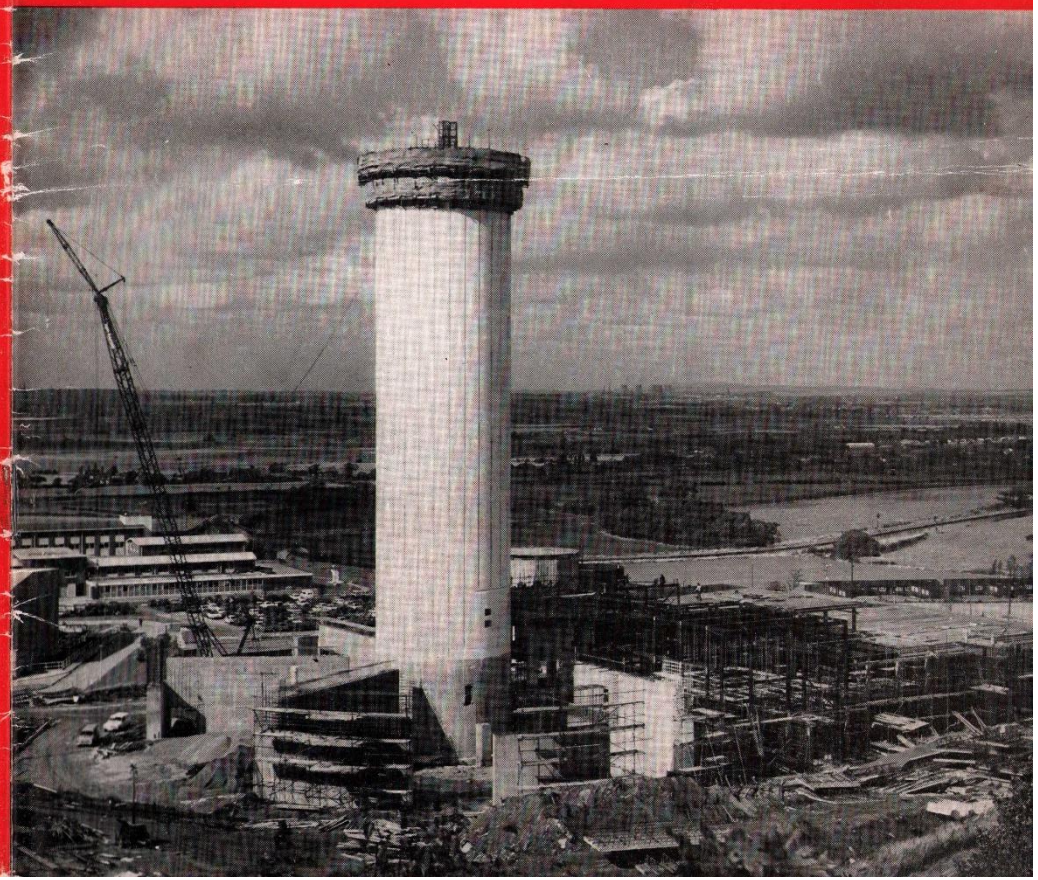
QUEST

Vol. 8 No. 3

The work of the Research Councils

In search of a better image

Himalayan wanderings



QUEST

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Cover
Our cover picture shows the creation of a new landmark. At 2.00 am on Thursday, 18 September, 1975, when the main tower reached a height of 53 m, an important landmark was created both in the surrounding countryside and in the progress towards completion of the NSF at Daresbury. During a period of only twelve days the tower sprang with remarkable speed from the 9 m level to its full height using the slip forming technique. In this, the shuttering moves up continuously as the concrete is added. The construction had a sudden visual impact on the area around the Laboratory and created considerable interest both at the Laboratory and amongst the local population.

Contents

The work of the Research Councils

Part of this year's meeting of the British Association for the Advancement of Science, held at the University of Surrey, Guildford in August, was a one-day symposium on the "Work of the Research Councils". Professor Sir Sam Edwards gave an opening address, the published text of which is reproduced here.

"All of the rich nations and many of the developing nations have seen the need for a national research policy, but their way of going about it differs. Research is done because

(a) There is a specific need in a particular industry or aspect of national life.

(b) There is a general need over a longer time scale with broad objectives.

(c) There is a desire to contribute to knowledge for its own sake, only supposing, as experience bears out, that all scientific knowledge in the long run leads to applications which can improve the standard and quality of life.

Some industries have many problems to resolve and are large enough to carry their own research organisations; others cooperate in supporting Research Associations and commission the solution from them, or from independent firms which do contract research. In many cases the State must itself finance research, for example in defence, where the state is the responsible "industry", in agriculture where the industry consists of a vast number of small operators who are nevertheless vital to the nation, and in medicine where those needing research are the entire community.

In cases (b) and (c) the state is likely to be the sole supporter of research except for charitable trusts and a few firms interested in a long-term view. Difficulties arise with the state support of research once one has to decide the subjects and the scale of research effort.

In this talk we need not consider the position of the Ministry of Defence since it does not concern the Research Councils; outside the MOD, research is carried out by the Research Councils, the Government Departments (Industry, Environment, Energy, Health, Agriculture and Fisheries, Home, Employment) and the higher educational system, principally the Universities.

This tripartite system is repeated all over the world, irrespective of political system and national wealth, but with different emphasis on the different sectors. Likewise the boundaries between the sectors and within sectors are subject to paroxysms of reorganisation, the latest in the UK being in 1965 and in 1973. The UK is quiet at present but Australia is apparently reorganising right now and there are rumblings in the USSR. The reason for this constant enquiry into the right way to do research is that people are always trying to solve a problem objectively and rationally, and no way has yet been found which is objective and rational to tell a nation how much research it should do, and who should do it.

Let us start then by briefly discussing the situation pre-1965 and pre- and post-1973. Before 1965 there was a separate government department, the Department of Scientific and Industrial Research (DSIR) and the two Research Councils, the MRC and ARC. The DSIR covered a wide range of research from strictly applied (eg Building Research Station) to basic, including support of university research and training. The reorganisation brought about by the Science and Technology Act of 1965 had two main purposes. One was to bring much of the mostly applied research directly under the appropriate executive Department; the other was to group together the sciences of the natural environment under a new research council and to give the social sciences similar recognition. Thus the DSIR was dismantled, some of its stations going into Departments and others (eg Geological Survey) to the Natural Environment Research Council, which was also given the National Institute of Oceanography, the Nature Conservancy and the support of the grant-aided Association for Marine and Freshwater Biology. The remaining functions of the DSIR were formed into the Science Research Council—these include Astronomy, Space Science, Radio Research and high energy and nuclear physics from the Atomic Energy Authority via the National Institute for Nuclear Research. The SRC also continued the DSIR's responsibilities for support of university research and training in all those subjects not covered by the other four Research Councils.

The position aimed for in the 1965 act was that research which was of immediate concern to industry and government would lie with the various departments whereas those aspects of research where decisions were best left to the scientists themselves, in consultation with their broadly-based Councils, lay with the Research Councils. There were still substantial differences between the different Councils however. The Science Research Council had as its main purpose the selective support of University research, and apart from some long term commitments like the time service and aspects of radio research its entire effort lay in the Universities or in establishments created at the request of the Universities to service University research which was expensive and had to be carried out cooperatively. Its research came mostly into category (c) above, and entered category (b) only in as much as it provides support for University Engineering and Technology Departments for work which is before the stage at which support can be gained from the National Research Development Corporation (NRDC) or industry direct. The Social Science Research Council is rather similar to SRC, but the other Research Councils have powerful Institutes which have their own research programmes, as well as supporting Universities.

This research system was further revised in 1972 following the publication by government of the Rothschild and Dainton reports. The government made three main changes. Firstly the organisation of the research now done directly or financed by the Departments of Industry, Energy and Environment, was clarified by setting up Chief Scientists Organisations in each Department and also Requirements Boards which include members from the industries and sections of the community for whom research was being done. Government research laboratories and other contracting agencies now receive their budget through commissions from these Boards and must do the research commissioned by these Boards, being allowed only a small part of their budget to be used as the laboratories themselves decide. Secondly, the Government decided that quite substantial parts of the Research Council funds were devoted to research which should be funded through government departments, rather than through the Research Councils. To this end substantial parts of the ARC, MRC and NERC budgets transferred to Customer Departments so that after a settling-down period, the Councils would have to compete for this money with other agencies. Since SRC and SSRC do not do research of this kind these arrangements did not affect them. Thus a substantial part of NERC's budget passed to the Requirements Boards and arrangements were made between MRC and DHSS, and ARC and MAFF and the Scottish Agricultural Department. Thirdly, an Advisory Board was set up to advise the

Professor Sir Sam Edwards (left) and Professor Sir Bernard Lovell arriving at one of the Symposium sessions

Secretary of State for Education and Science on the way he should divide the monies assigned for Science amongst the Research Councils. This Board consists of Heads of Research Councils, certain Chief Scientists and independent members.

Let us consider these three changes in some detail.

Requirements Boards In principle I consider this to be an excellent reform. It enables the community served by government laboratories to have a major say in the research done and puts an unambiguous responsibility and authority on the Chief Scientist. The danger in the scheme is that the members of the Requirements Boards could be very short sighted in the choice of the research they approve, and not mindful of those parts of the community who were not represented. One could imagine, for example, industrialists on a Board who would encourage research which will help their own industry, but discourage research which would prove that aspects of industry created environmental damage. Clearly great responsibility lies with Chief Scientists and it is hoped that really comprehensive accounts of their stewardship will be regularly available. A good start has been made here.

