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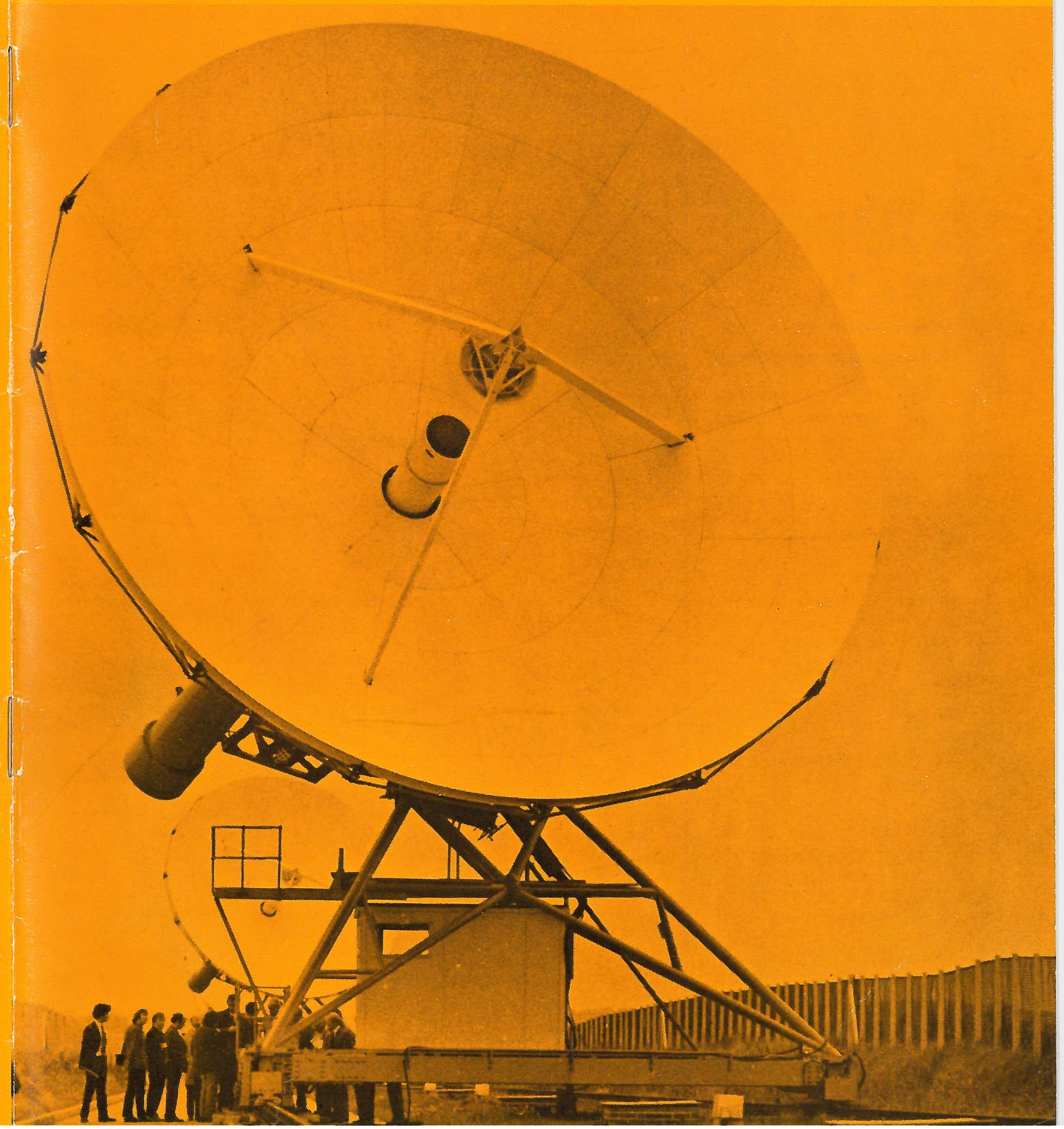

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QUEST

House Journal of the Science Research Council

Vol. 5 No. 4
1972

contents

Getting it straight from space

Cover picture shows one of the eight 42 foot dishes of the new radio telescope at Cambridge. Placed along a straight east-west 5 km line, the eight dishes give the effect of one enormous dish with a diameter of 5 km (3 miles).

The design was pioneered by the Cambridge Radio Astronomy group under the guidance of Sir Martin Ryle, FRS, now Astronomer Royal. It was built with a SRC grant of £2 million and the help of the UK Atomic Energy Authority, British Insulated Callenders Cables Ltd (who designed and laid the cables) Marconi Company Ltd (the aerials and the Myriad computer) and Mitchell Construction (civil works and the control building). The extremely accurate survey was carried out by the Ordnance Survey and the construction firm reckon that it is "probably the longest and most accurately defined straight line ever set out".

Four of the dishes are fixed and four move on bogies along a 28-foot gauge rail track. As it happens the piece of land bought for the telescope used to be a section of the old Cambridge-Bedford railway that ran due east-west at this point. But the telescope's baseline had to be straight 'in space' and could not even be allowed to follow the curve of the earth.

The telescope was inaugurated on October 17 by Sir Alan Hodgkin, President of the Royal Society.

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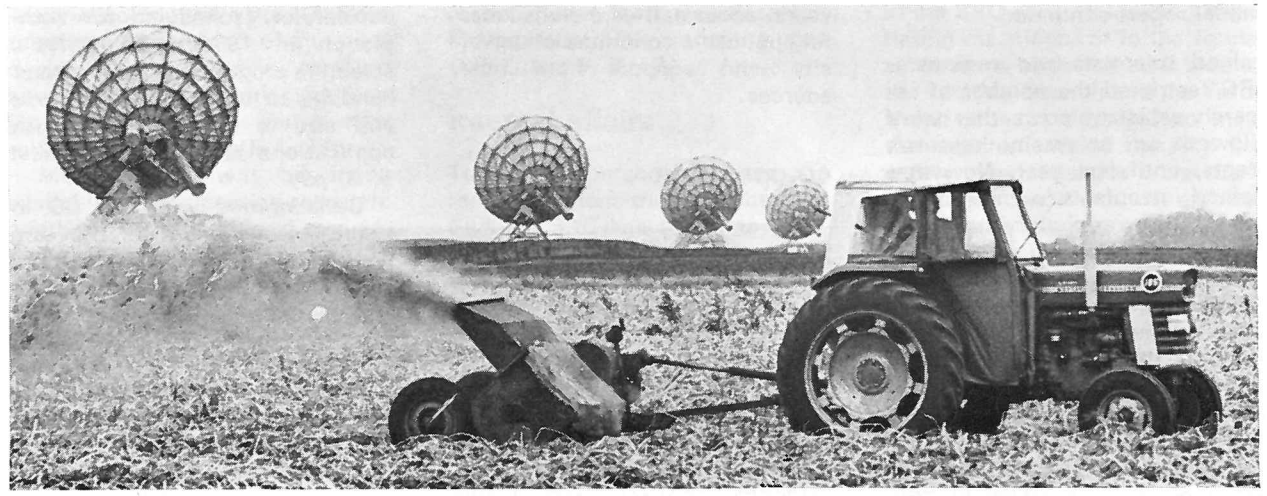


Two products of applied research
One helps the astronomer to glean clues from the sky on the history of the universe while the other helps the earthward-looking farmer to a better harvest. The one on the skyline is four of the eight radio telescope dishes that make up the 5km radio telescope at Lords Bridge Cambridge. *See cover caption on facing page.*

1971-2 annual report

looking back —and forward

The SRC's seventh report for its seventh year was published in September and presented at a press conference held by the Chairman and four Council Members: Dr Eastwood, Professor Ford, Professor Kornberg and Professor Matthews.

Since the cloud thrown by the 'R & D' report on SRC's future rôle has been lifted, the auspices seem to be good for continued progress. However, there are indications in the report that SRC is not altogether happy about its future fund expectations compared with the likely rate of expansion in universities and polytechnics.

The three main themes of the report are SRC's views on the organisation of Government support of research and development; SRC's policy for support of research and postgraduate training; and the facilities and services provided by the SRC establishments for university research.

SRC and R & D

Addressing the conference, Chairman said that the report had been written before the appearance of the White Paper on Government support of applied research and development (R & D), but the views expressed in the report were much the same as the Government later decided after 'the great debate'. SRC was particularly pleased that the White Paper had defined SRC's primary function as the support of research and postgraduate education in the universities.

The Council gave evidence to the Select Committee on Science and Technology (as summarised in *Quest 5, 2, p1*) and, says the report, it welcomes the Government's decision that the Research Councils – subject to applied research being commissioned on a customer-contractor principle – shall remain under the sponsorship of the Department of Education and Science.

Although SRC is only marginally involved in support of applied R & D, we have begun joint reviews with the Departments of the Environment and of Trade and Industry, to see whether we can improve present collaboration in R & D programmes and the use of results. The fields under review are control engineering, transport, mechanical and production engineering and civil engineering. Computing science will also be looked into.

In the report we say that applied R & D undertaken with a particular application in mind is often more expensive than basic research. Only when enough basic research has been done, so that an objective and the research route to it can be identified, is there a sound basis for an applied R & D programme. On the other hand, R & D often reveals gaps in basic knowledge which are seldom made good on an R & D programme, forced through lack of time to expensive *ad hoc* solutions. The gaps are filled most effectively and economically by further basic research.

grants - stop and grow

SRC awarded £1M more for university research grants than in the previous year – a total of £15M. We continued to give priority to engineering, to give special support to areas of science selected for their special significance or promise and to concentrate support in certain areas to a limited number of university departments.

Because of industry's need of

annual report continued

trained scientists and engineers, SRC restricted the number of research assistant posts that were allowed on university research grants, until last year. Now that trained people are no longer scarce the restriction is lifted, except in the case of nuclear physics.

The same number of post-graduate awards was offered in 1972 as in 1971 and there will only be a small increase in 1973. Thereafter the number available will depend on the extent of university expansion over the next five years and increases in SRC funds.

More studentships were taken up in 1971 than in 1970 and fewer eligible candidates were turned down. As in previous years, about half of the unsuccessful applicants continued at university with support from other sources.

co-operation

On the subject of international collaboration, the report mentions the moves to promote co-operation in all areas. (A progress report appeared in Quest 5, 3, p17).

