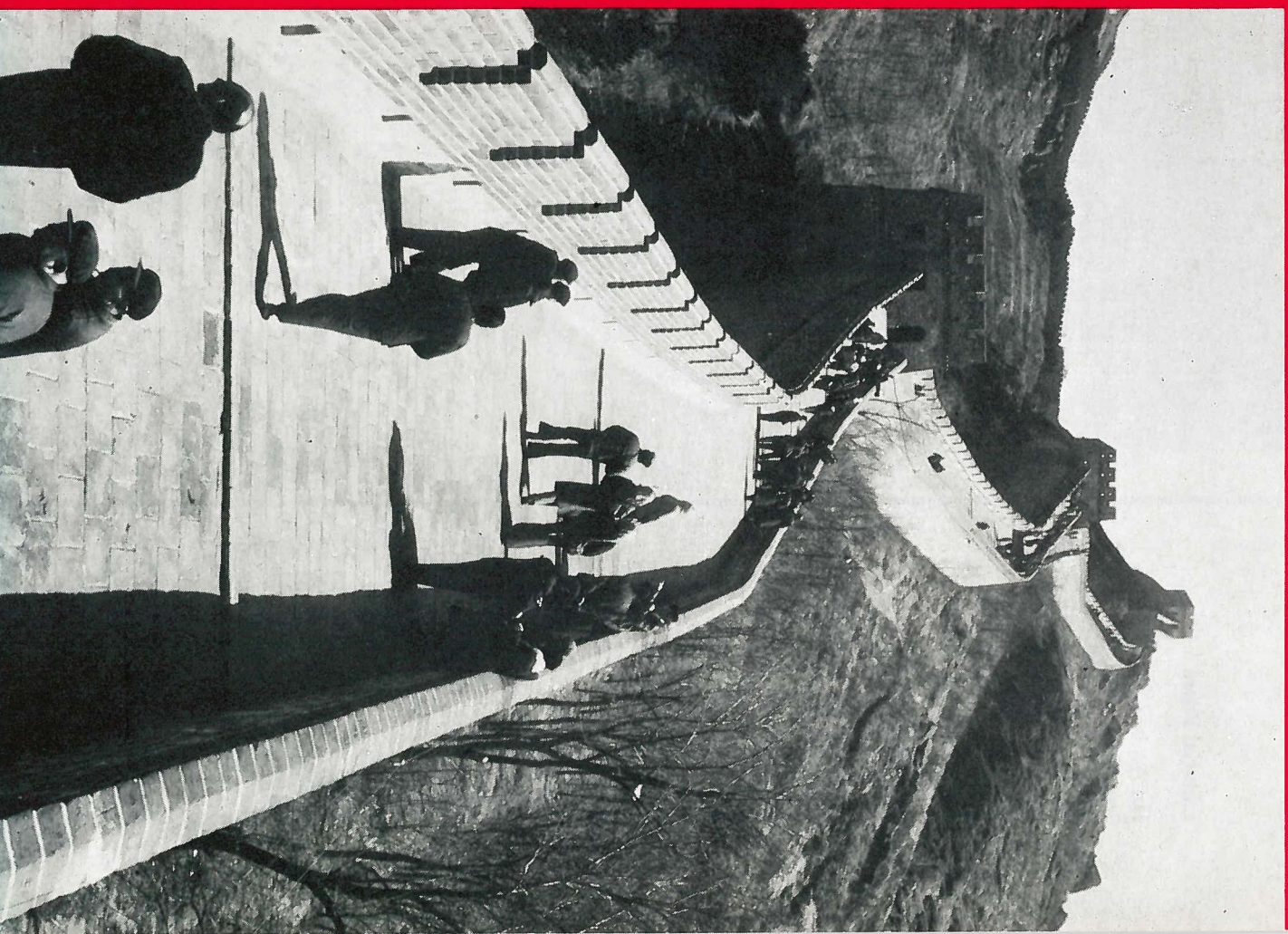


QUEST

The 'Locstitch Machine'
New techniques for oil extraction
Recollections of China

Vol 9 No 3



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Cover shows the Great Wall of Ten Thousand Li, stretching like a Roman road with dragon's teeth for four thousand miles or more from east to west across the inner northern border of China. (See 'Recollections of China'—page 5)

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(The following statement was issued by Council on October 21 when its annual report for 1975-76 was published)

Precautionary measures in view of current financial uncertainty

Page 3 of the Annual Report describes the programme which the Council had planned to follow on the allocations indicated in the last Public Expenditure Survey and the Second Report of the Advisory Board for the Research Councils. After the summer cuts in public expenditure, it became clear that the SRC's budget will fall more quickly, and that the Council will have to revise its plans in a number of ways.

The nature of the work supported by SRC makes it difficult to adjust expenditure rapidly. In order to operate effectively, the Council need long-term assurance of the level of funding. They will make new plans to develop research and training to best national advantage, as soon as they have an indication of the resources likely to be available.

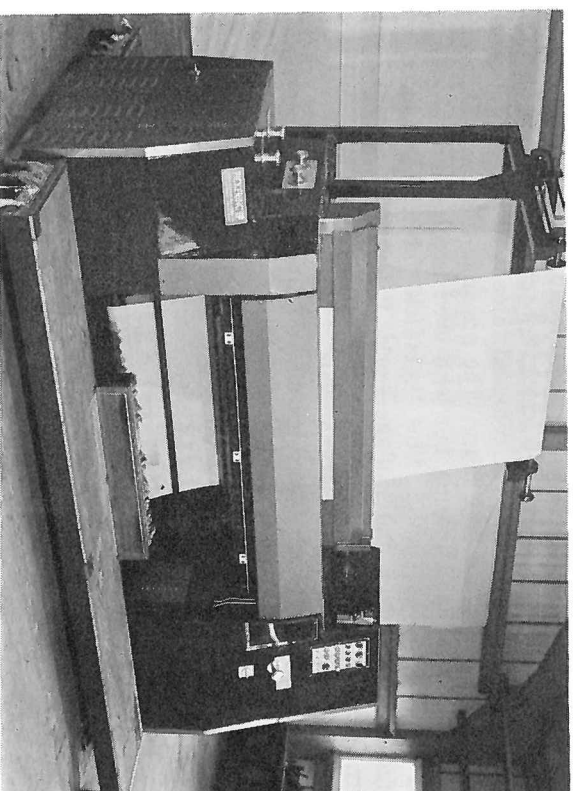
Meanwhile, the increasing cost of international subscriptions due to changes in exchange rates is presenting problems for the current financial year and could present similar problems in the next financial year. These payments now account for almost one-third of the SRC budget. The Government is considering how to deal with this situation and the possibility of savings in the international contributions is being explored. However, until we know the basis on which variations in exchange rates are to be handled and also what funds will be available to the Council in 1977/8, uncertainty will remain.

I hope that this uncertainty will be resolved before long, but meanwhile, as a matter of prudence, the Council has decided that they should, so far as is practicable, defer making new commitments. Therefore, until the financial situation is clearer:

- the special restrictions on recruitment to fill vacancies which occur among the Council staff will continue in force;
 - commitments at SRC establishments to expenditure in 1977/8 on supplies, services and equipment will be limited to 80% of the sums requested in the Council's Estimate proposals for next year;
 - the announcement of research grants for new programmes, which would normally be made in November or December, will be deferred; and
 - consolidated grants and grants for rolling programmes will continue to be announced in the normal way but holders will be asked to defer the filling of vacant posts and the making of new commitments for capital expenditure wherever this can be done without serious damage to the work.
- A further statement will be made about future operations when the financial situation has been clarified.

Contents

| | |
|-----------------------------------|----|
| The 'Locstitch' machine' | 1 |
| Council Commentary | 3 |
| New techniques for oil extraction | 5 |
| Recollections of China | 6 |
| Newsfront | 10 |



The prototype 'Locstitch' machine, designed in the Department of Mechanical Engineering, Loughborough University of Technology, by the inventors, G F Ward and G R Wray and built by Pickering Locstitch Ltd in 1971

The 'Locstitch' machine

Newcomers to the machinery involved in the manufacture of textiles are often surprised by the variety of mechanisms used.

Most of these have evolved during a period of intense mechanical engineering activity in the early nineteenth century. As a result many of the machines used today for the manufacture of yarns, fabrics and garments, have clear origins in highly ingenious devices thought of over a century ago; designers have extended traditional practice but until recently little modern mechanical engineering technique has been applied.