Funding of Research Councils by Customer Departments

Here matters can be much more difficult since it must be emphasized that there was no agreement as to whether the magnitude of the transferred funds was in accordance with the stated intention to transfer to certain departments the responsibility for applied research. It is widely believed by the Research Councils that

an independent assessment of the amount of their work which would be better assessed by Requirements Boards than by their own committees because it was applied research, would have led to a far smaller figure. The danger lies in that if work of long term importance is taken by Requirements Boards it is liable to reorientation, and a consequent loss of national capability. It is also important to realise that whereas a contract research company will ensure a substantial profit on research contracts which it undertakes, and can carry over profits to match lean years against rich years a Research Council cannot charge more than a very modest overhead and must abide by normal Treasury rules that accounts are completely closed each year. Thus if Research Councils are to bid for Research money in competition with all comers, as Rothschild envisaged, they labour under grave disadvantages to counter balance the preference which they would expect in a case of other things being equal. So far ARC and MRC have experienced little difficulty with the new system, but the Requirements Boards which fund NERC are at present spread over six different Departments. This inevitably leads to complexity and causes problems which have not yet been entirely resolved.

One general sad point has to be made affecting both departmental and Research Council Laboratories under the new system. There is a tremendous increase in committee activity since detailed reports and proposals are now necessary for almost all expenditure, and the time senior staff have available to do research is seriously curtailed.

Decisions about the research and development required to support national economic and social policies must rest with Ministers who have responsibility for those policies. The Government's view, as stated in the White Paper on "The Reorganisation of Central Government" (Cmnd. 4506), is that Government Departments should be organised by reference to the task to be done and the objectives to be met. Applied research and development are necessary to achieve many of the Government's objectives, but they cannot be regarded as forming a distinct function of government. Any attempt to formulate overall objectives for a supposedly collective activity of research and development would lead to confusion. The Government does not therefore accept the recommendation of the Select Committee on Science and Technology in their First and Fourth Reports for the Session 1971–72 that there should be a Minister for Research and Development with his own Vote. But the Government fully recognises that adequate machinery must exist for ensuring co-operation and co-ordination between Departments. The Lord Privy Seal exercises this function at Ministerial level. The Chief Scientific Adviser to the Government has responsibility for interdepartmental co-ordination. He advises Ministers on the scientific and technological aspects of the Government's policies, both domestic and international. He will also be responsible, in future, for advising on the way in which the new arrangements for the management of applied research and development are working.

The division of the Science budget becomes a crucial matter in times of cuts and ABRC has been forced to think out a policy for hard times. Its decision has been a simple one, that those aspects of science where money is spent in large clearly discernible blocks should be cut. This means that special stringency is applied to the fields of high energy physics astronomy and space science where modern equipment is extremely expensive. The whole issue is complicated by several other factors which are described in more detail in the section of this talk devoted to SRC and big science.

Before turning to SRC, let me say a word now about the Social Science Research Council. The social sciences cover a very wide field. Some parts of the social sciences have intellectual roots near to the humanities, other parts, to science. The aim of the social sciences is no different from that of science—by means of observation and theory to achieve an understanding of reality and to use this understanding for the betterment of the human condition. As with the other Councils, some SSRC support research has a direct bearing on public policy, some much less so. The SSRC's policy contacts with government departments are rather different from those of the other Research Councils. Much social science research in government departments, especially in economics, does not come under Chief Scientists or else is in departments where no Chief Scientist organisation has been set up.

Picture shows the Research Council's Exhibition at the University of Surrey, Guildford

The policy questions studied by social scientists are in many cases close to the centre of political debate. This makes the need for scientifically rigorous research more urgent, not less so; but it means that some rather special problems exist in the application of the results of research. In financial terms the SSRC is much the smallest of the five Councils. The bulk of its research support is through universities and it has only five fairly small research units of its own.

The SRC and the problems of big science

The SRC has an organisation of three tiers: the Council, the Boards (Astronomy, Space and Radio; Engineering; Nuclear Physics; Science), and the Committees of the Boards. The Committees discuss the giving of small research grants and send up large proposals and matters of principle and innovation to Boards. The Boards decide between the competing claims of their Committees, authorise expenditure at the SRC Laboratories, and again send-up large proposals and matters of principle and innovation, to Council. The Engineering and Science Boards fund a large number of University Scientists and Engineers, and although they have some very important decisions to make in these hard days, particularly in Engineering they are so far as expenditure is concerned not the main problem today. The Nuclear Physics Board spends about two fifths of the SRC Budget on high energy physics, that is the study of the elementary particles that lie at the heart of the matter and which can only be understood by arranging experiments at enormously high energy and correspondingly high cost, and nuclear physics, that is the study of the structure of the atomic nucleus, nowadays a matter of detailed study with high precision instruments. Although these instruments are expensive, they are not exceptionally so in comparison with more and more of modern science. High energy physics is conducted at two UK Laboratories, the Rutherford Laboratory at Chilton (next to AERE Harwell) and the Daresbury Laboratory near Liverpool, and at the joint European Laboratory, CERN at Geneva. The UK is a member of CERN and pays a proportion of its budget, in Swiss francs, according to a formula involving, but not simply proportional to, its G.N.P. The weakness of the pound sterling has led to a continuous rise in the CERN subscription which is now over £17M per annum. This in its turn means that the proportion of SRC's budget devoted to high energy physics remains obstinately high in spite of continued savage cuts which all land on the domestic programme. As a result the Daresbury Laboratory is at present winding up its commitment to high energy physics altogether, and the programme at Rutherford has been severely reduced, and even more draconian cuts will have to be made to fit in with ABRC policy of channelling government cuts largely onto SRC, with this and the space programme in mind. One now sees a definite prospect of no high energy physics at all in UK other than that offered by CERN. Many people argue that this is a perfectly adequate, indeed overgenerous support to a subject which is agreed to be at the frontier of science. The HEP community itself argues that without a domestic programme UK work in this field will not flourish. The situation is particularly depressing when UK scientists have developed a world-beating new accelerator design (called EPIC) which just a few years ago would have been within SRC's capability to build.

Astronomy and Space Science are likewise a frontier of science and expensive and absorb about one fifth of the SRC Budget. Their situation is somewhat different from HEP in that the running and manpower costs are far lower so having built an expensive telescope, it will function virtually indefinitely at a moderate annual budget. Satellites and rockets are expensive also and of limited life. On the one hand they are things easily stopped, but on the other hand are heavily involved in international collaboration, both with ESA and NASA. As with CERN there is little point in paying the ESA subscription of £5m unless one uses it, and there is no doubt that UK scientists have done splendid work in collaboration with the Americans, and this collaboration can only be effective if it is reliable. So far the reduction of SRC's budget has led to the abandonment of the new radio telescope planned by Sir Bernard Lovell, and the abandonment of a major collaborative satellite in the X-ray region. The impending cuts of SRC's budget although not devastating in simple arithmetic, can only land on that part of the programme that is not tied up with the several international agreements, (ESA, the Anglo Australian telescope, the South African Observatory), and would amount to a very severe reduction in the UK space progamme.

The difficulty facing ABRC, and the Council of SRC itself, is the nature of the choice. If one asks should there be a UK scientific space programme in competition with all other parts of government expenditure, one could well come up with a different answer to the question as posed to ABRC: within a predetermined Science Budget do you have a space programme instead of more money on wheat breeding, or on heart disease; or as posed for SRC's Council: in competition with support for say University departments specialising in Offshore Technology. Given this juxtaposition the expensive frontiers of Science are abandoned and one can only hope for better days."

Council Commentary

June and July 1975

Membership

In July the Council thanked Professor Mason, who is retiring from Council, for his great services both as a Council member and as a Chairman of the Science Board. The Secretary of State has appointed Professor Jinks (Birmingham University), who will become Chairman of the Science Board and Professor Polkinghorne (Cambridge University) to be members of Council from October 1975. The Council also thanked Professor Ashmore for his services as the Establishment Director in attendance at Council; he will be succeeded by Dr Reddish the new Director of ROE.

Estimates 1976/77 and the Forward Look 1976

In the light of information from DES, the Council agreed that preparation of the 1976/77 Estimates be started on the basis of an assumed allocation of £93.8M as compared with the 1975/76 Printed Estimates of £95.2M—a reduction of about 2%. Since it also seemed likely that this rate of reduction of the SRC's allocation would continue during the next Forward Look period, Council decided that there should be a thorough and complete reassessment of all Council programmes during the next session.

Postgraduate Training

The Council in June considered two Reports on postgraduate training:

(i) *Postgraduate Working Party Report*

The main conclusion of this Report by a Working Party under the Chairman was the insufficient diversity in the types of education offered to students to meet the needs of industry and the public services for science based postgraduate careers outside research. Specific recommendations include proposals for new broadly based postgraduate degree courses particularly in the applied sciences, based on taught courses; modification to the SRC system of allocating research studentships giving preference to departments that provide broadly based compulsory courses for PhD students; SRC encouragement of universities and polytechnics to join in consortia to develop wide ranging postgraduate programmes; increases in the numbers and proportion of SRC awards going into special schemes e.g. CASE; and that SRC should seek a substantial increase in the value of studentships in special areas judged to be particularly important for the nation's economy.

(ii) *Joint SRC/SSRC Committee Report*

The Joint Committee was established to foster broader postgraduate training blending information for science and engineering with the social sciences. Its first report in 1972, recommended continuation of its activities until evidence was available to judge their success or failure. The second report by a reconstituted Committee under the Chairmanship of Lord Ashby concluded that the individual programmes of broader training supported by the Committee had been successful and that this form of training should be developed on a larger scale. The Committee recommended measures through which it hoped to treble the number of studentships allocated to broader training to 400 per annum by 1980.

Council welcomed both Reports and agreed that they should be published together to seek comments from all interested parties. It is hoped there will be a national discussion of UK future postgraduate needs. Comments received will be taken into account by Council in completing the present review of SRC policy for support of postgraduate training.

(iii) *Postgraduate Training Advisory Panel*

In July, Council agreed to establish a Panel to coordinate advice on postgraduate education. It will advise on the number and type of postgraduate awards to be offered; the financial provision required in the Forward Look; their distribution between Boards and, where relevant, committees; and on studentship and fellowship regulations. Dr Horlock has agreed to be the Chairman and the Panel will have representatives from each of the Boards, the Joint SRC/SSRC Committee and the Polytechnics Committee. The

Panel will be free to coopt other members as required.