Existing collaboration over the joint funding of large facilities is going well in the fields of nuclear physics (CERN) and scientific satellites (ESRO). The CERN programme is currently expanding, with the addition of new large facilities, such as the Intersecting Storage Rings (already in use) and the 300 GeV proton accelerator (scheduled for completion in 1979). But ESRO's scientific programme, on the other hand, is to be reduced in scope and size to allow expansion in applications satellites *(see Quest 5, 3, p9).*

Collaboration with the US in space science was marked by the launch of the Ariel IV satellite last December. Meanwhile preparations go ahead on UK5 and on plans for the future UK/US programme.

The five UK research councils are co-operating in the field of pollution. They have published the report "Pollution Research and the Research Councils" and set up an inter-Research Council Committee, under Professor Neuburger FRS. SRC and SSRC together have commissioned the University of Manchester to identify areas for environmental research in their own fields of interest.

Another inter-Council review is looking into the use of computers, future needs and possible centralisation of facilities.

An aerial and trailer-laboratory for monitoring microwave radiation from the sun at the Radio and Space Research Station. The picture comes from the film 'Talking of Science' made by the Central Office of Information. The film takes a wide look at work in the natural sciences supported by four of the Research Councils. (It can be borrowed from the COI Central Film Library).

our prospects

For the first time for several years SRC has been given a provisional allocation of funds for two years ahead (1974-5). Though less than our needs, this nevertheless makes it possible for us to plan with more assurance. On the other hand, the level of allocations, which are expected to increase by only 2½% a year to 1975, increases our fear (expressed in last year's report) that the gap will grow between SRC resources and the rate of expansion in universities and polytechnics.

Within the budget, the report says, we hope to keep nuclear physics allocations constant in 'real' terms and, while giving priority to the growing CERN programme, to build the electrostatic generator for nuclear structure work now being designed at Daresbury. (For up to date discussions on the future of the NP Laboratories, see *Council Commentary* in *Quest 5, 3, p2).*

In astronomy – a priority field – plans include the Mark VA radio telescope (the subject of a current design study), a new northern hemisphere observatory (site testing is in progress) and a new millimetre wavelength facility.

More money will be made available for engineering research, another priority field, and associated applied sciences.

In space research, the Astronomy, Space and Radio Board is planning alternatives to fill the gap left by the reduction in ESRO's scientific programme. It has also decided, following the (published) review of the role of the Radio and Space Research Station, that the services and support for the whole of the UK space science programme should be centred at RSRS. The Station already provides services for university groups, has its own space programme and has recently taken the Space Research Management Unit under its roof (see *Quest 5, 3, p8).*

internal affairs

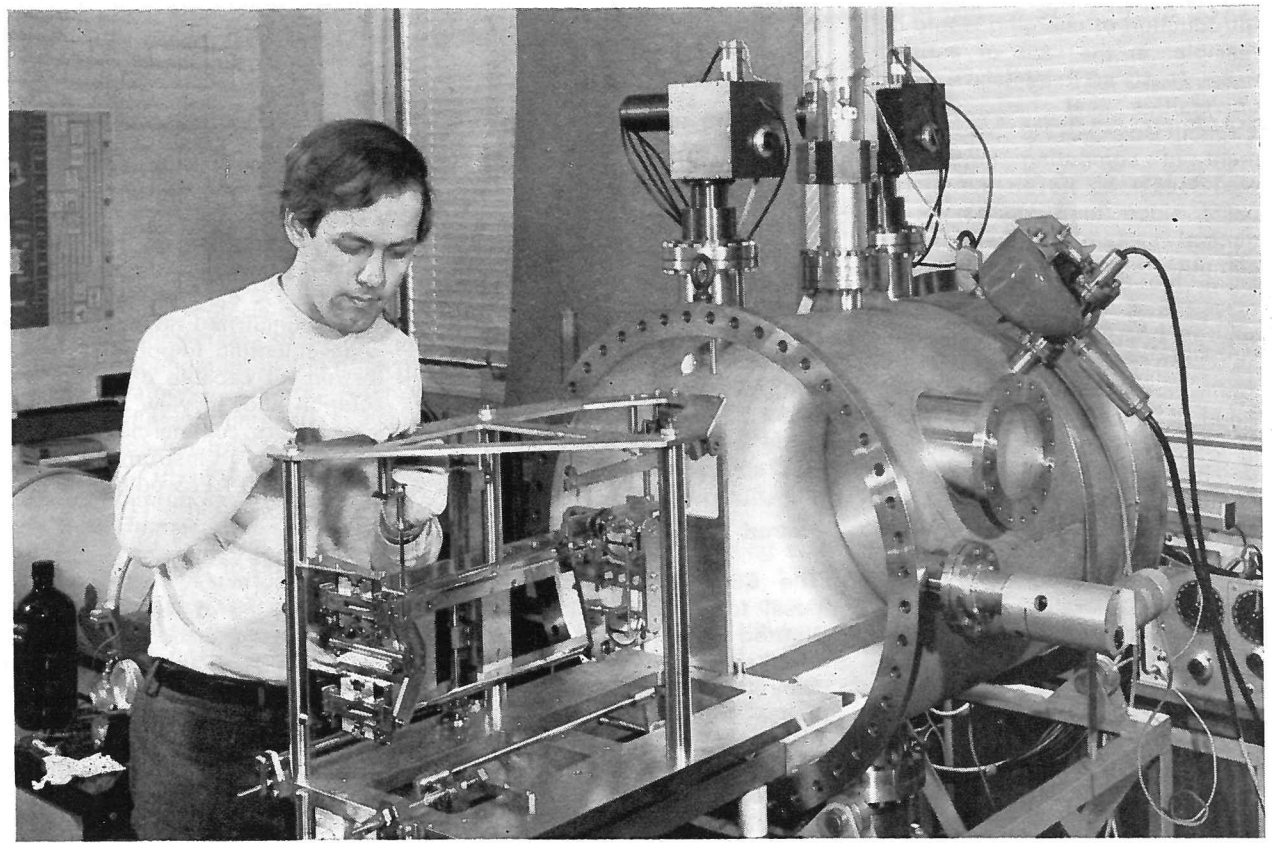
Turning to personal matters the report mentions that, like the Civil Service, SRC has begun to introduce staffing changes based on the recommendations of the Fulton Committee. The main change has been the merger of most of the classes into three main groups – 'Administration', 'Professional & Technology' and 'Science'. As at March 31, 1972, there were 949 people in the Science Group and 545 in P & T, out of a total staff of 2,893.

The Industrial Relations Act was studied by the Whitley Council and the Joint Negotiating Committee. It was not found necessary to make any changes in the SRC consultative and negotiating machinery or in the formal agreements with the staff side of the Whitley Council and the Trade Union side of the JNC to meet the requirements of the Act. But a few minor changes were made to some conditions of employment and some procedures.

About twenty-five members of SRC served with other organisations during the year, on secondment or special leave, as a result of SRC's policy to encourage people to gain wider experience. We hope, the report says, that mobility of staff will be helped by the improved superannuation arrangements that were introduced to bring the SRC scheme up to modern standards.

If you want to read the report, look for it in the Station Library or your local administration section.

Dr John West of Reading University adjusting one of the precision drives on the grazing incidence grating monochromator designed for Daresbury Laboratory's Synchrotron Radiation Facility by the University. This instrument works in the far ultra-violet region of the spectrum and is able to select particular wavelengths out of the continuous radiation from the synchrotron. It is used to study the absorption of ultra-violet light by metal vapours.



council commentary

june

computer review

Council considered the first report of the SRC Computer Review Panel which had been set up to rationalise the Council's computer requirements as whole. Apart from the new DNPL computer, already approved, and the plans for the Atlas Laboratory, the immediate and additional needs of the Boards, Establishments and London Office were found to be small. It was clear, however, that the requirements were constantly growing and changing and Council felt that the Panel had carried out a useful review and agreed that it should continue in existence, reporting annually in relation to the Forward Look.

The Panel had been requested by Council to look at the feasibility of charging for computer use and a subsidiary panel had been set up to consider the problem in more detail. Council accepted the recommendation that the introduction of charging would be feasible; in the case of entitled users (such as Establishments or universities that had received Council approval to an entitlement of computing time) this would have to be on a notional basis, since there was as yet no general system of charging for computer use in the universities.

collaboration with Europe

Council discussed a note of a meeting with the Centre Nationale de Recherche Scientifique (the French equivalent of SRC) and approved the proposal to set up a standing SRC/CNRS committee to advise both bodies in Anglo-French collaboration. Also approved was the initial allocation of £10,000 for a short-visit scheme to encourage European and British scientists to visit each other to discuss possible collaborative research programmes.

Council considered an application from Leicester University for a supplementary grant for the preparation of 2 experiments for the UK-5 satellite. In view of the high priority of the UK 5 satellite programme Council approved a supplementary grant of up to £64,700. Because of escalation of costs due to the special circumstances of grants for satellite work, Finance and ASR Divisions were asked to review the arrangements under which experiments were prepared and expenditure estimated and controlled. Reference was made to the possibility of closer involvement of RSRS in all experiments prepared for large space projects.

extra grant for UK 5

july

retirements

The Chairman paid tribute to three Chairmen of Boards – Professor Ford (Engineering), Professor Gunn (Nuclear Physics), and Professor Kornberg (Science) – and to Professor Hoyle and Dr Menter, who were all retiring from Council. The Council also thanked three retiring members of London Office, Dr Francis, Mr Jolliffe and Mr Clemow for the vitally important contributions they had made to the work and progress of SRC and of its predecessor DSIR.

nimrod injector

The Council considered a proposal for a new injector for the Nimrod accelerator at the Rutherford Laboratory which would keep Nimrod comparable with other major proton synchrotrons at a total cost of £2.180M. It planned to replace the present injector with a new 70 MeV linear accelerator consisting of some components of the old 50 MeV proton linear accelerator and some newly purchased components. The construction programme would be timed to coincide with lengthened shut-down periods of the machine. During this period the running time on Nimrod would be reduced by 25% and the resources provided for high energy physics research on the accelerator reduced by a similar amount. The equipment cost of the project would be met from savings arising from the reduction in the accelerator programme and the freed manpower used intensively on construction and installation of the new injector. Council agreed that, pending a decision on which of the two major nuclear physics machines should be closed down, only the preliminary planning work required in connection with the scheme should proceed: it is expected that such a decision will be taken by November 1972.

