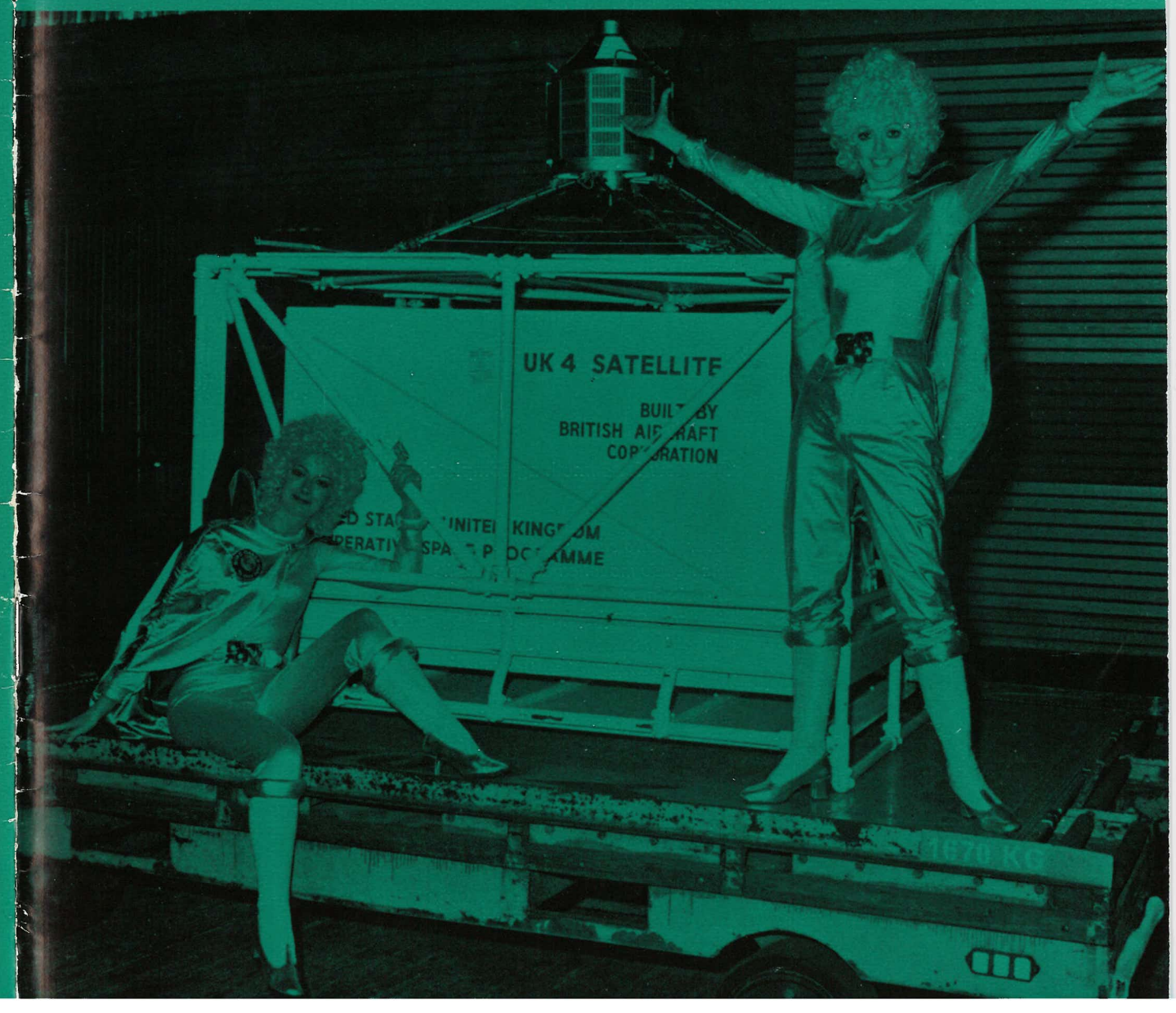
QUEST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QUEST

House Journal of the Science Research Council

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October 1971

contents

'And now for something completely different . . .'

