

foundation, which has assets of \$841 million, last week announced 21 individual awards worth a total of over \$4 million, with another 29 expected later in the year.

Eight of the initial recipients are scientists, and include Stephen Wolfram, a 21-year-old physicist at the California Institute of Technology, the Harvard geologist and paleontologist Stephen Jay Gould, and oceanographer and climatologist John Imbrie of Brown University and the University of Rhode Island.

The names were chosen by the trustees of the foundation from a list of nominations proposed by 100 educators, scientists and artists who acted as scouts in what other foundations, more conventional in their granting of awards, have dubbed the "search for genius". There are no conditions attached to the way that the money — between \$24,000 and \$60,000 a year for each individual, depending solely on age — can be used, nor can the award be withdrawn within the five-year period.

The MacArthur Foundation's novel approach to the support of intellectual activities is perhaps the most ambitious of a number of attempts to meet the charge that more conventional forms of funding discourage innovative or risk-taking work.

Last year, for example, Berkeley physicist Richard A. Muller, winner of the National Science Foundation's (NSF) Alan T. Waterman award based on research for which he had initially encountered difficulty in obtaining support, told a congressional committee that individuals engaged in innovative research often had similar experiences, for example when their proposed project did not fit neatly into one or another disciplinary compartment.

Dr Muller's testimony and other similar complaints led Congress to ask NSF to assess current funding mechanisms to find out how well they are working. So far these studies have not uncovered any substantial problems, nor pointed to any particularly radical solutions.

Furthermore, a task group set up last year by NSF's advisory council on the funding of innovative high risk proposals has reported that "on the whole, the foundation's procedures seem to be effective".

In the light of the comments received and of its own investigations, the task force, headed by Halsey Royden, dean of the school of humanities and sciences at Stanford University, suggested that NSF programme officers be given greater encouragement to support innovative risk-taking proposals and that a small Group on Innovative Research Topics be set up under the deputy director, to "promote promising research that does not fit naturally into the framework of existing programs and divisions of the NSF."

Both proposals are now being considered by NSF. However, Dr Langenberg points out that the task force specific recommendations are likely to be absorbed into the bigger organizational changes now under way.

**David Dickson**

## High-energy physics

### On the rocks

The Swiss tunnel expert Giovanni Lombardi, who has honeycombed the Alps with road and rail tunnels, denied last week that it might be impossible to build the tunnel for LEP — the next big project of the European nuclear physics laboratory CERN.

The assertion, in the British magazine *Consulting Engineer*, would have prevented governments from approving LEP construction at next month's crucial CERN Council meeting. Lombardi is not only a world-recognized expert on Alpine tunnelling but also CERN's principal geological adviser.

Lombardi and CERN do however admit to geological difficulties in that part of the LEP tunnel which will go under the limestone of the Jura, to the north-east of the CERN site. The worst of the troubles have however been avoided by shrinking LEP from 30 km to 27 km circumference, it is said. In this way, the tunnel should avoid the folded core of the Jura, a region of unstable limestone which Lombardi knows to contain water and mud-filled caverns.

Even so, progress through the Jura will be uncertain and based on "forage à l'avancement", where a small (2-inch) hole is drilled 20–30 m ahead of the main borer to probe for boundaries between limestone layers. At hundreds of metres below the water table, there may be mud and pebble-filled "karsts" at these rock divisions which will have to be emptied and filled with concrete before drilling through. If water-flow through the karst is too great, it can be impossible to place the concrete.

Uncertainties of this kind have persuaded smaller member states of CERN, led by Sweden, to demand guarantees that the CERN budget will not be raised to meet any extra costs. It has thus been agreed that future CERN budget increases can be vetoed by any state, while for decreases a two-thirds majority is sufficient. And CERN's director-general, Herwig Schopper, has agreed in principle that LEP cost escalations would be met by lengthening the time over which LEP is built.

Strenuous efforts to delineate the geology of the Jura are under way at CERN, but the principal reconnaissance gallery will not reach the tricky region until April next year. So CERN is also drilling a hole vertically above the deepest part of the proposed tunnel under the Jura and making geophysical observations from within it to find the water table and the trend lines of the various limestone boundaries. The results of this investigation will not, however, be known for another three months.