1 A electron microscope

Amongst the grants approved by Council in July was one of up to £260,000 to Dr V E Cosslett at Cambridge University for the design and construction of an experimental 1Å electron microscope. The Council had no doubt of the wide scientific importance of an instrument capable of atomic resolution and, in view of the possible future commercial exploitation of such an instrument, hoped that DTI and AEI would also contribute towards it.

exploitation of research

Mr D N King of NRDC was present when the commercial exploitation of results arising from SRC grants was discussed. Some universities had criticised the guidance and regulations on patents published in 1971, and the role of NRDC. This had stemmed partly from a lack of understanding: appropriate changes have now been made to the grant regulations to take account of the views expressed. The future role of NRDC is being considered by DTI and the arrangements for collaboration between SRC and NRDC in ensuring exploitation of research results may have to be reviewed when this has been established.

framework for R & D

Copies of the White Paper 'Framework for Government Research and Development' (CMND 5046) were tabled and the Council discussed the implications for SRC; these were less immediate for SRC than the other Research Councils, but the Council foresaw that there would be considerable long-term implications for the funding of SRC activities.

computer facilities

Council welcomed the proposal that the Atlas Laboratory should provide a substantial part of the Natural Environment Research Council's (NERC) future computing needs, initially estimated at one hour a week on the IBM 360/195 and five on the ICL 1906A. A small NERC group will be located at ACL and to co-ordinate computer policy between SRC and NERC, the latter will be represented on the ACL Committee. The initial minimum annual cost to NERC will be about £50,000.

Proposals from the Nuclear Physics and Science Boards for the purchase of thirteen terminals — twelve British universities and one at CERN — to be linked to the ICL 1906A and the IBM 370/195 at the Atlas and Rutherford Laboratories were approved by Council. This experimental scheme will allow university scientists and engineers to have access to these powerful computing facilities.

A request from The Atlas Laboratory for additional office accommodation and conference facilities was also approved by Council.

astronomical years

In 1972 two of our observatories celebrate important anniversaries. The Radcliffe Observatory reached 200 years in June and the Royal Observatory Edinburgh is 150 years old in October.
An outline of the Radcliffe's history follows (a fuller account appeared in Nature Vol 239 No 5371).
ROE will be featured in the next edition of Quest.

the Radcliffe Observatory

200 years in two hemispheres

A D Thackeray

On June 27 1972 the Radcliffe Observatory in Pretoria celebrated the 200th anniversary of the laying of the foundation of the original observatory in Oxford. After the Radcliffe Infirmary was built out of funds left by Dr John Radcliffe (d. 1714), the Savilian Professor of Astronomy at Oxford — the Rev Thomas Hornsby (1733-1810) — persuaded the Trustees to found an observatory for use by the University astronomers.

The Radcliffe Observatory was the second established in the British Isles as a permanent institution. As at the Royal Greenwich Observatory (established in 1675), most observations were made to assist navigation and related to the position of the sun, moon, planets and stars. But the real interests of the astronomers then and later lay in the study of the refined aspects of planetary motions – to test Newton's gravitational predictions – and in the proper motions of 'fixed stars', first detected by Halley in 1718. As it turned out these results also were of use to navigators.

The Observatory building was complete in essentials by 1774 but the octagonal tower, copied from the Temple of the Winds in Athens (see picture), and the interior finishing were not completed until 1793. The Observatory was generally recognised to be one of the best equipped, if not the best, in the world. The original instruments were an 8-foot transit, two 8-foot mural quadrants, a 12-foot zenith sector (actually little used) and an equatorial sector.

Hornsby himself was a remarkable observer. From 1774 to 1803, when he had to stop due to ill health at the age of seventy, he recorded — single-handed — 80,000 transits and 20,000 zenith distances. It is recognised now that the accuracy of his observations was exceptionally high. In Right Ascension his measures had

Dr Thackeray is the present Radcliffe Observer, the Director of the Observatory. In 1969 he gained a special promotion to Deputy Chief Scientific officer. His own work was outlined in Quest Vol 2, 4 p7.

200 years continued

less than half the errors of Bradley's: a previous Savilian Professor and the pioneer of accuracy in astronomical observation. He even achieved somewhat better measurements than RGO in 1852 under Sir George Airy.

As an example of Hornsby's accuracy he derived a solar parallax of 8″.78 (now measured as 8″.79415) from transits of Venus in 1824, even though Encke's value of 8″.57 continued to be accepted for many years. It also came to light very recently that Hornsby's observations of Sirius showed the orbital motion due to the pull of a white dwarf companion that was not announced till 40 years later, by Bessel. Hornsby narrowly missed discovering Castor's binary motion when he pointed out the proper motion of the two components.

Because of the advantage of comparisons over a long time span, such early observations continue to be of value even though modern measurements may be much more precise. From Hornsby's death in 1810 until 1839 the Radcliffe observatory continued to observe positions under Abraham Robertson (1751-1826) and Stephen Rigaud (1774-1839), who recorded 53,000 transits and 40,000 zenith distances between them, but with employed assistance. Their observations have never yet been reduced or published and might be worth studying.

an unfortunate split . . . got a practical man

Unfortunately a split occurred in 1839 between the University and the Observatory Trustees over the choice of Rigaud's successor. As a result the University appointed the Rev G H S Johnson as Savilian Professor of Astronomy, and the Trustees, under the chairmanship of Sir Robert Peel, gave the Radcliffe Observer appointment to a much more practical astronomer, Manuel Johnson. So the Savilian Professor was left without an observatory until the University built one 25 years later.

Manuel Johnson had become well known while at St Helena, where he had compiled a catalogue of 606 star positions for the East India Company. These are the earliest records of southern systems of proper motion still in use today. He also detected the large proper motion of α Centauri and told Henderson at the Cape Observatory who examined his own measurements and gained the credit for having made one of the first measurements of a stellar parallax.

At Oxford Johnson started regular annual publication of observations and began the first of six Radcliffe catalogues of star positions. After Bessel had used a heliometer to measure the parallax of 61 Cygni, the Observatory acquired the only heliometer ever to be used in England. Johnson used it to study variable stars and attempted to measure trigonomical parallaxes until it was realised how few bright stars were within its range.

The Observatory's traditional work continued under Robert Main (1859-1878) and E W Stone (1879-1897). Stone was particularly interested in the solar parallax and used the heliometer to observe minor planets in an attempt to improve the knowledge of this fundamental quantity. When Stone was succeeded by A A Rambaut in 1897, stellar photography was just beginning. To introduce this Rambaut persuaded the Trustees to buy two refracting telescopes – a twin 24 inch photographic and an 18 inch visual refractor – and as a result the Observatory abandoned the meridian work that had occupied it for 130 years.

At first the observers concentrated on photographic studies of stellar parallaxes but later, more profitably, they turned to the study of proper motions and also took part in Kapteyn's international plan of selected areas, a star count in which several observatories covered areas of sky, selected at random, to gain an overall idea of the size and shape of the galaxy.

First-epoch plates were taken and stored by Rambaut, second-epoch plates were taken by Harold Knox-Shaw who succeeded him in 1924. Knox-Shaw and his assistants had to struggle hard to complete the observing during ten years in deteriorating conditions and they measured and reduced 32,000 stars down to a faintness of 15 magnitude. The Radcliffe catalogue of proper motions published in 1934 was unique in its coverage of the sky down to such a faint limit. Observations have since been repeated in a few of the selected areas with the same telescope (now at the University of London Observatory) and reductions are in progress at the Royal Greenwich Observatory and the Kapteyn Laboratory, Groningen.

decided to move . . . to Klapperkop

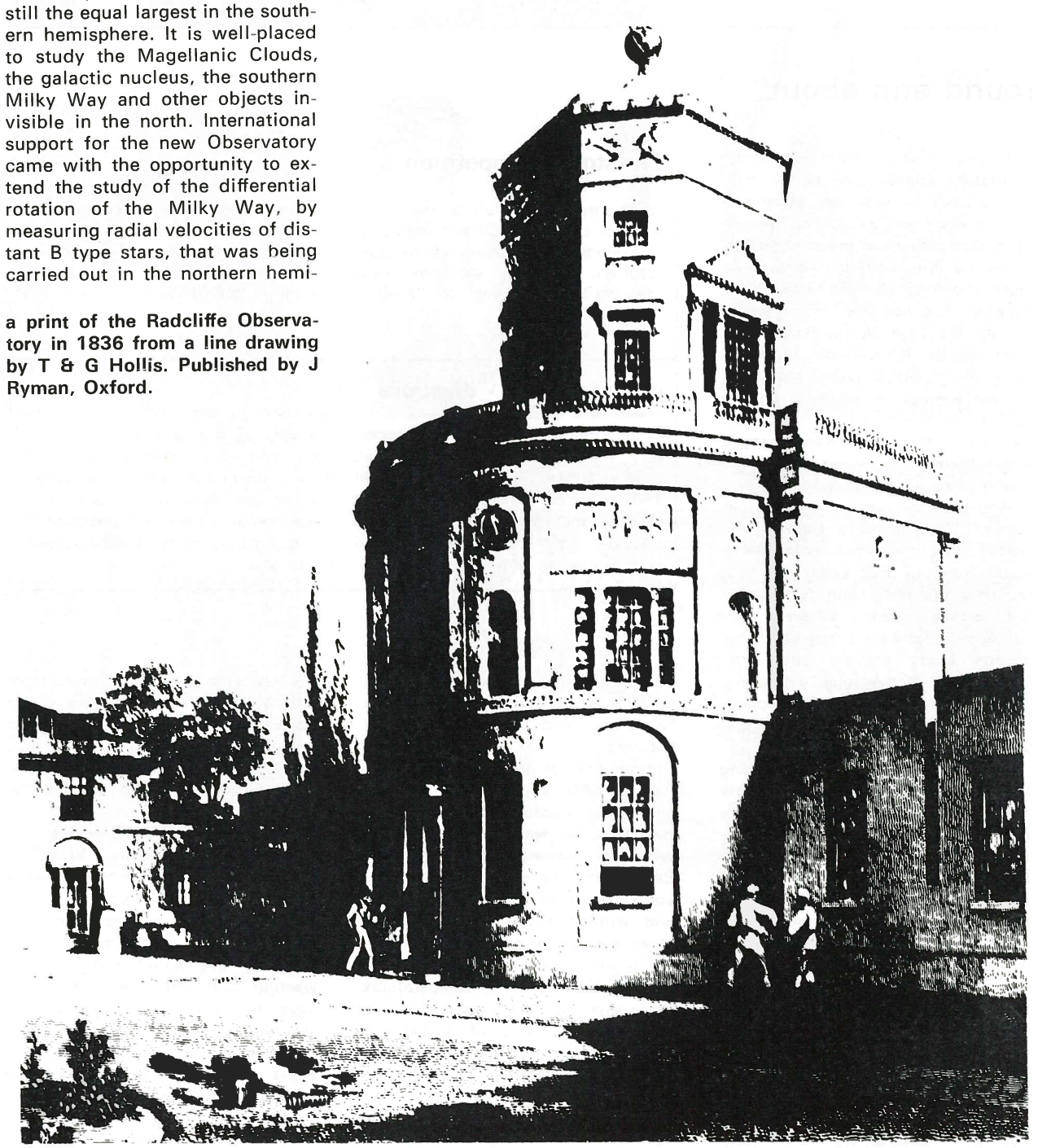
Another outcome of Knox-Shaw's directorship was the publication of "Hornsby's Meridian Observations, 1774-1798". It was this reduction of Hornsby's work that proved its high accuracy, as mentioned earlier.