Cover picture shows the UK 4 package and a half scale model on the way to the United States for the NASA launching. The part RSRS play in the UK–US project was told in Quest July 1971 p. 8. The project scientist Robert Dalziel says he did not in fact provide the two assistants in the picture. We think BOAC may be responsible, they provided the freight service and the photo.

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new director for RGO

Professor E. Margaret Burbidge, FRS

Professor Margaret Burbidge, FRS is to become the new Director of the Royal Greenwich Observatory. She has been Professor of Astronomy at the University of California, San Diego, since 1965, and is expected to join the Observatory in the summer of 1972. Professor Burbidge will succeed Sir Richard Woolley, OBE, FRS, the present Astronomer Royal who retires at the end of 1971.

In recent years Professor Burbidge has made important studies of the quasi-stellar objects, known as quasars, in collaboration with her husband, Professor Geoffrey Burbidge, FRS, who is Professor of Physics at the same university. They were married in 1948 and have made many significant contributions to astronomy, working together. SRC is now considering arrangements which will enable their collaboration to continue in this country. Both are British subjects and graduates of University College London. They have one daughter.

From 1948 to 1951 Mrs. Burbidge was Assistant and Acting Director of the University of London Observatory followed by several research posts in the United States until her present appointment at the University of California. She was elected a Fellow of the Royal Society in 1964. Travel and music are her main recreations, and at one time she played in an amateur string orchestra. Her father Stanley John Peachey was a Lecturer in Chemistry and a Research Chemist.

Publications include 'Quasi-Stellar Objects' (Margaret and Geoffrey Burbidge) and many contributions to scientific journals, mostly in the United States.

An account of the Observatory's work as it has been moulded under the direction of Sir Richard since 1955 follows on page 2. Between the date of his leaving and the new Director's arrival, Dr. A. Hunter the Deputy Director will act as Director of the Observatory.

Sir Richard Woolley
OBE FRS

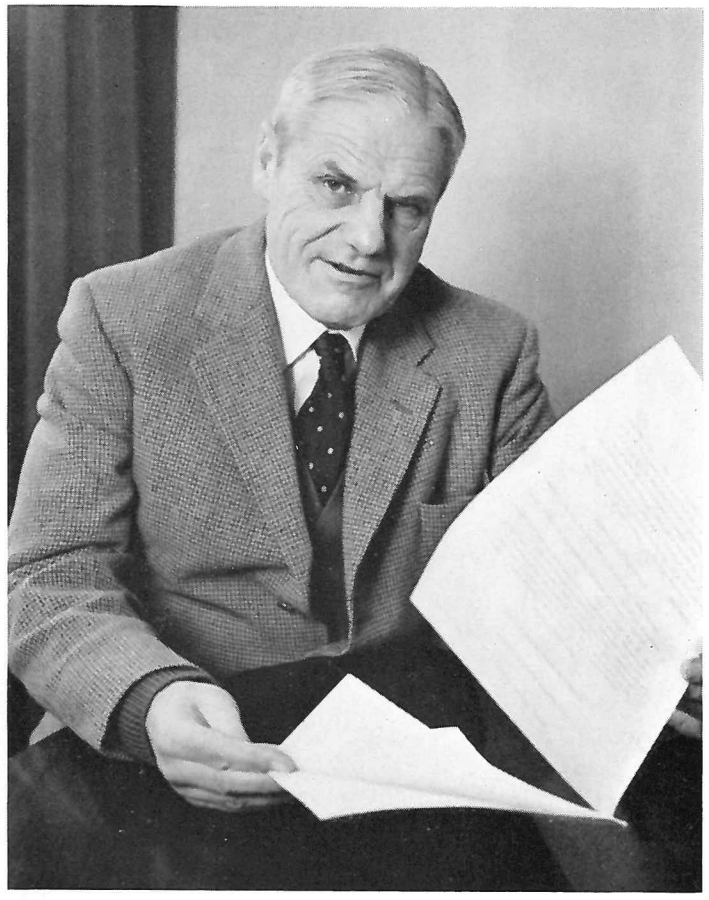

Photo Universal Pictorial Press, London.

At the end of the year Sir Richard Woolley retires from the ancient position of Astronomer Royal to undertake the direction of an entirely new venture – the South African Astronomical Observatory.

