

of loan system help to create a sense of realism about the value of university education—high or low as it may be—among university students, but this also seems to be the only realistic hope that the growth of the university system will be as buoyant as it should be.

POLITICAL PARTIES

Liberals Seek Policies

HARD on the heels of the symposium on science and technology organized by the Conservative Party (see *Nature*, 220, 633; 1968), the Liberal Party last weekend gathered at the University of Nottingham a group of its own members and of outside advisers to talk over the several reports on the proper use of scientific manpower. Unlike the political parties which can realistically hope to become a real government, the Liberals do not have to pretend that they must hammer out at their meetings a grand strategy to sustain an administration through five years or more of office. The result seems to be that discussions are at once sensible and practical. Many of the particular suggestions made at the conference last weekend will no doubt appear in the form of parliamentary questions or lobbying behind the scenes in the months ahead.

The conference was blessed at various times with the principal authors of the three reports on manpower problems which have appeared in the past two years—Professor Michael Swann, Dr F. Dainton and Dr F. E. Jones. The three speakers, and Mr Stephen Bragg of Rolls-Royce who presented the industrial case on scientific manpower, told collectively a gloomy tale. Dr Dainton, whose committee presented its views on the causes for the drift away from science studies in British schools just over a year ago, eloquently explained how it has come about that young people in the schools seem to prefer courses of study with at least some leavening of the arts and humanities to courses which consist exclusively of science and mathematics. The question which remains to be answered is how soon the committee's recommendations about the curriculum will find their way into current practice in the schools. Mr Bragg seemed to be more optimistic about the chances of remedying the unwillingness of science and technology graduates to work in British industry, and said that he had persuaded his own company that the time had now come "to stop sniping at the universities". He acknowledged that much of the unwillingness of graduates to enter industry could be remedied by better arrangement for the training of new entrants to industrial companies. It seems to be agreed that young people should be put into responsible positions as soon as possible. Mr Bragg's truce with the universities does not, however, extend to the PhD degree, which he described as quite unsuited to the needs of industry. The trouble, unresolved at the conference, is that the opposition to the present state of affairs may restrict the scale of postgraduate studies and not modify the quality of PhD courses in ways that would please the industrialists.

The most sombre tale was told by Dr Jones, whose committee was responsible for the report on the reasons why trained manpower tends to emigrate. For one thing, it now appears that the rate of emigration has increased—according to Dr Jones, the number of qualified engineers leaving Britain in 1967 was 50 per

cent of the number graduating, compared with 42 per cent the previous year. The chief cause remains what it has always been—that facilities and salaries are better overseas. Dr Jones argued eloquently for higher salaries for people beginning their careers. He was, however, depressed about the likelihood of striking an economic balance between Britain and the United States. The stagnation of industrial investment for several years was only one of the reasons why British industry was now less productive than its competitors elsewhere.

PESTICIDES

Strong Measures in Sweden

AFTER a meeting of expert advisers from several countries in Stockholm last week, the Swedish National Poisons and Pesticides Board (the Giftnämnden) has recommended strong measures for dealing with some organochlorine insecticides. Recommendations are that from January 1 next year the use of aldrin and dieldrin in Sweden should be banned completely. The use of DDT and lindane for domestic purposes—in home and garden—is also to be forbidden, and the agricultural use of DDT is to be banned for two years.

The initial two year ban on DDT is suggested as a way that the Swedes can assess their own contribution to the large concentrations of residues that have been found in wild life and soils throughout Sweden and in the Baltic. There will be a programme of special studies to find out how much of this contamination is a result of Swedish use of DDT, and how much comes as fall-out from abroad. At the same time there will be research into alternatives to the banned insecticides.

Although various other countries have banned aldrin and dieldrin, Sweden may take the lead as the first western country to recommend a ban on DDT. There is a great deal of public interest in pollution and other environmental problems in Sweden at the moment, and these recommendations should do something to influence opinions in other countries. In Britain they will no doubt be of interest to the Wilson Committee, which operates a pesticides safety precautions scheme and is now reviewing the organochlorine compounds.