The biggest event of Knox-Shaw's term of office was the decision to move the Observatory to the southern hemisphere. Due to the poor climate and for want of large telescopes, the United Kingdom had, by the 1920's, fallen far behind the United States in observational astronomy. As it happened, the Oxford Medical School in the Infirmary next door were ready to expand with the help of Lord Nuffield's donations to medical research. So the Trustees sold the building and the land and set aside £65,000 for a new Observatory in South Africa with a 74 inch (1.88m) reflecting telescope. The Municipality of Pretoria donated a site on the Klapperkop ridge, $4\frac{1}{2}$ miles south east of the city, and laid on water and electricity.

So far so good. Unfortunately the University raised a legal objection to spending so much Trust money outside the court's jurisdiction. The Trustees won the case but this delay and others due to casting failures of the 74 inch disc (in USA) and the intervention of war held up the move and the Observatory was not commissioned until 1948.

From 1948 to 1968 the Radcliffe reflector was the largest British optical telescope and it is still the equal largest in the southern hemisphere. It is well-placed to study the Magellanic Clouds, the galactic nucleus, the southern Milky Way and other objects invisible in the north. International support for the new Observatory came with the opportunity to extend the study of the differential rotation of the Milky Way, by measuring radial velocities of distant B type stars, that was being carried out in the northern hemisphere at the Dominion Astrophysical Observatory in Victoria, British Columbia.

In 1951 the Trustees came to an arrangement with the Admiralty who controlled the Royal Observatory at the Cape, whereby two Cape observers were allotted one night in three in return for an Admiralty grant, and the staff was increased so that observations could be made through all available dark hours. In 1958 the instruments were improved with the help of a grant from the Department of Scientific and Industrial Research and many UK astronomers visited the Observatory with the help of DSIR grants. In 1967 SRC made a 7-year agreement



a print of the Radcliffe Observatory in 1836 from a line drawing by T & G Hollis. Published by J Ryman, Oxford.

200 years continued

with the Trustees whereby it took over administrative and financial control while the Trustees continued to contribute from their Astronomy Fund.

Since 1948 the Radcliffe reflector has been used by nearly a hundred astronomers, mostly from Britain but also from the Commonwealth, Europe and the USA. With an average observing time of more than 2400 hours a year (more than the Californian telescopes), it has probably been used more in 24 years than the telescopes at Oxford during 160.

With SRC assistance, the Observatory has now installed an image-tube spectrograph, constructed at RGO, and other advanced modern equipment. The spectrograph which is about ten times faster than conventional photography, is opening up the field of extra galactic spectrocopy and results are beginning to emerge about faint stars in the nucleus of our galaxy and beyond.

(An account of the present work of the Observatory appeared in Quest Vol 2, 2, p7).

round and about

Did you know that Rutherford Laboratory spends over half a million pounds a year on electricity and no less than £85,000 on steam? I find that difficult to grasp. Actually, I have no idea what it means. How much steam do you get for a pound anyway? It's not the sort of commodity the man in the street has much to do with. Could someone out there in QUESTLAND provide a homely analogy in terms of boiling kettles or filling the dome of St. Paul's or distances between oranges and billiard balls to enable us to quantify the elusive vapour?

And what do they *do* with all that steam? I would have thought the place was already comfortably warm from all that electricity. But no, they use the steam for heating and cooling. I don't suppose their canteen Committee, if they have one, spends hours arguing about the temperature of the soup, unless it's because the clientele are complaining about burnt mouths. I wonder what their water bill is?

Talking of heating, a funny thing happened on the 13th floor of State House a couple of years ago. One of the west-facing rooms was L-shaped with windows running the length of the longest side, so that on a sunny afternoon in summer the temperature would rise unpleasantly, particularly in the top part of the L where the ratio of window to cubic content was exceptionally high. Now it came to pass that during one of the half-yearly re-organisations which we have in LO this room changed hands, and the new occupants were regaled with stories of how healthy COs had suffered heatstroke in the oven-like atmosphere and how, therefore, this unaccommodating space was declared unfit for human habitation and filled with filing cabinets.

Now one of the new occupants was an SSO, who felt that he was entitled to a little privacy from the two SOs he was forced to share with, so somewhat foolhardily he decided that he would put his desk you-know-where. Came the spring and with it a few of those days when the sun turns itself on before the powers that be have turned the central heating off. Temperatures rose, and our hero saw what the future, in the way of a warmish summer, might have in store for him. Rather than abandon his territory, however, he called on Office Services with a request for improved ventilation. Soon after, a couple of OS men turned up with a third from MPBW. This should have been warning enough, because the latter species was very rare and has, indeed, since become extinct. An attempt was made to explain the situation, but the man from the Ministry cut straight through to the heart of the problem. 'Why are these people working in shirt-sleeves with all the windows open,' he asked. Explanations began to flow again but he cut them off. 'The place is overheated and you are wasting fuel,' he said. 'We shall have to turn down the heating.' Whereupon, having found a problem he could solve, he left and was never seen again. Certainly he did nothing about the problem of overheating in summer. There's a lesson to be learnt from that.

Christmas competition

Seeing that Daresbury is the birthplace of Lewis Carroll and the home of a machine that looks at invisible particles, we think someone must have written a sequel to *"Alic* in Wonderland." Competitors are asked to write a 200 word review of the book and say why they will give or be given it at Christmas. Results of mottoes competition are held over

nutcracker 10 - diaspora

In an attempt to eliminate unnecessary meetings and reduce rental, London Office, which has a staff of 350, is to be moved to the Isle of Mull. Of the 280 junior staff 115 are willing to move but a total of 215 staff, including 105 women, are determined to stay in London. The majority of the staff of course are men and this position is worst among senior staff, only 20 of whom are women. Furthermore, only 5 of these senior women are prepared to move. So how many senior men will go to Mull?

Sports day 1972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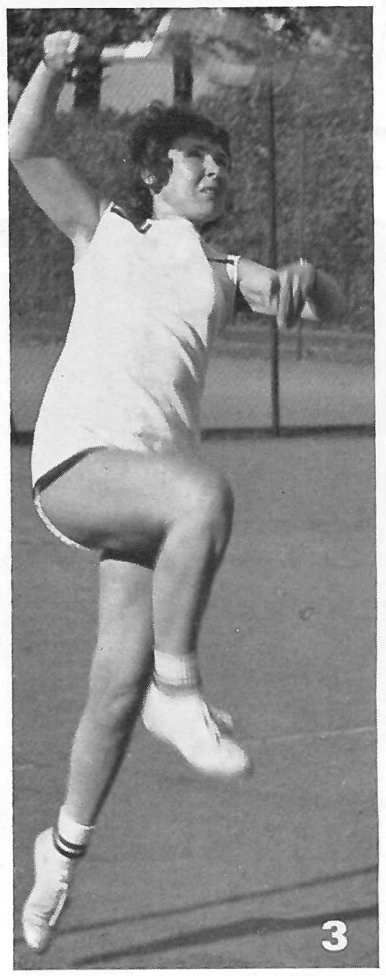
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We always hope for good weather on Sports Day, whatever the forecast, but this year the Met. man's safe bet of a little bit of everything on June 19 turned out to be true. The doubt kept some spectators away but there were more players than before: the number has risen each year.

The sun was there and play was not stopped by the 'occasional showers', it merely paused for ten minutes while we all sheltered happily in the pavilion bar. The indoor games of chess and table tennis went on but did not have much spare room for people to sit and watch.

Pictures

1. Dr. Francis presides and . . . 2. Mrs Margaret Francis presents the Bowls Rinks Shield to the RHEL team. The four in the team were J A Goode, E Gray, L Holder and C Grindrod.

3. Mrs Pat Martin RSRS who won one of the mixed doubles sections with R Smith, but lost the final. *(see p. 10-11).*

4. & 5. A Chilvers RHEL wins the table tennis.

