cultured leukaemia cells.

The meeting ended with a thought-provoking discussion of the general nature of cellular differentiation and its relationship to malignancy which was sparked off by H. Holtzer (University of Pennsylvania). This was a welcome addition to the attention to particulars with which most scientific meetings rightly concern themselves.

This meeting was stimulating and very informative. Its success is due tribute to the excellence of Japanese science and to the wisdom of Imperial patronage of science and especially of cancer biology, biochemistry and molecular biology.

PESTICIDES

Pests on File

from a Correspondent

THE use of computers in pesticide research was considered at a joint meeting of the Pesticides Group and Physicochemical and Biophysical Panel, Society of Chemical Industry, on October 15.

Aspects of modelling the behaviour of pesticides and pests were first considered. The panel chairman, I. J. Graham-Bryce (Rothamsted Experimental Station), stressed in his introduction that models are greatly simplified compared with the real situation and assumptions must be selected carefully and, ideally, confirmed. The sensitivity of the model to various factors can then be explored and thus critical ones can be identified. R. C. Bridges (Plant Protection Ltd, Jealott's Hill Research Station) considered penetration of a pesticide applied to the surface of a wheat leaf and its subsequent movement through the xylem. Several pathways into the leaf are feasible and the equations for the multi-compartmental model can be solved on a digital computer. The permeability of the pesticide in the leaf is critical: too rapid penetration can lead to accumulation and possible phytotoxicity; too efficient transport through the xylem may concentrate the compound in the distal parts of the lamina and provide insufficient protection to the remainder.

J. M. Osgerby (Shell Research Ltd, Woodstock Laboratory) considered applications of the analogue computer, which can simulate physical systems, to the addition of the molluscicide trifenmorph to water in an irrigation canal complex in Egypt (*Pestic. Sci.*, **1**, 5; 1970). Trifenmorph was added at one point upstream of the area to be treated. The main feeder canal carried water continuously to storage dams from which small canals ran to fields that were irrigated for 10 h daily from Monday to Friday, inclusive. By varying factors such as dosage, the time and duration of the trifenmorph, the optimum conditions were deduced within the limits of the model. Osgerby also considered examples of the diffusion and leaching of pesticides in soils treated with various formulations (*Pestic. Sci.*, **3**, 753; 1972).