



## Antarctica: the end of an era?

THE problems of mineral exploration in Antarctica will almost certainly be discussed when signatories of the Antarctic Treaty meet in Oslo in June. Largely concerned with the potentially vast reserves of oil and other fossil fuels, the discussions will ensure that old issues of territorial sovereignty will once again be raised. But fears that each of 12 signatory states intend to grant themselves exclusive rights of exploitation may be unnecessarily pessimistic, writes Alan Piper.

There is still a considerable amount of doubt about the full extent and

location of fossil fuel resources in Antarctica, though consideration of the pre-drift, Gondwana continental arrangements suggests that the Ross Sea and Weddel Sea areas may prove productive. Even vague possibilities, however, lend an added significance to the debate about possible mineral exploitation in Antarctica and it is unlikely that the tacitly acknowledged, underlying political rationale behind the maintenance of expensive scientific bases in Antarctica can remain suppressed for very much longer.

At the time that the Antarctic

Treaty (see box) was signed five of the contracting nations — Australia, the UK, France, New Zealand, and Norway—had previously asserted recognised claims to about 80% of the Antarctic landmass and adjoining continental shelf in sectors radiating outwards from the pole. Of the remaining signatories, Argentina and Chile had advanced conflicting claims to most of the British sector, while the governments of the Soviet Union and the United States had refused at any time to recognise any territorial claims on the continent and have asserted none themselves; Japan had renounced her former territorial claims under the terms of the 1951 peace treaty.

The treaty is justifiably held in high regard as a considerable political achievement. It not only froze the legal *status quo* regarding claims to territorial sovereignty but, significantly, was the first multinational treaty of substance to involve the Soviet Union. The demilitarisation of the Antarctic continent and the provision for scientific cooperation has provided a continuing zone of contact between the super powers.

The treaty has worked well in its assurance of exclusively peaceful operations. And though each of the signatories can inspect "the full scope of another nation's scientific and logistics operations", a right regularly exercised by several countries, no evidence has yet been produced to suggest that the spirit of the treaty has been contravened by any party.

Regular consultative meetings of signatories are called for by the treaty, and at the last meeting, held in Wellington in 1972, the representatives recommended to their governments that "the subject 'Antarctic Resources Effects of Mineral Exploration' be carefully studied and included on the Agenda of the Eighth Consultative Meeting". The issue will certainly figure prominently in the Oslo discussions.

To date, there have been no signs that the UK has finalised a policy on the issue of economic exploitation, but some decisions will have to be reached soon. The obvious need is for a regime within which mineral exploitation would be available to any state operating under licence, whether or not a party to the present treaty. That approach to the problem, however, would presuppose that the over-riding issue of territorial jurisdiction had been settled. As long as uncertainties over sovereignty continue, it is doubtful whether signatories would agree to recognise the legal rights of any outsider to operate within a claimed sector.

It is to be hoped, at the least, that a system of licensing under the control of the present signatories will be

The Antarctic Treaty, applying to the entire area of the globe south of 60°S, was signed in Washington DC on December 1, 1959 by Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the Soviet Union, and the United States. After ratification by all 12 signatory states the treaty entered into force on June 23, 1961, since when it has been acceded to by Czechoslovakia, Denmark, the Netherlands, Poland, and Rumania.

Recognising that "it is in the interests of all mankind that Antarctica shall continue for ever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord" the treaty

- suspends previously existing disputes over territorial sovereignty in Antarctica

- prohibits the establishment of military bases, the explosion of nuclear devices and the disposal of radioactive waste within the treaty area

- invests contracting parties with the right to inspect the full scope of another nation's scientific and logistic operations to encourage open scientific cooperation in Antarctica

- calls for regular consultative meetings between the signatory states for the purpose of "exchanging information, consulting together on matters of common interest pertaining to the Antarctic, and formulating and considering ... measures in furtherance of the principles and objectives of the treaty".

In 1991, after the treaty has been in force for 30 years the contracting parties will be required to review its operation.

adopted. Some of the signatories will arrive in Oslo with no definitive policy in mind. That is almost certainly true in the case of the United States. The likelihood of unilateral action, which has always remained a possibility with that country, cannot as yet be ruled out but the Americans will probably adopt a wait-and-see attitude: "On paper, the United States has a policy; in reality, it does not", says a recent article in *Science*. Whatever policies or

non-policies the signatories take to Oslo, however, there is little hope that they will be published in advance. When preparatory discussions, called especially to consider the problem of mineral exploration, ended in Oslo recently no formal statement was issued.