Since 1966, a research and development programme at Loughborough University, under the supervision of Professor Gordon Wray, who holds a personal chair in the Department of Mechanical Engineering, has developed a machine which now offers great flexibility and potential over conventional weaving methods for manufacturing pile fabrics.

'Locstitch' machine

Known as the 'Locstitch' machine and based largely on the university-designed prototype, it is now currently operating successfully in several parts of the world. The production speeds are some thirty times faster than traditional pile-fabric weaving.

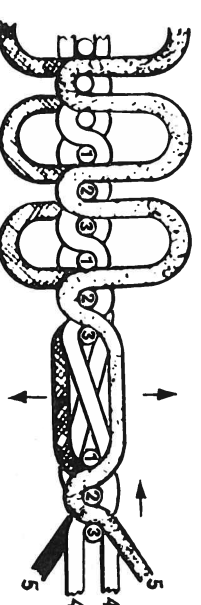
The story is somewhat unique in the field of manufacturing machinery.

For Professor Wray and his colleagues, the story of an investigation which resulted in a new machine and process for British industry, started on the back of a British Rail menu card. For SRC the involvement was grant aid of £11,567.

The invention, research, development, testing and prototype design stages were all conducted within the department in four years.

Pile fabrics

Traditionally pile fabrics — the sort of material we all



1, 2, 3 web yarns 4 ground weft yarns 5 pile warp yarns

use in terry-towelling, velvets, carpets, upholstery fabrics and blankets is based on the principle of the

interlocking of pile warp yarns (see fig (page 1) section 5) with ground warp yarns (4) and weft yarns (1, 2, 3) to produce the complete pile fabric in one weaving operation. The operation is slow mechanically, the resultant fabric not very stable and a pull may cause the pile to "run" or the fabric to fray.

In 1961 while working at UMIST, Professor Wray visited Czechoslovakia and East Germany, and saw two unconventional fabric machines using a base fabric into which stitches were inserted by compound knitting needles at high speed.

This method too had limitations in that pile loops could only be produced on one side of a base fabric. The complex stitching system limited production values even though this exceeded conventional pile weaving.

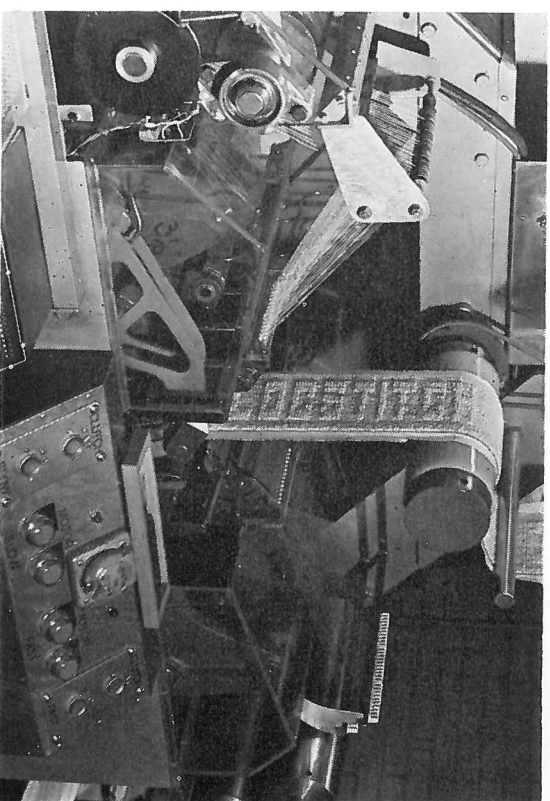
Ideal equipment

Discussing the problem the following year with Mr G F Ward, a colleague whose industrial experience in boot and shoe stitching machinery design complemented his own in textile machinery, Professor Wray and Mr Ward came to the conclusion that the ideal

First practical embodiment of the stitch was performed by two domestic sewing machine needles using different coloured threads to penetrate a card-board base fabric. The principle is in fact similar to hand-knitting but with eyed needles and through a base fabric. Now 'Loositich' fabric is produced in many parts of the world. It will not fray when cut and is ideal for brushing or cropping blankets, rugs, furs of similar materials.

Current versions of the "Loositich" machine produce plain unpatterned fabric. A further SRC grant (£23,000) has enabled Professor Wray and his colleagues (Mr R Vitols and Mr J E Vine) to develop a sculpture-patterning system in which individual loops are preselected from a pattern painted on a continuous transparent film. The sensing of this pattern is done by photo-electric circuitry. The circuitry activates individual solenoids to "interfere" with a loop or orbit mechanism. Thus, either a high or low pile height is produced according to the electric signal perceived.

This approach however has limitations and Professor Wray and his colleagues are still refining their techniques on a remarkable technical innovation with



Sculpture-patterned pile-fabric emerging from the research rig

construction was a stitch in which looped pile could be generated on *either* or *both* sides of the base fabric, the loops being of a similar character and securely locked so that they could not run or fray. The ideal locked-loop double pile stitch was given the trade name 'Loositich' and the idea came to them during a meal on British Rail while returning to Loughborough from London.

which Council is pleased to have been associated.

Mr Ward is now technical director of Pickering Loositich Ltd who developed the Loughborough process under NRDC licence and is therefore able to devote himself to the commercial realisation of the machine of which he was co-inventor.

Think on these things when next you try out that non-run deep pile fabric in the local department store.

Council Commentary

May to July 1976

Membership

At the July meeting the Chairman thanked the retiring Council members (Professor Callan, Mr Ferguson, Dr Pringle and Professor Stibbs) for their services and announced that the Secretary of State had agreed to the appointment of the following new Council members: Professor G Allen (Imperial College), Dr J P Birks (BP Trading Ltd), Dr P F Chester (CEGB), Professor Sir Granville Beynon (Aberystwyth), Professor W E J Farvis (Edinburgh) and Professor Sir George Porter (Royal Institution).

New Grant Regulations and Procedures

At its July meeting Council approved a new grants 'package' which should simplify the administration of research grants and give grant-holders considerably greater freedom. Under the new arrangements investigators holding 'normal' grants will be allowed to transfer funds between headings virtually without restriction and grants will automatically be compensated for national salary awards; there will, however, be no further supplementation allowed or extensions (save a 6-month flexibility in starting date). Certain grants which are 'special', because of their size, duration or nature whilst having the above features will also be subject to review and may be of a 'rolling' kind (e.g. initially a 4-year grant reviewed after 2 years to determine the future level of support).

Joint SRC/SSRC Committee

In June the Council considered the Joint SRC/SSRC Committee's proposals for implementing the recommendations of its second report on broader post-graduate training. To underpin and sustain this kind of training the Committee wishes to award limited research grants to provide a stronger research base in this area. The Committee also proposes a planning target of 200 studentships (involving extensive use of CASE) by 1981. The Council accepted these proposals as a general guide subject to the normal annual review of allocations.

Polytechnics Committee

Also in June the Council had a preliminary discussion of the first report of the Polytechnics Committee. Because of the marked differences between Polytechnics and Universities the Committee believes SRC must give special consideration in helping Polytechnics carry out those important functions which they are best able to undertake, such as vocational training (and here the support of part-time students may be particularly important) and collaborative research and training with local industries and public bodies. The Council discussed the Committee's report with Board representatives at its weekend conference in September.

SRC Fellowships

At its July meeting the Council approved the creation of an Advanced Fellowships scheme. A small number of these fellowships will be awarded for up to five years to outstanding research workers who are well-qualified for academic careers but who do not hold tenured posts. They will fill a gap between the Council's existing postdoctoral fellowships and senior fellowships.

Central Computing

At its July meeting the Council approved a proposal for upgrading the Daresbury IBM 370/165 at a cost of £670K plus VAT. At present insufficient funds are available to undertake the whole of the upgrading and the Council therefore, authorised the Chairman to approve the placing of orders for the individual items if and when funds became available. The Council also noted that discussions were being held between SRC, International Computers Limited and the Department of Industry on a computing project (The Distributed Array Processor).

Establishment and Facility Committees

In June the Council approved the setting up of Establishment Management Committees for each of its Establishments. The Committees are to advise the

Chairman of Council and the appropriate Boards on the resources required to undertake various programmes and to advise Establishment Directors on the carrying out of these programmes. The Committees will have delegated powers of financial approval. Additionally the Council agreed the membership and terms of reference of a Laser Facility Committee, a Neutron Beam Research Committee, an Interactive Computing Facility Committee and (in July) a Facility Committee for Computing. These Committees will advise the appropriate Board (and in the latter case the Council) and the appropriate Establishment Directors on the use of the facility concerned.