ASR

Transatlantic Balloon Facility

Council has approved the establishment of a Trans-Atlantic Balloon Facility in collaboration with the US National Center for Atmospheric Research and the Italian Consiglio Nazionale delle Ricerche at a cost to SRC of £890K up to 1977. The attraction of these balloon flights is that their increased flight times allow longer observing periods compared with rockets and conventional balloons. The east to west winds across the Atlantic in summer months will be used to fly balloons from Sicily to the eastern seaboard of the USA. The first test-flight in August 1975 will show the feasibility of the programme and allow development of the radio communications and control systems required for the balloon.

Mm Astronomy Facility

In June Council approved expenditure of up to £95K on feasibility and site studies for a national millimetre wavelength facility to be sited overseas at a likely capital cost of £3M. The telescope would detect millimetre radiation from molecules in interstellar space and would operate down to 0.75 mm wavelength. The proposed facility will have a dish antenna of 15 m diameter of high surface accuracy and the aim of the feasibility studies is to determine its optimum design. The Appleton Laboratory will be responsible for the feasibility studies.

The UK-6 Satellite Project

Council has approved increased costs of £0.54M for the UK-6 Satellite project bringing the revised cost estimate for the spacecraft and launch to £6.16M at December 1974 prices. These increases arose from specification changes for the spacecraft, inflation and items of intramural capital equipment, costing £148K, required by the Appleton Laboratory for the Satellite Control Centre.

Engineering

(i) *Manufacturing Technology*

Council in July considered a Report from a Joint Working Party of the Engineering Board and the Department of Industry which proposed a new joint initiative in manufacturing education and research. The aim of the programme is to attract good young engineers into production technology in order to improve UK manufacturing practice. The Working Party and the Board concluded that the conventional support of university research via grants and studentships was insufficient for the scale and importance of the area and that new mechanisms were required; although in a minority report Professor Tobias (Birmingham University) had argued for further development of the existing academic system before new methods were adopted. The Working Party has developed a scheme where research and training would be developed on an experimental basis by university groups working with selected host companies. The young graduates under the guidance of company, university and polytechnic staff would take an active part in improving the manufacturing practice and profitability of the host companies, while the universities would provide course work to complement the graduates' industrial experience. The Working Party also recommend that planning should proceed for a central institution to be developed for manufacturing technology having a high-calibre director and small supporting staff to co-ordinate and expand company-university programmes. In the longer term the possibility of developing a free-standing institute would be an attractive possibility.

Council agreed that the majority and minority reports of the Joint Working Party should be published to stimulate a wide debate on these important proposals. The CEI would be invited to organise a consultative meeting to discuss the Report. Council welcomed the objective of the proposals but was somewhat critical on both educational and technical grounds of aspects of the proposed pilot schemes. Nevertheless in order to maintain the current momentum it approved expenditure on the pilot schemes, subject to the definition and development of the schemes being monitored by the Engineering Board.

(ii) *Research Grant*

Council approved a grant of up to £147K to Professor G Standart UMIST to exploit the pilot plant at the UMIST Separation Processors Centre in studying absorption and distillation phenomena. Council also approved a grant of up to £230K to Dr V E Cosslett and Dr W C Nixon (Cambridge University) for further work on the design and construction of a 1Å high resolution electron microscope.

Science

(i) *SRC Central Laser Facility*

In December 1974, Council approved SRC participation in a joint programme with the UKAEA to develop a central laser facility. The UKAEA is now unlikely to be permitted to participate in the proposed joint programme. In July, the Council therefore approved a more limited central laser facility programme to be carried out by SRC alone at the Rutherford Laboratory at an estimated cost of £5.6M in the period 1975/81. The programme has been divided into two parts: part I covers those investigators where a single beam high power laser is used to investigate non-linear optical effects, laser plasma interactions, and X-ray productions and applications in chemistry and biology. Part II covers the investigation of the production and properties of dense plasmas by laser compression of spherically symmetric targets. Part I is entirely unclassified while part II although unclassified might involve security considerations.

(ii) *Research Grants*

Council approved a grant of up to £92K to Professor M G Simpson (Lancaster University) to establish a centre in simulation aimed at developing general methodology. A grant of up to £126K was also approved to Dr A D Yoffe (Cambridge University) for studies on crystalline and amorphous semiconductors and thin films.

(iii) *Small Angle Scattering Apparatus*

Council has approved expenditure of £91K on the construction of a small angle neutron scattering apparatus to be installed at the domestic neutron beam facilities at Harwell.

International team fly scientific balloon across Atlantic

At dawn on 5 August 1975 an international space research team launched a 380 foot diameter balloon from Sicily on an Atlantic crossing at 130,000 feet.

The project, which was sponsored by the SRC, the Italian Consiglio Nazionale delle Ricerche and the American National Science Foundation provided about three and a half days observing time for the scientific instruments it carried to study cosmic rays. (Scientific balloons normally provide only about 10 hours observing time before they lose touch with their ground stations and have to be recovered. For some experiments, particularly in the cosmic and gamma ray fields where events are not frequent, much longer observing times are needed.)

British scientists proposed the project and this was the first time that scientists had flown a balloon carrying scientific experiments across the Atlantic. The idea came from Professor Peter Fowler FRS, working on heavy primary particles at Bristol University, and Dr David Ramsden, working on gamma rays at Southampton University, who suggested that much longer observing times could be obtained if a balloon could be allowed to drift for a long distance and still be recovered reliably. They had shown theoretically that at certain times of the year the upper atmosphere winds were sufficiently steady to allow a balloon to be launched in Sicily and be recovered in America about five days later.

The major part of the payload consisted of Professor Fowler's 1,200 lbs of special plastic and photographic films for recording tracks made by heavy primary particles. These tracks are now being identified and measured at Bristol. Data from Dr Ramsden's small gamma ray experiment were telemetered back to ground stations in Sicily and the USA.

Management of the programme and the development of the radio communication and control systems required to maintain contact with the balloon and keep it at a constant height were the responsibility of Appleton Lab.

In Search of a Better Image

B McINNES

'It's bad for your image', said one of my colleagues. 'But very good for my figure', I was tempted to reply. It was really the fault of the architect who designed our observatory, coupled with the telex technique of the Site Testing Project's team leader on Madeira. Not that I am complaining about either of these things; it is rather pleasant to work in an interesting piece of Victorian architecture, and it is always a relief to renew contact with the adventurous lads who man the desolate summit of Encumeada Alta.

Moving the Observatory

When the second Astronomer Royal for Scotland retired in 1888, it was generally agreed that Calton Hill, near the centre of Edinburgh, was no longer a suitable site for the Royal Observatory. Smoke, both from the chimneys of the houses round about and from the railway station below, polluted the air and even the primitive gas lighting of the streets was proving to be a nuisance. A new observatory was proposed on a new site, Blackford Hill, which was then well away from the city—so far, in fact, that the staff would find it advisable to live on the premises. The architect accordingly designed a group of buildings consisting of four houses ranged on one side of a T-shaped main block.

Over the years the complement has risen from the four staff members of 1896, when the new Royal Observatory was formally opened, to more than eighty today. One by one the houses have been vacated and their rooms have been adapted to other purposes. My office is in what was a bedroom in the upper floor of the second assistant's villa. The telex machine, however, is on the top floor of the main building.

Encumeada Alta

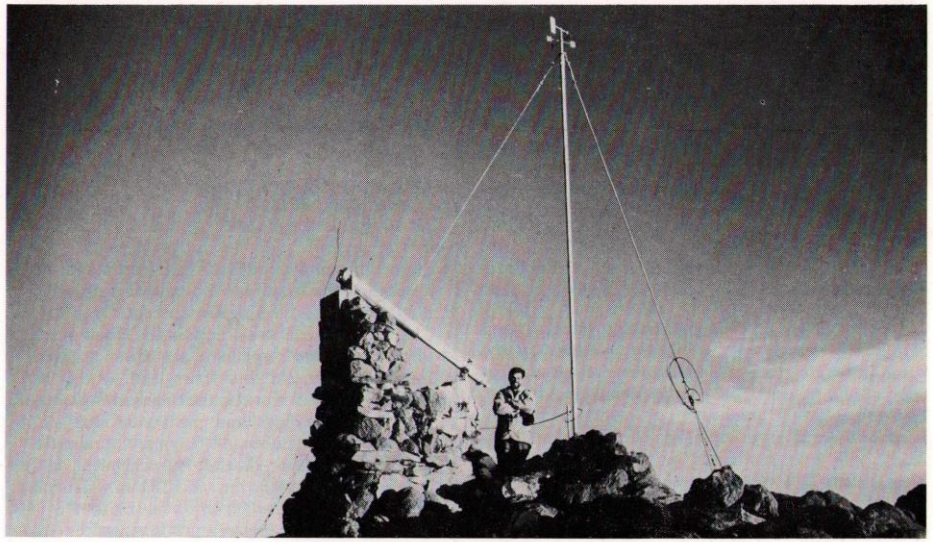
The Portuguese island of Madeira in the Atlantic was once an active volcano, building itself up from the ocean bed by ejecting vast quantities of lava and ash from a central vent. Some of it was hard basaltic rock but much of its structure was soft and easily eroded. The result is that today it is a dramatic example of natural sculpture, with a surprising variety of scenery contained within its comparatively small bulk. From east to west it measures about fifty kilometres; from north to south it is less than twenty five. The highest point is nearly two kilometres above sea level. Encumeada Alta is a peak close to the highest point and upwind of it (in terms of the prevailing wind).

In the autumn of 1973, members of the Royal Observatory staff built a one-roomed wooden hut on Encumeada Alta. This was not the easiest of tasks because the road was two hours' walk away. The building materials were bought in Funchal, Madeira's main town, driven by Land-Rover up to the road-end, and then ferried across to the site by local porters and by the observers themselves. The path is a spectacular one—now cut out of vertical cliffs, now plunging down steep flights of rough steps, now disappearing into dark tunnels cut through the very heart of the mountains.