6. The 6-a-side football final between RHEL and DNPL *(see p. 10-11).*

photos P Hicks RSRS


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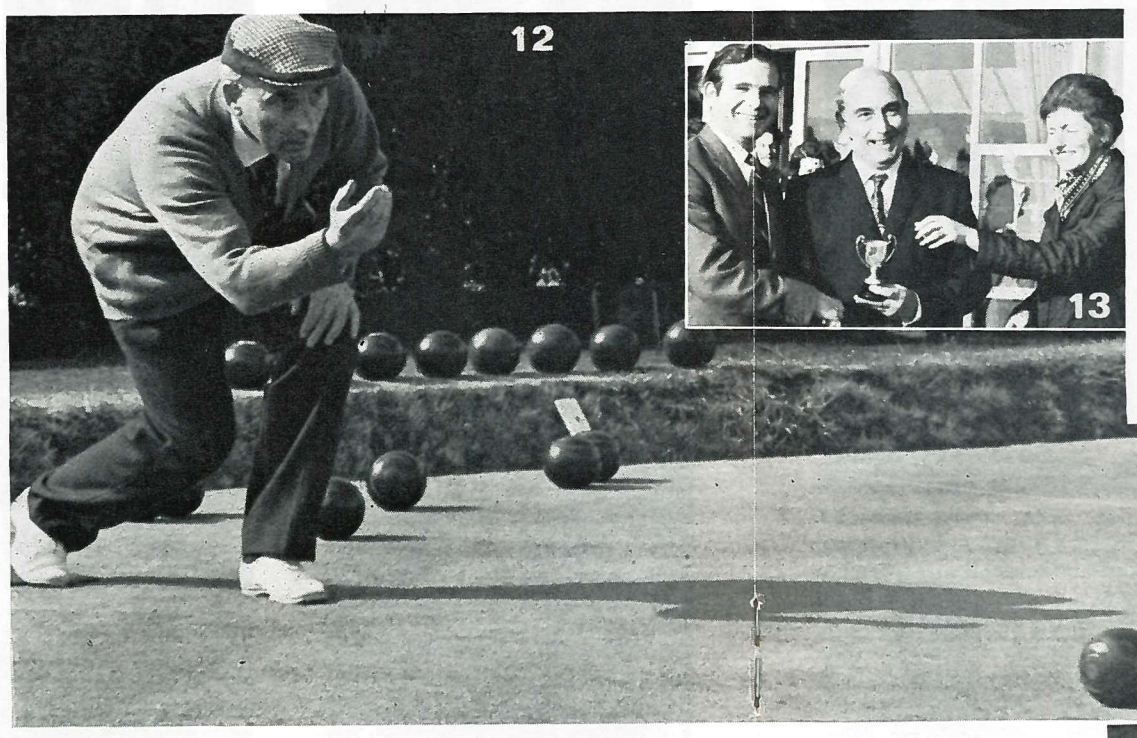
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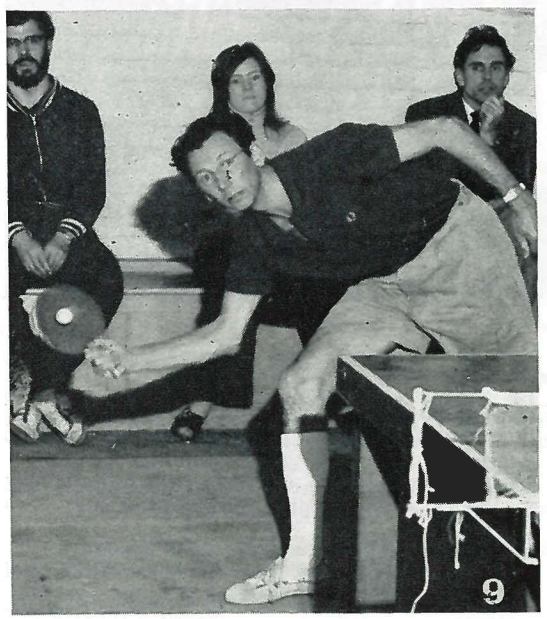
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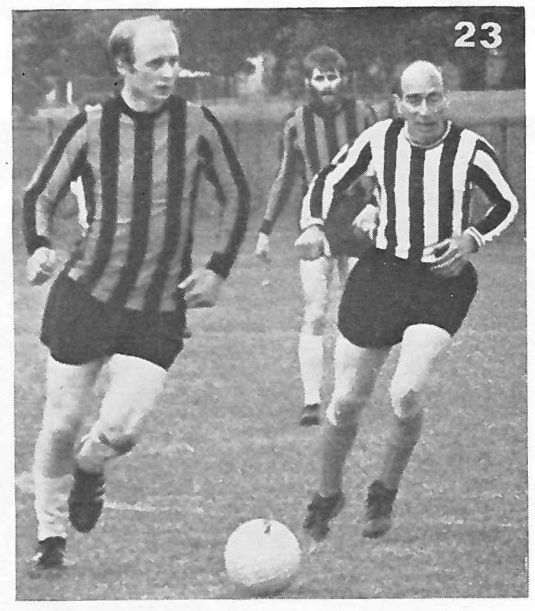
19

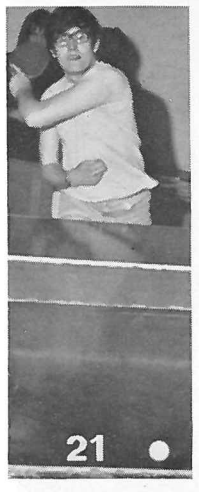
Sports Day was organised by the SRC Sports Association, Chairman Dr F Horner RSRS and Secretary Mrs Yvonne Windsor LO. Dr W Francis CBE, then Council Secretary, presided and his wife Margaret Francis presented the prizes. The Civil Service Sports Ground did the catering and provided the pitches, greens and pavilion facilities. Bill Butler of RHEL led the first aid team. RSRS and LO provided the extra helpers who looked after the events and sold the lunches.

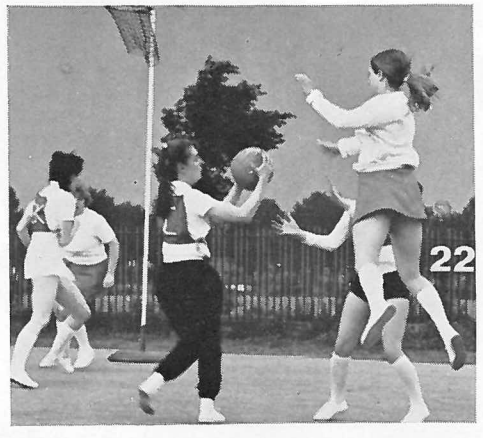
Seen at Sports Day 7. Sports Association Secretary Yvonne Windsor (r) presents flowers to Mrs Francis. 8. A bit of cricket outside and . . . 9. table tennis in the pavilion. 10. Netball in the sunshine. 11. "Only two can play" in the lightning chess tournament. The onlooker, Dr E Bramley RSRS, won it again this year. 12. C Hayes, DNPL, bowls in winning style and . . . 13. receives the Pairs Cup with partner G Robinson. 14. G Gordon-Smith and A Roberts, RSRS, won the men's tennis doubles again and kept the title and . . . 15. J More and Marie Huggins won the mixed doubles by beating R Smith and Pat Martin RSRS in the final. 16. In netball style. 17, 18, 19 Players in the 6-a-side soccer final between DNPL (in darker shirts) and RHEL 'B' team. DNPL won 4-1.
Photos by P Hicks RSRS, except 12, 17, 19 by J C Beech DNPL and 8, 18 (Quest).

More from Sports day

The organisers made everything run smoothly although some games were held up because people were signed up for several events. This seems a bit hard on the players. It might be better to concentrate on fewer, stronger teams and getting some events finished earlier. Some impromptu competitions have been suggested for next year, to give more players and spectators a chance to meet earlier in the day. This year the social evening provided the meeting ground and the party was a great success thanks to the RSRS 'disco' team and their music.







Pictures
20. Chess winner (l) Dr E Bramley, RSRS, ponders. 21. Well placed! and . . . 22. some jump! 23. Meanwhile, back at the football and . . . 24. in netball fashion.
25. Bad light never stops cricket at Sports Day. The winning team RHEL, seen in the gloaming on their way back to the party in the pavilion. RHEL beat LO in the final by 68 for 1 against 64 for 9.
Photos P Hicks RSRS, except 23, 25 (Quest).

$\frac{d \text{ seeing}}{dt}$ is negative

This is Greenman's Law, and he knows about these things, having invented astronomical "seeing" in 1913 after a series of experiments on the roof of the local piano factory. In plain terms it is another version of the Universal Law of Cussedness *(Quest Vol 5 No 2 p18):* as soon as you have chosen an excellent remote site with good seeing for a telescope, its advantages for tourism, an iron smelting works and a cement factory are also noticed. Floodlit sports arenas and motorways quickly follow. It is nice to think of the fortune to be made selling for development the site you bought for £5 per acre, but that doesn't help astronomy.

"site testing is impossible"

Finkelstein propounded this hypothesis after four years of site testing at Lido di Jessolo (August 1968), Torremellinos (July 1969) Zermatt (January 1970) and Nassau (August 1970). In practice this is true: the most eminent scientist available may collaborate with the finest administrator to assemble a hand picked team of men of undoubted resource and skill, and still there is trouble. For example once there came messages from afar: the site testing anemometer had broken, please get another one from M's urgently. The lady at M's despatch was charming: Mr M himself was helpful: BOAC were on their mettle: we got it there: they installed it. Within a month the mast was struck by lightning. After overcoming this and other setbacks, results began to flow in: site 3a and site 7a (why not sites 1 and 2? but that kind of thing happens in site testing). Then instrument 1 at site 3a did not read the same as instrument 9b at site 7 or was it 9 at 7a..... and one of them was calibrated in cm/sec and the other in mph, but we did not know which. Anyway the operator had not read 3a on alternate Wednesdays or 7a on

another chapter in the

great site testing saga

by one who never did

'voracious appetites . . .'

every 3rd Friday. He didn't read either on Thursdays, or even Tuesdays. Of course there was no question of weekend work and anyway what was the use of an electric recorder up there?

You may feel this is a bit far fetched, but I must remind you that (a) it is true (more or less, for I fear they didn't tell us about the termites till later) and (b) so far we have only got as far as wind, which any schoolboy worth his salt knows how to measure.

"I think God is trying to tell us something"

(Quote from a discussion on disasters following site testing attempts).

If at last you get down to comparative astronomical tests between two sites, your problems really begin. Apart from hostile factions in the local community, animals with voracious appetites for scientific apparatus, sun stroke, flood, avalanche and blizzard, the apparatus will not work. When it does, the two will not be the same. One day you may find all systems are 'go' at both sites. Torrential rain will set in and a letter from SRC will remind you all the grant has been used up. When you have gained most of the results, a dictum will come from on high, to the effect that reports of excellent work by D in America (and we know who brings those reports) make it essential that your apparatus should be calibrated to match D's. On investigation, you find D's apparatus is (i) on a Carribean island in the middle of a revolution (ii) made of old car parts and string (iii) unlikely to work. Anyway D is now working on fertility rites among aboriginal tribes (or was it "solar spectroscopy"?)

a practical approach

For these reasons, seasoned astronomers conduct site testing in a more empirical way. They get up before dawn (on any convenient day) and visit the possible site. Points are awarded for pleasant aspect and freshness of the morning. A recommendation in the Guide Michelin counts double points. There is a bonus if they see the green flash (a phenomenon at point of sunrise in exceptionally clear sky). This system works and is inexpensive.