Radio Wave Propagation Research at the Appleton Laboratory

At its June meeting Council agreed that support of long-term research in radio communications at the Appleton Laboratory was more logically the responsibility of the Engineering Board rather than the ASR Board (as at present) and agreed to transfer this responsibility.

Astronomy, Space and Radio

(i) *Fulmar Sounding Rockets*
The Council has approved increases in cost in the procurement and launching of six Fulmar rockets. The revised cost estimates are now £339,000.

(ii) *3.8m Infra-red Telescope*
The Council in July approved cost increases (due to exchange rate variations and inflation) of £365K for the construction of this telescope. The revised cost estimate is £2.562M.

(iii) *First phase of the Northern Hemisphere Observatory*
In July the Council considered and approved a proposal to proceed with work on a first phase of the Northern Hemisphere Observatory at a capital cost of £4.904M. This phase will comprise the moving of the 2.5m Isaac Newton Telescope, a new 1m telescope and some site works.

(iv) *Grants*
The Council approved a consolidated grant not exceeding £225K to Professor Sir Bernard Lovell at Manchester University for radio astronomy research at Jodrell Bank and approved a supplement of £129K for work on a stratospheric and mesospheric sounder for Nimbus G satellite.

Engineering

(i) *Marine Technology*
Council, at its July meeting, considered the report of the Marine Technology Task Force set up by the Engineering Board to advise it on priorities and funding requirements in marine technology. The principal recommendations of the Task Force are that SRC should support a major coordinated programme in marine technology related to the extraction of offshore hydrocarbons and that SRC funding should be focused on a limited number of centres of expertise, with work being concentrated initially on six priority areas identified by the Task Force. The Task Force saw the need for a programme costing £24M over five years with an additional £10M for capital items. The Council recognised the need for such a programme, although of course the actual level of its funding will need to be assessed taking into account the competing claims from other areas of the Council; to provide the central coordination clearly required for such a programme the Council agreed to the formation of a Marine Technology Directorate. Meanwhile, in order to deal with existing proposals for work in this field, Council also approved the setting up of a Marine Technology Panel with the delegated powers of a Committee to make research grants.

(ii) *Interactive Computing Facility*
In November 1975 Council agreed in principle to an interactive computing facility being established under the auspices of the Engineering Board. The Council has now approved the first steps in its establishment by agreeing to the enhancement of the PDP 10 computers at Edinburgh University and UMIST (which will be part of the network which will form the facility) and to the purchase of an initial instalment of terminals.

(iii) *Grants*
The Council approved grants of £182K to Professor F J Bayley (Sussex University) for a thermo-fluid dynamics research laboratory, of £152K to Professor N A Dudley (Birmingham University) for support of a programme at the 'teaching company', Matrix Machine Tools Limited and of £113K to Professor R J Sury (Loughborough University) for support of a programme at the 'teaching company' Herbert Morris Limited.

Science

(i) *Neutron Scattering Experiments at High Pressures*
In July Council approved a proposal for the con-

struction of a high pressure sample cell and pressurising system for neutron scattering experiments at a cost of £63K.

(ii) *Synchrotron Radiation Source*

Also in July Council approved increases in the capital cost for construction of the Synchrotron Radiation

Source; the revised approved cost is £4M.

(iii) *Grants*

Council approved a supplement of £6.1K to an award of £130.8K to Professor D J Bradley, Imperial College for work on vacuum ultra-violet gas lasers.

New Techniques for Oil Extraction

Experimental techniques aimed at developing new methods to recover oil from reservoirs are being tested by a team of engineers and scientists at Heriot-Watt University, Edinburgh. Current methods of extraction employed by the petroleum industry may leave behind as much as forty to fifty per cent of oil and, if the methods being investigated by the University research team prove successful in application, the life of an oil well, presently estimated at twenty years, could be almost doubled.

Council has backed the research with two 'priming' grants, totalling £24,250, under the direction of Professor Cecil Nutt, Head of the Department of Chemical and Process Engineering at Heriot-Watt University, together with Professor James Brown (Chair of Petroleum Engineering), and Dr Roger Burley, Dr Terry Bale and Dr Adrian Todd.

Use of foam

The first of two methods being investigated involves the pumping of a foam into an oil reservoir. At present, oil is extracted by natural pressure supplemented by injecting water or gas. Water and oil, however, do not mix and this technique leaves considerable quantities of oil behind, trapped in rock pores. It is thought that a foam will displace the oil more efficiently than water or gas separately and so the University researchers believe that considerably more oil can be extracted, by using foam in this way; little, however, is known of the problems which would be involved.

"Our present methods of extracting oil are pretty poor," comments Professor Nutt. "The so-called 'depleted' oil-fields of America, for instance, still hold great quantities of oil. Earlier methods of extraction skimmed off the cream, estimated at only fifty to sixty per cent of the total, leaving the rest behind,

and have perhaps made it more difficult to extract the residue in the future. The foam method looks promising, and we are trying to learn something about the fundamental properties of the foam and what will happen when a foam 'plug' flows through porous rock."

A £5,700 equipment grant from the Council earlier this year enabled the research team to test the performance of the foam under laboratory conditions, using artificial beds of sand or rock core in columns several feet high.

Chemical method

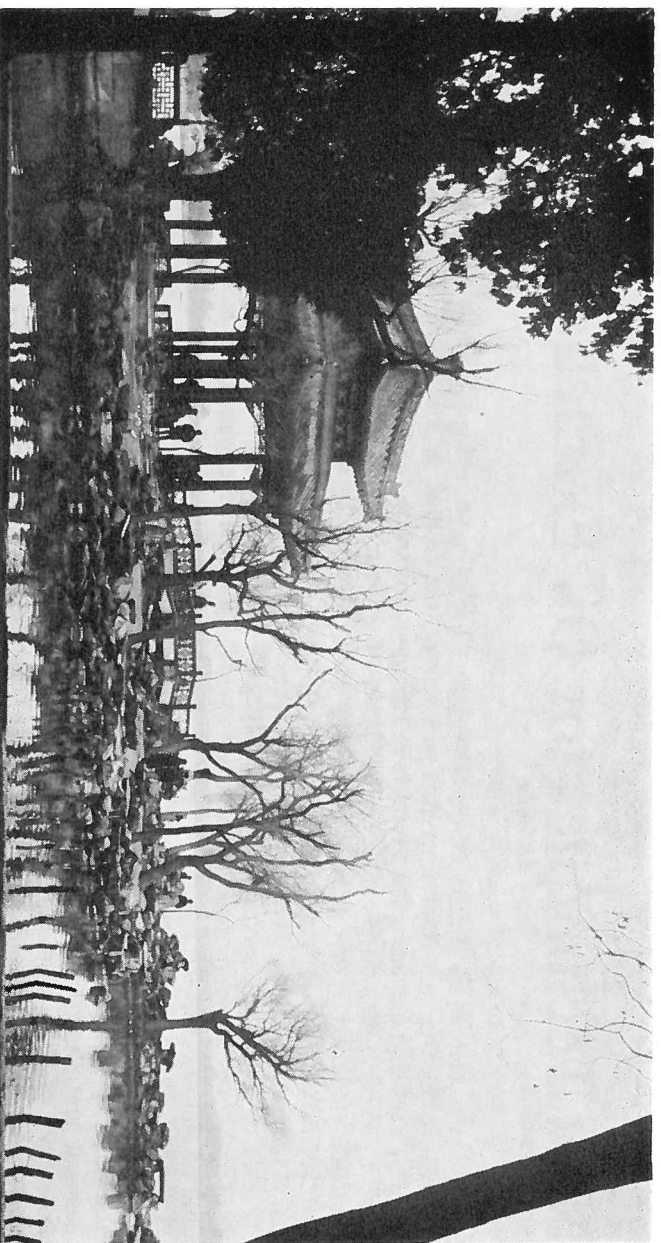
The second method, research into which received a further grant of £19,550 from the Council in July, tackles the same problem but from a different approach. Instead of foam, the research team is investigating the use of chemicals, somewhat similar to soaps or detergents which emulsify the oil (in much the same way as a washing-up liquid cleans grease off a plate), and the way the surface-active soaps displace oil from the rock pores.

"Crucial to the economics of both methods," comments Professor Nutt, "is that rather expensive foaming and detergent chemicals tend to be lost by absorption in the rock stratum or by dilution in residual water. Our investigations will help to predict more accurately the behaviour of chemicals in these conditions, to minimise waste. At a later stage, our Department of Economics, under Professor Donald Mackay, may be involved in quantifying the economics of the new methods."

