CANADA

Spraying controversy revived

A link is suspected between the use of certain tree sprays and the condition known as Reye's syndrome. David Spurgeon reports from Ottawa

THE spraying of forests in the Maritime provinces to prevent infestation by the spruce budworm has created a sharper controversy than ever this spring because of the deaths of five children from a disease suspected of being linked to the insecticides used. It is not the first time arguments have arisen over the spraying programme: DDT was used as an insecticide in the 1950s and 1960s until it was found to have caused severe fish kills in surface waters. But it is the first time human deaths have been linked to the programme.

A number of children, mostly from areas that have been heavily sprayed in the past, have died from Reye's syndrome, a condition first described in 1963 following the US Air Force's aerial defoliation in Vietnam and Thailand. The disease causes increased susceptibility to viral infection, and it is the spray dispersal emulsifiers which are suspect; the sprays used are Fenitrothion and Phosphamidon.

The current budworm outbreak, which now covers about a third of the province of Nova Scotia, was first reported in 1969. The budworm (*Choristoneura fumiferana*) is a moth that lays its eggs in firs and spruces in July. The eggs hatch in about 10 days, and the larvae spread through the trees.

They remain dormant for the winter, emerging in late April and early May to begin feeding on new shoots. In June they enter the pupal stage, and the moths which emerge in June or July can defoliate and kill trees to the extent of causing their death.

Massive increases in population can occur when there is a large incidence of host trees and favourable weather. This has happened in the Maritime provinces six times since the early 1700s. Predictions for this year were bad from the point of view of the forest industries, particularly in Cape Breton Island, so Nova Scotia Pulp Ltd and Nova Scotia Forest Industries—a branch of Stora Kopparbergs Bergslags AB of Sweden—applied to the Nova Scotia government for permission to spray with Fenitrothion or Phosphamidon.

The Nova Scotia department of lands and forests recommended against it, but the Cabinet gave approval in February. Seven weeks later, on April 2, Cabinet approval was withdrawn as a result of a story that appeared first in the *Cape Breton Post* and subsequently in other newspapers. The story summarised the work of a research team at Dalhousie University begun in 1974 which indicated that a link was possible between the spraying programme and the deaths from Reye's syndrome. It was based on material given to the *Post's* editor by a PhD student who was a member of an environmentalist group.

The research group had published a

preliminary report on their work in *The Lancet* in 1974, and has a further paper in press now. Its members applied spray chemicals topically to the abdomens of about 13,000 mice in the same concentrations used in the spraying programme, and then exposed the animals to a virus. They found that the mice died, not as a result of the virus or of toxin but of some third entity. At the time they published in 1974, they had applied only the insecticides as sprayed, to the animals. Later they purchased the carrier substances separately and concluded that one of the emulsifiers used in the sprays was probably the substance linked to Reye's syndrome.

Dr J. F. S. Crocker, one of the research group and an assistant professor of paediatrics, emphasises that the research has been strictly with animals and indicates only that a link between the spraying programme and the deaths from Reye's syndrome "is possible theoretically." The group is now planning *in vitro* experiments and work with primates, and has proposed identifying chemicals in the tissues of children struck by Reye's syndrome—if possible before they succumb. Dr Crocker himself finds it extraordinary that so little research has been done in this field. He says that if the companies that do the spraying make up their own spray formulation, they do not even require a licence for the emulsifiers, whereas the spray mixture must be licenced if it is packaged as a ready-made formulation. Yet the chemical structure of the emulsifiers is unknown—and of course the effects on humans are unknown.

The budworm problem has been worst in New Brunswick in past years, and has only recently spread to Nova Scotia. No spraying has actually been carried out in Nova Scotia, but in New Brunswick it has always been carried out by Forest Protection Ltd, a Crown corporation representing the provinces and its major pulp and paper industries. Decisions about whether to spray or not in a given area have been made by the corporation's board of directors and approved by federal and provincial governments. Costs have been shared equally by the federal government, provincial government and industry. Fenitrothion has been the chief insecticide used since 1968: it is claimed to be non-persistent, non-cumulative and not subject to concentration in the food chain. There is also evidence it is less harmful to fish than is DDT.

This year's spraying programme in New Brunswick will cover 10.2 million acres. The federal government has opted out of the programme, but the federal department of regional eco-

Canadian cutbacks

THE Royal Society of Canada has joined in the general clamour of protest by Canadian scientists against a federal freeze on research funds. The Prime Minister, M. Pierre Trudeau, recently received a brief signed by W. Bennett Lewis, president of the council of the Society's Academy of Science, which said the 1975-76 level of federal support for government laboratories was only 83.3% of the 1969 level in terms of the fraction of federal budgetary expenditures. Research in Canadian universities is in an even worse position, with support in 1975 reduced to 67% of the 1969 level—and although the decline was arrested last year, the freezing of grants this year will cause support to decline to about 60% of the 1969 level.

Although it was recognised in 1969

that government support of industrial research and development was already too small, it is now even smaller, the brief said. In terms of the fraction of federal budgetary expenditures it had fallen by 1975 to 68% of the 1969 level. To make matters worse, the Department of Industry, Trade and Commerce had abolished one of its aid-to-industry research and development programmes and had cut back another.