In sending our good wishes to Sir Richard in the new undertaking we also remember his work over the past sixteen years as Astronomer Royal. This has been largely spent in leading the Royal Greenwich Observatory to its present day position as a centre for optical astronomy and astrophysical research.

Sir Richard was appointed to the post of Astronomer Royal at the beginning of 1956 on the retirement of Sir Harold Spencer Jones. He is the eleventh holder of the office; his predecessors are remarkably few considering that there has been an Astronomer Royal for the past 296 years.

It was decided many years ago to move the Royal Greenwich Observatory from its original location in Greenwich Park to somewhere else in Britain with skies more suitable for astronomical observation. However the actual move was delayed by the Second World War and its aftermath. By 1956, although nearly all of the staff were working at Herstmonceux, most of the telescopes had not yet been placed on the new site. One of the present Astronomer Royal's first major tasks was to arrange for the erection of the equatorial telescopes and to initiate various observing programmes with them.

At Greenwich most of the work of the Observatory had been related to the determination of the positions and motions of the heavenly bodies and to the provision of an accurate time service. Although most of the old interests have been continued, there has been a great broadening of the outlook of the Observatory in recent years. There has been a considerable change of emphasis and various branches of astrophysics now play an important role. Some of the older types of work have received added impetus from the presence of the new interests in the observatory.

The study of distant galaxies and quasars is very important and often produces spectacular results. However only a relatively small fraction of the observational astronomers in the world work on these objects partly because most of the problems in this field require a large telescope situated in a good location. The work of the Royal Greenwich Observatory in recent years has been concerned mainly with the properties of individual stars or groups of stars and with the structure and evolution of our Galaxy. In this case there are many important observations which can be made successfully even in a poor climate. Many of the programmes initiated by Sir Richard are ones designed to study the motions of different types of star in our Galaxy using various techniques. (Velocities in the direction of the line of sight can be found spectroscopically using the Doppler effect. Proper motions in the plane perpendicular to the line of sight can be determined by observing with a transit circle or by comparing photographs of the same part of the sky at different epochs.) Considerable attention has also been paid to obtaining the colours and magnitudes of stars in star clusters; such information is the observational basis for much of the theory of stellar evolution. Much work is being done at Herstmonceux on various types of variable star, particularly those of RR Lyrae type. These latter stars provide useful information on both the early history and the distance scale of our Galaxy.

Most of the telescopes now at Herstmonceux were originally at Greenwich. A very important exception is the 98-inch Isaac Newton Telescope which became operational in 1967. This instrument is for the use of astronomers from both the Royal Observatories and the universities. A considerable amount of the work of the Royal Greenwich Observatory during the past sixteen years has been the analysis of observational material obtained with telescopes situated in better climates than that of Britain. Sir Richard is himself a keen observer; in recent years he has observed in South Africa, California and Egypt in addition to his night time work at Herstmonceux.

It is important that observational astronomers should relate their work to that of the theoreticians and vice versa. In addition to theoretical work being done at Herstmonceux, there are now close links between the Royal Greenwich Observatory and the Astronomy Centre in the University of Sussex. Sir Richard is a Visiting Professor of Astronomy in the University. Collaboration between astronomers in different institutions in Britain is also encouraged by the annual conferences at Herstmonceux which were initiated by the Astronomer Royal in 1957. Another innovation was a summer vacation course for undergraduates. These have been very successful and many of the students who have attended these courses have subsequently chosen astronomy as a career.

In addition to directing the work of the Royal Greenwich Observatory and that of the Royal Observatory in Cape Town, the Astronomer Royal has been closely involved with other aspects of British astronomy such as the plans for the erection of the Anglo-Australian 150-inch telescope. In spite of all these commitments, Sir Richard has found time to continue with his own research interests. He was awarded the Gold Medal of the Royal Astronomical Society in 1971; this was for his contributions to observational and theoretical astrophysics particularly in the field of stellar dynamics.

