Following work at the Glasshouse Crops Research Institute, the predatory mite, *Phytoseiulus persimilis*, is widely used in the United Kingdom to control the glasshouse red spider mite, *Tetranychus urticae*. H. G. Fransz (Netherlands Institute for Marine Research, Texel) discussed three ways of simulating the predation of *T. urticae* eggs by *Typhlodromus occidentalis*, which is used in Holland, considering factors such as prey density and predator gut content. His stochastic approach, in which the system changes state according to a series of random numbers, was run 100 times for each prey density to determine the mean values and 95% confidence limits. In his deterministic simulation random events were replaced by continuous rates of change and a hypothetical mean run once for each prey density and so forth. In his compound method gut content was divided into five states and a deterministic model applied to each (and to other factors split into states). For given conditions he found differences in the number of eggs attacked between stochastic and deterministic models with the compound method nearer the second model.

The use of computers in information storage and retrieval was then considered with R. A. E. Galley in the chair. J. A. Silk (Plant Protection Ltd, Jealott's Hill) discussed the value of computers in technical information services, in providing information summaries on which management decisions can be based and explained how relevant references to published literature are provided from commercially available tapes. Clearly for an organisation the size of Imperial Chemical Industries computerised sorting and retrieval of information are essential, a point reinforced by G. Palmer (ICI, Pharmaceutical Division), who stated that more than 135,000 compounds are stored in the company's file with details of their biological activity, availability and Hansch parameters. He explained how their structures are stored in the Wiswesser Line Notation (WLN), letters and numbers standing for specific chemical groups. When the memory is searched for compounds of the required type on an atom for atom basis the rate is only 350 compounds per minute, so a preliminary sorting is needed to reject most unwanted compounds, for example a one fragment search runs at 50,000 and a WLN search at 4,000 compounds per minute.

D. T. Saggers (Fisons Ltd, Agrochemical Division) explained that testing compounds for biological activity enabled those with desirable properties and the relationship between activity and chemical structure to be identified and he illustrated this by structures (again in WLN) with specified pesticidal activity and recalled by computer. J. C. Wickham (Wellcome Foundation, Berkhamsted) showed how computers can be used to undertake probit analysis, to determine the relative potencies of a series of related compounds and to predict the properties of aerosol mixtures, containing, for example, an insecticide, a synergist and a knock-down agent. Costs of the components can be included in the program and the commercially optimum recipe can be decided.

H. S. Stammers (Shell Research Ltd), introducing the discussion, asked whether too much of computer time is spent on statistical analyses, the results of which are of questionable value, and warned that the study of model systems can become expensive. Several of the audience agreed with earlier speakers that the next stage is a greater use of on-line computers which can be interrogated directly.

IRON-SULPHUR PROTEINS

Low Redox Potentials

from our Photosynthesis Correspondent

CAN membrane bound iron–sulphur proteins with midpoint redox potentials lower than −530 mV be involved in the primary photochemical events of chloroplast photosynthesis? This is a question posed from recent work of Ke, Hansen and Beinert (*Proc. natn. Acad. Sci., U.S.A.*, **70**, 2941; 1973). It is about 3 years since Malkin and Bearden (*ibid.*, **68**, 16; 1971) first suggested from electron paramagnetic resonance (EPR) studies that a membrane bound ferrodoxin may serve as a primary low potential electron acceptor for photosystem 1 (S1). Since then work from several laboratories has supported the idea that an iron–sulphur centre accepts electron from the light activated S1 reaction centre (P700). Several lines of investigations have indicated that the redox level of the reduced iron–sulphur centre was lower than −250 mV and could possibly be −470 mV.

By carrying out redox titrations with digitonin-fractionated S1 subchloroplast particles monitored by low temperature (13 K) EPR spectroscopy, Ke and his colleagues have uncovered some new and striking properties of membrane bound iron–sulphur proteins. They have resolved three different iron–sulphur centres: one with resonance lines at g=2.05 and 1.94; one with lines at g=2.05, 1.92 and 1.89; and one detected by a single line at g=1.86. Redox titrations between −450 and −610 mV carried out at *p*H 10 indicated that the midpoint potentials of these iron–sulphur species fall into two distinct separate regions, −530±5 mV and 580 mV. The redox reactions of each of the membrane bound iron–sulphur centres were found to be reversible and apparently involved a two electron change. Although all three centres could be reduced by light at room temperature, at 77 K illumination did not bring about photoreduction beyond that

Magnetic Fields in Neutron Stars and White Dwarfs

IN a supernova explosion the interior of a star may be imploded to form a neutron star or white dwarf and, as the electrical conductivity of stellar material is high, magnetic flux should be conserved during the implosion. As a result an initial field of only 100 gauss can be converted to 10^{12} gauss in the resulting neutron star. If pulsar neutron stars are typical, neutron stars do have magnetic fields of strength about 10^{12} gauss. In addition a small minority of white dwarfs have strong fields of order 10^7 gauss. Although flux conservation during implosion may account for the neutron star fields, it is perhaps surprising that most pulsar neutron stars seem to have magnetic fields of about the same strength, for stellar fields before implosion may have very different strengths.

Present theories of supernovae produced by explosive carbon burning suggest that a remnant white dwarf or neutron star can only be left if the onset of the explosion is delayed by the occurrence of convection in the interior of the star. Without cooling by convection, the explosion is catastrophic and no remnant remains. In *Nature Physical Science* next Monday (December 10), Ruderman and Sutherland suggest that this convection produces the magnetic field which is amplified in the final stages of implosion. They suggest that convection will amplify any initial field until its energy is in equipartition with the energy of the convective motions. Using estimates of convective velocities based on the mixing length theory of convection, they predict a field of 10^{12} gauss in neutron stars and one of order 10^7 gauss in what they take to be a small minority of white dwarfs formed in supernova explosions.

This is a very promising suggestion although some of its details are controversial; for example, the mixing length theory may not give a very good estimate of convective velocities. It has never been proved convincingly that an equipartition field must be produced by the interaction of magnetic fields and convection and the field produced by such interaction might be a small scale field rather than a large scale field of strength 10^{12} gauss. These points will no doubt be discussed in future.