the increase in global temperature is not likely to exceed 1.0 K. But as Rasool and Schneider point out, even this increase is unlikely to be realized in practice because man's involvement with the atmosphere is more than a question of adding carbon dioxide. Over the period during which the carbon dioxide has increased by 7 per cent the aerosol content of the atmosphere has increased by something like 100 per cent; and the effect of this has probably been to decrease the Earth's surface temperature.

Rasool and Schneider have estimated the magnitude of the scattering and absorption of both infrared and visible radiation produced by typical atmospheric aerosols, using the theory of multiple scattering. Their results show that an increase in the equilibrium dust concentration of the global atmosphere by a factor of 4—which is quite possible within the next century—could decrease the mean surface temperature of the Earth by 3.5 K. Moreover, because of an exponential dependence of the back-scattering by the aerosols the rate of temperature decrease is likely to increase with increasing aerosol concentration.

In spite of the obvious uncertainties in estimating and predicting the effects of carbon dioxide and aerosols in the atmosphere, it seems that, on balance, man's continued pollution is likely to lead to a reduction rather than an increase in global temperature. Thus, far from there being a melting of the ice caps, it is Rasool and Schneider's view that the triggering of an ice age is more likely.

PARASITES

Behaviour of Insects

PROFESSOR D. DAVENPORT of the University of California at Santa Barbara has said that the ultimate aim of any study of animal behaviour is to break down behaviour patterns into a form that can be analysed in physiological terms. The extent to which this has been achieved in the case of parasitic animals and biting insects was one of the problems discussed at a joint meeting of the Linnean Society of London, the British Society for Parasitology and the British Section of the Society of Protozoologists held in London on July 8 and 9.

Dr J. Llewellyn (University of Birmingham) pointed out the difficulties involved in the study of trematodes. The targets of the larvae of monogenean flukes are mostly fish of much greater size and vastly greater speed of movement. Attachment to the host is therefore only possible in stages of the life cycle when they are relatively immobile. Light effects and chemical stimuli from the host, operating over very short distances, are probably the key factors for the parasite. Light is equally important in maintaining the activity of larval nematodes. Dr N. A. Croll (Imperial College London) described how the normal waning of motor activity can be halted by a five-fold increase in light intensity. By successive increments of this order, involving increases of more than a thousand times over the original level, larvae can be kept on the move indefinitely. This shows that control of activity is likely to be sensory rather than metabolic.

Dr S. Brenner (MRC Molecular Biology Laboratory, Cambridge) asked whether it was possible to "get" the complete structure of a small nervous system. For a nematode a millimetre long, his answer was that one should first describe what is there and how it is connected. Electrophysiology was unnecessary but genetics could be used instead to "ablate" sense organs and to compare the behaviour of mutants with that of normal worms.

The richness of the sensory equipment of biting insects was described by Dr C. T. Lewis (Imperial College, London). In the antenna of the stable-fly there is a concentration of more than 5,000 sense organs. The use of electrophysiology was essential for their study, but only shows that information of a favourable stimulus has been passed on to the central nervous system. In getting to understand the integration of the latter lay the key to further advances.

The chemical guidance of mosquitoes to their hosts was discussed by Dr M. T. Gillies (University of Sussex) who pointed out that host/vector encounters were dependent on the insect flying into the odour plume of the host. Tsetse flies, on the other hand, tended to follow moving animals. According to Dr A. G. Gatehouse (Imperial College, London) visual factors were primarily responsible for this.

Professor G. D. Nelson (London School of Hygiene and Tropical Medicine) looked at the parasites of man acquired from animals. Those parasites

DNA Duplication *in Vitro*

THE biochemistry of DNA duplication is today almost as great a mystery as ever it was. DNA polymerase I (the Kornberg enzyme) is not essential for the duplication of the *E. coli* chromosome and the same can probably be said of the recently discovered DNA polymerase II, and so with the true DNA duplicase yet to be identified and isolated the field is wide open to all comers. The chief obstacle to progress has, of course, been the lack of an *in vitro* system which maintains the functional integrity of the original replication fork and supports the semiconservative replication of biologically active DNA at a rate comparable to that in intact cells. These are difficult criteria to meet but according to Matsushita, White and Sueoka's report in next Wednesday's *Nature New Biology* "toluenized" bacteria, bacteria which have been rendered permeable by treatment with toluene, fit the bill.

Last year Moses and Richardson devised this procedure and reported that "toluenized" *E. coli*, in the presence of all four deoxyribonucleotide triphosphates, synthesize DNA rapidly. Sueoka's group, using *Bacillus subtilis* rather than *E. coli* because they could then study the replication of particular marker genes by transformation assays, set out to determine whether the DNA replication supported by "toluenized" cells is indeed semiconservative, whether or not the newly made DNA is biologically active and finally whether replication after "toluenization" proceeds at the replication fork existing before exposure to toluene or depends on new initiation sites.

By allowing the "toluenized" cells to incorporate the density label bromodeoxyuridine triphosphate and then isolating and characterizing the newly made DNA they have been able to prove that synthesis is semiconservative. Moreover, the newly made DNA can be used to transform cells so it is biologically active. But the crucial question is whether this DNA synthesis observed *in vitro* is DNA duplication rather than DNA repair synthesis. If it is the latter, of course, toluenized cells will be of little use in the search for the real DNA duplicase, but if it is the former, the biochemistry of duplication may at last be accessible to detailed study.

In an attempt to decide this issue, Sueoka and his colleagues first measured the rate of DNA synthesis *in vitro* and *in vivo* and found that toluenized cells make DNA at a rate ten times less than intact cells. Encouraged by this they exposed a synchronized population of *B. subtilis* cells to toluene and, by measuring the time of replication of selected transformation markers, were able to prove that DNA continues to be made after "toluenization" at the replication fork which existed before this treatment. Both these results strongly suggest that the DNA synthesis *in vitro* is duplication and not repair synthesis. For if it were the latter it might be expected to occur at a slower rate and not exclusively at the existing replication fork. Bottles of toluene will no doubt be appearing on the shelves of every group intent on identifying the enzyme responsible for DNA duplication.