Meanwhile CERN is preparing for its mid-year council meeting on 25 June at which delegations from the 12 member states would normally approve the 1982

budget. This year the budget contains an appropriation for LEP, which is not being costed separately. The debate will centre on precisely what level the budget should take, and what guarantees can be given on LEP cost overruns.

Sweden, apart from its doubts on the latter score, is in political crisis, and will almost certainly abstain; Norway may do the same; and the Netherlands are in the midst of elections and cannot predict their position. Moreover, the CERN Council delegations of many of the member states have not yet been officially briefed (this includes Britain) and so the outcome is far from certain. Procedurally, if eight states vote for the budget including LEP, and none votes against, LEP can go ahead, and this seems likely, although Schopper would like to leave the door open for a few months after June to achieve a unanimous decision.

**Robert Walgate**

## Hormone legislation

### Consumer protest

#### Brussels

The failure of the European Community's council of agriculture ministers to make significant progress on banning the use of natural and artificial hormones in livestock production is forcing European consumers to take retaliatory measures. The Bureau of European Consumers' Association is now trying to persuade the sympathetic member states to block meat imports from the United States, New Zealand, Australia and elsewhere.

Last September, the Community agreed in principle to ban the use of all hormones in livestock breeding. The decision was hailed as a victory for the consumers but has since proved to be a hollow one. It has been suggested that the September council failed to understand the difference between natural and artificial hormones and hence the problems of forbidding the use of the former. On 12 May, the agriculture ministers met to consider the European Commission's two proposals for directives to implement the ban — the outcome was disappointing.

A German proposal was adopted banning some artificial hormones already forbidden under existing laws operating in all member states except the United Kingdom. Diethylstilboestrol and other stilbenes are now to be banned, although whether this entails a separate directive or merely the partial implementation of the Commission's all-embracing directive is unclear. The other growth hormones, and the problem of enforcing any bans, will again be considered by the next agriculture council on 15 June.

The United Kingdom is becoming increasingly isolated in the discussions. The philosophy of not to ban a hormone until it has proved to be dangerous resembles that of the United States, but the legislation of other Community countries reveals a much



more cautious attitude. The United Kingdom has, however, been able to persuade its partners not to adopt the wide-sweeping legislation the Commission proposes until further studies have been carried out.

Various scientific committees will now be given the job of examining the health hazards of natural oestradiol, testosterone, progesterone, trenbolone (a processed natural hormone), zeranol and perhaps others. The United Kingdom rules permit the use of these hormones, which many other member states have forbidden. Similarly, until there is "conclusive" scientific evidence to the contrary, oestrogens, androgens and gestagens (except stilbenes) are considered safe, as far as the Community is concerned, for therapeutic use and to regulate the menstrual cycle.

The consumers feel that this scientific research could drag on for a long time, and matters will not be helped by the United Kingdom taking over the council presidency after the summer from the Dutch, who support tough Community legislation.

Jasper Becker

## Canadian radioastronomy

### Longer bases

#### Washington

Canadian astronomers have started design work on what is hoped will eventually be the largest radioastronomy facility in the world. An eight-dish array of 32-metre antennas is to be distributed along a 5,000-kilometre line stretching from one end of the country to the other.

Canada's National Research Council (NRC) has already given its formal approval to the project, provisionally named CASCADE (after the Canadian Astronomy Society). Meeting in Ottawa in February, the council members gave the array top priority over four other possible national facilities that had been suggested for funding: a high-energy electron ring, an orbiting observatory, a kaon antiproton physics facility, and the creation of several centres of acoustics.

NRC and the Natural Sciences and Engineering Research Council have now agreed to share the costs of a \$300,000 design study for the array being carried out by a technical committee chaired by Dr Ernest Seaquist of the University of Toronto's department of astronomy. It is hoped that detailed plans for the array, estimated to cost about \$30 million at 1981 prices, can be completed by the beginning of next year; and that if the Canadian government can then be persuaded to support the project, funding for construction be provided in 1983.