£1M A YEAR FOR ATOMS MOLECULES AND PLASMAS ++ BEST DATA YET FROM SKYLARK SPACE
PROBE IN SOLAR ULTRA-VIOLET SPECTRUM ++ SYMPOSIUM ON ELECTRON AND PHOTO INTERACT
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BER PHOTOGRAPHS BY SWEEPNIK AIDED BY SRC GRANT OF £40,473 ++ SUCCESSFUL LAUNCH O

june

Each year the Council visits one of its Establishments and this year the June meeting was at the Radio and Space Research Station at Slough. Council was shown round the Station and had the opportunity of discussing the work with Dr. Saxton and his staff. A visit was also arranged to the 25 metre steerable aerial at Chilbolton.

The main subject discussed at the June meeting was future participation in the European space programme. SRC is only directly concerned with the scientific aspects of the European space activities and the purpose of the discussion was to advise on the scientific satellite and sounding rocket parts of proposals put forward by the Chairman of the ESRO Council. Advice on UK participation in the application and launcher programmes comes from DTI and from other potential users of application satellites.

The proposals for the future of the European space science programme envisaged a reduction in the level of the scientific satellite programme below that of recent years and Council considered the likely return to the UK of such a programme both in relation

to the domestic space science activities and to the bilateral UK/US collaboration. The cost of the European programme is high and, with the small number of scientific experiments likely to be flown, doubts were expressed whether such a programme could form a scientifically viable and cost effective part of the UK space effort.

At the July meeting, Professor Sheppard and Mr. Hosie were able to report on the outcome of the ESRO Council meeting when the proposals for the future were considered. Final decisions both on the science and applications programmes have been deferred until later in the year but a detailed draft plan has been drawn up on the basis of the views expressed. Participating countries are now considering these proposals further in readiness for the next ESRO meeting in November.

At the June meeting, Council also finalised the draft of its Annual Report for the year ending 31 March 1971. The Report was submitted to the Secretary of State and was published on 29 September.

july

At an earlier Council meeting Sir Ewart Jones pointed out that one of the most valuable research resources, that of time, could not be provided through the existing SRC research grant scheme. He suggested that the advance of science would be significantly helped if Council gave research grants to enable a few outstanding individuals to devote their whole time to research by freeing them from administrative work and all but a small amount of teaching. At the July meeting Council recommended introduction of a scheme, on an experimental basis, whereby research workers could have their salary paid by SRC for a period normally between 3 and 5 years. Views on the scheme will be invited from the Vice Chancellors' Committee, th UGC and the other Research Councils before Government approval is sought.

In the Autumn of 1969, the ASR Board appointed a Panel to consider the present programme of the Radio and Space Research Station and to make proposals for the future. The Panel has now completed its work and its report was presented to Council by Dr. Eastwood. He drew attention to the valuable role that the Station has played in providing basic information about radio wave propagation and explained how this should be continued in future years. Particular interest is now centred on short wave propagation where tropospheric influences are paramount. He also outlined the space activities of the Station and the part at present played in support of University space groups. The Council accepted the recommendation of the Panel that the effort on ionospheric radio propagation should be reduced and that the Station should become more active in space science. In this connection RSRS is to be the future home of the Space Research Management Unit, at present located in London Office. Council went on to endorse participation by RSRS in the Italian satellite project, SIRIO. The Station's interest will be to study variations in transmissions from the satellite at short wavelengths. A network of six 12 GHz receiving stations will be constructed to determine the correlation of fading patterns caused by rain and other atmospheric effects.

Amongst the grants approved by Council in July was an award of up to £101,000 to Oxford University to enable Dr. J. T. Houghton to build an experiment to be flown in the NASA satellite Nimbus F. Dr. Houghton and Professor S. D. Smith (Heriot Watt University) have had considerable success with their selective chopper radiometer experiment, launched in Nimbus D, which records temperatures up to about 40 km measuring infra-red emission from CO_2 in the atmosphere. A second experiment is under preparation for Nimbus E which will include new wavelengths in the infra-red. The proposal made by Dr. Houghton for Nimbus F is a new technique using a pressure-modulated radiometer which will extend the temperature soundings up to 80km from the earth's surface.

In recent months the Engineering Board has been looking into the possibility of setting up major University centres in transport research and Council approved grants totalling up to £680,000 for five such centres – at Leeds, where the emphasis will be on transport planning, Newcastle – transport operations, Liverpool – marine transport and Cranfield and Loughborough – transport technology. Government approval for these awards is now being sought. The main interest is in design and formulation of transport systems which will be viable in the economic and social context and an important aspect of the support being given will be the number of young people trained in this new field.

