

This, however, is only the superficial part of the problem. A more serious question is the means by which the grand strategy of defence research is or should be determined. In the past, ever since the end of the Second World War, there has been no effective means by which the demands of the defence research establishments for manpower and money could be moderated by criticism from outside. It is true that there are many circumstances in which the needs of defence must be considered to be paramount, but this principle has often too easily become a means by which the defence establishments could grow without restraint and take on jobs which are not properly their business. With the reorganization of the Ministry of Defence in the past three years, it has become easier to keep the establishments properly in check. For one thing, explicit forward planning has become fashionable. More practically, central direction has become stronger. Yet there is a great deal still to be done if there is ever to be a built-in mechanism by means of which considerations which seem imperative to the Ministry of De-

fence do not distort the pattern of research and development in other fields as well. The Central Advisory Council on Science and Technology is the obvious way of striking a proper balance, but it has been less than fully effective since it was set up a year ago, partly at least because the Ministry of Defence has responded with less than enthusiasm to suggestions that its research should be more fully co-ordinated with that of other agencies. To be fair, this unwillingness may also be prompted by unsureness about the future development of the Central Advisory Council—what kind of a body will it turn out to be? The Select Committee on Science and Technology could help a lot by helping to define more accurately the part which the Central Advisory Council should play. It may also think it profitable to consider other schemes for co-ordinating defence and civil research—one possibility, for example, would be an independent research council with powers to advise on and even direct the development of defence research as if this were any other public activity.

## Good Start on Natural Environment

THE second report of the Natural Environment Research Council is a sober document but also a worthy one. In the short period of its existence, the council has evidently taken the line that it must begin slowly and concentrate on the creation of institutions. This is sensible enough. The council owes its existence to the report of the Brundrett Committee in 1964 which argued that there was a serious need of some comprehensive organization which could sponsor and encourage the development of research in a variety of fields, from oceanography to nature conservation. In the circumstances, it is only prudent that the council should wish to be assured of a firm base for operations. The search for a better organization for the Institute of Geological Sciences typifies the problems which the council quite properly seeks to solve. Regional offices responsible for the continuing geological survey of the United Kingdom, among other things, have to be rehoused, and there is also a need to make long term decisions about the siting of the headquarters. The difficulty here is that the institute must necessarily have a double-headed role—half of its work is academic and it should properly become a catalyst of much that happens in universities, but the institute also has administrative responsibilities for geology, mining and hydrology. It is therefore sensible that the council seems convinced that any new buildings there may be should be closely linked with universities, at least geographically. Whether it will be able to satisfy its ambition to find a headquarters outside London is another matter.

If the past year has been moderately successful, however, there is not much in the new report to suggest which way the council's institutes will develop in the years ahead. It is one thing to have a decent wish to work closely with the universities and quite

another to be energetic enough in the pursuit of such ideals. Indeed, for all its well-wishing on this subject, the council's latest report gives the impression that some of its establishments will remain self directing and essentially autonomous organisms with only the most arbitrary links with academic institutions, however closely interested these may be. This is why the council should ask itself whether there is not a case for duplicating some of its establishments in other environments. It would, for example, do no harm if some other university than Liverpool became so well endowed with facilities for research in oceanography that it could look the National Institute of Oceanography squarely in the face. There is also a case for asking that the dominant role of the Nature Conservancy in another field of operations should be somehow softened by the building up of well endowed centres of excellence at the universities. To say this, of course, implies no more than that competition between research establishments working in strictly academic fields is usually beneficial. And, in any case, anything which the council can do to strengthen its hold in the universities will help to strike a better balance within its budget, which at present seems to involve the spending of too great a proportion of its resources on institutions and too little on grants for supporting research projects.

## Russian Eclipse

THE following description of the Russian preparations for the solar eclipse of September 22, 1968, has been supplied by Evald Mustel, chairman of the Astronomy Council of the USSR Academy of Sciences, and Nataliya Yegorova, an associate of the Astronomy Council of the USSR Academy of Sciences, through the Novosti Press Agency.

On September 22, 1968, a total solar eclipse will be observed on the territory of the USSR. A full phase band will start near Severnaya Zemlya, North Land, will cross the Kara Sea and enter the mainland near Vorkuta. It will then go nearly straight to the south along the 62nd to the 64th meridians. Then, turning sharply to the south-east, it will pass slightly north of Alma-Ata, west to west China and will end north of Lobnor Lake.

