

## IN BRIEF

**Azbel in Israel**

Mark Azbel, who for the last 2½ years has been running the Moscow 'Sunday seminar' for refusnik scientists, arrived in Israel last week. He said the recent closure of the seminar was not a condition of his obtaining an exit visa, and that he was confident it would reopen shortly.

**German report**

Professor Heinz Maier-Leibnitz, president of the Deutsche Forschungsgemeinschaft (DFG) has told of the continuing effect of financial cutbacks on Germany's research effort. Writing in the 1976 annual report, published at

the end of last month, he says the "awareness of being at the mercy of something arbitrary in [research] promotion, wherever it comes from, and not to know any more whether a good plan will even be welcomed, easily leads to discouragement and bitterness".

Of the DM646.1 million the council had at its disposal last year (an increase of DM26.1 million on 1975), DM367.6 million came from the Federal government and DM269.9 million from the Lander.

**European scrutiny**

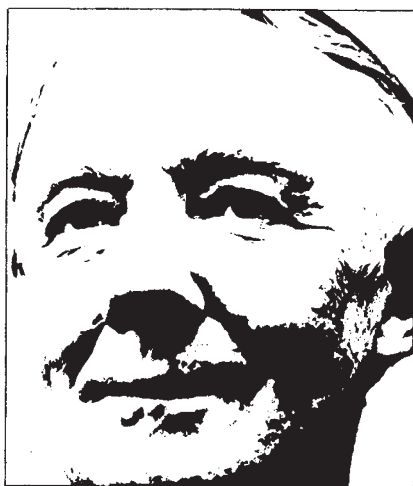
Well over a year after welcoming the suggestion that other House of Com-

mons Select Committees apart from the existing Committee on European Legislation should consider proposals coming from the European Commission, the Select Committee on Science and Technology has decided to "consider the merits of EEC instruments falling within their order of reference". But the committee's special report announcing the decision, published last week, indicates the sort of fears about divisions of responsibility that may have caused the delay. Such work, the report insists, "cannot supplant the examination of such instruments by parliamentary representatives in the Energy and Research Committee and other appropriate Committees of the European parliament".

Air pollution has both local and international effects. Smoke and dust are usually urban problems, less serious the further one moves from their source. Fluoride, from brickworks and aluminium smelters, seldom causes damage beyond a radius of fifteen kilometres. But sulphur can be transported for hundreds of kilometres, over frontiers and oceans, and may cause international disagreements. It is well known that scientists in Norway and Sweden complain that sulphur emissions from Britain, Germany, Czechoslovakia and Poland have turned their rain and their rivers acid, harming freshwater fisheries, and possibly reducing growth in their coniferous forests. Many people have the impression that the industrial countries have developed a technique for keeping their own air relatively clean and at the same time causing gross pollution to harm the innocent Scandinavians.

It is true that, though there has been little decrease in the total emission of sulphur by industry and from domestic heating in Britain over the last twenty years, levels of sulphur dioxide, SO<sub>2</sub>, in our cities have fallen as the gas has been increasingly discharged from high chimneys. This can be shown by the way the disease 'black spot' has returned to damage roses in urban gardens, where previously the fungicidal properties of the air kept it in check. But though the sulphur is certainly more widely dispersed, the bulk of it remains near to its source. British or German air is much more heavily charged with sulphur than that which crosses the sea to Norway and Sweden. British rain is generally acid. Even in rural Cambridgeshire measurements of pH 4 and lower

are common; some 70 kg of sulphur is deposited on average on every hectare of Britain, and more than 20 kg in the most rural farming areas. The amounts deposited in Scandinavia are much lower. Yet

**Acid rain****KENNETH MELLANBY**

damage in Britain is rare, and widespread in Norway and Sweden. The situation is clearly complicated.

In Britain most of the sulphur polluting the atmosphere is gaseous SO<sub>2</sub>. Even in the cleanest areas annual average levels of 20 µg m<sup>-3</sup> are recorded. These are generally believed to have no harmful effects. None have been detected with crops or animals, and even foliose lichens, plants known for their extreme sensitivity to sulphur, flourish. In southern Norway, SO<sub>2</sub> levels are seldom as high as 5 µg m<sup>-3</sup>, and, as we would expect, lichens grow well. By British standards, the air is remarkably pure. The SO<sub>2</sub> hardly

seems to be the villain.

The main cause of acid rain seems not to be SO<sub>2</sub> but sulphate. In Britain amounts of sulphate are, in comparison to SO<sub>2</sub>, low, and probably of little importance. In Scandinavia most of the airborne sulphur is present as sulphate, much derived from SO<sub>2</sub> produced by European industry and transformed during the period of passage north. This is washed out by the heavy rainfall. As already mentioned, the rain is actually less acid than that falling in Britain, and the total amounts of sulphur are generally small (less than 10 kg per hectare). Why then should there be all this fuss?

There are two main reasons. First, most water in Britain is well buffered, and it and most soils can neutralise most of the (comparatively large) amounts of sulphur pollution. Most Scandinavian freshwater is very 'pure' with little buffering power, so a little additional acid can greatly reduce the pH. Also much rain is stored as snow for up to six months; when it thaws the pollution of half a year can be suddenly discharged.

There is no easy solution. Industrial countries can reduce levels of sulphur emission sufficiently to eliminate damaging pollution within their own borders, but will find it difficult to prevent the small fractions of their emission which escape overseas from damaging the rivers of Scandinavia. It is ironical that this sulphur can also contribute to agricultural productivity. Many Scandinavian soils are sulphur deficient and to optimise crop yields this element must be added as a fertiliser unless adequate amounts are deposited from the atmosphere. What is pollution for the fish may be an essential growth factor for the cereals.