image restoration and enhancement enabled the removal of many of the effects of the Martian dust storms from the early Mariner 9 pictures. The Land Area Remote Sensing project at Purdue University uses frequency transformations of aerial and satellite photographs of the Earth to classify crops being grown.

A typical high energy physics laboratory produces half a million photographs a year, so physicists have been forced to automate their data analysis procedures. Mr D. G. Royston (Argonne National Laboratory) discussed the several systems designed in the past decade and concluded that the most successful are interactive rather than fully automatic.

Dr M. B. Clowes (University of Sussex) described recent computer programs for robot vision. These programs interpret the picture using knowledge of perspective projection and various hypotheses about the nature of objects, usually opaque polyhedra, and the relationships such as concatenation and support that those objects can enjoy.

At this conference there seemed to be a feeling that the pattern recognition paradigm is almost exhausted. That paradigm derives from taxonomy, with its emphasis on sorting patterns into classes. The analogy may be pursued. Pattern recognition is to machine perception as taxonomy is to modern biology. Further progress in machine perception will only be achieved by concentrating on the basic truth that pictures and sentences communicate meaning. A partition of multidimensional feature space is not an adequate representation of semantics, as workers in artificial intelligence have long realized.

CANCER RESEARCH

Treatment of Tumours

from a Correspondent

PROFESSOR J. F. FOWLER (CRC Research Unit in Radiobiology, Mount Vernon Hospital), as chairman, opened the twelfth and last meeting of the series on principles of experimental and clinical oncology at the British Museum (Natural History) on March 27 by outlining the bases of radiotherapeutic treatment of cancer.

Professor Fowler said that there are in Great Britain each year about 250,000 new cancer patients of whom 100,000 can either be cured or their disease can be brought under control until they die of other causes. About half of all patients are subject to surgery, half to radiotherapy, some to both. Patients of all kinds could be given additional chemotherapy. The adoption of high voltage generators of ionizing radiations has made a very substantial improvement in the treatment of some forms of cancer; since 1940, for example, the five-year survival of patients with Hodgkin's disease has changed from 5 per cent (untreated) to 73 per cent in 1970 almost entirely as a result of the successful use of radiotherapy. The advantages of radiotherapy are that a fair degree of site localization is possible but there are always difficulties in controlling the damage to normal tissues.

It was clear, Professor Fowler said, that combinations of treatment are likely to be the most beneficial, but a distinct handicap in the way of achieving such an ideal is the lack of basic biological understanding of the relationship between malignant and normal cells. (This reiterated a theme which has cropped up several times during this series of meetings.) Professor Fowler stated that oxygen is the biggest single factor known to potentiate the damaging effect of ionizing radiation and that there is much to learn about the judicious use of hyperbaric oxygen as an adjunct to radiotherapy.

Dr M. Berenbaum (St Mary's Hospital, London) said that the basis of chemotherapy is that cells differ from each other. He approached the problems of the chemotherapist by outlining the various ways in which a drug can affect a malignant cell. First, the drug has to get in and surfactants are likely to be useful in assisting this. Once in the cell, some form of activation is likely but it should also be realized that detoxification is another possibility. It is sometimes possible to utilize the dependence of cells on a particular metabolite to attack them, but again both repair mechanisms and alternative metabolic pathways may exist. Various studies have been made in experimental animals of drug sensitive and drug resistant tumours and also of the differing sensitivities of various normal tissues to drugs. The surviving fraction of a tumour may depend on the proportion of cells in cycle and Dr Berenbaum felt that with increased knowledge of such phenomena it might be possible to predict for any particular tumour what is likely to be the best chemotherapeutic treatment.

Mr I. Burn (Hammersmith Hospital, London) pointed out that treatment of

More on Tasman Geosyncline Tectonics

WHEN Oversby reported the first analysis of the Tasman Geosyncline (or Tasman Orogenic Zone) in terms of the new global tectonics (*Nature Physical Science*, **234**, 45 ; 1971), he admitted that his interpretation may not gain universal acceptance but hoped, nevertheless, that it would provoke discussion. In next Monday's *Nature Physical Science* (May 1) Solomon and Griffiths take up this challenge by extending the analysis to cover the whole orogenic belt (Oversby limited himself to consideration of the southern part).

Oversby envisaged that the southern part of the Tasman Geosyncline had been subjected to several tectonic cycles during the late Precambrian and Palaeozoic. Each cycle was accompanied by a time lag between the onset of plate motion and its manifestation on the continental side of the trench complex which includes the present geosyncline, and another lag between the end of motion and its final effects. Even so, each successive cycle seems to have overlapped the previous one both in time and space. The relatively mild tectonic activity and the lack of marked topographic relief in the region then led Oversby to suppose that the downdwelling oceanic plate was moving westwards only very slowly; and the eastward younging of plutons was taken to indicate an eastward migration of the downwelling plate margin. Such a migration would presumably explain the predominance of steep structures in the area.

Solomon and Griffiths relate the Tasman Orogenic Zone to both New Zealand and Antarctica; they claim that the Cambrian to early Ordovician history of the zone is best revealed in Antarctica and Tasmania, and the Ordovician to Permian history in New South Wales and southern Queensland (namely, the Australian mainland). In general terms, what emerges from their analysis is that throughout the region there was a progressive eastward development; but continental margin growth by sedimentation was complicated by the probable existence of crustal blocks to the east. Subduction (trench) zones decrease in age in the easterly direction; but the Carboniferous and Permian sites in the north are separated by the continental crust of the Lord Howe Rise. This block, of course, could have developed by sedimentation from the continental margin; but in the relatively short period represented by the Carboniferous–Permian this seems unlikely.

Solomon and Griffiths suggest that the block is a fragment broken off from the Australian Shield. If so, it is clear that the subsequent collision of the Lord Howe block with the Australian margin would have severe implications for the continued growth of that margin—and these are spelled out by Solomon and Griffiths with supporting evidence from geological indicators—until, at a later stage, subduction and continental margin sedimentation became established to the east of the block.