more frequently encountered by an insect and that this assists the development of a feeding relationship. This process does not seem to have been generally operative in the case of the host/epiphyte situation during the postglacial period in Britain.

Species density alone, therefore, may indicate antiquity in a forest, but it may also be misleading under certain conditions; for example, the increased microhabitat diversity which accompanies limited disturbance may, at least temporarily, inflate species density since it allows the invasion of species characteristic of unstable habitats. Also, local air pollution may deplete the epiphyte flora of even an ancient forest. A more hopeful approach to the assessment of past forest continuity is the use of species which are sensitive to disturbance. Rose has attempted this by constructing an "Index of Ecological Continuity" for woodlands based upon the occurrence of twenty selected lichen species which he regards as indicative of long periods of undisturbed woodland conditions. On this scale the New Forest has a rating of 100; very few other British woodlands have values of more than 70. Again, however, some woods with lengthy historical continuity could be underrated because of recent pollution, particularly in eastern Britain.

Peterken has recently proposed (*Biol. Cons.*, **6**, 239; 1974) a similar system which he has used for the assessment of woodlands in Lincolnshire for conservation purposes. He selects flowering plants and ferns confined or almost confined to proved ancient ('primary') woodlands within an intensively surveyed study area and uses these as a yardstick for assessing woodlands over a wide region. His data demonstrate a positive correlation between the number of 'primary' woodland species recorded at a site and the area of the site. This suggests that richness in sensitive woodland understorey species is a function of undisturbed conditions in both temporal and spatial dimensions. As with the epiphytes, the oceanic conditions of western Britain are particularly favourable for the growth of woodland plants, hence some of the species indicative of antiquity in eastern Britain are more widespread in the west. Complications from air pollution, however, are likely to be less important than when using epiphytes as indicators, since understorey herbs are less sensitive.

Many of the plant species used by Rose and by Peterken as indicators of undisturbed situations grow slowly under conditions of low humidity and are poor in their dispersal capacity; thus spatial fragmentation of woodland presents them with problems of spread and survival. It is the presence of these indicators, rather than the total number of species per unit area, which is likely to provide the clues for the detection and subsequent conservation of our dwindling fragments of ancient woodland.

Properties of plasmas

from A. G. Sitenko

The Second International Conference on Plasma Theory was held in Kiev from October 28 to November 1. The Conference was organized by the Institute for Theoretical Physics of the Academy of Sciences of the Ukrainian SSR and the Lebedev Physical Institute of the USSR Academy of Sciences and was sponsored by the International Union of Pure and Applied Physics.

CONTEMPORARY plasma theory is based largely on statistical methods—but there are different techniques for describing the properties of the statistical system. A. G. Sitenko proposed a detailed description of statistical and electrodynamical plasma properties, based on the consideration of fluctuations. Of fundamental importance in this description are the spectral correlation functions, which have simple analytical properties. In linear electrodynamics the fluctuation-dissipation theorem establishes a relation between fluctuations of different quantities and electrodynamic properties of the medium. That is why, once we know the fluctuation spectrum in plasmas, we can determine the electric plasma susceptibility by inversion of the fluctuation-dissipation theorem. The generalisation of this theorem for the non-linear case allows the description of non-linear electrodynamic plasma properties. Allowing for the non-linear wave interaction explains the saturation of the fluctuation level in non-equilibrium plasma under critical conditions. This level, corresponding to the stationary turbulent plasma state, can exceed the thermal level significantly. The kinetic equation for waves is derived, taking into account the interaction of waves with fluctuating fields in plasmas. To neglect this interaction (a procedure adopted in many papers) is not valid in nonequilibrium plasmas. In the stationary case the solution of the kinetic equation determines the fluctuation spectrum for the turbulent plasma state. Such an approach is very promising when considering the scattering and transformation of waves in plasmas

V. E. Zakharov applied the inverse scattering problem method to non-linear problems of plasma physics. He showed that a set of non-linear equations, which describes resonant interaction of three one-dimensional wave packets, may be solved exactly by the inverse problem method. The conservation laws are found and complete integrability of the equations is proved. In the case of decay resonant interaction between wavepackets the physical picture depends on the relative magnitudes of pumping rate and secondary waves' velocities: if the pumping rate is intermediate between the velocities of secondary waves, then the long packet of pumping decays practically completely when it collides even with arbitrarily small secondary wavepackets; but if the pumping rate is extreme, then the decay of the pumping wave is possible only when colliding with intense enough secondary wavepackets. The solutions for explosive instability are found, which describe the rise of local singularities in the limited wavepackets.

The question of turbulent plasma heating by beams of electrons and light was discussed by L. I. Rudakov on the basis of the soliton model of turbulence. The solitons may be formed as a result of a one-dimensional turbulent state modulation instability and are in fact sets of waves, trapped by the diminished plasma density domains, which, in turn, appear under the high-frequency field pressure. The formation of solitons is energetically advantageous, as it causes a decrease of the Langmuir quanta frequency, and the released energy promotes the formation of diminished density domains. As a result of collisions the solitons can decay or join. If the distances between the solitons exceed their sizes, then binary collisions play the main part. The electron changes its velocity when passing through the soliton. As a result of repeated collisions the electrons can increase their energy, thus changing the distribution function. This picture for the one-dimensional case is confirmed by the numerical integration of the non-linear equations of Langmuir turbulence. The joining of solitons can lead to the collapse phenomenon, that is, to dynamical accumulation of energy in certain regions of space. The existence of such a process, when special initial assumptions are fulfilled, is confirmed by numerical calculation. The interaction between particles and the collapsing formation causes the heating of the particles in the medium.

In conclusion, the conference gave participants a good chance to acquaint each other with investigations in plasma theory. The next International Conference on Plasma Theory will be organised by A. Salam in 1976 at Trieste.