and thereby offer scientists attractive posts. Furthermore, most firms are wary of research workers with a university background and prefer, when recruiting scientists, to look for them in the major colleges such as the Polytechnique or the Centrale. And university lecturing, also suggested as an alternative solution for those excluded from the CNRS, has been completely transformed in recent years, with the result that a teaching background is insisted on for lecturers. It is not at all certain that the universities will find satisfactory recruits among the members of the CNRS who had chosen precisely this field in order to pursue their work without any teaching commitments. The only course for those affected by this measure—which from now on must be repeated year after year—seems therefore to be to yield sooner or later to the temptations of the brain drain. The American "head-hunters" indeed have been making conquests in France for some time, and young people in France are beginning to have a better knowledge of English than their elders.

Money and Health

THAT the "healthiest" countries (judged in terms of mortality) spend most on health services is one of the conclusions reached in the 1967 World Health Organization report, *An International Study of Health Expenditure* (price 12*s*.) covering 29 countries. The objectives of this report were two-fold: to compile comparable information on expenditure on health services and on methods of financing such services, and to develop a standardized framework for national health accounting that could be used as a routine aid to health planning in all countries.

Most of the figures in the report were drawn from questionnaires, and the countries covered were not, it is emphasized, necessarily representative of all countries in the world because of the difficulty of obtaining information from countries with lower standards of living. Estimates of health expenditure for each country are compared with gross national product and national income.

It seems that over the period of study Israel, Canada, and the United States spent the greatest proportion of national income on health services, while the proportion of Gross National Product devoted to health services varied from 2·5 per cent to 6·3 per cent in countries providing full information. Countries with relatively high standards of living tended to spend more on health expenditure than countries with a lower standard of living. As the latter countries have on the whole poorer health than richer countries, less was spent both absolutely and in relation to total resources where the need was greatest.

The report states that generally there is no evidence of correlation between health expenditure and the need for health services: rather, health expenditure is presumably influenced to a large extent by the "felt needs" of governments. No country was found in which less than 25 per cent of the money spent on health services came from public funds and among the high-income countries those receiving heaviest government support were not those allocating most money to health expenditure.

Breaking down the capital expenditure on health services, with the exception of Pakistan and France, 18 countries allocated 88 per cent or more to personal health services. Furthermore, hospitals took more than 74 per cent of capital expenditure in all countries except Chile, Czechoslovakia and Yugoslavia. The United Kingdom was well down the list with only 76·4 per cent provided through hospitals compared with 99·7 per cent in Canada, although a spokesman at the Ministry of Health said that 14 hospitals had in fact been built in England and Wales since 1948.

APPROXIMATE TOTAL EXPENDITURE ON HEALTH SERVICES (CAPITAL AND CURRENT) AS PERCENTAGES OF GROSS NATIONAL PRODUCT

	Year	Total health expenditure (£ millions)	As % of GNP
Israel	1961–62	40·71	6·3
United States	1961–62	1,303	5·8
Australia	1960–61	262	5·2
Poland	1960	311	3·7
United Kingdom	1961–62	1,016	4·2

Looking to the future, until cost-benefit analysis and other techniques become applicable to the selection of targets for health programmes, the report suggests that it is desirable that the costs of health services should be consistent with a chosen long-term plan, and that the plan should be firmly based on economic realities.

Developing Oxford

from our Oxford Correspondent

As *Nature* went to press, Congregation at Oxford was voting on a proposal for acquiring new sites in north and central Oxford, principally for the university's scientific and administrative institutions. The administration of the university has been conducted from various buildings in different parts of Oxford, the Registry being, for example, in the Clarendon Building in the centre, while the financial department is three-quarters of a mile away in Wellington Square. In 1965, it was proposed that the Registry should expand into the premises of the nearby Indian Institute, which would then be displaced if not dismembered. Much criticism was directed at this proposal and Bodley's librarian resigned on account of it. Now, because the university has bought a number of houses around Wellington Square and also because the Franks Commission recommended that the administrative buildings should be in one place, the Hebdomadal Council has decided to apply for planning permission to redevelop Wellington Square, and move all the administrative buildings into that area. But a new Indian Institute library is already being built on top of the new Bodleian. If, then, the new proposal is accepted, all but the ground floor of the Clarendon Building and the old Indian Institute will be empty.

The council has not yet put forward suggestions for using this extremely valuable area in the centre of Oxford, considering it "premature" until planning permission has been granted for the Wellington Square development. It is possible that Hertford College will take over some of the Indian Institute building, but part at least will continue to be used as a library. Similarly, it is suggested that the Taylorian Institute and Modern Languages Faculty will take up residence in one corner of Wellington Square, leaving another large central area empty. Here again no decision has yet been made on how to use the space.