In the Science Board area, the major grant made at the July meeting was up to £88,500 to Sheffield University for work on the reactions of gaseous ions. The research, which is to be carried out by Dr. K. B. Jennings, involves construction of a specialised mass spectrometer. The main objectives are to develop the preliminary work, initiated at Sheffield and Cambridge, on the study of energetics and mechanisms of uni-molecular fragmentations, to investigate the kinetics of metastable transitions and to study the transitional energy dependence of ion-molecule reactions.

ESRO

Mr. J. F. Hosie, OBE, has been appointed Chairman of the ESRO Administrative and Finance Committee. Mr. Hosie is the Director of Astronomy, Space and Radio (ASR) at London Office and has been one of the UK representatives on the ESRO Council since the organisation was established in 1964. Before the SRC was set up Mr. Hosie was in the office of the Minister for Science, later the Department of Education and Science. Earlier in his career he served in the Indian Civil Service and in the Ministry of Defence before being lent to the War office – in the Quartermaster General and Finance Division. A general account of the many space activities looked after by ASR appeared in *Quest* Vol. 1 no. 1 p. 9.

ESRO, the European Space Research Organisation, was formed to provide for, and to promote, collaboration among European States in space research and technology exclusively for peaceful purposes. Besides the United Kingdom, the member states include Belgium, Denmark, France, the Federal Republic of Germany, Italy, the Netherlands, Spain, Sweden and Switzerland. Austria, Norway and Ireland have observer status.

The Organisation launches sounding rockets, develops satellites, provides certain services such as data acquisition and handling and conducts some applied research. For its rocket launchings the organisation uses its own rocket launching site (ESRange) at Kiruna Sweden, north of the Arctic Circle in Northern Lappland, and also the Italian national range at Salto di Quirra, Sardinia and, more recently, the Woomera range in Australia. The rockets chiefly used are the British *Skylark* and the French *Centaure.* Smaller rockets such as the *Skua* launched for meteorological surveys are not included in the ESRO programme but are used in national campaigns. The latitude of Sardinia (39.6°N) makes it suitable for mid-latitude atmospheric and ionospheric studies and in summer, when the sun is high, it is used for solar studies.

Mr. J. F. Hosie, OBE

ESRange is very close to the centre of the auroral zone, which passes just north of it along the coast of Norway. Many experiments are launched to study the aurora and in particular to relate the brightness of an aurora with the incoming flux of high energy particles. An equally important activity lies in studies of the ionosphere and its relation with magnetic fields. Several rockets have been launched to investigate noctilucent clouds during the northern hemisphere summer when they are seen at high latitudes. The recent use of the Woomera range has been for launching stabilised rockets when recovery of payload is desired.

More ambitious have been the ESRO satellites Iris, HEOS–1, Aurorae and Boreas which were launched by NASA (the US National Aeronautic and Space Administration) in 1968–9. More experiments are being prepared for HEOS–A2, TD–1, ESRO IV for launch in 1971–2 and, still at an early planning stage, COS B, a γ-ray satellite, and GEOS, a geostationary satellite for study of the magnetosphere.

The European Space Technology Centre (ESTEC) at Noordwijk, Netherlands is operated by ESRO for the study and development of spacecraft and payloads for sounding rockets and for applied research work on space technology. At Darmstadt in the Federal Republic of Germany, there is a Space Operations Centre (ESOC) which looks after the provision of rocket launching facilities, the control in orbit and tracking of satellites, and data collection and processing.

The Space Research Institute (ESRIN) at Frascati, Italy, carries out laboratory and theoretical research in the basic physical and chemical aspects of space phenomena.

ESRO experiments come from space research teams at the universities research institutes of the Member States who develop experiments, prepare payloads and process data, generally in their own laboratories. In this country there are some 12–15 university groups engaged on scientific space re-

search of which the largest is the Mullard Space Science Laboratory at University College London (a description of the MSSL's work appeared in *Quest* Vol. 1 No. 3 page 2). SRC establishments are also involved, particularly the Radio and Space Research Station, which also operates three tracking stations, the Astrophysics Research Unit at Culham and the Royal Observatory, Edinburgh.

