nearly a decade ago. Then it seemed that a more or less passive organization would be able to gather enough information about the environment for effective conservation and exploitation. Professor Wynne-Edwards's research council is, however, much more active and even ambitious.

The first thing to be said is that there is nothing wrong with the declared intention to create what might be called a mission-oriented research council. This, as it happens, is what the Agricultural Research Council has set out to be. To judge from the annual report of the Natural Environment Research Council, it seeks to impose economic tests to the projects which accumulate on its books. This is laudable, not to say fashionable. The council is evidently aware of the danger that such a policy may sometimes lead to the neglect of the fundamental studies from which distant benefits might spring. A less obvious danger is that too rigorous a concern for economic benefit may tempt the council to devote large efforts to fruitless pursuits. Oceanology is such a suspect. The national interest, which the council acknowledges to be a potent influence, could be a more prolific spur to pointless activity.

But is it necessary that a mission-oriented agency should rely as heavily as NERC intends on direct labour at its own institutes? This is a more serious worry. The council is spending only about ten per cent of its budget on university research, and the proportion is likely to diminish as the council's plans for new institutes materialize. It is all very well to promise that the universities will be drawn into the formulation of long-term strategy—how can they do this effectively when they are only modestly involved in the kind of work for which these opinions are needed? In short, there is a case for asking that the council should reconsider its implicit agreement, with the popular slur that universities are largely academic places unsuited to the conduct of economically valuable research. Apart from its self-justifying quality, that proposition has no foundation.

100 Years Ago

OUR BOOK SHELF

Lehrbuch der Chimie, *gegründet auf die Werthigkeit der Elemente.* Von. A. Geuther, Prof. in Jena. Erste Abtheilung. (Jena: Dœbereiner, 1869.)

THE doctrine of Quantivalence plays a most important part in the general theory of modern chemistry; but when carried out to the extreme lengths which Dr. Geuther claims for it, this doctrine, so useful in the classification of elements, fails altogether to bear an original meaning. The following is an extract from a table, on page 16 of the above-named work, showing the Quantivalence of the elements according to Geuther:—

	H = 1		
As	V. III. I.	Na	V. IV. III. II. I.
Ba	II. I.	Os	VIII. VI. IV. III. II.
Br	VII. V. III. I.	S	VI. IV. II. I.
Cs	V. IV. III. II. I.	N	V. III. I.
Cl	VII. V. III. I.	Ag	IV. II. I.
Cr	VI. IV. III. II.	K	V. IV. III. II. I.
Fe	VI. IV. III. II.	Mn	VII. VI. IV. III. II.
Fl	(VII.) (V.) III. I.	I	VII. V. III. I.

Here, for example, we find potassium described as acting as a monad, a dyad, a triad, a tetrad, and a pentad element, and chlorine as a monad, dyad, triad, pentad, and heptad element. What does this do more than express, in a roundabout and inconvenient way, what Dalton long ago enunciated as combination in multiple proportions—that great law round which the whole structure of the science is built up?

From Nature, **1**, 165, *December* 9, 1869.

WILSON PANEL

Space Research

from our Astronomy Correspondent

THERE is some consternation in space research circles over the report of a special committee set up by the Science Research Council under the chairmanship of Dr R. Wilson of the Astrophysics Research Unit, the group at the Culham Laboratory which the SRC saved from disbandment. The Wilson panel was to look at the workings of the committee of the SRC's Astronomy, Space and Radio Board which deals with space research —the Space Policy and Grants Committee. What has happened is that, as well as suggesting how the Space Policy and Grants Committee might function better, the Wilson panel has made far-reaching suggestions about the future course of space research in Britain. In particular, the panel seems to have proposed that the doctrine of "centres of excellence" should be applied to space research as it has been already in radio astronomy, for example.

The Wilson report is believed to recommend that in future British space research should be concentrated in four groups, most probably the following: Professor J. Sayers's group at the University of Birmingham, the Mullard Laboratory of University College (London), the SRC Radio and Space Research Station (Slough), and the Astrophysics Research Unit. It is true, of course, that the funds to smaller groups are not going to be cut off immediately, not least because of the rocket and satellite experiments currently being prepared. What will most probably happen if the principle of selectivity is indeed to apply is that the principal groups will be encouraged to grow at the expense of the rest. The Darwinian process could be helped by a grant speedily given here, another withheld there. Some groups even suspect that such a policy is not entirely new, and say that they have been feeling the pinch for some time. Good relations with the European Space Research Organization will not be a saving grace —officially, relations between British groups and ESRO are through the SRC.

Other parts of the Wilson report have already come to pass. Since October this year, the seven working groups reporting to the Space Policy and Grants Committee have been replaced by three working groups which have already had their first meetings. The scientific interests of the committee were previously

shared among six working groups with titles such as Terrestrial and Planetary Atmospheres and Ionospheres and Radio Propagation. A seventh working group used to be concerned with technical facilities, and this has survived intact. The other six have been compressed into an astrophysics working group and a geophysics working group. (For these purposes, geophysics does not include the Moon or the planets but only the space within the Earth's magnetosphere, but what happens when the Moon passes within the tail is uncertain.) One result, of course, has been to cut down the number of scientists who are party to working group discussions, and there have been complaints of the way members of the old working groups heard almost out of the blue that their services were being dispensed with.