"It is essential that Britain gets involved in this field of research if we are to ensure that quick methods of extraction of oil from the North Sea reservoirs are not going to be unnecessarily wasteful."

Recollections of China

ANGELA KILLICK



The surrounds of the Summer Palace outside Peking are famous for their man-made vistas which are superb, even in the rain

“You have spent 18 days seeing our country,” said the Chinese comrade next to me on the train from Canton to the Hong Kong border, “and I should like to know what you think are the major problems facing China.”

Pausing to collect my wits – after all, 18 days in a country does not qualify one as an expert – I suggested rather tentatively that one major problem was how to handle over-manning, another was how to stimulate the economy without causing upsetting distortions elsewhere, and a third was whether the Chinese system could be made more flexible so as to take advantage of favourable opportunities such as in trade.

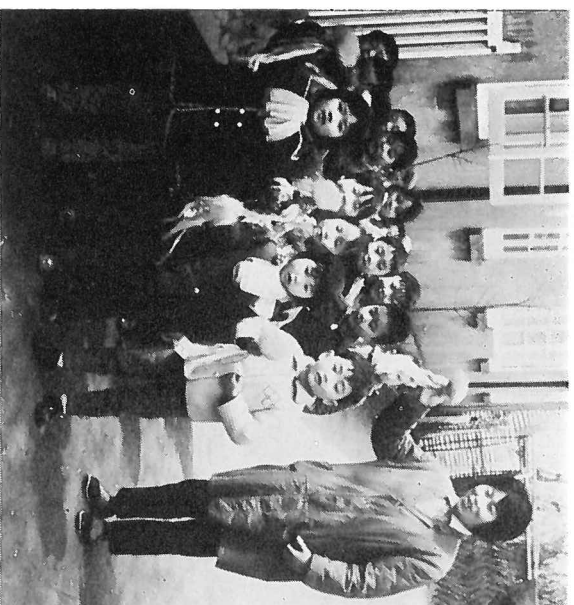
China has a population approaching 800 million, of whom more than half have been born since the Communist takeover in 1949. The first objectives of the Chinese Communist Party (the CCP) have been to feed and clothe this population – which they have done. Now their objective is to create a classless

society. There would be no point, they say, in simply exchanging one class for another as has happened in the USSR.

Dissatisfied customers

It is extremely important to assess the People's Republic against the background of old China. To me the achievements seem immensely impressive. However, as with everything in this life, there is always a price to pay. The Chinese themselves say that possibly 8–10% of the population may be opposed to the present regime. They point out that in a western style democracy this would not be an unacceptable proportion of dissatisfied customers and that in China, 10% is 80 million people. Most of these, they suggest, bow like the reed in the wind; perhaps 3% are actively opposed. Some of these will risk their lives trying to get to Hong Kong; some apply to leave China and are allowed to go (China would let more go if Hong Kong would let them in); some no doubt

are sent to lao jiao (education through labour) and others, more seriously, to lao gai (reform through labour) which may well be in prison; others remain in their jobs and homes but have their civil rights withdrawn and are under local supervision. The



Children and staff at a factory kindergarten in Shanghai



One of the spectacular figures from the Avenue of Stone Statues on the route from Peking to the Ming Tombs

Chinese say they have fewer people in prison now than before the Cultural Revolution in 1966. I am certainly not in a position to know the realities of the Chinese prison camp system but my best guess is that it is probably less vicious than the Gulag Archipelago.

And the other 720 million? Eighty per cent of these are peasants. It was my impression when speaking to students that, if a cachet attaches to any particular job in China, it is to the peasant's, though clearly one would have to live in China to verify this. In a country where manual labour has traditionally been despised this is indeed noteworthy. Mandarins in old China used to grow their nails to such a length that it was clear they could not work!

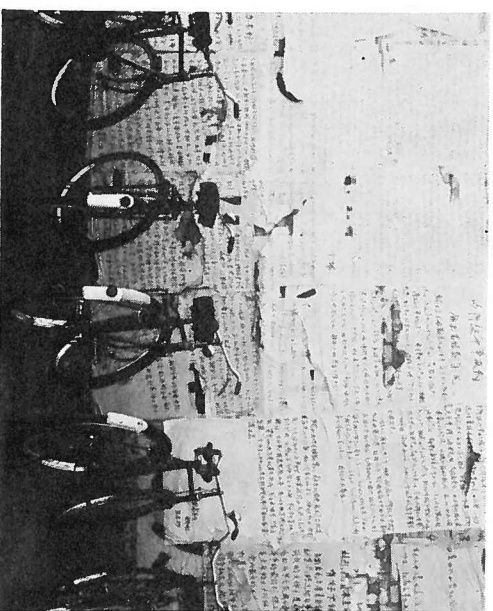
Pre-revolution conditions

A great many peasant homes do not have glass windows, electric light, running water or private lavatories. However, a great many do have mud brick walls and mud tile roofs compared with the daub and wattle and thatch of thirty years ago. To most people in old China personal liberty was academic. It became difficult and often impossible to stay out of debt. Landlords charged interest on loans, and interest on interest so that in time the debt grew larger instead of smaller; at one time under Chiang Kai-Shek taxes were paid 40–70 years in advance. The collapse of the yen was even more dramatic, and consequently traumatic, than inflation in the Weimar republic. People starved in hundreds of thousands, if not by the million. To be obliged to sell one's child or even parents was common. Against this background, to be free from the fear of hunger, of homelessness, unemployment, war and debt, to have some prospect of saving money (on which the government will pay them 4% interest), and a modicum of educational and medical facilities – is for many like living in the kingdom of heaven.

Two years after the revolution, or liberation as the Chinese call it, the communists boasted that every woman in China now had a comb, a handkerchief and a pocket mirror; today they boast (I was told) that every family in China has a wristwatch, a radio, a bicycle or a sewing machine. I repeated this to one of our guides; he thought for a moment. “No,” he said, “it isn't quite true: we are working towards this objective but we haven't got there yet.”

No wonder that Mao Tse-tung has virtually become a god. Ironically for someone opposed to all superstition he may have been assisted a little by his wart which in old China would have had great significance as a cyst on the chin or forehead denoted the benediction of heaven. It is not too surprising that the little statuettes of “the Buddha to come” that used to be sold at the spring festival have metamorphosed into representations of Mao-Tse-tung.

There is no doubt that Chairman Mao is a giant among men, but it is disquieting to see the eulogism carried to excess. The four apostles are Marx, Engels, Lenin and Stalin; the room in which the Chinese communist party was formed in 1921 contains twelve chairs, and the table is laid for what looks for all the world like the last supper. Mao is at times depicted with streams of light, adulating crowds at his feet – everything in fact bar a halo. “Our Great Leader Chairman Mao” became OGLCM in my notebook to join GPCR (Great Proletarian Cultural Revolution) and MLMTT (Marxist-Leninism-Mao-Tse-tung-Thought).



Bicycles and wallposters outside the machine tool workshop attached to a teacher training college near Peking

Song titles at Chinese concerts include “Mao Tse-tung sent me to the University”, “The cadres don’t fear the hardships or dirt in looking after the pigs”, and “We listen with joy to the communiqués of the First Peoples National Congress”. The retired couple to whom we posed the question “What do you do in your leisure time?” replied “There is nothing in our life that is not political”. Old age pensioners participate in three hours political discussion a week, students eight hours, and so on through all walks of life. It has been estimated that in the first decade of communist rule alone, each adult had engaged in perhaps ten thousand hours of regular study sessions.

Sent to a commune

Every urban child on leaving middle school at the age of 16 or 17 is sent to work on a commune. There is no choice about this. The only exceptions are the sick, the disabled and the last remaining child in each

family. After 3–5 years each comrade is assessed by his peers and leading comrades for suitability for higher education on the grounds of attitude to the Party, attitude to work, the nation’s needs, and his ability – in that order. Presumably the wishes of the individual are taken into account at this stage though everyone we questioned immediately responded by saying they wished simply to “serve the people”.