PS Anybody who is sceptical about all this is reminded of the remarkable junketings now going on in London Office under the guise of relocation. People in establishments will be forgiven, we hope, for believing that this is site testing in its most rampant form. (It is reliably reported that they had smoked salmon at Milton Keynes!).

radiation and man

John Coleman

John Coleman M.Sc is the Radiation Protection Officer (SSO) at Daresbury Laboratory and Head of the Health Physics Section.

The word 'radiation' often conjures up horrifying visions of catastrophic proportions in the minds of many people – an emotional response that probably originates from the destruction of the Japanese cities Hiroshima and Nagasaki by atomic bombs in the Second World War. The idea that radiation almost always spells total disaster is often perpetuated by those television and film script writers who invent physical and biological properties unknown to science in order to create an exciting story.

Sensational press coverage is also responsible for exaggerating and at times erroneously reporting situations concerning radioactivity. The result is a misinformed frightened public, unable to arrive at a balanced judgement of the real problems regarding radiation, its uses and its effect on man.

At the risk of over-simplification, this article attempts to explain the health hazards arising from radiation, the problems of protection facing man in our modern technological space age and at the same time considers some of the benefits.

Radiation simply means the emission and diffusion of rays. Light, heat, television and radio signals can all correctly be called radiation, so the first thing to realise is that we are concerned with a particular type of radiation known as ionising radiation.

This special type of radiation, when impinging on materials, forces orbiting electrons away from the parent atoms of the substance leaving them with an excess of positive electrical charge. The isolated electrons also have an equal but opposite (negative) charge. This condition exists for only a very short period of time and eventually recombination takes place, the atoms regain the lost electrons and once more become stable. Th process is known as ionisation and the constituent parts are termed positive and negative ions.

How this affects our bodies is that atoms join together into various chemical combinations by virtue of their outer orbiting electrons and the molecules so formed, in our case, build up into living cells. The atoms of our living body tissue were never meant to suffer ionisation so when it occurs the complex chemical bonds are broken and on regaining stability new chemical bonds may have been created which can be detrimental to the cell. Depending on the intensity of the incoming ionising radiation, these chemical changes in the cell can produce local damage which can ultimately affect the body's well-being and even its future offspring.

Rays of ionising radiation can best be visualised as streams of tiny projectile-like particles directed at the atoms of material which consist of a central nucleus made up of positively-charged particles known as protons and uncharged particles called neutrons. Around this nucleus of protons and neutrons orbit the negatively-charged electrons: the positive charges balance the negative charges, producing a neutrally-charged atom. The ionising radiation projectiles are simply bits of basic atom and can be divided into two categories; those that are electrically-charged and those that are uncharged. Charged particles consist of three main types—the positively charged proton with a mass of 1, the alpha particle with its two protons and two neutrons (therefore having a double positive charge and mass of 4) and the negatively-charged electron with a mass 1800 times smaller than the proton.

Charged particles have such a strong electrical force that their energy is quickly spent pushing and pulling the protons and electrons near the surface of the material – rather like a strong ball magnet rolled into a pile of steel marbles. So while a relatively large number of target atoms are ionised, ionisation takes place in a small area very near the surface. Therefore charged particle radiations, while densely ionising, are not deeply penetrating.

Uncharged particles are the neutron, with the same mass as the proton, and the photon, a name given to electromagnetic radiation such as x-rays and gamma rays when being considered as a stream of small particle-like packages of energy. Ionisation of target atoms by uncharged particles is only brought about by direct collision and since the atoms making up the molecules of the material are relatively as far apart as stars in the universe, uncharged particles miss more often than they hit, so unlike charged particles, they penetrate deep into the material before collision, and hence ionisation, occurs.

Although the basic effects are penetration and ionisation, each radiation particle type (i.e. proton, neutron, alpha, beta and photon) has its own characteristic property and this can vary with energy. To give an example of the difference in penetration properties of the main particles (all having a similar energy of a few MeV) alphas would be stopped by a sheet of

paper, most of the betas would be stopped by a plate glass window, but it would take about 1 cm of lead to decrease the photons by 50% and the same thickness of lead would stop only a few neutrons.

Each particle also has its characteristic biological effect and in practice is designated by a number known as a Quality Factor (QF). The QF varies from 1 to 20, the higher the number the greater the biological effect. This factor like the penetration property can also vary with energy, but generally the alpha has a QF of 10, the beta a maximum QF of 1.7, and the photon a QF of 1. The neutron depending on energy can have a QF between 2 and 10 and recoiling nuclei have the highest QF of 20.

The energy deposited by each type of radiation can be physically measured, the unit of measurement being the rad (equivalent to 100 ergs per gram). This unit does not always give a measurement of the biological damage so the Health Physicist also needs to know the type and energy of the radiation producing the rad dose in order to assess the 'quality'. By using various other methods of measurement it is possible to deduce an average effective QF. Multiplying the rad dose by the QF gives the rem (Rontgen Equivalent Man) dose which is a unit meaningful in terms of both radiation intensity, type, and resulting biological damage. The old unit, the Rontgen so often quoted in press reports, is quite meaningless when talking of mixed types of radiation producing varying biological damage to human tissue.

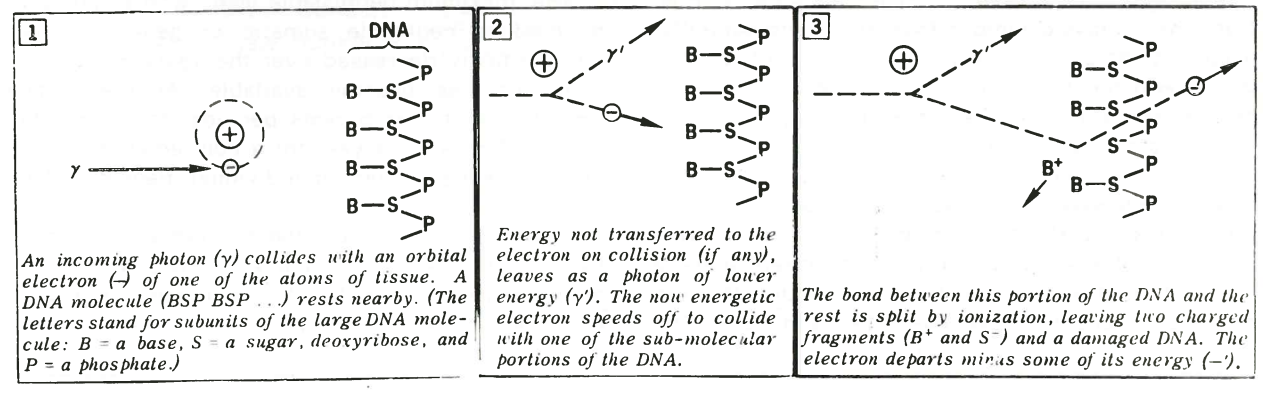
damage to man

Radiation damage to man is brought about either by external penetrating radiation, such as photons and neutrons passing through the outer layers of tissue and ionising cell atoms deep in the body, or by internal radiation. In the later case densely ionising alphas and betas must actually be transported into the body via the nose or mouth and while the outer dead layers of skin of the body would absorb alpha particles without much damage, this is certainly not the case when the absorbing layer of tissue is the wall of the intestine or lung. So the basic hazards are from either external penetrating radiation, usually photons and neutrons, or contamination radiation, usually alphas, betas and photons, and of course both problems can occur together.

There are two kinds of molecular damage; the direct effect where a biologically important molecule is directly smashed by an incoming radiation particle producing useless fragments, and the indirect effect where the water molecules of which as much as 80% of the cell is built, are split into reactive ions or radi-

the direct action of photons and neutrons on tissue

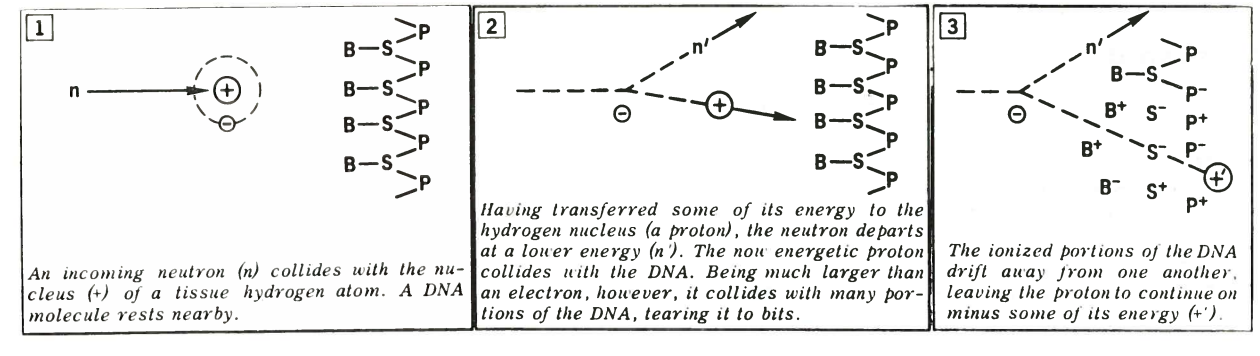
(reproduced by kind permission of the US Atomic Energy Commission)



An incoming photon (γ) collides with an orbital electron (–) of one of the atoms of tissue. A DNA molecule (BSP BSP . . .) rests nearby. (The letters stand for subunits of the large DNA molecule: B = a base, S = a sugar, deoxyribose, and P = a phosphate.)

Energy not transferred to the electron on collision (if any), leaves as a photon of lower energy (γ'). The now energetic electron speeds off to collide with one of the sub-molecular portions of the DNA.

The bond between this portion of the DNA and the rest is split by ionization, leaving two charged fragments (B^+ and S^-) and a damaged DNA. The electron departs minus some of its energy (–').



An incoming neutron (n) collides with the nucleus (+) of a tissue hydrogen atom. A DNA molecule rests nearby.