The experiments proposed by the universities and research groups are assessed by one of ESRO's six scientific *ad hoc* groups and, if recommended, are combined into the payloads for selected rockets or satellites. At the same time ESRO carries out a technical feasibility study and estimates the cost. The Launching Programmes Advisory Committee (LPAC) then makes a selection on scientific grounds of the payloads that can be accommodated within the framework of the budget.

The Administrative and Finance Committee (AFC) is responsible, under the ESRO Convention, for advising the ESRO Council on all administrative and financial matters. In particular it screens the Secretariat's proposals for annual budgets and future level of resources, considers all questions of international co-operation and decides all contract matters above the level to which the Director General has delegated authority.

In the years since ESRO came into being in 1964, most of the Member States have become more interested in space applications, and their wish to switch resources from scientific space research led to difficulties. At the ESRO Council meeting in July 1971 the scientific programme was reviewed and it was decided that after 1973 the sounding rocket programme would be discontinued and the scientific satellite programme restricted, while ESRO could expand its activities into other areas of space technology. Although the rocket work described in this account will not long be continued as part of the ESRO programme, the facilities will no doubt continue to be used for national research programmes.

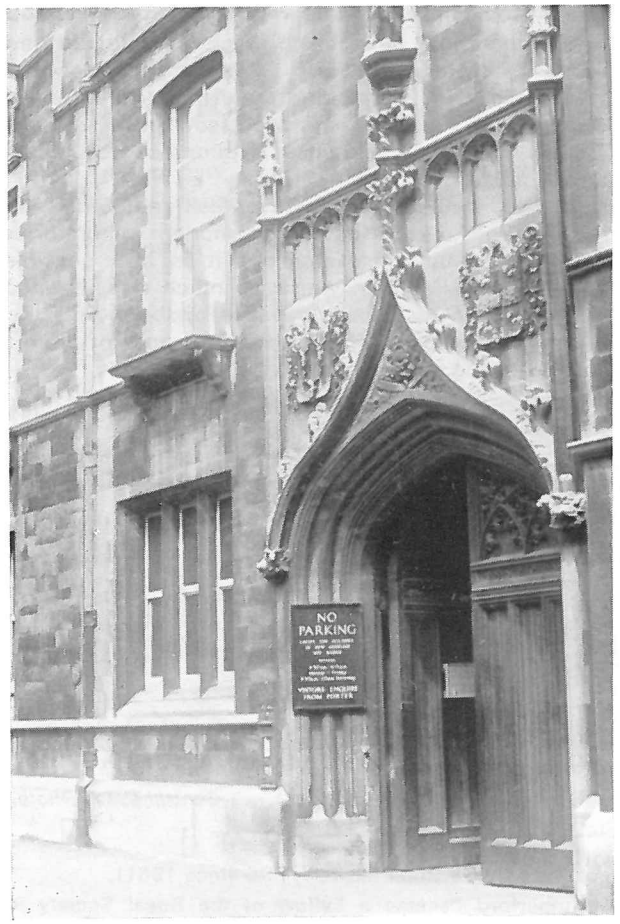
the cavendish laboratory in the thirties