Housing

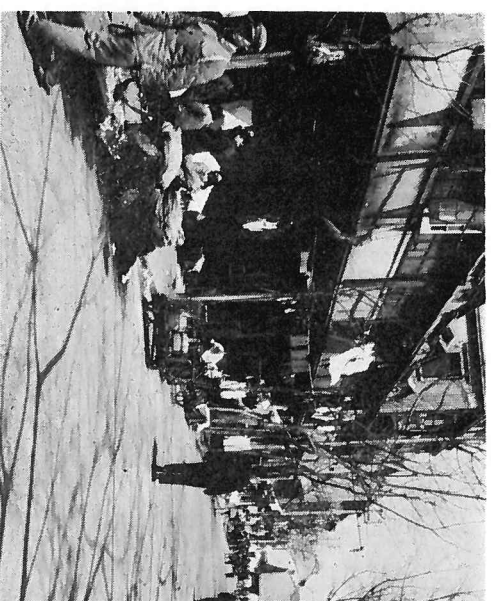
In Peking, a city of about 10 million people, new dwellings are being built at the rate of approximately 100,000 a year. But if, say, 4 million people need



Part of a peasant comrade’s open-air kitchen on a commune near Canton

rehousing then at the current rate of progress this will take 40 years – by which time the early post-war blocks will probably require substantial attention. The present norm is up to five storeys, no lift, two rooms, a kitchen and lavatory for a family, and one bathroom for the block. In a Shanghai housing estate, built in 1952 and in many ways quite attractive in layout, there was no form of heating in the flats which were not self-contained; three families shared a lavatory, a cold water tap in a common kitchen, each family having two gas rings. There was some evidence that if a flat were under-occupied the tenants would be asked by the district housing office whether they might not help house relatives and they might even have another family “billetted” on them. It seemed usual in the towns for a nuclear family to

sleep together in a single room. It was a Confucian ideal to have five generations under one roof, and certainly three is common now. China could not cope for the time being with individual homes for individual families.



A typical street scene in Shanghai

Population control

To control the population explosion, the Chinese discourage women from marrying before 25 and men before 28. People seem very well aware that China could not manage with a mushrooming population and we came across couples who said that one child was enough. Divorce is possible but discouraged, and the same applies to abortion. Contraceptives are readily available for married couples but pre-marital sex is strongly discouraged. Propaganda to this effect seems to be extensive and it would not surprise me if the possibility of lao jiao for any “delinquents” helped ensure widespread compliance.

China’s wage structure

There is an eight-point wage system in China and since the Great Proletarian Cultural Revolution (GPCR) the aim has been to reduce differentials gradually from 8 to 6 and so on down to nil. The Chinese say that the road to communism is a long one and that at the moment they have attained only socialism (this also saves being disappointed in communism). Under socialism, bourgeois right remains. Broadly, this means that you may keep what you have earned under the previous system provided you did not acquire it by exploitation. Therefore a professor earning an unusually high salary of, say,

280 yuan (£70) a month continues to be paid at that rate and will retire on a pension of 70% of final earnings – thus prolonging the differential till he dies. But a new teacher being recruited today might receive only the usual wage of 40 yuan (£10). There might be increments up to around 100 yuan but probably not much higher. There is income tax and the professor would probably be able to buy a television, and since 1975 a record player, and theoretically even a car. However, cars seemed to be the preserve only of officials and I would have thought a private person might draw unwelcome attention to himself if he possessed one. The Chinese claim they have had no inflation since 1949 and certainly the price of everyday commodities has remained stable and, in some cases, even come down. Rent and utilities amount to 5–10% of wages, and £4 will feed someone for a month. The cotton ration per person is 20 feet a year. (Until 1965 sugar was rationed to 2½ lbs per person a year, and fat to ½ lb per person per month.) Rice is still rationed but I believe the allowance is fairly generous. By our standards the diet is limited but by Chinese standards it is better than it has ever been. Mao Tse-tung, who was the son of a middle peasant, was brought up on two meals of rice a day except for once a month when he had an egg.

Spectacular impressions

If I have to single out the most spectacular impressions of my visit they must be the thousands of blue clothed peasants toiling in the landscape, removing it by the bucket and wheelbarrow full to create new and orderly rice paddies, and drainage channels; and trees planted by the tens of million – the Chinese plan to affect the climate by about 2000 and no doubt they will. Chinese honesty has become well known in the west and it was almost a relief to discover that they do still have thieves: it is rare for a bike to be left unlocked – so they are human after all! In the towns, sad to say, I felt visually very deprived. Beauty in the eyes of the Chinese is, for the present, a factory workshop or a pylon on the landscape, and one day there will have to be a monumental boom in China for white paint! But if there is one aspect more memorable than any other it is the courtesy of the Chinese, their smiles, and warmth, and the amazing lengths to which they would go to please us as “honoured guests”.

Angela Killick works in the International Relations Section of the Council Secretariat and this spring she travelled to China for her annual holiday.

New Head for Laser Division

Professor A F Gibson has been appointed as Head of the new Laser Division at the Rutherford Lab. He will manage the Laser Centre, which is being equipped with an 800 gigawatt neodymium glass laser which will be used by university scientists for research into the creation and properties of very dense plasmas and the non-linear interactions between high intensity electromagnetic radiation and matter. Professor Gibson, who is Chairman of the Physics Department at Essex University will take up his new position in January.



Photo Alexandra Studio

Mr Peter Rice

Picture above shows Mr Peter Rice who was appointed Assistant Director of the Council's Polymer Engineering Directorate on 1 October. Mr Rice joins the Council from Harcosstar Ltd, a plastics company within the Butterfield Harvey Group, where he was Technical Director. Educated as a mechanical engineer, Mr Rice's early industrial experience was with the development of small diesel engines and injection equipment (Petter Engines Ltd) and as a senior project engineer, carrying out special

projects on plastics machinery (John Brown Group). He has been an active member of the Plastics and Rubber Institute and served on a number of committees within the industry.

First SRC Senior Fellowships

Council has made the first awards under the new SRC Senior Fellowships Scheme, which will enable a few outstanding scientists to devote up to five years to research, free from their normal administrative duties. The first six Senior Fellows are:

- Dr A Boksenberg (Department of Physics, University College, London)
- Professor A Carrington FRS (Department of Chemistry, University of Southampton)
- Professor B Clarke (Department of Genetics, University of Nottingham)
- Dr P H Gaskell (Pilkington Bros Ltd and Cambridge University)
- Professor C A R Hoare (Queen's University, Belfast)
- Professor E C Zeeman FRS (Department of Mathematics, Warwick University).



Mr M Dermody

Our picture shows the Lord Lieutenant of East Sussex, the Marquess of Abergavenny, presenting Mr Mick Dermody (RGO) with the BEM at Herstmonceux Castle in June. Mr

Dermody, who is workshop foreman at RGO and cares for the big telescopes there, has also been involved in the mechanical commissioning of several optical telescopes in other parts of the world. These include the Egyptian 74-inch reflector at Kotamia (1966), the Spanish 13-inch reflector at Granada (1968) and the South African 74-inch reflector at Sutherland.

SRS progress

With worldwide interest in the use of synchrotron radiation for research rapidly increasing it is satisfying to be able to report that the construction of the Synchrotron Radiation Source (SRS) at Daresbury is progressing well. Since the facility will be using existing buildings evidence of progress is mainly seen in the arrival of items of equipment.

The first signs of construction are now visible in the NINA experimental hall where the linac and booster synchrotron, which in turn accelerate the electrons before their injection into the storage ring, are to be situated. The necessary modifications to the electrical and water supplies located in this area have been carefully phased so that they have not interfered with the high energy physics program on NINA. Service ducts are now being cut through the concrete floor using 10-inch diameter diamond drills. These ducts will connect with the existing service tunnel and give access to the linac and booster areas for power supply cables, cooling water and other services.

Many of the major components for the project are now being manufactured by industry. These include the linac, the booster rf cavity (which, incidentally, is being made by the British Aircraft Corporation at Filton), the booster vacuum vessels, the prototype rf cavity and the 250KW klystron amplifier for the main ring.

After some delay nine blocks for

the booster prototype magnet were delivered and the magnet has now been assembled. At the time of writing the magnet is undergoing a series of mechanical, electrical and magnetic tests.

Meanwhile a prototype power supply has been constructed at Daresbury for the 10 Hz supply for the booster magnets. This has been used to power the prototype magnet and has enabled design of the operational supply to be finalised. Also in the power supply area the fast kicker supplies are under construction following completion of tests on their prototype.

A key feature of the whole SRS will be the computer control system. This has recently completed an important phase in its development, after the commissioning of the booster rf amplifier. This amplifier is being used as a test bed for the control system and has been successfully operated under the control of a mini-computer through a portable console. This portable console is a purpose built unit for the SRS and enables control of any item of equipment through a naming convention.