Whatever the weather

The hut was to allow continued occupation of the site through the rigours of the occasional winter storm. Two of the builders had been at the project's observing station on the island of Tenerife during the winter of 1972. They retained vivid memories of what it felt like to be inside a temporary hut on top of a mountain while the wind gusted to well over 150 kilometres per hour. They could recall their alarm as the roof rose and fell and the walls vibrated under the onslaught of the hurricane. They remembered the rime that had formed to a thickness of nearly a metre on the windward side of their telescope mounting. These memories encouraged them to persevere with the effort required to bed the corner posts of the hut on Encumeada Alta deep in concrete and to build a massive dry-stone wall all round the little area that would be their home for the next few months.

Observations—made every hour, on the hour, throughout the night, every night—had been started on this site in August 1973. At that time of year sufficient protection was provided by tents. For a large part of the time the sky was completely clear. The only clouds to be seen, by day or by night, were far below in the flat stratocumulus layer which is a characteristic feature of the region. In most parts of the world for most of the time the temperature of the air decreases with altitude but in certain regions and in certain circumstances a layer is formed in which the temperature increases with altitude. This temperature inversion layer acts like a lid, holding down below it not only the clouds but also dust from the land and salt particles from the ocean and giving clear, dry air above—very good for astronomical observations. Both Madeira and the



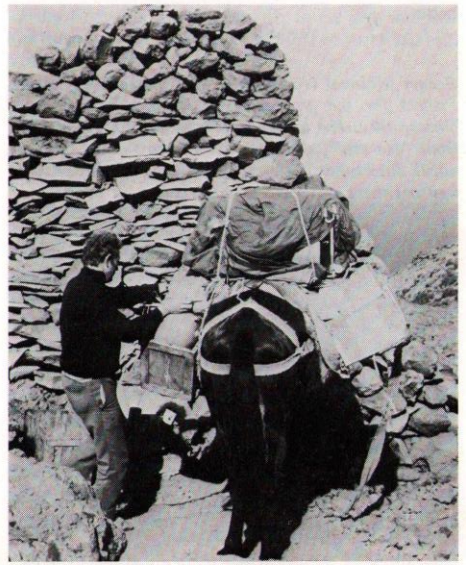
Site testing with Dr T T Gough, one of the original British site testers on La Palma

Canary Islands experience this meteorological situation for a large part of the year.

Once or twice a week the team leader has an early breakfast (perhaps at midday instead of at two in the afternoon) and then walks across to the road-end, wearing a hard hat in case of rock falls (and remembering to take the keys to the Land-Rover with him). After less than an hour's driving he is in Funchal and at the office of the Delegação de Turismo da Madeira, where there is a telex machine, kindly made available to him by the authorities so that he can contact the home base of the Site Testing Project.

Run to cut the cost

The message to Edinburgh begins with 'PLEASE CALL B MCINNES' followed by a blast on the buzzer. Two thousands miles away and a split second later the action begins: typist goes to telex, picks up telephone and informs telephonist; telephonist rings extension 30, says 'You're wanted at the telex'—and then waits for the bang as the receiver goes down. Through a door. Seven steps down. Through a door. Fourteen steps down. Three steps up. (That architect!) Through a door. Three steps down. Narrowly miss colleague, who makes remark about image. Fifty metres up the slope past the flower beds. Through a door. Fifty-six steps up and round two full turns of the spiral stair. Through a door. Past the lift (too slow to be of any use this time). Through a door. Twenty metres across the



Supplies on La Palma come by mule

flat roof. (Magnificent view of the city from here, if you have time to enjoy it.) Through a door. Past the photocopier. Past the typist. Type 'BENNET HERE AND READING'—except on the occasions when the incoming message is long enough for the machine to be still clacking away, at 400 characters a minute. If I did not run it would cost us more escudos to have the exchange of news and views that helps to keep the project going in top gear—and I might not be fit enough to get across that exhausting path the next time I have to visit Encumeada Alta!

The other side of the world

Ten hours of longitude away, on the Pacific island of Hawaii, on top of the highest mountain in the world (if we count the part below sea level), is another team of site testers. Unlike their friends on Madeira, they do not have to argue about who will cook tonight, because there is an observatory on the mountain already, with a resident chef. But they have other problems, such as a noticeable shortage of oxygen. At more than four kilometres up the observer has to learn how to breathe more deeply and to move more slowly than usual, because he is much nearer the comparative emptiness of outer space there than at sea level. From an astronomical point of view this is an advantage: we want to study starlight and the less air it has to pass through before being collected in the telescope the better.

Bennet McInnes is Project Leader of the Site Testing Project for the proposed new Northern Hemisphere Observatory. His article is reprinted, with permission, from "Hermes", the magazine of the Junior Astronomical Society. In May this year (after the article was written) there was a very sad accident on Encumeada Alta: one of the observers fell down a steep slope and died as a result of his injuries. For this and for other reasons, work at that site has been suspended. During the summer of 1975 attention has been concentrated on the Canary Islands, which are four degrees south of Madeira. International teams, with observers from Spain, Sweden, Denmark and the Netherlands working alongside the British site testers, have been studying the conditions on the islands of La Palma and Tenerife. Concurrently with the testing of sites, there has been a lot of work done in Britain on the specification of telescopes and of associated instrumentation for the proposed new observatory. All this effort is being brought together into a scheme which it is hoped will form a major part of the Science Research Council's spending on astronomy during the next six or seven years and will lead to one of the world's best sited and best equipped observatories.

Polymer Engineering Programme

Council has now appointed the Director and the Management Committee for the programme of the Polymer Engineering Directorate. Dr A A L Challis, who has been appointed Director of Polymer Engineering, joins the Council from Imperial Chemical Industries Ltd where he undertook R & D work on the chemical engineering aspects of process and product development and later on methods of polymer fabrication. He became Head of the Petrochemical and Polymer Laboratory in 1967 and General Manager, Company Planning in 1970. He is now Senior Vice President, ICI Americas Incorporated. Dr Challis has served as a member of the Council (1973/4), its Engineering Board (1972–4) and also the Polymer Science and Technology Committee (1968–72). Between 1968 and 1974 he was the Privy Council member of the Court of Stirling University.

Dr Challis will report to a Management Committee comprising representatives from the three sponsoring bodies (the Council, the British Plastics Federation and the British Rubber Manufacturers' Association) and his first task will be to draw up a costed programme of research and development whose broad aims will be:

i. to provide the highly trained engineers which the British Polymer Engineering industry needs in order to prosper in an increasingly competitive world;
ii. to generate research programmes in universities and polytechnics in order to establish the base of knowledge on which participating firms can build their own applied research and development programmes; and
iii. to ensure that within about five years the training and research projects established in universities and polytechnics have attracted the active collaboration of firms in the Polymer Engineering industry.

Himalayan wanderings

M HOWELLS

In the past it was quite usual for accounts of mountaineering expeditions to consist of about 60% journey to the mountain and 40% climbing or failing on it. This seems to be changing now because, in climbing circles, accounts of approach marches are felt to be boring. Whether this is true for the general reader I'm not sure but after my first journey to the Himalayas I can certainly understand the preoccupation with travelling in remote places. I doubt if it broadens the mind but, to me, it is simply incredibly fascinating. I think the most appealing thing is to be constantly reminded that one's own way of doing everyday things is not the only way. And furthermore that a little reflection always shows that the other man's way is based on perfectly good sense. This shouldn't be surprising but we in the West seem to have a certain unconscious arrogance and discovering the cleverness of foreigners is always a bit of a revelation.

Katmandu, fabled city

However one may philosophise about the benefits of travel everyone agrees that there are hardships. My journey from England to Nepal in the late summer of 1974 was designed to have the minimum of hardships. Four people Mo Anthoine and his wife Jackie, Ian Campbell (climbing friends from North Wales) and myself travelled overland in a VW bus and met the fifth member of our party, Bill Barker in Katmandu, the fabled capital city of a land of oriental mystery and natural grandeur. The new policy of encouraging tourism has removed a lot of the mystery but I doubt if anything could alter the magnificence of a country no bigger than Scotland which contains eight of the nine highest mountains in the world.

The 7000 mile journey was full of interest and incident, mostly difficult to record in print. The first surprise was that nearly all the roads as far as the Khyber Pass were excellent, far easier driving than most British roads. Only about 100 miles or so of the whole route was unsurfaced and only in parts of India were the roads really bad.

Local eating

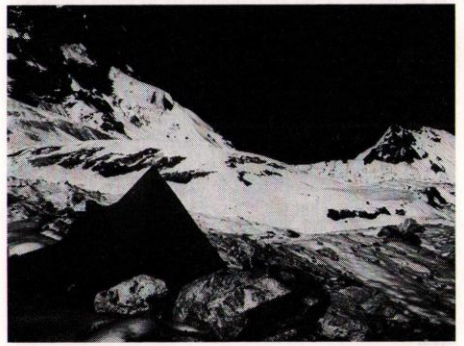
One constant source of interest was food. We used local hotels and eating places for the journey to save time, keeping our British bought food for the mountains. It seems to be a near eastern habit to take incommunicado foreigners into the kitchen to show them what is on sale. Needless to say the cheaper places do their cooking in unspeakable squalor and the contrast between one's own feeling of shocked resignation to eating the stuff with the owners smiling sales patter is an exercise in international misunderstanding. We managed to force all kinds of nasty looking material into our stomachs but other parts of our digestive tracts insisted on protesting. We all had minor variations of dysentry and Mo had a bad one that put him in hospital for a few days.

Drink

Attitudes to drink in the Moslem countries amused us somewhat. We met a friendly group of Iranians who wanted to drink with us but although drink is not illegal in Iran it is subject to a religious ban and is socially completely unacceptable. We ended up drinking happily amongst the bushes in a town centre park. I was reminded of Wales and the supposed abstinence of the Chapel-goers. We actually found only one bar (in the centre of Tehran) in the 3000 or so miles from Ankara to India.