Although the 1968 eclipse is unfavourable for observations because of the short length of time for which it will be visible—a maximum of 42.7 seconds—and the low height of the Sun above the horizon—a maximum of 18.7°—many Soviet astronomers are going to observe it. It is proposed to place nearly all expeditions near the railway station of Kargopolye, on the Sverdlovsk-Kurgan line, where the maximum duration of the eclipse and the maximum height of the Sun above the horizon are combined with relatively favourable meteorological conditions.

In the optical range, all traditional types of eclipse observations of the corona, chromosphere and photosphere will be conducted. Associates of the astrophysical observatory of the Georgian Academy of Sciences, as well as the astronomical observatories of Kiev, Lvov and Ural Universities, intend to obtain large-scale photographs of the inner, middle and outer coronas important for studying coronal structural details. Kiev and Lvov Universities are planning to observe the degree of polarization of coronal emission, while the observatory at Lvov will undertake colorimetric observations of the corona. The spectrum of the corona will be photographed by the Abaetumani Astrophysical Observatory of the Georgian Academy of Sciences, and by the astronomical observatories of Kiev, Ural and Kharkov, as well as by the Sayanskaya Solar Observatory.

The observatory of Kharkov University is planning to take direct photographs of the chromosphere at the wavelength of the hydrogen  $\alpha$ -line. The sun department of the Institute of Terrestrial Magnetism, the Sayanskaya Solar Observatory (with the Echelle spectrograph) and the main astronomical observatory of the Ukrainian Academy of Sciences are planning to study the chromospheric spectrum, which requires great skill in observations and subsequent thorough processing. The programme of the Sternberg Astronomical Institute includes taking pictures of the chromosphere and the corona with the Fabry-Perot standards which make it possible to evaluate the distribution of the temperature and the turbulence velocity around the solar disk.

In addition, the programme of the Sternberg Institute and the main observatory of the Ukrainian Academy of Sciences includes investigations of the photospheric spectrum on the solar limb, and the behaviour of spectral lines near the limb. Ural University will do similar studies using a stationary horizontal solar telescope. The Sternberg Institute will also be making photoelectric records of fluctuations from the centre of the disk to the limb in individual portions of the photospheric continuous spectrum.

Finally, the main astronomical observatory of the USSR Academy of Sciences and the observatories of Leningrad and Kiev Universities are preparing to record solar emission during the eclipse. These recordings will include investigations of the fine struc-

ture of local sources of the slowly varying component of the solar emission at 4 cm, and of the distribution of radio brightness of local sources on the Sun, and on the limb of the quiet sun. Investigations will also be made of the degree of inhomogeneity of the corona, and of the radio sizes of the solar disk in the centimetre wavelength range.

## Transport Arranged

THE Minister of Transport, Mrs Barbara Castle, seems now to have completed most of her planning for the development of transport in Britain in the years ahead. The last of four white papers on transport policy was published earlier this week, and deals with the organization of public transport (Cmd 3481, HMSO, 3s. 9d.). The outstanding proposal among those contained in the White Paper is that responsibility for public transport systems should be transferred to public transport authorities set up in the various regions of the United Kingdom. On some occasions, this will mean that municipal buses are nationalized. Because most transport undertakings are at present in public ownership, however, the principal effect of the new proposal would be to transfer to regional authorities responsibility which is at present centred on the central transport commission.

Mrs Castle hopes that her plan will commend itself to those who argue that transport systems should be planned in such a way that they are closely integrated with city planning, and she is no doubt correct in that assessment. It is also reasonable that, if the regional transport authorities are to be subsidized, the injection of money should be used to pay for capital resources rather than for running costs. Some difficulties stand out, however. For one thing, there is no assurance that within the framework of the proposals now put forward it will be possible to find room for the kinds of technical developments in transport which are necessary in modern cities. Monorails may be out of fashion, but there is always a possibility that a regional transport authority would be more anxious to guard the sanctity of its existing stock of buses than to introduce small road transport vehicles, for example.

## American Industrial Research

INDUSTRY in the United States seems to be playing a decreasingly important part as a performer of research and development. It still does the lion's share—70 per cent in 1965—but this represents a decline from the peak reached in 1957, when 78 per cent of all research was done by industry. The growth in the industrial sector, 5 per cent between 1964 and 1965, is the slowest of all. These figures, published by the National Science Foundation in a report called *Basic Research, Applied Research and Development in Industry* (US Government Printing Office, 65 cents), show that despite the change in emphasis, industry in the United States still does a greater proportion of the work than does industry in Britain. In 1964-65, British industry was doing about 60 per cent of all research and development work.

The slower growth recorded by industry in the US seems to have been a consequence of a deceleration of federal support; industry's own contribution has continued to rise at the same rate for several years.