It would be unrealistic to expect that a settlement will be reached during the Oslo talks. (Discussions on the conservation of the Antarctic seals continued for 10 years before the final proposals

were adopted in 1972. Recommendations on measures for the conservation of Antarctic flora and fauna, first proposed in Brussels in 1964, have still not met with final approval.) But most of the parties to the treaty are unwilling to roll an already snowballing problem further into the future, and many will feel that further prevarication on their part will lead outside countries to question the capability of the signatories to handle the matter satisfactorily. □



## Limits to oncology

*Dr Michael Stoker, Director of the Imperial Cancer Research Fund Laboratories, Lincoln's Inn Fields, London, thinks that a levy on money for cancer research should be used to ensure that sufficient 'strategic research', as opposed to 'tactical research', is carried out. (From a lecture given at the dedication of the Seeley G. Mudd Building, M.I.T., on March 6.)*

**E**VEN in these hard times, the support available for cancer research is relatively large by comparison with other biomedical fields, especially in the USA. But, in spite of clear enough aims in terms of alleviation of suffering caused by cancer, the course to be followed is uncharted and the weighting to be put on the various alternatives is largely guesswork. Indeed, the modest progress in prevention and cure of cancer has so far been based almost entirely on empirical judgements and serendipity, followed by well organised development, but it has given no guide to formulation of the principles to be followed for any major and general advance. Close monitoring and direction by the sponsors is, therefore, scarcely possible or at any rate useful. This results in a dilemma concerning the limits of cancer research supported by earmarked funds, particularly for those tackling the more

fundamental aspects of cancer biology.

I shall first consider, as background, some pressure which tend to broaden the limits of cancer research. At an extreme would be the socioeconomic viewpoint, which would consider cancer as a minor problem compared with poverty, population control, pollution and so on. This radical view could consider it justified, and not at all dishonest, to divert cancer funds to the greater good, or to choose research topics, which, though related to oncology, also contribute to the solution of greater social ills. But this almost certainly neglects the wishes of the donors. These may be based on emotion and irrational fears about the implacability of cancer, but it is surely the worst and most dangerous sort of scientific conceit to decide that you know better than the customer what he really wants, at any rate in terms of final objectives.

Then there are those who accept the objective of cancer alleviation, but for whom the modest progress so far, and the lack of a rational approach, means that a better understanding of biological systems as a whole is a necessary prerequisite for any real advance in cancer research. Cancer funds at this stage, therefore, should go predominantly to general biology. This viewpoint is no less strong through its reinforcement by the more personal motives and ambitions of scientists. Most of us would like to do something about cancer, but we are also strongly attracted to the great unsolved problems of wider generality, where advances will bring us the acclaim of our peers.

It is against this background, and the opposing forces of accountability, cost benefit and so on, that the question of relevance, and also responsibility to the sponsor or donor, must be considered. If you gave your money to cancer research, how would you like it spent? At one extreme almost any science, or at any rate biological science, would be relevant, whereas, at the other, cancer research funds should be restricted to programmes with at least conceptual links to practical applications in a finite time.

In some fields of research this dilemma can be acute, for example,

those relating to the molecular and supramolecular organisation of eukaryotic cells. Two main classes of research can be identified in relationship to oncology, and it is helpful to distinguish them.

The first would include any research programme which might have a bearing on cancer, but which is just as likely to lead to benefits in other fields of medicine, agriculture and so on. In other words there is no *a priori* reason to suppose that the resulting advances in knowledge will benefit cancer over and above any other human good. Clearly this research includes the general understanding of living systems and is very long term in its objectives. It is still applied research in that the goal is human health rather than satisfaction of curiosity, but it is multi-purpose, with oncology included.

The second class covers research likely to be more relevant to cancer than anything else. Though other benefits may come, the reason for the research is the special likelihood of increasing the understanding and finally the alleviation of cancer, and not of other human ills. It may still be very much concerned with fundamental aspects of living processes, but those thought to be especially important in cancer.

I shall refer to the former approach as strategic research and the latter as tactical research. They can be distinguished by applying the following questions. Is the research programme under consideration more likely to benefit cancer than other ills? If so, it is tactical. Or does the research include cancer among other possible benefits? It would then be strategic. This requires judgement of outcome and not intent.

In the light of these criteria, I shall mention briefly three research fields which are at present believed to be of high priority and which compete for cancer research funds.

The first is the cell surface, which is at present a subject of such intensive study, much of it with cancer funds. But is the elucidation of the mysteries of the cell surface more likely to benefit cancer than for example the vascular diseases or the primary immunological disorders? Of course there are a num-