Having transferred some of its energy to the hydrogen nucleus (a proton), the neutron departs at a lower energy (n'). The now energetic proton collides with the DNA. Being much larger than an electron, however, it collides with many portions of the DNA, tearing it to bits.

The ionized portions of the DNA drift away from one another, leaving the proton to continue on minus some of its energy (+').

cals, and may form, for example, poisonous hydrogen peroxide. Subsequent cell injury can be divided into 'somatic' damage where the cell's function is impaired and 'genetic damage' where the cell's reproductive ability is impaired.

In somatic damage the body is affected. This is also the case if genetic damage has occurred in a cell other than the human egg and sperm cells – for example, if genetic changes have occurred converting a healthy liver cell into a cancerous one. When genetic damage has occurred in the egg or sperm cell the offspring can be lethally affected, possibly without affecting the parent at all.

In general discussion of the subject, somatic damage means personal body injury and the term genetic damage is usually limited to the egg and sperm cell which ultimately affects future generations.

The biologically important molecules are the DNA (deoxyribonucleic acid) molecules of the cell nucleus. These build up into genes which are contained in microscopic thread-like units called chromosomes. The whole assembly is a complicated chemical structure containing the 'blue-prints' necessary for the cell to reproduce itself. It does not require much imagination to visualise the havoc caused when the electrons binding the whole system together are suddenly torn away by ionisation produced by incoming particles of radiation. Not only can the cell be killed outright but in some cases subtle changes produced in the genetic material can produce cancerous cells, and in the egg or sperm cell can produce a mutated offspring.

Man has always been subjected to radiation both from cosmic rays coming in from space and naturally-occurring radioactivity in the air, water and earth of the environment. Cosmic rays consist mainly of protons and alpha particles of great energy. On striking the atoms of air at the top of the atmosphere they produce secondary showers of penetrating particles which eventually reach the ground. The dose rate to man is about 0.1 mrem a day (1 millirem is 1/1000 of a rem). Naturally-occurring radioactivity in the ground stems mainly from uranium, thorium and their products in various rocks and soils. The dose rate depending on geographical location varies between 0.1 mrem per day to 0.3 mrem per day, but in a few isolated places, notably in Brazil, the dose rate can reach as high as 4.4 mrem per day.

It is only since the turn of this century that man has been subjected to radiation dose rates in excess of the background radiation. The first victims were the early scientific experimenters and medical doctors machine. Becqueral's discovery of radioactivity in who used Rontgen's marvellous invention, the x-ray material also led to injury. This was not immediately recognised, even though Becqueral himself is reported to have sustained a serious slow-healing skin ulcer from handling the material. Further cases of injury resulted from the demand in World War I for instruments that could be seen in the dark. This effect was achieved in those days by using luminescent paint mixed with radium salts, a concentrated naturally-occurring radioactive substance. The girls employed in painting these dials developed the bad habit of most artists who produce fine work, of sharpening the point of the brush with the mouth. The resulting tragic sickness and death of some of these girls together with the high incidence of lung cancer observed in pitchblend miners (the ore from which the Curies obtained their radium) led to the forming in 1925 of what was to become the International Commission on Radiological Protection. This organisation, consisting of learned people from all parts of the world, was established to define safe working limits for persons coming into contact with this new hazard.

The 'maximum permissible level' whole body dose to produce negligible somatic or genetic damage has gradually decreased over the years as more information has become available. At the present time this is set at 5 rems per year for a radiation worker, 1.5 rem per year for a non-radiation worker, and 0.5 rem per year for individual members of the public.

In Part II I shall describe the radiation received by man in space, medicine and industry and look at the reasons given for the continued controversy over the maximum permissible levels of radiation.

Crossword

Maxim

Across

1. Special lessor re-accommodated in temporary black-outs (5, 8)
7. Tin is poison, I'd made up a reason for sick leave (13)
8. Disorganised as an American organisation (4)
9. One way to knock holes in a computer program (5)
13. Happy story printed backwards by the editor (6)
14. Many stars are bright outside, soft inside (6)
16. When there are 1 across, it's not! (5)
17. A soft song for two (4)
19. Strange alien moon ring in a country north of China (5, 8)
20. E for engineers and elasticity (6, 7)

Down

1. Insurance against Rothschild? (7, 6)
2. Explodes target, revealing Polaris (8)
3. Réaumur equals Kelvin? It's a possibility (4)
4. Anchor used to give unity (6)
5. A frequency to play on (5)
6. If sorry nose nags badly, consult an expert in these (7, 6)
10. Family of isotopic lanthanides (4)
11. Nash is heard before bells (4)
12. Like Inter-City lines, affording infinite get-togethers (8)
15. At peak performance, magazines aim to do this (6)
16. Back in monster nebulae (5)
18. Managed to get rid of one employee, ready for retirement (4)

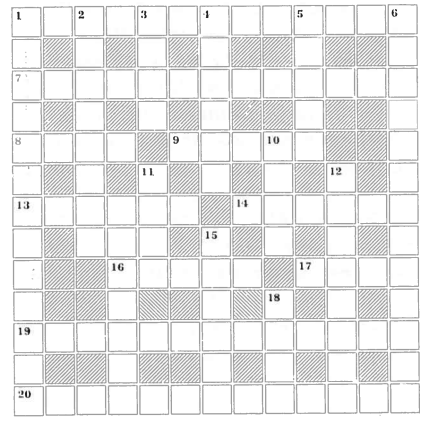
It cost just under £¼ million.
Is it (1) a South Bank Concert Hall? (2) SRC's new bunker? (3) . . . or what?

Answer: Picture shows the landscaped approach to the three million volt Van de Graaf Generator at the University of Sussex. The machine and the new Laboratory building cost £228,000 to build and most of it was met by an SRC grant of £200,000. It was opened on July 10 1972 by Sir Alan Cottrell, FRS, Chief Scientific Adviser to the Government, and is directed by Professor M W Thompson of the School of Mathematical and Physical Sciences. The use of small accelerators in research into solid state physics has increased in the last ten years following important developments in the study of particle-solid interactions. This machine will continue fundemental studies in this and related fields, such as in changing the properties of materials by ion bombardment and investigating the nature of impurities in solids and the various constituents of alloys.

PS We understand, by the way, that the resemblance to that concert hall is only superficial. The Van de Graaf Generator inside is well-tuned but hardly tuneful. *(— is that how the pop group got its name then?).*

reward

The first correct answer opened gains a £1 book token. Send entries to *Quest* at London Office not later than December 8 marked "CROSSWORD"



London decides to move

"While we at headquarters are being distracted by reorganisation, you must run the railway"
G F Fiennes, BR Eastern Region (c. 1966)

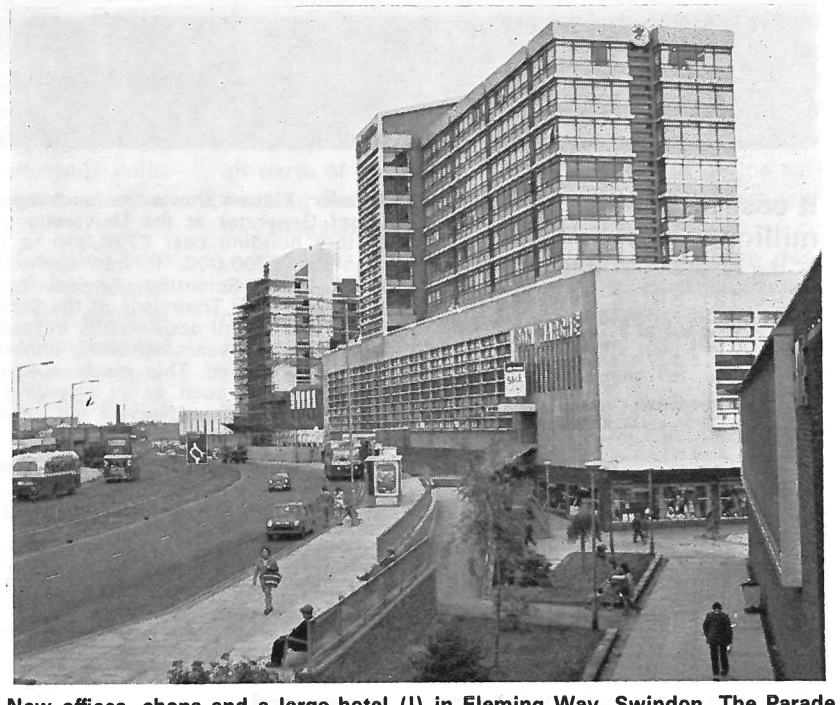
'It's nice to get out for a change . . .'. LO staff and their families at Basingstoke. *P. Culba.*

Swindon gets most votes

On October 18 1972 the Council decided that London Office should move and that Swindon, the location most favoured by the Working Party and by the staff who were prepared to move, would be the first choice. But the decision would depend on financial arrangements being made with DES and CSD/Treasury and on confirmation from the staff that, in the light of the decision to disperse, Swindon was the location preferred by most of the people who were prepared to move. In the first opinion poll 148 staff put it down as first, second, third or open choice and 97 put it first. It was selected by the working party because it is far enough from London to qualify as a 'dispersal area', it is not too far from four SRC establishments and has a good train service back to London (65/80 minutes), London airport and to other parts of the country.

The working party found that there were less cultural and business amenities than in larger towns. There are few professional entertainments and, as yet, no 'west-end' style shops. But they got an assurance from the planners that these will come with Swindon's expansion over the next ten years. The population, now 125,000, is planned to rise to 200,000 in the late 1970's and to 300,000 by the year 2000.

The present amenities are the surrounding countryside and excellent facilities for outdoor sports, amateur theatricals and many other leisure pursuits. Also housing, cheaper than in London, is available to rent or buy. Bristol, Oxford and London are within reach with their wider choice of shopping and evening entertainments.



New offices, shops and a large hotel (l) in Fleming Way, Swindon. The Parade shopping centre lies behind them *Published by courtesy of Swindon Corporation*

A long sift to find a short shift

as seen by a Town mouse

London Office has been driving round in coach loads to surprise out-of-town dwellers in their natural surroundings. We have looked critically at the way they live, where they put their washing and other amenities and have swept off again to talk it over.

It's all part of the LO dispersal/disposal exercise. The three towns we visited were Basingstoke, Milton Keynes (Bletchley) and Swindon: each seen in fair and alphabetical order, and previously vetted and short-listed by the working party elected to do this complicated business.