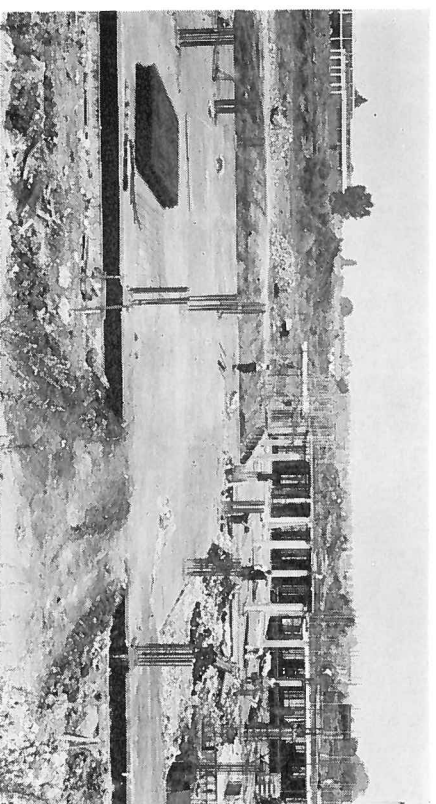
The project has now reached a stage where much of the design work has been completed and now more effort is being devoted to building equipment and it is encouraging to see these items of hardware appearing around the site.

Progress at Swindon

Construction of the new offices for SRC and NERC at Swindon is well up to schedule.

The photograph (above right) which was taken from the South bank of the site looking towards Swindon Technical College, shows the situation in mid-August.

The concrete ground slab was *in situ* for the SRC and Centre blocks and preparations were being made to construct the concrete columns to support the SRC's first floor. Off the picture to the left the NERC ground slab was well on the way to completion. At the time of going to press (end of September) the support columns for the entire first floor were in place and the contractor had almost finished laying the concrete slab for the SRC's first floor.



Swindon office starts to take shape



Picture shows from left to right Mr P Gregory (Rutherford), Mr R B Yates (Daresbury) and Mr J H Richards (London)

SRC Golf tournament

The 1976 inter-establishment golf tournament was held on June 4 at the Wentworth Club, Virginia Water.

Seven teams from Rutherford, Daresbury, Appleton, London/Swindon Office and RGO competed for the Brian Flowers Trophy, the best four net returns over 36 holes from each six-man team deciding the winners.

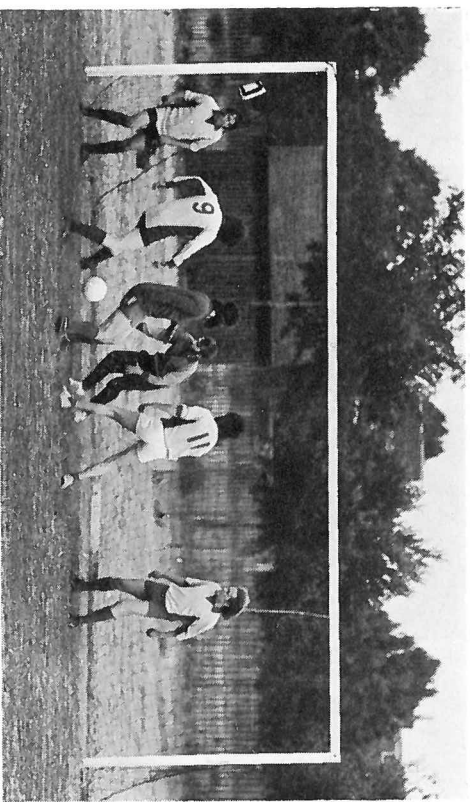
This year the winners were Rutherford 'A' team (Brian Parkinson, Jim Valentine, Doug House, Peter Gregory, Geoff Manning, John

Jenkins) with a final score of 593. Rutherford 'B' team came second with 603 and Daresbury 'A' team third with 615.

The best individual scores were:
Best gross score over 36 holes John Delury, Appleton, 166 gross.
Best net score over 36 holes Jack Moore (handicap 20), Appleton, 142 net.

Best net score over morning 18 holes Bob Cunningham (handicap 18), Daresbury, 64 net.
Best net score over afternoon 18 holes Jim Valentine (handicap 10), Rutherford, 74 net.

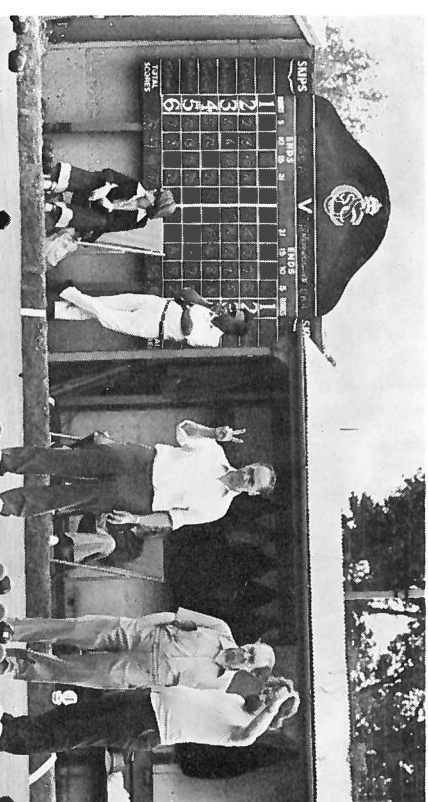
Sports Day 1976



Daresbury v Daresbury in the six-a-side football competition



Fierce concentration from the netball players



From left to right IO bowls players: Harry Cook, Charles Bradley and Richard Weaver

The annual battle between SRC Laboratories took place at Chiswick Sports Ground on 13 July, and a good time was had by all, both competitors and spectators. Amazingly, in this drought ridden summer, there was a shower of rain towards the end of the afternoon. The Chairman and Lady Edwards came to watch the competitions and we are very grateful to Lady Edwards for presenting the prizes.

A large number of teams entered the football event and competition was fierce, which was sometimes quite painful because of the very dry ground. The eventual winners were the Rutherford "A" team.

Five teams entered the netball competition and the Daresbury team took home the large new trophy.

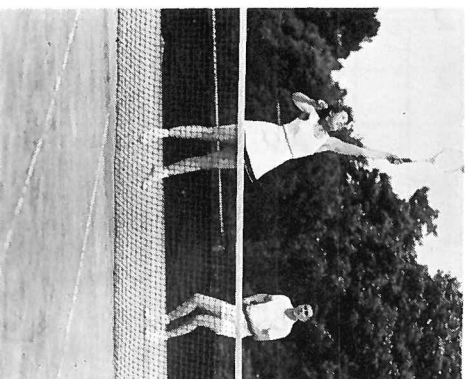
Tennis is a sport which attracts a large number of competitors. The winners of the mixed doubles were, once again Mrs I Malin and G Wilkins from RGO. The men's doubles were won by P Gardner and D Stanley from the Appleton Laboratory.

This year, the bowls competitions held were Pairs and Triples. The pairs were won by E Kirby and L Harding of Rutherford and the Triples by C Grindrod, A Goode and P White of Rutherford.

The cricket competition was a long one and the eventual winners, Rutherford, finally beat the opposition too late to receive the trophy at the presentation from Lady Edwards.

The winner of the chess competition, held in the quieter atmosphere of the marquee, but nevertheless generating excitement, was E I Bramley from Appleton.

Sports Day was also the occasion for the presentation of the Sir Brian Flowers Trophy for the SRC Golf tournament which had been held in June. The winning golf team was from Rutherford.