It is even beginning to look as if the streamlining which was the chief reason for the reshuffle is going to be blunted. Because of the debate about the future of the lunar and planetary sciences in Britain, and the need speedily to take up American offers of participation in sample analysis, there has been a move to set up a sub-group along the lines of the old working group on the Moon, planets and interplanetary matter. This seems to have succeeded, and it could yet happen that all the reorganization has done is to replace a two tier structure by a three tier structure.

Because the new working groups were formed after the period covered by the most recent SRC annual report, the report does not contain a list of members, who are appointed for not more than four years: Geophysics Working Group, Professor F. G. Smith (chairman), Professor W. J. G. Beynon, R. Dalziel, Professor J. W. Dungey, Dr J. T. Houghton, Dr J. W. King, D. G. King-Hele, Professor P. L. Marsden, Dr R. J. Murgatroyd, Dr J. J. Quenby, Dr W. J. Raitt, Miss P. Rothwell and Professor S. K. Runcorn (secretary, Dr G. Clarke); Astrophysics Working Group, Professor R. L. F. Boyd (chairman), Professor D. J. Bradley, Dr H. E. Butler, Professor P. H. Fowler, Professor W. R. S. Garton, Professor G. W. Hutchinson, Dr K. A. Pounds, Professor J. Ring, P. W. Sanford, Dr D. W. Sciama and Dr R. Wilson (secretary, Dr J. H. Price); Facilities Working Group, Professor H. Elliot (chairman), Dr H. E. Butler, Dr E. B. Dorling, R. Dalziel, Dr H. G. Hopkins, A. C. Ladd, Professor J. Sayers, D. B. Shenton and E. G. Warnke (secretary, Dr G. Clarke).

RESEARCH GRANTS

Money for Polymers

THE Science Research Council is prepared to provide special support for research in polymer physics and technology following the recommendation of its Polymer Panel (*Nature*, **222**, 209; 1969). Universities and other academic institutions are invited to apply for these special grants (without having to fill in the standard grant application forms) before January 15, 1970, and particular areas of research will be given priority. To begin with, proposals based on an interdisciplinary team approach will be sought; the panel suggested that a typical research team should contain a chemist, an engineer, a physicist and a polymer scientist, but, even where an integrated team cannot be formed, the SRC will favour the fullest possible collaboration between departments or institutions. Money will also be concentrated in areas where successful research could show immediate practical benefits, particularly in polymer synthesis, including three dimensional polymers; thermally stable polymers from cheap starting materials; inorganic polymers and new methods of polymerization leading to predetermined structures; the physical and mechanical properties of polymers and of composites based on polymers; and engineering aspects, such as design with polymers and their processing.

The SRC may make grants available for longer than the usual three year period and, as recommended by the panel, the funds will be open to small specialized groups as well as for the five or six main centres where research is now concentrated. The panel considered that there might, in the long term, be a case for a central polymer research institute but that at present the most effective support will be increased direct grant support through the normal channels. A committee under the chairmanship of Professor C. E. H. Bawn has been set up to assess these applications and to keep the research under regular review. Two other committees which have recently been established to encourage research in interdisciplinary fields are for control engineering and for enzyme chemistry (*Nature*, **222**, 209; 1969).

HUMAN SCIENCES

Postman's Knock at Oxford

THE fate of the proposed Human Sciences course at Oxford still hangs in the balance. The course has already been accepted by faculty boards and by the University's General Council, but although the motion calling for withdrawal of the decree which set up the course was rejected by 153 votes to 122 in the Hebdomadal Council last month, more than fifty members of the council called for a postal vote. The result is that the rejection cannot be confirmed unless the postal vote swings the same way. Voting papers must be returned to the registrar by 4 p.m. on Monday, December 8.

INSTRUMENTS

Set Fair at Siding Spring

from our Astronomy Correspondent

WITH the mirror blank for the Anglo-Australian telescope at sea between the United States and Britain, the workshops of Grubb Parsons at Newcastle upon Tyne are preparing to grind their biggest mirror yet. At a diameter of 155 inches, the blank is more than half as big again as the 98 inch 'Pyrex' blank now in the Isaac Newton Telescope at Herstmonceux. The 155 inch mirror is cast in 'Cer-Vit', the new glass developed by the Owens Illinois Company of Toledo, Ohio, which has become the wonder material of optical astronomy. The almost negligible coefficient of expansion is not the only advantage—the glass is also quicker to prepare and cast than conventional 'Pyrex' and the blank is easier to figure. Preliminary shaping of the 24-inch thick mirror and the drilling of the central hole for the Cassegrain focus have already been done at Toledo. Grinding and polishing at Grubb Parsons begin on December 10, and will last a good two years.