Dope

Dope is something that crops up a lot in all eastern travels and countries vary dramatically in their attitudes. Cannabis is the usual subject of the many



Glacier camp with col in the centre. Peak on right. Avalanche debris in middle ground

Syabrubensi village. Building in the centre is named the International Hotel

offers one gets at very inflated prices (though still low by Western standards). In Turkey and Iran there are heavy jail sentences for possession, but Afghanistan and Nepal are tolerant to the point of approval. There is considerable westward traffic in the stuff and the Afghani/Iranian border is where much preventive action takes place. The local smugglers are kept until the following Tuesday and then shot out of hand. The Westerner gets a trial and about twenty years in Meshad prison. Nepal is interesting in this connection because the cannabis producing plant (called "ganja" by the Nepalis) grows wild in great profusion. We had to push our way through semi-jungles of it for quite long periods. There is a story that the Nixon administration offered a huge sum of money to the King of Nepal to "buy" and destroy the cannabis "crop". The story goes that he accepted the money and closed the government dope shop called "The Joint" in the capital, but failed to alter the ecology of the country.

Afghanistan

Impressions of travellers to different countries are notoriously unreliable but I found Afghanistan an enchanting and delightful place. There is an atmosphere of relaxed contentment and an impression that "development" is being consciously resisted. That is not to say that an Afghani would refuse a car or a television if it were offered (he would take it and sell it) but one gathers that ten hours a day slogging away in a factory would not be regarded as a change for the better. Both the Russians and the Americans who between them built the main through road have tried but both have now gone.

India

If the atmosphere of Afghanistan is subtle and difficult to assess, India is in many ways just the opposite. The overcrowding hits you like a wave as you go into the cities. You see monuments to an ancient and cultured society, you see first class modern technology but much more than anything else you see the tragedies of exploitation, suffering and poverty. The more you enquire the more you learn of the shattering scale and complexity of the political and economic problems in the world's largest parliamentary democracy. India has achieved a great deal but is still a long way short of meeting even the most basic needs of her 600 million people.

Nepal

After leaving India, Nepal is a chance to relax. The pressure of overcrowding is gradually relieved and although industrially Nepal is much less advanced than India the basic human problems are considerably less in evidence. When we arrived the mountains were ghostly and beautiful in the monsoon clouds and we began to remember that we had come to climb. Our last day's drive was eight hours to cross the seventy mile final pass into Katmandu. The road over this pass was severely damaged by landslides caused by the monsoon and for a long while the issue of our crossing was in doubt but we finally arrived after taking seventeen days for the journey from England. This is a fast time and required considerable devotion to the task of maintaining a good mileage every day.

Our intention had been to go to the Rolwalling Himal area. This is a fantastic and remote gorge bounded by high peaks on both sides. Those to the north form the Tibetan border and are subject to restrictions. We were interested in certain peaks to the south and east. However, enquiries soon revealed that the road from Katmandu to Lhasa which would have taken us within about eleven days walk of our objective was heavily damaged by the monsoon landslides and several more days would be added to the walk both in and out. We all had time limits on our stay and this discovery caused us to change our plans in favour of the Langtang Himal, an area about fifty miles as the crow flies, north of Katmandu.

A hard bargain

Five days of chaotic organising, bargaining and gear sorting saw us, all our gear and the eighteen porters required to carry it, setting out in two hired jeeps up the road to the north. This was also damaged but we expected to get about half way to the roadhead at the town of Trisuli Bazaar. When we reached the half way point a typical bargaining situation arose. It became clear that the road was open all the way and the jeep drivers wanted 1000 rupees (about £40) to take us. The alternative was three days extra walking. Our negotiating strength was nil and they knew it. We paid up and continued along the remaining forty miles of debris-strewn hairpins to our destination. We got out and waited while our sidar (a sort of foreman porter) had organised them into some sort of movement and started walking. We left 5 kgm of sugar in one of the jeeps, an oversight which we cursed roundly for days.

A straight deal

The porters were a motley crew mostly very young, good looking and surprisingly cheerful. They carried 70 lb, 50 lb of our gear and 20 lb of their own. This load and the rate of pay for it (about 60p per day) are standardised but there is still plenty of room for bargaining about distances, cigarettes, firewood and various other issues. Contrary to the experience of many expeditions we got a very straight deal from our group of porters. They did exactly what they said they would do for exactly the price negotiated. They were not very big or very strong and they struggled to get the loads on to their headstraps, but once moving they had a very good technique and moved slowly but confidently over the most difficult ground. It was naturally rather easy for us (carrying only about 30 lb) to keep up with them.

The next eight days were thus a delightful ramble through rural Nepal along narrow tracks, up and down steps and through farming villages eking out a precarious living from the steep hillside terraces. The farmers were poor. Their relative prosperity is determined by the flatness of the land, the amount of firewood and the distance to the roadhead. Many are badly served in all three respects.

The last village on this trail, Kyang-chin-gompa, is at 12,500 ft. It has a number of farms mostly based on yak herds, a large "gompa" or monastery and a small cheese factory. From here we did our last "carry" up to a base camp at 16,000 ft just below the snow line. We said goodbye to the porters who ran laughing and shouting down the hill, no doubt looking forward to spending their money on the girls and chang houses they had seen on the way up. We established ourselves in a small yak hut and set about our first problem which was to explore the area. The monsoon clouds shrouded most of the peaks and our camp was not a very good vantage point. Furthermore due to our late change of plan we had no detailed map of the area.

Exploring

The next day we set out in two groups to assess the climbing prospects around us. The results were inconclusive. Bill and I went down to the glacier above the village and looked at Langtang Lirung (23,771 ft) the biggest mountain in the group. The face of this peak was huge and swept by enormous avalanches every few hours. It was completely out of the question. The ridge to the north of the face was clearly a possibility but it was enormously long and about 10,000 ft in height. We had to admit that attractive though it was, it was well beyond our limited resources of time, food and manpower. The other party climbed up above the camp to a large glacier dropped down from, a col* (saddle) at about 20,000 ft which formed the skyline (and incidentally the Tibetan border). There was a peak on each side of the col. Both looked steep and hard on our side but only a visit to the col would establish whether there was a practical route out of our present line of sight.

Nepali children in Langtang village. Necklace made of nuts

Altitude symptoms

By now we were beginning to notice the standard symptoms of high altitude, headaches, difficulty in sleeping, coughing etc. Ian and Jackie went down to Kyang-chin-gompa for a day on account of this and the other three of us explored as far as we could get up the glacier towards the col. There were no problems except very bad snow conditions. These are caused by the sun melting the crisp top layer of snow which then becomes treacherous. You try to take a step forward, make half a step and then break through up to your thighs. The uncertainty is highly frustrating and utterly exhausting at high altitudes. We decided that we needed a camp on the glacier so that we could make a dawn start for the col and make the most of the good snow conditions caused by the night-time freeze.

The glacier

The following day Mo and I set out taking a tent and enough food for two days. We reached the glacier in

* mountain pass or saddle.

good time and pitched the tent at about 18,000 ft kicking out a platform in the snow and using rocks to hold it down. We went to bed early after a good meal of tinned stew, chocolate, and tea followed by dozens of cigarettes. We expected a hard but unexciting day on the morrow. Fortunately we had no inkling of what was in store for us.

We woke up at three and made breakfast still in our sleeping bags. We shivered in the cold of the night but did not complain since the cold conditions suited us well. A hard freeze means that snow bridges over the crevasses are sound, snow conditions are good and the likelihood of avalanches greatly reduced. We laboriously dressed and packed and set off with the dawn at about 5 o'clock. We made good progress, reached our previous highest point in about two hours, and collected some of the gear that had been dumped at that point with a view to leaving a reasonable dump for a future camp on the col. We continued higher up the glacier zig-zagging to avoid crevasses. The heavier loads and higher altitude slowed us down. We were still not very high, but since this was the highest we had been we were not yet acclimatized. The sun came out and we toiled on, sweating and panting in worsening snow conditions. The frequency of our rests was getting greater all the time as we finally made it at 11 o'clock to the col and sat down for an extended rest.

Avalanche

Now climbers are always conscious of the possibility of falling objects especially when sitting still and even more so in a camp. Mo and I had automatically eyed up the rocks around the col and spotted a reasonable ledge sheltered by an overhang and eminently suitable for a camp. It was here, about fifty feet above the floor of the col, that we sat down for a smoke and a rest.

Suddenly, there was an incredible rumble and the overhang above shook violently up and down. Our shelter seemed as if it would shake loose and crush us. We grabbed our axes and sacks and leapt off the ledge into the snow, cowering and waiting for what would happen next. There was a dangerous silence, then a wind filled with stinging snow particles, then the unmistakable sound of an avalanche. We could not see it but clearly the earthquake, for that was what we had experienced, had shaken loose anything that could be shaken loose. It soon came, a massive river of brown gravel and rock pouring down about a hundred yards from us. It reached the col and turned down the glacier a great long snake of horror pounding on like a railway train, knocking over seracs and filling up massive crevasses. It passed fifty feet below us and as soon as it was clear that we were safe Mo shouted "Photograph it!" I had a camera round my neck and I carefully, and with great presence of mind shot the thing four or five times as it went past. It was a pity I hadn't *enough* presence of mind to change the camera from 'time exposure'!

We sat back gasping at the enormity of the forces of nature and pondering our escape as the dust settled. We weren't sure whether the earthquake would make subsequent avalanches more or less likely. We decided that the only place for us was back at base as quickly as possible, so we dumped everything needed for the col camp and left. Another nasty surprise was in store for us. We rounded the corner and got a view of our route up from the glacier camp. We stopped, shocked at the sight ahead. The entire face above our route appeared to have avalanched covering about three miles of our tracks in debris tens of feet deep. It dawned on us that the earthquake had taken place during the one half hour period of the day when we were safe from its deadly consequences. There was nothing to say and only one thing to do. We shot off down as fast as our legs would carry us.