Plans for a very long base array — which will be able to provide an angular resolution of  $5 \times 10^{-4}$  arc seconds at a wavelength of 1.5 centimetres, a hundred times better than at present be provided by

the largest Earth-based radiotelescope — have been discussed for the past three years within the Canadian astronomy community, one of the first to develop and work with very long baseline interferometry. Two years ago, the very long base array came out on top of two other proposals, a 100-metre centimetre-wavelength dish and a large (25–30 metre) millimetre-wavelength antenna, in a study conducted by the Canadian Astronomy Society.

Despite enthusiastic support from astronomers, there was initially some scepticism from industrialists in NRC, who doubted that the project would have sufficient economic pay-off to justify the initial capital investment. However, after considerable lobbying several companies, particularly in the electronics, computing and telecommunications industries, were persuaded to back the proposal, particularly after it was pointed out that most of the components would be built in Canada. Astronomers argued, for example, that the increased production of antennas and equipment, together with some improvement in high frequency performance, would help Canadian aerospace and communications companies to compete for foreign markets.

As planned, the array would stretch along an east-west line from Newfoundland to Vancouver Island. Signals would be recorded independently at each station and subsequently correlated at a central processing facility, giving 28 components of the Fourier transform of the image of a cosmic radio source.

Efforts are being made to generate public support for the array by appealing to nationalistic instincts. A circular distributed by the chairman of NRC, Dr Larkin Kirwan, says the array would "assure Canadian leadership in radioastronomy for at least thirty years", and the Canadian Astronomy Society says it would "remain a permanent advertisement for Canadian science and technology".

In a similar vein, the secretary of the design committee, Dr Brian Andrew of NRC's Herzberg Institute of Astrophysics, heads a public relations committee whose task he describes as being "to elevate the array to the status of a national shrine." He also points out that the planned array would be able to take advantage of Canada's unique geography, and that "linking the country from end to end seems to have intangible overtones that would make it politically attractive".

Meanwhile budget restrictions have forced US scientists to put back their own plans, developed last year by a group at the California Institute for Technology and its Jet Propulsion Laboratory, for a two-dimensional array stretching across the continent of the United States, and including antennas on both Hawaii and Alaska (*Nature* 288, 4; 1980).

Similar in size, conception and cost to the Canadian plans, the US proposal is said

to have been given top priority for the next decade by the Field committee now preparing a report on the future of US astronomy for the National Academy of Sciences. A north-south array would fit well with Canada's plan.

However, one of the victims of the budget cuts announced by President Ronald Reagan in March was a 25-metre millimetre-wavelength radiotelescope planned for Mauna Kea in Hawaii, and previously approved for funding through the National Science Foundation by the Carter Administration. With this project placed back in the melting pot it seems unlikely that other new capital construction will get much consideration in the next few years.

David Dickson

## Hungarian agriculture

### Economic growth

Hungarian agriculture is to be remodelled in the next twenty years on ecological principles. This is the burden of a report last month to the Academy of Sciences of an interdisciplinary survey of the country's "agroecological potential". The survey was first proposed at the 1978 annual general meeting of the academy by Dr Istvan Lang, at that time deputy general secretary. Thirty research institutes, universities and computer centres took part, and more than 400 scientists were involved.

The survey asked three main questions: what quantity of agricultural plant production can realistically be attained by the end of the century? What conclusions can be made about the long-term targets of economic policy? How can production be increased and costs reduced in the medium term? The preliminary conclusion is that in the most favourable conditions, the annual grain yield could reach 22 million tonnes (present level 12–13 million tonnes) and that the productivity of grasslands could be doubled.

Nevertheless, the survey notes, there are constraints on the development of Hungarian agriculture. The country is poor in fossil fuels, so that with rising oil prices a point may be reached where it is economic to settle for lower than maximum yields and less expenditure on fertilizers. The country's geology is also a constraint. Hungary lies in the lowest part of the Carpathian basin, and the run-off from the mountains has produced tracts of saline and/or alkaline soils, principally in the western half of the country. Thus the Puszta remains a virtual desert in spite of an annual precipitation of 550 mm. Yet normal leaching methods of reclamation are ineffectual, since the soil is so impermeable that the water would simply pond on the surface. Moreover, Hungary has no means of disposing of the drain water, since the quality of the rivers Tisza and Danube must be ensured at the southern frontier.

Nevertheless, on the Comecon scale of