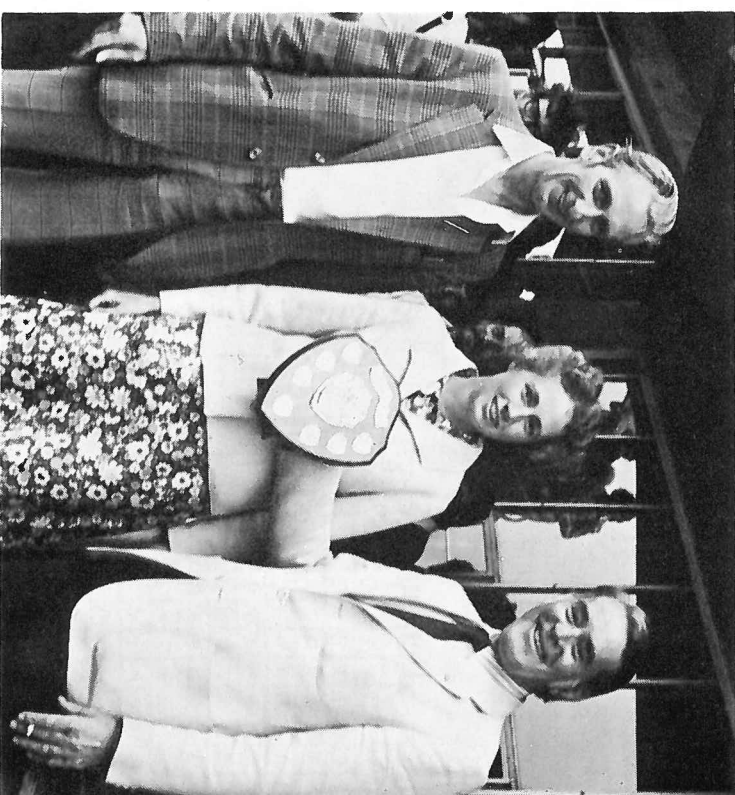
George Wilkins and Mrs Irene Malin compete in the Mixed Doubles



Lady Edwards presents the Daresbury netball Captain Hilary Mason with the trophy



Even umpiring netball can be a dangerous occupation



Lady Edwards presents the bows shield to the winners of the Pairs Competition: Eric Kirby (left) and Les Harding of the Rutherford Lab

Herstoncoenx swarm

There is no denying the variety of what Council employees do at Research Establishments. We were wandering around the Castle grounds at the Royal Greenwich Observatory one lunchtime when we saw three white-overalled people with strange masks over their heads walking towards the car park. One of them was carrying a step ladder and another a large cardboard box. They were looking up at a large tree so we waited a while to see what was going on. We then became aware of a large number of bees and following the direction of the overalled figures' gazes we saw a swarm of bees clustered around a branch about ten feet from the ground.

The man with the step ladder erected it under this swarm and then climbed up the ladder to be immediately under the swarm. He was handed the cardboard box which he placed immediately under the swarm, gave the branch a sharp tap and the swarm disappeared into the box. It was as simple as that and the man performing this operation wasn't even wearing gloves although he did

have a mask over his head.

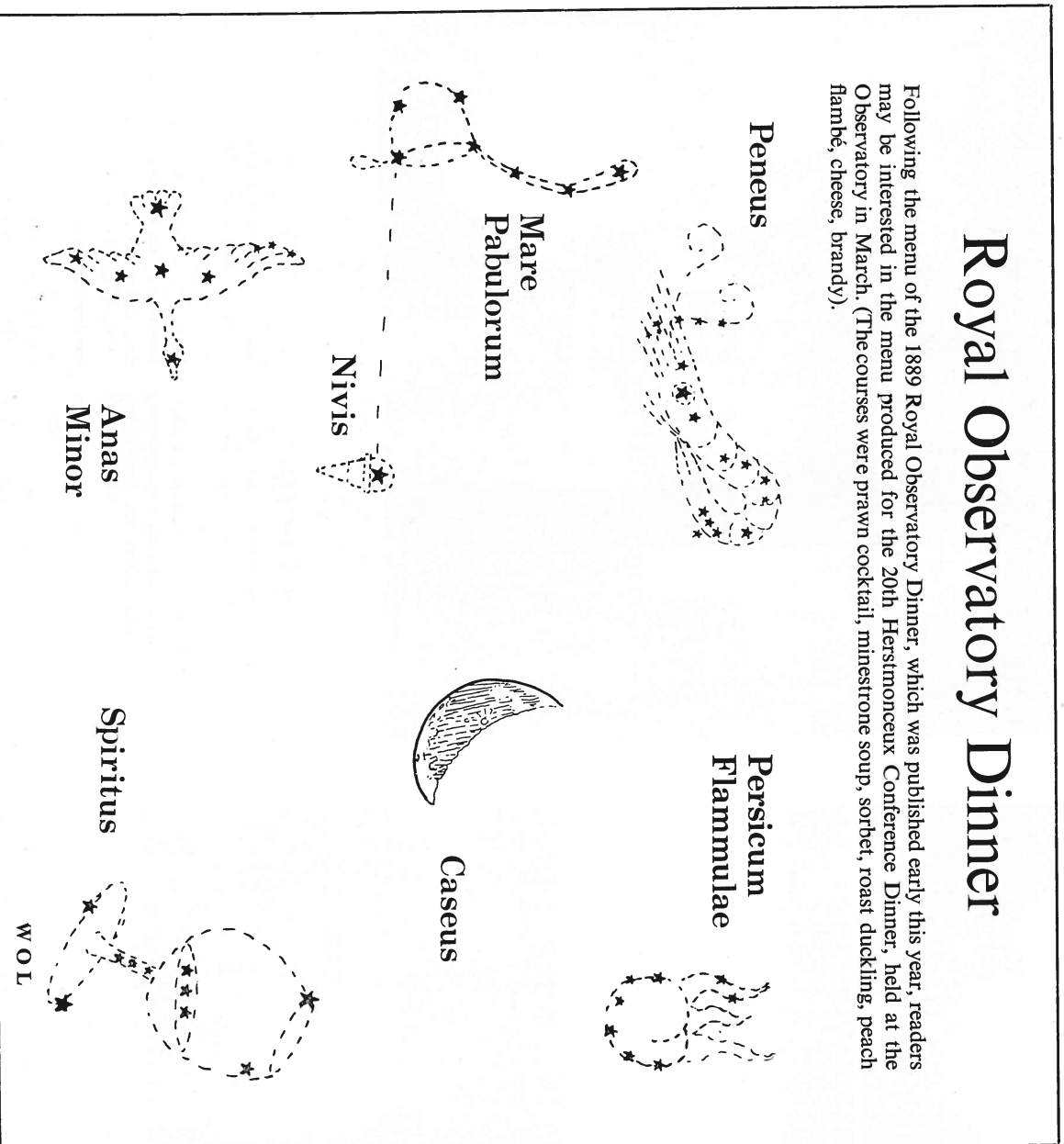
I later mentioned this incident to Ron Baker who has recently joined RGO from Rutherford. He told me that he had an interest in bee keeping and said that this particular swarm of bees would be in quite a good-natured condition since they would have been gathering honey for a number of days. He said the weight of the swarm would have been around 9-10 lbs and, since only a relatively small number of bees would have been actually holding on to the branch, it was a simple matter to break this tenuous hold by striking the branch a quick blow. We took his word that the bees would have been in a good-natured condition but still would not have liked to have done the job.

He also explained that it was usual to remove the swarms at night time since many of the bees belonging to the swarm would have been out gathering honey and to collect them at midday would have meant many of them would have been lost. Also, when these wandering bees returned they certainly would not have been

(Continued on page 14)

Royal Observatory Dinner

Following the menu of the 1889 Royal Observatory Dinner, which was published early this year, readers may be interested in the menu produced for the 20th Herstmonceux Conference Dinner, held at the Observatory in March. (The courses were prawn cocktail, minestrone soup, sorbet, roast duckling, peach flambe, cheese, brandy).



in a good natured condition once they found the swarm had disappeared, and eventually would die. Obviously to meet this situation the bee-keepers that removed the swarm left the cardboard box with a sheet covering it at the foot of the tree and we noticed it was still there when we left in the evening.

The next morning the box had been taken away so we assumed the bee-keepers had returned at nightfall to remove it. We certainly noticed no angry bees in the vicinity and were both pleased for ourselves and for the bees.

Castle folk dance
The Herstmonceux Castle Folk Dance Group marked National Folk Day on 26th June 1976 by holding an open-air dance in the gardens of the Castle. It was a perfect evening, the air being absolutely still and the temperature pleasant after a very warm day. Dancing went on until 10.15 pm, at which time it was still possible to identify faces.

Among the dancers it was good to see our new Director, Dr Graham Smith, with his wife, and also founder member Harry Cook (now at London Office) with his wife,

Janet, who was a former member of staff too.

The caller was Irene Wheatley, a keen supporter of folk dancing from Stonegate, who helped to form the group twenty years ago at the request of its founder, Sir Richard Woolley (then Dr Woolley). The group is a registered group of the English Folk Dance and Song Society and has recently become a section of RGO Club.