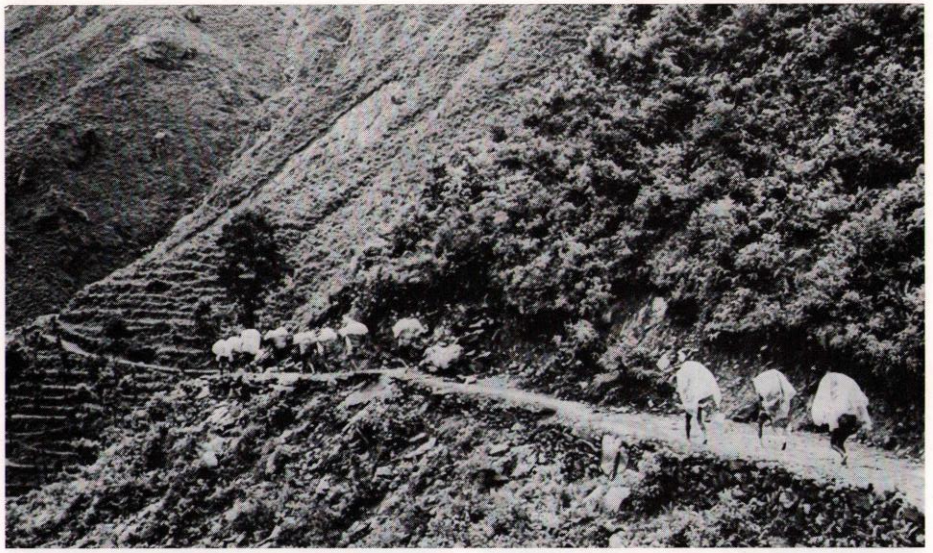
Good news

We found the glacier camp was about a quarter of a mile out of range of the avalanches and took comfort that our judgement had marked up one success after a day of survival more on luck than anything else. The others at base had also felt the tremor and seen some awe inspiring avalanches on the big face of Langtang Lirung. The stones of the hut had bounced visibly up and down and we all wondered if we might get woken that night by a collapsing hut. In the excitement of the day one piece of good news had been established and this was that a feasible route did appear to exist up the peak on the righthand (east) side of the col. This peak was smaller than the one on the left (which we had not been able to see properly) and seemed well suited to our purpose.

The next day Mo and I rested, Jackie came up from Kyang-chin-gompa much refreshed while Ian and Bill set out with the intention of establishing the col camp. They spent a night in the glacier camp and like us made an early start to use the snow while it was hard. They saw no further avalanches and apart from the hard work involved they had an uneventful carry up to the col. They left the tent unpitched feeling that with better acclimatization we might not need it. Jackie meanwhile was feeling the need to get up higher and do something so she took a load of food and gas up to the glacier camp.

A minor complication

All was now set for an attempt on the top and since Mo wanted to go with Jackie the other three of us set out together. It was a squeeze with three in the tent but all slept well and made an early start. We gained the col following our previous tracks and paused while I sorted out a minor complication. I had left my crampons at the col and my boots which fitted the



Porters walking in the rain using polythene sheets for shelter

crampons had been stolen. We never found out by whom but presumably one of the yak herdsmen had come up in the early morning to have a look at us and found them. In any event I was now wearing Mo's boots which were double and did not fit the crampons.* There followed half an hour working away with a screwdriver and pliers to adjust the crampons. This slightly bizarre task done we set off. As so often happens our putative camp site, thought to be just below the col proper, turned out to be about 500 ft below it. We trudged up still on good snow, our crampons biting crisply in. The view from the top was staggering. We could see for miles over range after range of snow peaks, all in Tibet.

The summit

We turned our attention to the peak. The route lay up a snow slope starting at an easy angle and then steepening to a rock buttress. One could then see a way of turning the rock buttress to the right to end up on a ridge leading to the summit. The final climb up to the top was an anticlimax. We came round into the sun and the snow rapidly became very poor. We slogged slowly up wading knee deep and more.

The angle got steadily steeper and the only question was how much of it would be steep enough to give us trouble. It turned out that there was only one pitch that was hard and that *was* hard. The last ropelength of snow before the rock, reared up to 50°. This is a very high angle much more so than one would imagine and it was two foot of powder on top of hard ice. Ian led it clearing the snow and using the ice for the picks of his axes and the front points of his crampons.

Once the rock was gained there were no more problems to the ridge. One awkward rock pitch then led on to easy scrambling to the top. We sat on the top in hot sun. It was still only mid-day. We took photographs, had a smoke and some food and generally enjoyed being on top of a Himalayan peak. We never discovered any name for the peak) and who were we to give it one) but we did work out later from compass bearing that it was marked as 21,467 feet on the map.

The descent

After half an hour we started the descent. An abseil* took us down the hard pitch and all was straightforward after that. We had not needed the col camp but left a minimum of gear in case Mo and Jackie did. We were back at base that evening exhausted but content. The next day Mo and Jackie did the climb in

* the spikes for walking on snow or ice.

* *abseil:* to let oneself down a rock face using a double rope.

equally perfect weather and in a fast time. By dint of carrying enormous loads down from the glacier camp they brought all our gear back to base. We had very little difficulty in arranging for some of the local farmers to act as porters to help bring our gear down and we got the whole lot down to Kyang-chin-gompa in one day.

Alpine style

The whole job had taken only ten days and we reckoned we had three more days climbing left to do. We felt fit and acclimatized and wanted to try one more. Ian, alone, was satisfied with the peak we had done

On the col looking towards Tibet approaching final stage to the summit

and decided to rest and eat. The rest of us set off up the other side of the valley towards the Kangja La, a high pass (17,000 ft) leading eventually to another path back to Katmandu. We intended to climb a 19,300 ft peak to the east of the pass. We hoped to do it alpine style (up and down without any camps) and we bivouacked on a disconcertingly warm wet evening just below the pass. It was a good site as mountain bivouacs go but it rained and snowed on and off all night and by morning it was snowing steadily. It was far too warm for safe climbing. An hour spent making breakfast and another hour lazing in our sleeping bags produced no improvement in the weather so there was no choice but to go down.

We arrived back at the village about mid-day disappointed by this reverse but with the secret feeling of relief you get when you know that the difficult and dangerous part of something is over. It was indeed plain sailing all the way back to Katmandu and we all made our way home, Mo, Jackie and Ian in the minibus and Bill and I by plane.

The reason why

It might perhaps be worth reflecting a little on why people do this kind of thing although I think it is much better understood these days than in pre-war times. Then, most people did not need an outlet for their physical and spiritual energy. The simple task of surviving and making a living was challenging enough. Similarly in Nepal, with the world's most marvellous mountains, nobody thinks of climbing them for fun. Even the most professional sherpas never climb for pleasure. Everyone is too busy earning the next day's meal. When making a living is not too difficult as is the case for many in Britain today they must turn to something that is difficult and this will be where their greatest motivation is expressed. Scientists are good examples of this. Where, after all, would science be if men who found a problem easy had not pressed on to one that was difficult!

Malcolm Howells is a physicist, a Senior Scientific Officer, working on photo-emission spectroscopy at the Synchroton Radiation Facility at Daresbury Laboratory.

Central Laser Facility

The Council has received Government approval to provide a high power laser and ancillary equipment for use by university and polytechnic research groups. The facilities will be set up at the Rutherford Laboratory.

The equipment will be a versatile neodymium glass laser system and comprehensive diagnostic and experimental equipment costing altogether about £1 million. There will also be a full programme of laser development on the basis of which further facilities may be provided. The total cost of the provision and operation of the facilities over the next six years is estimated at £5·7 million.

Rutherford Laboratory will provide the necessary staff and operate the facility, to undertake the study of new laser systems and to provide the engineering and administrative support for the university groups.

Sports Day 1975

Sports Day this year was held on Thursday 3 July. It was a dry day but it was disappointing, especially for the spectators, that the sun did not shine as much as it had during the preceding few days.

Atlas supporters: (from left to right: Linda Woolford, Kate Fearnall, Julie Bryant and Anne Roberts) enjoy themselves in spite of the weather

Competition in all the events was, as usual, extremely fierce and all the winners deserve much congratulation. A large number of teams entered the very exciting football competition and RGO beat last year's winners, Rutherford, in the final. Daresbury Ladies team enlivened the event by showing us how football should be played.

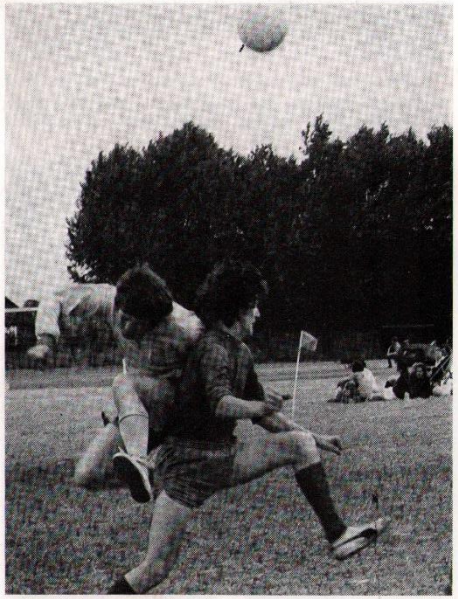
The tennis also attracted plenty of keen competitors and was played as an American Tournament followed by a final of three short sets. T Houzego and K Taylor from Rutherford won the mens doubles and Mrs I Malin and G Wilkins, the holders, from RGO won the mixed doubles.

Another cup taken home by a Rutherford team was that for netball—the only all women's event and one which attracted a big crowd to watch the keenly competitive games.

