

lived in terms of thousands rather than millions of years and vigorous. There are therefore signs of a semi-quantitative breakthrough in the understanding of geothermal processes. This has been brought about by the use of a wide spectrum of analytical techniques on, for instance, the ophiolite massive sulphides of Cyprus and the porphyry copper of El Salvador. Their use elsewhere will markedly enhance our understanding of the processes involved in ore genesis.

Happily, the days when it was considered almost indecent for 'pure' academic scientists to concern themselves with 'ores' are over. A period of fruitful collaboration between hard-headed practicality and high quality academic research is, it is hoped, here to stay. □

Phyto-insanitary Britain

from a Correspondent

A LARGE proportion of the money devoted to agricultural research in the UK is spent on phytopathology and crop protection and has enabled the production of virus-free and disease-resistant crops that can be fully protected by insecticides, fungicides and herbicides, to give near maximum possible yields.

Phytopathology research within the UK has been mostly confined to known indigenous pathogens but there is an additional threat from the vast amounts of plant material imported in many different forms every day. This comes from all over the world and frequently carries pathogenic organisms or strains of pathogens alien to this country. Fortunately most of these pathogens cannot survive in the unfavourable climate but the few that can may cause economically serious diseases.

Many such diseases have already entered the UK through the importation of infected plant material. Fire-blight of apples and pears, for example, was unheard of in Britain 20 years ago, though it was widespread in North America. It is now an established disease in southern England affecting hawthorns, many ornamental species of Rosaceae and posing a potential threat to apple and pear species, though disease outbreaks have been mostly confined to South-East England (*Ann. appl. Biol.*, **69**, 137; 1971). This disease has put severe restrictions on nurserymen who wish to export apple and pear varieties. Tobacco ringspot virus has also been introduced recently on pelargoniums imported from the USA.

The fruit industry suffered another setback recently when the Ministry of Agriculture reported that at least 150 acres of plums have some levels of infection with plum pox (sharka) virus, an aphid-borne virus. This potentially devastating disease originated in south-eastern Europe but has now spread throughout most of the continent. The Germans unknowingly introduced plum pox into their own plums from propagating material brought back from Yugoslavia after the last war, which resulted in serious losses in crop production in some regions. The virus is now endemic in many parts of Eastern Europe infecting a wide range of *Prunus* species (*Acta. Horticulturae*, **44**, 155; 1975).

Britain, through the Nuclear Stock Association (Tree Fruits), has been producing virus-free plums for nurserymen and fruit farmers for several years. Ironically a wide range of *Prunus* species from all over Europe is also imported even though the dangers of plum pox have been apparent for many years (*Pl. Pathol.*, **17**, 66; 1968). Much of this material is accompanied by phytosanitary certificates of the exporting countries which are not necessarily the countries of origin. These certificates state that the material has been inspected and is certified free of certain diseases.

Most virus diseases cannot be detected by visual inspection, however, particularly in dormant plants in transit. When the material arrives in the UK it is again inspected by the Ministry of Agriculture Plant Health Inspectorate who are not equipped to detect most virus infections at this stage. The plants are then distributed to nurseries for propagation, and are often grown close to virus-free rootstocks and mother-trees in the nuclear stock scheme. In the retesting of nuclear stocks carried out last year some plum pox infection was found.

As plum pox severely affects Victoria plum, the most widely grown cultivar in the UK, the survival of the plum industry is threatened unless steps are taken to eradicate this disease.

Because of the present loopholes in the system, which have been apparent for many years, particularly for virus diseases, it may only be a matter of time before diseases such as apple proliferation, oak wilt and pear moria are introduced.

Unlike countries such as New Zealand and the USA, the UK is failing to implement effective phytosanitary measures. Farmers and growers in Britain are not getting the protection they require and production is being restricted or made more costly by the introduction of new diseases. For too long exporting countries have been able to sell sub-

standard and infected plant material, undercutting local industries and threatening the health of home-produced material. It is time that the Ministry of Agriculture and Plant Health Branch heeded the warnings of research workers and implemented effective phytosanitary procedures. □

Observing satellites

from a Correspondent

On January 17, 1976, there was an all-day meeting, at the Royal Society, in London, of optical observers of satellites and the university researchers who are, or soon will be, using their observations. The meeting was organised by the Optical Tracking Subcommittee of the British National Committee on Space Research, and the stimulus was the recent award by the Science Research Council to the Universities of Aston and Leicester of grants for research projects based on optical observations of artificial satellites. The current observing effort is to be augmented by recruiting a second team for the Hewitt Camera at Malvern and an increase in staff in the Satellite Orbits Group at the Appleton Laboratory, Slough, which provides the prediction service.

THE morning session began with an outline of the university proposals from their initiators, C. J. Brookes (University of Aston) and A. J. Meadows (University of Leicester). Brookes's programme includes a varied group of geophysical studies based on orbital analysis. The aims are to obtain better values of zonal harmonics in the geopotential, to study the variation of atmospheric rotation rate and air density during a solar cycle, and to study in detail the radiation pressure effects on orbits, using balloon satellites. Meadows proposed to concentrate on two topics: first, analysis of resonant lunisolar perturbations, by intensive observation of satellites at particular inclinations (56.06° being a promising starter); and second, studies of spin rates of similar satellites in orbits at different heights, to distinguish the effects of atmospheric and magnetic damping in the hope of measuring the variations in both.

After these plans for the future, some recent results from orbital analysis were presented. D. M. Brierly (Royal Radar Establishment, Malvern) described his determination of air density at a height of 128 km from a