Tables and graphs accompanying the brief showed that Canada was alone among advanced nations in its reductions in support for science and technology. Organisation in other industrialised countries with functions similar to those of the National Research Council of Canada (supporting in-house research and development and university grants and scholarships) had been treated almost as well, and in some cases better, than they were in 1969.

conomic expansion will contribute. As a result of the controversy in Nova Scotia, questions have been asked in the New Brunswick house about the advisability of carrying on with the programme. In an article to be published in the June issue of *Science Forum*, Neal Bennworth and Chris Bailey contend that spraying should be prohibited because it is "an energy-intensive attempt to bend nature to conform with the forest industry's narrow concepts of how a forest should

behave".

They say the operation only increases in the long term the chances of occurrence of what it was originally intended to prevent, because preservation of the host trees by spraying "simply improves the environment for the budworm and increases the likelihood of further population expansion." This is so because the forest and the budworm are a self-regulatory system: the budworm destroys the forest and ensures a new development of host species favourable

for future budworm generations. The present composition of the forest, they say, has evolved as a result of budworm predation removing mature balsam fir preferentially, which allows less competitive species of trees to survive. Budworm spraying merely protects the host trees, which are economically significant to the forest industry, and this in turn improves the environment for the budworm, thus increasing the likelihood of further population expansion. □

USSR

ONE of the obstacles to communication between Soviet geologists and their foreign colleagues in recent years has been the unwillingness of Soviet geologists officially to admit the possibility of continental drift. This block was not due to any political considerations—unlike those imposed in Stalin's time on genetics and cybernetics—but seems to have been due to personal opposition from certain leading geologists, notably Professor V. V. Belousov of the Institute of Earth Physics in Moscow. Recently there has been a discernible relaxation in this attitude: the popular science magazine *Priroda* has carried an article dealing with this "hypothesis", and even Professor Belousov himself has somewhat half-heartedly discussed the subject in his latest book.

Now, however, a TASS radio bulletin, transmitted in English and hence clearly for international consumption, has given even greater approval to this concept, stating that Australian rock samples, collected by M. Ravich of the Institute of Arctic Geology in Leningrad, have proved to be "completely identical" to samples from the Antarctic opposite Australia, thereby giving added proof of the "so-called theory of Gondwanaland". According to Professor Ravich, the samples match not only in chemical composition and age (2,000 million years), but also in the size of the deposits, and give credence to predictions of mineral wealth in the Antarctic similar to deposits in Australia, South Africa and South America. A number of Soviet geologists have privately supported the concept of continental drift for some time. The TASS broadcast indicates a possible reversal of the official view of the Soviet geological establishment.

● The chance a private individual in the USSR has to participate in a major scientific research project nowadays is extremely limited. But it was granted to the citizens of Byelorussia, the Baltic States and the Leningrad-Novgorod region of the

Russian Republic by the flight, on February 11 this year, of what has been named the "Baltic bolide".

This large meteorite, which appeared in the twilight over the Gulf of Finland, crossed the gulf moving in the general direction of Moscow before burning up. Its flight time of

more than 100 seconds, instead of the normal one second or so, is a record for any meteor, and is attributed to a velocity comparable with that of the Earth and a trajectory virtually tangential to it. Before the bolide finally broke up with a fine display of natural pyrotechnics, some 600 people following it along its path had observed it closely enough for their letters and sketches to help astronomers at the Pulkovo observatory plot its course. According to V. Kratt, the observatory's Director, the bolide ceased glowing only at a height of 25 km, and there is reason to hope that some fragments may have penetrated the atmosphere to ground level. The Soviet Academy of Sciences has therefore appealed to all persons living along the route to survey the area for fragments.

● The State Committee for Science and Technology of the USSR's Council of Ministers has signed an agree-

ment on technical cooperation with British Petroleum, to run for an initial period of five years. It provides for broad-based reciprocal scientific and technical cooperation on a long term basis, and is the result of some two years of negotiation, since Academician Vladimir A. Kirillin, the committee's Chairman, visited Britain in 1974.

The agreement envisages exchanges of scientific and technical information and of specialist staff, joint research and development, the organisation of symposia on topics of mutual interest, and the joint implementation of research programmes and projects—on the production of unicellular proteins from petroleum wastes, for example. The State Committee has shown considerable interest in purchasing the expertise for deep-water drilling developed by BP in connection with the Forties field in the North Sea.

One new Soviet development in anti-pollution measures, however, is unlikely to form part of any exchange agreement. According to Moscow radio a new agent for cleaning up oil spills in the Caspian has been discovered: the cockle *Cerastoderma*, which, although only some 2.5 cm long, filters up to 15 litres of water through its body in its feeding process. Any oil contained in this water is coated with slime and eliminated, forming a sludge which falls to the sea-bed, where, it is thought, it is later rendered harmless biologically.

● The latest volume of the Large Soviet Encyclopedia carries a brief, 75-word biography of Andrei Sakharov, complete with photograph, describing him as a "Soviet physicist and Academician" and recording that he was thrice awarded the title of Hero of Socialist Labour (the highest Soviet civilian award). Sakharov's human rights work is nowhere mentioned: his recent activity is dismissed with the remark that "in recent years he departed from scientific activity". Sakharov himself commented that he was "very pleased" with the entry.

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