Six teams entered the triples bowls competition and it was won by a Rutherford team (C Grinrod, A Goode and T Molyneux) who defeated the Appleton team in a close final which lasted 2¼ hours. The bowls American

Rutherford's tug-o'-war team. From front to back: Rita Blake, Harry Jarvis, Pam Coulthard, Darrell Taylor, Sheila Shields, Bob McLure and Sue Wood

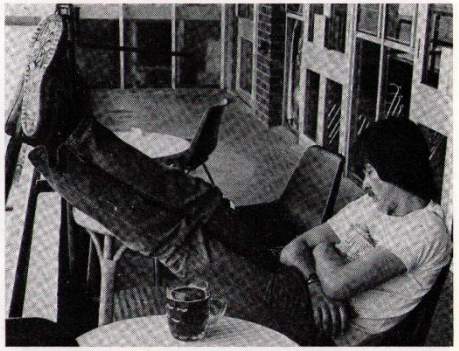
Rutherford's cricketers. From left to right (top row): Frank Cooke, Eddie Smith, Steve Hancock, Ray Smith, David Price, Arthur Chilvers, John Craig (bottom row): Mike Yates, Colin Smith, Bob Crook, Tudor Morgan, Martin Donald and Brian Goodenough



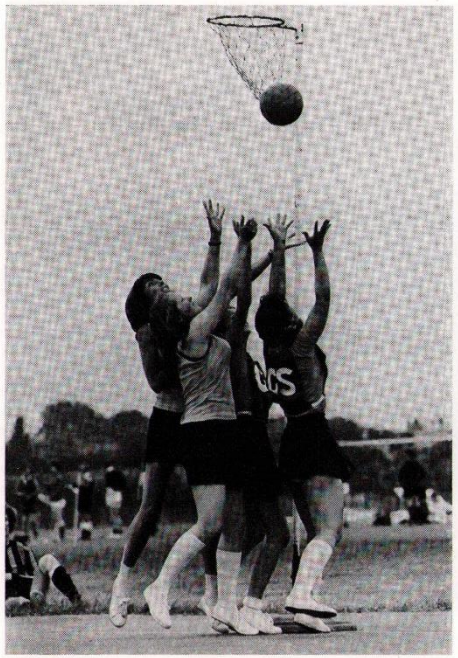
A tense moment in the Daresbury v Appleton match

fours competition was won by a team from Daresbury (G Robinson, A Eddie, C Hayes and B Blackwell) who were undefeated in all matches.

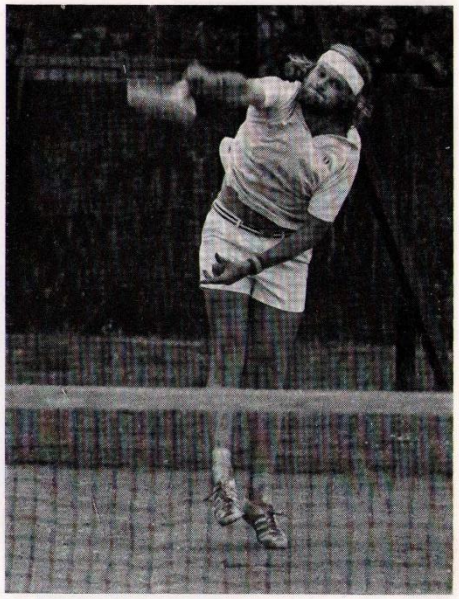
The cricket competition, won by Rutherford Lab, is particularly worthy of note as the total number of runs scored was the highest ever. Much credit must go to the losing finalists, Daresbury, who never gave up despite being faced with the task of scoring 8·5 runs per over to win.



It was hard work even for the spectators



Appleton's netball team get ready to score



Richard Brazier, one of Appleton's tennis players

The chess competition also provided excitement because the rules allowed each competitor only ten minutes to complete each game. So play was fast and you could almost hear the jangling of the players' nerves. The winners were from Appleton, worthy champions, having scored 8½ points out of a possible 9.

The annual tug-of-war event manages to survive despite the fact that the majority of teams are chosen on the day, some even on the minute, from competitors or even spectators. The crowd is clearly drawn more by the general disorganisation and "ad hoc-ness" and that it is the nearest event to the bar than the desire to see "a trial of strength with supple limbs and muscles of iron pulling like ramrods against a body wrecking opponent". This year the Appleton team took the prize.

We were very pleased to see Professor Sir Sam Edwards and Lady Edwards at the Sports Day and were grateful to Lady Edwards for presenting the trophies again. The Flowers Golf Trophy was also presented at Sports Day to the Appleton team which won the annual tournament held this year in June at Wrexham.

Lady Edwards again presented the trophies

We are grateful to all the people who helped with Sports Day and in particular to the organisers of each event and the First Aid team. Thanks are also due to the people from Appleton Laboratory who provided and ran a disco in the evening to round off the day's events.

Newsfront

HRH Princess Anne and Dr Hunter with the bust of John Flamsteed

SRC Bursary Award 1975
Our congratulations go to Jim Sadlier of the Central Training Section, London Office, who has been awarded an SRC Bursary. He is the first member of the Administration Group to be fully supported under the Bursary Scheme which will enable him to take an advanced course in Organisational Studies leading to an MA degree, at Leeds University. Jim Sadlier already has a degree in History and Political Science from Trinity College, Dublin, and after university spent a year working in Ireland initially as a trainee solicitor and then as a teacher. He joined the Council in 1972 and after six months in Finance Division transferred to the Central Training Section.

Daresbury visits RGO
On 25 June a party of some seventy-one Daresbury Laboratory staff travelled to the Royal Greenwich Observatory, for the Tercentenary Celebrations in a seventy-three seat Viscount aircraft chartered from Cambrian Airways. This imaginative enterprise ensured that, despite the long travelling distance, the party were able to undertake the return journey, in a day, without undue fatigue.

Everything combined to make it an enjoyable visit. The weather was excellent, the displays and demonstrations were of a high standard and the gardens and grounds were a delight.

One of the obvious benefits staff derive from these occasions is the opportunity it offers to make contacts with colleagues from other establishments and the measure of this success could be seen from the number of people seeking out their counterparts and the subsequent dialogue taking place amongst members of the various SRC parties.

The return flight was noteworthy in that the Captain's kind invitation to visit his flight deck was duly accepted leading to some congestion around the controls. A few feelings of apprehension were expressed as to who was actually flying the aircraft at certain stages over the Midlands!

As well as the ease of transportation an important consideration was the competitive cost figures for the trip as the overall charges for the charter of the aircraft and the hire of the coaches from Daresbury to Speke and Gatwick to RGO came to £1100 approximately £15 per head.

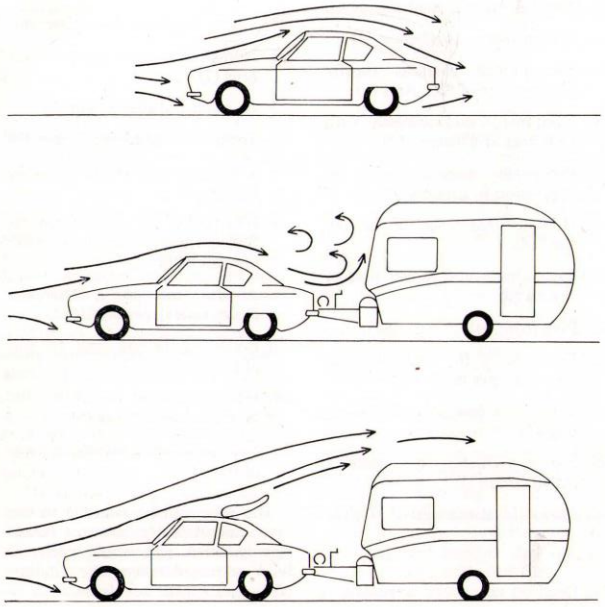
It was a pleasurable Open Day and our thanks to RGO and the Daresbury Laboratory management for making it so.

Royal Garden Party
The Royal Garden Party held at RGO, Herstmonceux Castle in July was blessed with perfect weather. HRH, the Princess Anne, arrived by helicopter and was greeted by the Lord Lieutenant and Lady Abergavenny. She was entertained to luncheon by the Director and Mrs Hunter and then paid a private visit to the Isaac Newton Telescope. The Princess was formally welcomed, together with the other guests, by the Director in the top rose garden. She then inaugurated the Tercentenary Sundial by unveiling the portrait bust of John Flamsteed, the first Astronomer Royal, set up beside the sundial to mark his establishment of the Royal Observatory at Greenwich, 300 years earlier.

Staff leaving the plane at Gatwick

Inter Council Brochure

The five research councils recently issued their first joint publication under the editorship of their joint public relations officer I L Arnison. The publication, a booklet called "The Research Councils" describes the function of each council and gives details of its establishments, budget and staffing.

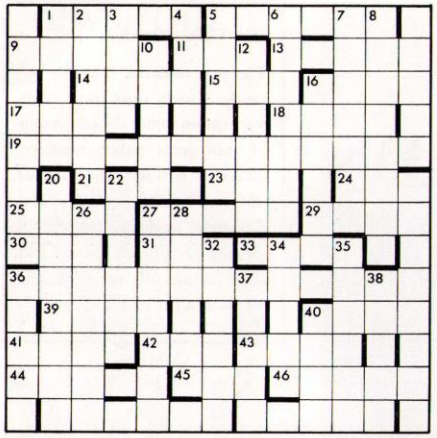


Econo-wing
During the past six months, Tony Peatfield, a PSO in the Computing Electronics Group at Daresbury and a keen caravan rally driver, has with the help of a caravan firm been developing an Economy-Wing to improve the fuel consumption of cars towing caravans.

The present price of petrol and the critical situation existing with regard to its use of course makes any progress in this direction very valuable.

The Econo-Wing is designed to remove the pressure build-up that occurs at the front of the caravan due to the poor matching of the shapes of car and caravan. It is mounted on the car roof and prevents air from flowing down over the rear-window and boot of the car (see diagram) and creates smooth air flow in an upwards direction thus removing much of the turbulence and pressure build-up in front of the caravan. Initial tests indicate that improvements of 20% in miles per gallon are obtainable with the additional advantages of smoother towing and reduction in instability when being overtaken by large vehicles.

Tony Peatfield, who has been competing in caravan competitions for the past fifteen years, intends using the Econo-Wing in "The Caravan" Rally Championship so that further evaluation can be made.



MAXIM 10

MAXIM 10

At last!—the Great British Crossword Puzzle, protected from the rest of the world by a frame whose insulating members are in approximately the right positions.