In spite of recommendations to consider the places, many of us said "What they've done to Basingstoke is *disgraceful*", "Milton Keynes sounds marvellous but . . . where is it?" "Some parts of Wiltshire are beautiful . . . but Swindon isn't." And some people did not want to move to any of them — 134 out of a total of 336 in the first poll.

Perhaps some of us who voted 'no' are just unenterprising. On the other hand, when looking for a 'good' place to work one does not usually first choose where to live. If the prospects of promotion and further experience are good, the 'quality of life' bit will follow.

wider prospects

Leaving out specialist jobs, there are not many higher administrative posts in SRC. So, to quote this year's annual report: 'the Council has continued to encourage staff to secure wider experience . . . Members served during the year with other organisations on secondment or special leave.' And some of them came back with the LO reorganisation.

Where are the wider prospects? Most must still be in London we believe (have always been told so), but what about other important towns like Bristol, Manchester, Oxford, Newcastle? Well Newcastle was not on but they did look at Bristol and found it attractively situated with a good range of houses (old and new) to buy, good cultural, recreational and shopping facilities, good local employment apportunities and 'excellent' transport links with SRC's business contacts. But the Hardman Committee said it was too far from London where, it has been decided, the Council, Boards and Committees are to meet.

There are not many people to move. There are less than 400 jobs and, according to the first poll, less than half the people in them want to leave town. So our transit is unlikely to cause much excitement.

what goes on

What do we do in London Office? According to the LO directory ('an excellent book'*) we have two sorts of staff. One half (under the four Boards) spends £19M on grants, sifts the applications for them, and attends or arranges committees to consider who should get how much. The other half (two of the Boards plus E & F) spends £20M on running SRC, and a few see to things like who should spend what on travelling to committees, being off sick or just visiting. This half also spends another £20M on national and multi-national facilities used by SRC and universities alike.

The first half want to be within reach of every committee member from any university, industry or government body in the British Isles. Now we have noticed, even here in the south east, that universities happen as far north as Nottingham or Coventry, so why don't the committees pick up their papers and go north . . . to Crewe? "No," they say, "it's easier for everyone to come to London and the papers are too — — heavy to carry anyway."

The other half work in close alliance with SRC's 'outer seven' – who will even find a way here via Woomera, CERN and Tenerife in Winter. Could this 'internal' affairs half have pitched a campus site with one of their well-endowed customers? or would it have caused a dilemma like that chap Paris had when he tried to decide who most deserved the golden apple?

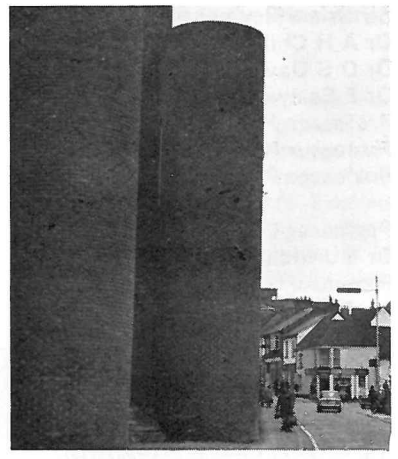
. . . Which brings me back to where I began.

* *the author is on the working party.*

New school in old 'farmhouse' style at Milton Keynes

What or who is a 'Wendy'?

A 'Wendy' is someone who refuses to grow up and face life – "Wendies" choose to live in a Never Never Land, preferably of their own making and seldom, if ever, venture into the world of reality; never of their own volition. Alternatively a "Wendy" is someone who chooses to live and/or work in London when the choice of dispersal is offered . . .
Oh why bother, it's exactly the same thing isn't it?
(With apologies to William Cobbett and Sir James Barrie).



The outside of the new shopping centre dwarfs old Basingstoke.

the new Council

newsfront

Four new Council members are appointed from October 1 1972:

Professor H G Callan FRS	Head of Department of Zoology, St Andrews University
Mr J M Ferguson	Director of Engineering, GEC Power Engineering Ltd
Dr R W Pringle OBE	Chairman and Managing Director, Nuclear Enterprises Ltd
Professor D W N Stibbs	Napier Professor of Astronomy and Director of the University Observatory, St Andrews

The retiring members were Professor H Ford FRS, Professor J C Gunn, Professor Sir Fred Hoyle FRS, Professor H L Kornberg FRS and Dr J W Menter FRS. Mr R St J Walker CBE has succeeded Dr W L Francis CBE as Secretary to the Council. *(see Quest Vol 5, 3 p1).*

Except for the Chairman and Secretary, who hold full-time appointments, the members of the Council are appointed on a part-time basis, usually for a term of three to four years. The names and full-time appointments of the existing Council members are:

Sir Brian Flowers FRS	Chairman, Science Research Council
Dr A H Chilver	Vice-Chancellor, Cranfield Institute of Technology
Dr D S Davies	General Manager Research and Development, ICI Ltd
Dr E Eastwood CBE FRS	Director of Research, GEC Ltd
Professor H Elliot	Professor of Physics, Imperial College of Science and Technology, London
Professor R Mason	Professor of Chemistry, School of Molecular Sciences, University of Sussex
Professor P T Matthews FRS	Professor of Theoretical Physics and Head of the Physics Department, Imperial College of Science and Technology
Professor E W J Mitchell	Professor of Physical Properties of Materials, University of Reading
Dr E J Richards OBE	Vice-Chancellor, Loughborough University of Technology
Professor Sir Michael Swann FRS	Principal and Vice-Chancellor, University of Edinburgh
Mr R St J Walker CBE	Secretary, Science Research Council

Chairman on pollution: Royal Commission

Sir Brian Flowers FRS has been appointed to succeed Sir Eric Ashby as Chairman of the Royal Commission on Environmental Pollution. His term of office is for three years from February 1973. Sir Brian has just become President of the Institute of Physics and he recently received an Honorary degree from the University of Wales, Aberystwyth.

research scientist builds safer scaffolding

An investigation into design improvements for steel scaffolding is being sponsored by the Science Research Council and the Construction Industry Research and Information Association (CIRIA).

There are two linked projects. One is Dr Edgar Lightfoot's mathematical and experimental study of the instability behaviour of scaffolding. The Osney Mead Laboratory (of Oxford University), where he works was once the Oxford Power Station so he has room to build full scale scaffolds under cover. Dr Lightfoot has an SRC grant of £17,442. He will study models and carry out failure tests on the full size version.

The second project is on-site surveys of the loads applied to scaffolding, load effects on parts of the structure and site erection standards. This project will be carried out by John Laing Research and Development Ltd. It is supported by CIRIA funds and by special contributions from the Department of the Environment, Kwikform Ltd, John Laing and Son Ltd, Peter Lind and Co Ltd, Sir Alfred McAlpine & Son Ltd and Rapid Metal Developments Ltd.

our own students get grants

Three people have been given the chance to do a year's full time study, with the help of SRC bursaries. Mr H J Jones and Mr D J Watson of Rutherford Laboratory are at the Oxford Polytechnic studying for the Council of Engineering Institutions (CEI) Part II exam. And Mr D K Yeomans of Daresbury is studying for an MSc in Thermodynamics at the Manchester University Institute of Science and Technology (UMIST). Anyone who is interested in taking up serious study may be able to get help of some kind. Your local Training Officer will advise you.

a career with accelerators

Mr A E Pyrah retired from Rutherford Laboratory in June. He entered the 'accelerator business' in 1947 (after war service) when he started work on the 5 MeV Van de Graaf machine, was promoted to Chief Experimental officer (1955) and went to help construct the Tandem Generator at Harwell, then the Oxford University machine (1960-66). For the last six years Mr Pyrah has been working on cyclotron ion sources at the Rutherford Laboratory.

above: Mr A E Pyrah (l) and Professor W D Allen (who made the presentation on behalf of RHEL staff) *–see report left.*

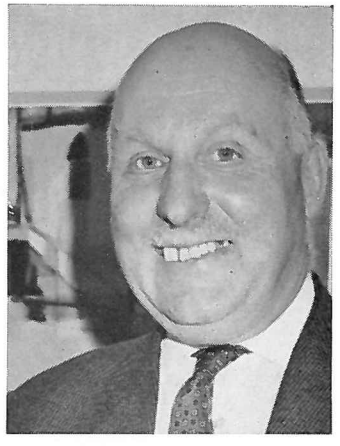
better frames for high rise buildings

Strength, elastic deflection, stiffness and safety against yielding are important things to know when you design a steel frame for a multi-storey building. There has been a lot of theoretical research over the last ten years and now a group of scientists at the Simon Engineering Laboratories have come up with a practical idea in the form of a computer program. They were helped with an SRC grant of £11,000.

The group, led by Professor M R Horne, have developed the program and tested it and have demonstrated that it gives more efficient and economic designs than existing methods.

The program first produced a trial design which is modified to take account of vertical forces that destablise a structure. The group have had to explore the relationships between the stiffness of frames and their ultimate collapse loads. Existing computer programs showed behaviour up to collapse but cost a lot in computer time when applied to large frames.

Above: Mr & Mrs W H J Hayes and (r) Dr J Howlett Director of ACL who made the presentation from the staff *(see below)*



Mr W J Parmenter, ACL *(see below)*

Atlas loses two

The first two people to retire from the Atlas Computer Laboratory left this year. Mr W H J Hayes and Mr W J Parmenter have been with ACL since it opened in 1963.

Mr Hayes was the chargehand responsible for all industrial staff and the Laboratory Shop Steward for nine years. At a dinner, held at the Bear Hotel Wantage, attended by seventy people, Mr Hayes was presented with an inscribed tankard from the Atlas and Rutherford shop stewards. The staff of ACL gave him a carriage clock, an appropriate memento of his earlier career as a driver. He drove for MRU, RAF Milton in the 39-45 war, the Lambourn volunteer ambulance crew for 20 years and the Rutherford Laboratory (1960-63). For thirty years he was Police Sergeant Hayes of the Berkshire, later Thames Valley, Special Constabulary.

Mr Parmenter, Senior clerk of works, was the second to retire. At a presentation ceremony he was thanked for his contribution to the present high standards of the building services at ACL.

we apologise . . .

There was not enough space here to include all the recent retirements and senior appointments. More will appear in the next issue.