In north central Oxford, where most of the present science faculty buildings stand, the university has done well to buy (or to be in the process of buying) one million square feet of buildings, after the recommendation of the Holford Committee which reported in 1963. New departments of psychology and zoology are at present being built and the Radcliffe Science Library, the School of Geography and the Physics Laboratories are being extended. Since the Holford Committee sat, sixteen houses have been bought from colleges for the use of the Social Science Departments, and some of these have already moved into their new accommodation. Congregation will now have voted on the proposal to buy another nineteen houses, with 100,000 square feet, for science facilities. Despite the Government's statement of January 16, 1968, further projects may be included in the building programmes for 1970. A new computer library will be built, and the adjacent Departments of Engineering, Survey and Geodesy and Metallurgy will be extended. The professors of these departments have already agreed to share as many facilities as possible, following the example of the zoology/psychology building, which will, the Hebdomadal Council states, guide many future developments.

Reinforced Plastics

THE production of carbon fibre reinforced plastics (CFRP) is now going ahead even though licensing and financing arrangements between the National Research Development Corporation and the three firms involved—Courtaulds, Morganite and Rolls-Royce—have not yet been finally decided. Rolls-Royce is producing the plastics for its own use, but Courtaulds and Morganite will sell CFRP in the general market. Morganite is quoting prices of £35 per lb for batch fibre and £100 per lb for continuous fibre, but it is acknowledged that prices will fall considerably when mass production is achieved.

The development and applications of these very strong plastics were described by Mr L. N. Phillips, head of the Plastics Technology Section, Materials Department, of the Royal Aircraft Establishment, Farnborough, at a joint session of the plastics and polymer group of the Society of Chemical Industry and the London Section of the Plastics Institute, on February 22. Mr Phillips began by pointing to the considerable experience of RAE in the development of cellulose, asbestos and glass reinforced plastics for structural purposes. The general engineering opinion was that glass fibre has too low a Young's modulus, compared with metals, to be attractive for structural purposes. Conversely, it was reasoned that a new fibre with a Young's modulus three to six times greater than glass would be of considerable interest.

Attention was focused on carbon fibres some four years ago, because of the wide difference between the properties of commercial fibres then obtainable by rayon pyrolysis (Young's modulus 6–9 million lb per square inch, with ultimate tensile values of 50,000 lb per square inch), and the properties of graphite whiskers (Young's modulus between 100 to 147 million lb per square inch). Details of the RAE processes for making high-strength high-modulus carbon fibres could not be given for commercial reasons, but the principle is to preserve the orientation already existing in a highly aligned textile fibre as the polymer is destroyed by heat. (The inventors are W. Watt, W. Johnson and L. N. Phillips.) Experiments with the composites at RAE have shown that water absorption is not a difficulty and that the fatigue life under various conditions is excellent, the heat build-up during fatigue testing being much less than with glass and other non-conducting fibres. Friction and wear tests carried out at Farnborough have shown that when carbon fibres are incorporated into thermoplastics and thermosetting resins, the coefficient of friction is lowered and the rate of wear enormously reduced. It seems as if a new class of bearing materials has been created. But many other uses for the materials have been uncovered—the Rolls-Royce Company has, for example, used them for very large fan blades in aircraft engines, which have a clear advantage in efficiency over titanium. Aircraft structures, chemical plant, marine uses and space applications were also mentioned.

Considerable increases in the stiffness of thermoplastics are obtained by incorporating small amounts of chopped carbon fibres—for example, 10 per cent weight addition can increase the modulus by 100 per cent. This is important in the manufacture of large mouldings.

Sensible suggestions for further uses of CFRP are welcomed by the Ministry of Technology.

Crack Detector

THE development of a new instrument for detecting invisible cracks in iron and steel surfaces was announced on Monday by the National Research Development Corporation. The new instrument works on the principle that a coil carrying an alternating current will induce eddy currents in nearby conducting materials. When the coil is moved over a surface crack, the crack causes variations in the eddy currents leading to a change in the voltage across the coil. This can be detected by a meter or made to sound a warning buzz in an earphone worn by the operator.

Eddy current techniques in non-destructive testing are not new, but up to now they have not been widely applied to ferrous materials. This has been because variations in the distance of the coil from the material under examination, such as might be caused by paint or rust layers, lead to interfering effects. The advantage of the new instrument is that it can be compensated for variations in the gap between the coil and the metal. This means that once the electronic circuit has been balanced for a particular specimen the instrument can be used over rough surfaces which may be covered by paint or rust, and over welds.

The initial impetus for the design of a crack detector was provided by the discovery of cracks in the hull of the nuclear submarine HMS Dreadnought. The instrument was developed by the Admiralty Materials Laboratory at Poole, and the patent rights were assigned to the National Research Development Corporation for exploitation. Two licensees have been appointed to manufacture and sell the instrument.

Because the new detector is simple, portable and rugged, it is likely to find many applications for testing structures in the field. Time savings of more than 80 per cent are expected when compared with conventional magnetic methods of crack detection, which involve cleaning the surface under examination. About