Clues

ACROSS

9. Rock back to compass point of a ship (5)
11. Hackney alphabet is distorted (3)
13. Female, qualified, makes famous queen (5)
14. I move away from left wing, becoming famous prince (4)
15. Jock's hat worn back-to-front—this conveys welcome (3)
16. Title of Uncle Remus's animals in *The Railway Queen* (4)
17. Murray's vital bit of microscope (4)
18. The right to take an article and to declaim with bombast (4)
19. Cut an ex-commie off from the privileges of religion (13)
21. Islanders' ex-language (4)
23. Descriptive of wines from the Basse Camargue (3)
24. Perfunctory judge gets shortened citation (3)
25. Exceptionally like Louis Armstrong initially, she sang with him later on (4)
27. Road accident—car's smashed up, ended up in hospital (5)
29. A novice, like Mrs Thatcher when flustered (4)
30. Yes, the year's a quarter gone (3)
31. With a trilby, its inherent (3)
33. The French overseas shortly became part of S.E. Asia (4)
36. Need one? I said carelessly, with little heat and listless (13)
39. Potentially electric, being in opposition to a rough lot (4)
40. Humour that's painful—to the feet? (4)
41. River that's not, repeat not, in France (4)
42. Flog front half of bicycle (3)
43. Fools do it to windmills, and knaves to pin-tables (4)
44. Take in a low joint in motor tour (5)
45. For convenience, not quite a closed circuit (3)
46. Clowns in islands west of Java (5)

DOWN

1. Dead on ten, elastic appears (5)
2. Indicate proof of European drink in re-formed Common Market (6)
3. People like Touchstone (Shakes) (4)
4. "Clear off!"—that's how swotting starts, with rapid learning following (5)
5. Well-publicised note—doctor comes to us (6)
6. Torch is not working properly—I find it difficult to see with my head down (7)
7. Third-order result of near try (7)
8. One improves with several helpers (8)
10. Appears indistinctly to be what upset hand-weavers (5)
12. Passed annually by Oxbridge men going west, ignoring the other points (6)
16. Returning in the direction of what preceded Shaw's *Methusaleh* (4, 2)
20. One quitter among hundreds? They give the chop! (8)
22. Take a low joint to embitter (6)
26. Non-clerical about type of trick brief (7)
27. Good let-out after gossip (7)
28. Spoke like a laird, incorrectly (6)
32. There's up to 42 means of public address (6)
34. Like part of the police force, reflected echoes are essential to my operation (5)
35. Ancient tax on a church—Presbyterian, perhaps (6)
37. Following behind, but to win after a tussle (2, 3)
38. Have a try in literature, for example; result, slang (5)
40. Shoe contructed around a piece of tree (4)

The prize will be awarded to the first correct entry drawn. Please state whether you would prefer a book or record token. The solution will appear in the next issue.

A square inside the walls of old Boulogne

Day trip to Boulogne

Graham Tidmarsh sent us this account of a day trip to France:

"On 6 August, 29 members of London Office went on a trip to Boulogne. The trip was organised by the London Office Sports and Social Club Committee which had felt that, apart from Christmas celebrations, the social side of their activities were tending to be neglected. Nearly as many non-members as members took advantage of the special day trip and party booking arrangements and Tudor Evans, taking a day away from the problems of London Office Administration had the bonus of winning a free ticket!

The day was very fine and as we boarded the Sealink ferry "Horsa" no-one was worried about the possibility of being seasick. Although we were on a party booking, there was no need to stay in the group and people quickly spread around the ship—some were up on deck to enjoy the sea breezes, some went to the bars to take early advantage of the low prices, some stayed close to the duty free shops and others were never spotted at all!

On arrival in Boulogne we quickly dispersed among the streets of the town. Most of us, by various routes, found our way up into the old town—at the top of the hill, and set behind massive walls. The first priority was lunch—in any case the shops were almost all closed for lunch until 3.00 pm. After lunch there was only really time to buy wine, at around 40p a bottle, cheese, French bread, etc, before returning to the pier to catch the ferry back to Folkestone.

All the group enjoyed themselves and suggested another day out so watch out Amsterdam or Paris—it is your turn next!"

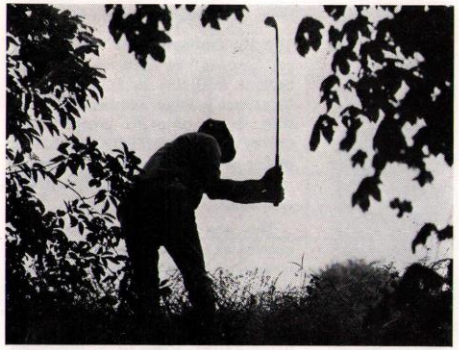
Save and Protect Your Earnings

The Government's new "index-linked" Save As You Earn scheme which became available in July is bound to attract a large number of savers who are anxious to protect their money against a fall in its purchasing power or who have been protesting in recent years about "negative interest".

The new scheme caters for the individual aged sixteen or over, who wishes to make a regular monthly payment in order to obtain a fixed eventual repayment. The return is fixed to the change in the cost of living rather than to a pre-determined sum of money. In this way, the saver is guaranteed that the purchasing power of the amount which he "puts on one side" is maintained.

The minimum monthly contribution for index-linked SAYE contracts is £4 and the maximum £20 for a period of five years. Each monthly contribution is revalued in line with the movement of the Retail Price Index and on the fifth anniversary of the starting date of the contract, the repayment value will be the total contributions plus any increase due to index-linking. If the index has fallen during the life of the contract, the saver will not receive less than the total of the contributions which have been made.

As with earlier SAYE schemes, contract holders will have the choice of opting for repayment at the end of five years or of leaving their contributions invested for another two years without any further payments. Those who choose the latter option will have their contributions readjusted at the end of two years in line with the Retail Price Index and will, additionally, be entitled to a bonus equal to two monthly contributions. Anybody who draws out after one year but before the end of five years will receive back all the contributions which have been made, unadjusted for movement of the Index but interest at 6% will be added. For contracts repaid within one year, only the sum contributed will be paid out. Contracts terminated by the death of the holder and repaid after one year from starting will be index-linked.



Out of the rough into the smooth?

Inter-Lab Golf Tournament

The Inter-laboratory Golf Tournament for 1975 was played at Wrexham Golf Club in June. Six teams competed for the Brian Flowers Trophy. The four best net scores from the team of six counted and the Appleton team (John Delury, Barry Shenton, Doug Roberts, John Kitt, Jack Moore and Neil Urquhart, with John Smith as reserve) won with a score of 588—four strokes in front of the next team Daresbury.

In addition to the team trophy, three individual prizes were awarded for the best gross score for 36 holes, the best net score for 36 holes and the best net score for 18 holes. Appleton swept the board, with John Delury, John Kitt and Jack Moore taking all three prizes.

Solution to Maxim 9

A	L	P	H	A	N	U	M	E	R	I	C
T	O	H	E	R	O	R	O	T	O	R	H
E	W	8	L	E	S	S	O	S	A	K	A
L	E	O	P	L	E	A	S	U	R	E	S
E	L	F	M	E	G	O	H	M	S	A	C
P	S	F	A	G	I	N	I	M	P	S	A
H	E	A	T	I	N	G	F	E	M	I	9
1	0	S	E	L	A	S	2	R	D	L	1
S	E	H	O	N	O	U	R	7	A	Y	R
P	L	I	N	T	H	S	K	I	L	N	O
O	D	O	U	R	M	A	I	N	L	Y	U
T	A	N	S	Y	S	N	U	G	Y	E	S

The winner was Carol Armstrong (London Office) who wins a £2 record token.

Solution to Nutcracker 18

The solution was φ A φ. The winner was Gordon Squier (Rutherford Lab) who wins a £2 book token.

NUTCRACKER 19

At the last grants round the Paleolithic Botany Committee considered between 100 and 200 applications. Two were transferred to other Committees, and of the remainder, exactly one third were rejected. Four applications were deferred, and of the remainder one fifth were recommended for awards at such low priority that they were not funded. The remaining four fifths should have been announced, but this took so long that two of the applicants died first. Of the grants actually announced, precisely one seventh fell in the Committee's special area of North Devonian Granes. How many applications did the Committee consider?

The prize will be awarded to the first correct entry drawn. Please state whether you would prefer a book or record token. The solution will appear in the next issue.

DIARY OF A DISASTER

Day 1 Off on camping holiday in France. Travelling with wife and another couple (Michael and Celia) in their Saab to catch the ferry to San Sebastian. Car grinds to halt on M3. Loose plug lead. Catch ferry. No-one sleeps for vibration.

Day 2 Everyone except me sea sick. Ship's water supply fails, but restored again.

Day 3 Woken 5.15 am for arrival. Ship's water supply fails again. Dock in San Sebastian, cross frontier into France heading for Bordeau. Brakes fail at traffic lights. We hit French 2CV, which hits Peugeot. No serious damage, but roof-rack looks unhappy. Camp at Ste Foy-la-Grande.

Day 4 Car in garage all day having brakes repaired. End of planned trip round Bordeaux vineyards. Replace one bolt in roof rack, and also buy spare.

Day 5 Ste Foy-la-Grande. Rodez. Tear mudflap off leaving camp site. Hit dog on road.

Day 6 Rodez-Avignon. Roof rack fails again. Different bolt needed so trek back to nearest garage. Buy spare again. In absence policeman arrives, talks about daughter studying in England.

Day 7 In Avignon. Go to post office to buy stamps for cards; accidentally post them before putting stamps on.

Day 8 Avignon–Mouries. Camp site full. Move back to Maussane-les-Alpilles. Discover Michael left camping carnet in Avignon. Visit Arles. Eat out of doors. Torrential thunderstorm.

Day 9 Visit Marseilles. On way back, strange rumbling from back of car. Exhaust hanging loose.

Day 10 Mostly spent refixing exhaust. Michael goes down with heat exhaustion. Replace mud-flap.

Day 11 Maussane–Alban. Stop to pick up carnet from Avignon. Michael tears off second mudflap.

Day 12 Alban–Digoin. Michael scalds foot with radiator overflow. Another roof rack bolt fails. Stop to replace it.

Day 13 Digoin–Orléans. Last bolt fails. We use our final spare.

Day 14 Orléans–Le Havre. Site run by bureaucrats. Unable to buy butter for dinner, because shop closes early.

Day 15 Catch Le Havre–Southampton ferry. Arrive home 22 00 to find all electricity in garage off. Freezer full of rotten food. Smell would stop a horse. And so to bed.

Peter Casey