

## US – Soviet pact

# Cooperation agreement signed

*Washington*

THE US National Academy of Sciences last week signed a two-year cooperation agreement with the Academy of Sciences of the USSR providing for exchange of research scientists, joint workshops and regular meetings of academy officers. Joint meetings were suspended in 1980 by the US side in protest against the internal exile of Soviet dissident Andrei Sakharov. The new agreement expands a protocol signed by the presidents of the two academies in January 1985.

A significant feature of the new agreement is that it specifies joint selection of scientists participating in workshops. This is intended to answer past criticism in the United States that the Soviets avoid sharing their best work by denying US access to their best researchers, especially in fields such as mathematics, where they may hold an edge over the United States. In addition, each academy agrees to support "insofar as possible" invitations issued to particular scientists by the other academy.

Individual exchanges have continued during the Sakharov protest at about 50 man (or woman) months in each direction

per year. The new agreement includes the same 50-month annual quota on exchanges in each direction for scientists nominated by the sending academy, but there is to be no upper limit on the number of visits by invitation.

The US National Academy of Sciences has been criticized by hardliners within the US administration for seeking to foster scientific collaboration when in their view exchanges increase opportunities for Soviet spying. Dr Frank Press, president of the US academy, said last week that such critics were "generalizing from a few bad examples". As a nod at concern about human rights, the new agreement specifies that all activities will be based on the Helsinki Accords. And, perhaps to forestall criticism from Sakharov sympathizers, the US academy this week sent a telegram to the president and members of the Soviet academy asking them to do all they could individually and collectively to ameliorate Sakharov's condition. The US academy also planned this week to release new details of its past activities in support of Sakharov.

**Tim Beardsley**

## Marine uranium

# Japan plumbs the depths

*Tokyo*

THERE are something like four thousand million tons of uranium dissolved in the sea: more than enough to run 1,000 nuclear power stations for 40,000 years. The problem, of course, is to find some way to extract it efficiently. There seems no easy solution but this week Japan's Metal Mining Agency takes the first step towards extracting at least a small part of this limitless treasure.

To be more precise, it hopes to obtain 10 kg of uranium within a year. This may not sound like much, but it is 1,000 times more than anyone else has so far succeeded in extracting in a year. It will come from the world's first large-scale sea-water extraction pilot plant which is just about to begin operation at Nio-cho in Kagawa Prefecture on the island of Shikoku.

The plant has been built by the Metal Mining Agency, an agency affiliated to the Ministry of International Trade and Industry's Natural Resources and Energy Agency at a cost of 3,300 million yen (US\$183 million). Only 0.003 parts per million of uranium are found in sea water and to bring the concentration up to usable levels, extraction takes place in two stages. First, 1,700 tons of sea water per hour are to be pumped through beds of particles containing specially developed titanium hydroxide absorbents. The concentration of uranium increases 7,000-fold. Next, the absorbed uranium is eluted with dilute hydrochloric acid and passed through an ion-exchange resin which increases concentration another 140-fold. The result, in laboratory tests, when the resin has been washed out, has been concentrations of uranium close to 3,000 p.p.m. — slightly better than natural uranium ore which contains 2,800 p.p.m. of  $U_3O_8$ .

Research on the extraction of uranium from sea water is under way in both the United States and West Germany where an unofficial world record was claimed at Kiel University with the recovery over several years of a total of 150 grams. If the Japanese plant reaches its target, it will be a considerable advance. Beyond that, various plans are in the air. To run an extraction plant efficiently, it is necessary to develop suitable absorbents and to find ways to minimize the energy required to pump enormous volumes of water through the absorbent. One proposal involves the construction of a plant on a causeway across a strait with a strong tidal stream. Another possibility is an extraction ship which sucks up uranium as it ploughs through the waves.

**Alun Anderson**

# An ombudsman for laboratory animals?

THE world's first professor of animal welfare, Dr Donald Broom, is likely to be much in demand when he takes up his new post in September. The new chair, at the University of Cambridge Veterinary School, has been funded by the Animal Welfare Foundation, set up in 1983 by the British Veterinary Association. And despite the broad terms of reference attached to the post, the keen interest shown by the popular press in the activities of the more extreme animal liberationists should mean that he will be constantly in demand to put

the "academic" case for experimentation on animals.

Dr Broom's present post is reader in pure and applied zoology at the University of Reading, where he has specialized on studies of farm animal behaviour and welfare. He plans to continue work on zoo and farm animals, but may consider other areas — animals as pets or in experiments, for instance.

A main aim of the work is to find ways of telling just how an animal is reacting to its environment. This is a topical problem, since one of the most contentious parts of the bill on laboratory animals at present going through the British parliament is the "pain clause", discussion of which continuously founders on the problem of deciding how much discomfort an animal is experiencing. Dr Broom says that "if there is some good reason for keeping animals or interacting with them in any way then we have the responsibility... to modify our treatment of the animals so that their welfare is as good as possible".

Dr Broom's past achievements include proving the benefits of scaring pigeons rather than killing them, and finding more humane ways of transporting poultry. His next target, of accelerating the "constructive discussion" on animal welfare issues, is a daunting one; emotion has so far eclipsed rational discussion. Charles Wenz

*Donald Broom*