TRANSPORTATION

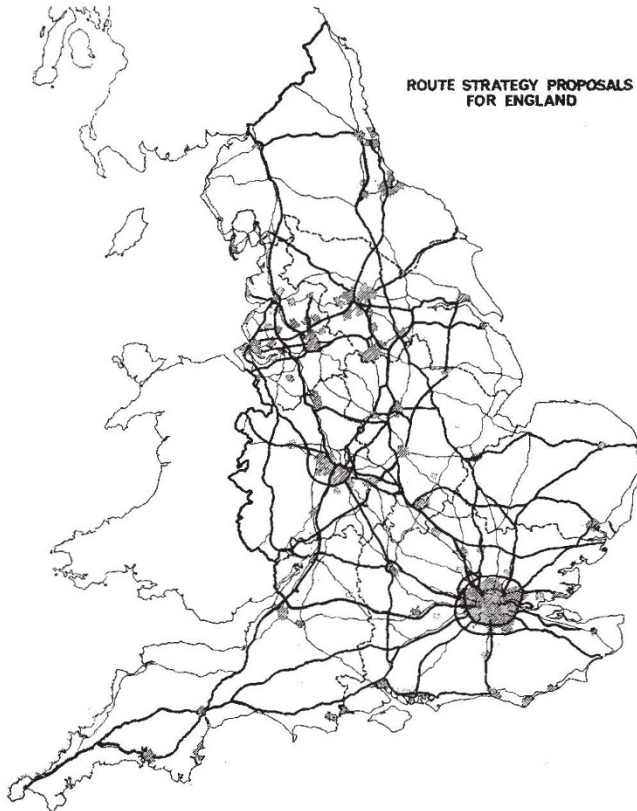
New Highway Strategy

A 2,000 MILE network of inter-city motorways and dual carriageways that will determine the pattern of movement in England well into the twenty-first century is the way Mr R. Marsh, the Minister of Transport, described the green paper, *Roads for the Future* (HMSO, 10s 6d), which was published last week. Gone are the days of isolated improvements of roads where the congestion is worst or the accident rate highest. Instead there is to be a comprehensive national highway strategy on a hitherto unprecedented scale in Britain, which will take into account the endlessly ramifying consequences of improved road communication.

The cost of the network shown in the map, spread over 10 to 15 years starting in 1972, is estimated at £1,600 million at present day prices; added to this, the plan demands a further £600 million for improving crucial points on link roads outside the network proper. The ministry has not at this stage decided on any

priorities among the proposals which are now up for debate. But before the end of 1969, when the plan has been fully appraised and the comments and suggestions of Regional Economic Planning Councils and local authorities have been mulled over, the minister intends to announce a definitive plan.

Apart from the scale and long-term planning, the new programme is distinguished from its predecessors in being backed by a new mathematical model developed by the ministry for assessing the cost effectiveness of the investment in roads. The economic benefits arising from individual road schemes, the savings in vehicle operating costs, the proportion of time wasted



by vehicle occupants and the cost of accidents have, of course, been part and parcel of road planning for years. But calculations have not previously included estimates of all the other consequential benefits of road improvement, still less combined their interactions in a network.

The mathematical model which the ministry has devised is in essence based on estimates of the traffic on every section of the network, and on the changes which would result if any part of the system were improved or replaced. The calculation of traffic depends on relationships between all the factors which generate traffic—population, vehicle ownership, distances between population centres and actual traffic on existing roads.

In the model, England is divided into about 1,400 zones of known population. All the links in the network of trunk and principal roads, as well as the characteristics of each link, the width of the road, the number of side roads, the average speed and so on, can be measured. From this information, a computer can calculate the traffic and its characteristics as populations move from one zone to another. The traffic flows

predicted by the model can then be checked against actual traffic flows and adjustments made until the model matches reality. With the model the ministry claims it can now calculate the redistribution of traffic and the consequent direct economic benefits that would arise from any change in population or improvement or extension of the road network considered either as a whole or in part. This can then be set against the capital cost of any particular road work to give an indication of which scheme gives best value for money. The model has already been used in drawing up the network announced in the green paper, but it will really start earning its keep when it comes to choosing between the proposed network and any other which may emerge during discussions and then deciding on the priorities within the network.

EUROPEAN SPACE

Esro Euphoric

from our Astronomy Correspondent

LAST week's two-day council meeting of the European Space Research Organization approved three new satellites for launching between now and 1972, including one launching for September or October this year which nicely fills what was previously an awkward gap in satellite launches before the next HEOS satellite in 1971. The meeting of the council in Paris was celebrated by Esro's most spectacular space experiment yet—the release of a cloud of barium ions 70,000 km over the Atlantic to plot electric and magnetic fields. This was visible with the naked eye from North and South America. As well as the sprinkling of small satellites which are now assured for the early 1970s, there is every possibility that by July Esro will be in a position to choose two major projects in the \$20–50 million class. One of these could be a planetary probe to Mercury, as a joint venture with the United States. It is hardly surprising that Professor Hermann Bondi, Director-General of Esro, is saying that there has never been a council meeting like this before.

Counting the next HEOS scheduled for September 1971 and TD 1 in March 1972, the council decision means that Esro now has five satellites on the stocks. The cheapest of the projects for which approval has been given is the launching of the spare flight model of Esro 1, the satellite now called Aurorae since its successful firing last year. Launching of the second flight model can be as early as September or October, a year after the launch of its predecessor. The satellite is designed to study the northern aurorae, and will be in orbit in time for the northern auroral season. The second new project, HEOS A2, is very similar to the HEOS satellite launched last December and will carry seven experiments, five of them entirely new. Its name is an acronym for the highly eccentric orbits in which this series of satellites travels outside the magnetosphere. The novelty of HEOS A2 is that its polar orbit will take it over the poles, thus mapping the polar magnetosphere and in particular the postulated neutral points between the terrestrial and interplanetary fields. The polar magnetosphere has been neglected in recent years, so that there should be rich pickings for Esro. Again, Junkers is to be the prime contractor, and the launching will be in December 1971. The third satellite is the TD2 rescue project,