Celia V. Hewardine

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | | | 10 | | | 11 | |
| 12 | | | 13 | | | | 14 |
| | 15 | 16 | | | | 17 | 18 |
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| | | | | | | | 33 |
| 35 | | 36 | | | | 37 | 38 |
| | | | | 40 | | | 41 |
| 39 | | | | | | | |

NUTCRACKER 22

Clues

- ACROSS
- 8D plus 14A
 - 3D times 14A
 - See 5D
 - 31A times 28D
 - 31A times 21D
 - See 34D
 - 31A times 11D
 - See 2D
 - 6D plus 6A
 - 21D plus 11D
 - The digits of 10D in a different order
 - 20A times 10D
 - The square of 6A
 - See 19D
 - 21D minus 31A
 - 14A times 33A
 - See 36D
 - The square of 21D
 - See 38D
 - 25A times 3D
 - 6D times 1A
 - The square of 6D
 - The digits of 6A reversed
 - 39A minus 22D
- DOWN
- 39A minus 6A
 - 1A times 14A
 - See 35A
 - 6A times 21D
 - See 15A
 - Seven times 17A
 - 1A minus 14A
 - See 18D
 - Twice 6A
 - 20A times 6A
 - The square of 10D
 - 20A plus 25A
 - Two more than 20A
 - See 17A
 - See 41A
 - 21D times 11D
 - Seven times 20A
 - One-fifth of 17A
 - 17A minus 31A
 - 9A plus 36D
 - 29D minus 40A
 - 12A times 14A
 - Twice 31A
 - 33A plus 31A

NUTCRACKER 22

Solution to Nutcracker 21

Idle became Secretary of Vampirics. The winner was Carol Armstrong (LO) who wins a £2 book token.

Solution to Maxim 11

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | S | H | O | R | N | E | R | C | L | A | Y | | |
| S | P | U | R | I | O | U | S | S | L | I | N | O | |
| C | O | B | B | L | E | R | S | T | E | N | O | R | |
| S | O | B | S | I | A | S | P | R | A | T | T | K | |
| C | N | A | M | E | D | E | P | A | R | I | A | H | |
| R | A | R | E | R | D | R | I | P | T | U | B | E | |
| U | L | D | A | L | L | Y | G | R | I | L | L | A | |
| F | L | I | N | D | E | R | S | I | C | R | I | E | R |
| F | E | A | R | E | D | H | T | H | E | M | E | T | |
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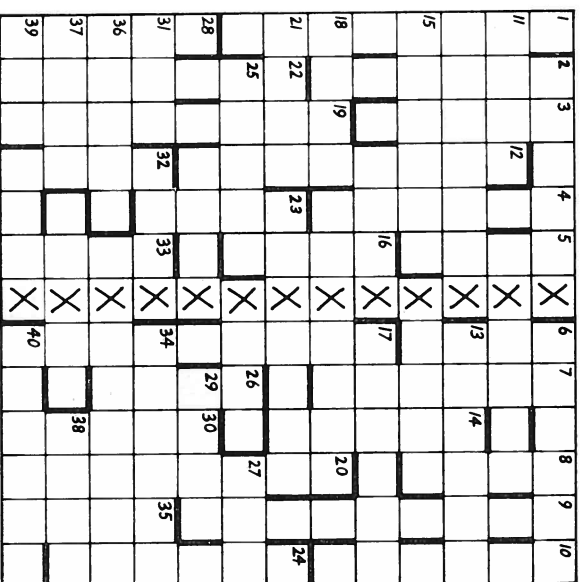
The winner was K P Duffey (Atlas Computer Division) who wins a £2 book token.

Suggestion Scheme Awards

Mr Edmunds, Chairman of the scheme's Co-ordinating Committee, made a presentation at Swindon Office on Friday 17 September to Mrs B E Stevenson of Salaries Section and Mr J J Madden of D Registry.

Mrs Stevenson, formerly of SUGA Current Awards Section was awarded £50 for her suggestion that the British Rail Selective Prices Manual be acquired to reduce the time spent by SUGA on the checking of students travel claims and Mr Madden was awarded £30 for a suggestion which reduced the time spent on checking file sequences in D Registry by the use of a colour tagging system.

Mr Edmunds observed that it was gratifying to find two such worthwhile suggestions coming from London Office. The administrative side did not generally provide opportunities for making substantial savings so it was all the more meritorious when such useful ideas were put forward.



MAXIM 13

- ACROSS**
- Given the opportunity, I'd mute this bore (6)
 - Instructed by ear, under stress (4)
 - Hearts make these, to steal away in most of this (6)
 - Attention! The Queen's progress (6)
 - Essential strength starts demonstrating guts (6)
 - Is held back by body providing 'get-you-home' service in the Continent (4)
 - Shelter of hard-bitten traveller (4)
 - Where gulf stream comes from, I take left helical motion (5)
- DOWN**
- So double-act performed musical notes separately (8)
 - Clans a-rioting in ways like Caledonian (6)
 - Take wrong route and become accentuatedly extravagant (5)
 - Snap, crackle and pop that we hear one after the other (6)
 - Agreed to take 1976 as an example (4)
 - To put on a note in official betting shop (4)
 - The unfortunate 50% nicety of the people (6)

- One stratagem used by hagiolaters (4)
- I'm ill! - a cub makes use of this to stay with mother (9)
- To put to the wrong purpose is in the spirit of inventiveness (6)
- The carpet on the chap in charge, in the nature of a burden (8)
- Turner's 'Gangrene and Gold' (5)
- Wind about easterly, on the left (4)
- I drive fit to bust - how would you describe my glasses? (9)
- Make in-law dry out in secret (8)
- Species of bear sank in landlocked state (8)
- Former country in east of France? Further! One where Asia starts! (7)
- Where you find topless towers, and destroy (4)
- Quiet, in shabby surroundings, just like Gonzalez (6)
- Current I'd dissolve in! (4)
- Get some meat from the waffle shop (5)
- World-sized body and molecule-sized body, joining together (5)
- Toilet on Motorway is a means of getting weaving (4)
- What's turned up for lunch-time? The same again! (4)
- Nearly the smallest meadowland (4)

The prize will be awarded to the first correct entry drawn on 1 December. Please send your entry to the Editor 'Quest' at State House and state whether you would prefer a book or record token. The solution will appear in the next issue.

Quest

If members of staff who are about to retire would like to continue receiving copies of *Quest*, would they leave their name and address with their local *Quest* representative (Astrophysics Research Division): Bill Burton; ROE: Jim Campbell; Appleton: Geoff Gardiner; Swindon: Adrian Dent; Rutherford: Harry Norris; Daresbury: Ian Rabinowitz; RGO: John Alexander; and State House: Carol Methven.

Nili Nisi Bonum

A recent press statement on the economy cuts advised us that among the public economies to be effected was the withdrawal of grants for 'silly' researches.

In case any readers should be tempted to browse through the Yellow Book (List of Research Grants) we must ensure that they do not remain under the impression that 'silly' grants were ever made. To show how easy it would be to gain this impression we have extracted a few genuine grants titles and list them below with explanatory comments:

Synapinimal complex asymmetry in the grasshopper

Investigation of the identity of aggression-controlling pheromones in mice

Ethology and ecology of Saharan gerbils

Studies on the B chromosomes of the mottled grasshopper

Perception and motivation as variables in the social behaviour of birds

Salt and water transport in the male genital tract

Encoding characteristics of human memory

The control of ventilation in dragon-flies

The control of flagellar activity

Fundamental investigation of the transient behaviour of brass wind instruments

Acoustics of stringed instruments

Three dimensional structure of fish schools

Direct measurement of surface drag

Response of vehicles to road surface roughness

Road behaviour of car in response to steering

Unreinforced conditional autonomic fear responses

Motor control mechanics in the dogfish

Motor control mechanics in the dogfish

Motor control mechanics in the dogfish

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Motor control mechanics in the dogfish



Daresbury Angling Club

A ten man, eight-hour fishing trip from Conway aboard the 'St Clair' on Friday, 16 June, was very successful thanks to bright sunshine, a light breeze and suicidal Mackerel. In addition to the many hundreds of Mackerel caught there were a few Whiting, Gurnard and five Thornback Rays. 'Ray' (1) Lawton accounted for the best Thornback of 18 lbs and the photograph shows Phil Moore respectfully handling another. Entertainment was provided by the boat skipper who gave fishing lessons after the manner of Captain Bligh.

PHILIP TINE

How to pass the buck.
The Estimates and Forward-Look panic.

Do they really blow out straight?
Everyone knows they screech.
42 x 40 x 42.
42, 36, 28 and a wig.
They bounce about.
It turns.
Frightened to death.
Do they have carburetors, too?
See no evil.
Hear no evil.
Speak no evil.
Peeping Tom - he crept out again.
What Peeping Tom saw.
How the Passerine Bird catches the male.
He was caught.
Frustrated Guppy.