Joy Clarke

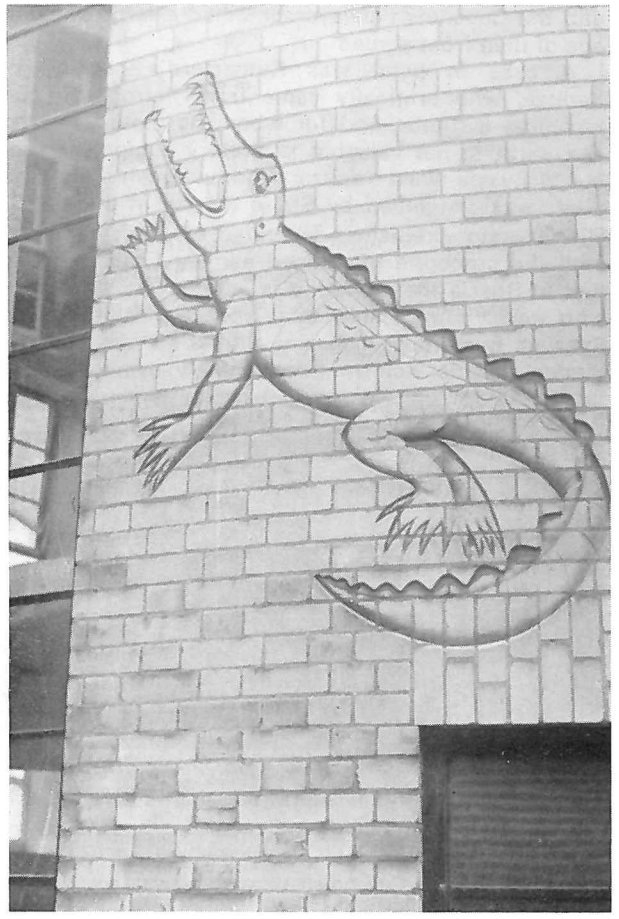
A scientific visitor from abroad coming to the Cavendish in the early thirties, to explore that Mecca for physicists from all over the world, would have experienced the surprise of his life when directed to the Laboratory down a back street in the middle of Cambridge. He would have walked down Free School Lane, a narrow passage behind Corpus Christi College, and he could well have imagined that he had come to the Victorian Free School itself – a sombre brick building, entered by a dark archway, and bordered by a concrete path. The labs and lecture rooms were primitive and inconvenient and in the courtyard were a number of temporary buildings. These housed various specialised projects such as Cockcroft and Walton's High Voltage Laboratory, the Crystallography Department, and, in 1934, Kapitza's Mond Laboratory for work on powerful magnetic fields at very low temperatures. The Mond was by contrast a very modern building with a round white brick turret decorated in low relief with a seven foot sculpture of a *crocodile* by Eric Gill – which I will come back to later.

The spirit of the Cavendish in those days was not in its brick and mortar, but in the scientific men who inhabited its dark passages and labs. At their head was Sir Ernest Rutherford, OM, PRS – in fact it could be said that Rutherford *was* the Cavendish. He had in 1919, inherited a great tradition from Sir J. J. Thomson OM, FRS under whose reign, someone commented, there was more physics to the square centimetre in the Cavendish than anywhere else in the world – partly due to the fact that facilities for ten or twelve researchers in 1903 had to make do for twenty-five in 1918. In the thirties Rutherford was at the peak of his influence on atomic physics and so international was the reputation of his team – his 'young men' as he called them – that to be accepted for research was to join an élite who have since made their mark in most of the Universities of the world.

Laboratory facilities in those days were very limited, and the major discoveries were made with equipment that seems laughable by modern standards. Cockcroft has said that the tradition of the Cavendish was to look very carefully before spending £50 on equipment and never to spend more than £100. But in the early thirties Cockcroft and Walton were allowed the unheard-of sum of £500 for apparatus for their High Voltage lab, and in 1932 announced their sensational breakthrough in artificial transmutation. Almost at the same time Chadwick



The Cavendish Laboratory



The Mond Crocodile

published an equally momentous paper on the discovery of the neutron. The staid Cavendish buildings were inundated with newspaper reporters who produced sensational headlines in the Press on Atom Splitting, little knowing how near the truth they were when they spoke of the end of the world being possible.

At the same time other researches, less eye-catching, but all bearing on the same problems were being done, with Rutherford at the head of his team. He co-ordinated their efforts with unflagging enthusiasm and had an instinctive skill in selecting both the men and the researches they were to pursue.

What of Rutherford the man? He was one of the truly great men of his era, large in frame, big in ideas, jovial, extrovert, and with the genius of seeing straight to the core of a problem. At home, his early background on his father's small farm in New Zealand gave him a liking for outdoor pursuits. He was a keen if somewhat erratic golfer, and played with a famous circle of Trinity Fellows, often five of them in a three-ball match, and the story is that their unevenness in skill was balanced by allowing the weaker party to say 'Boo!' loudly and suddenly on a certain number of occasions when the better players were making a stroke!

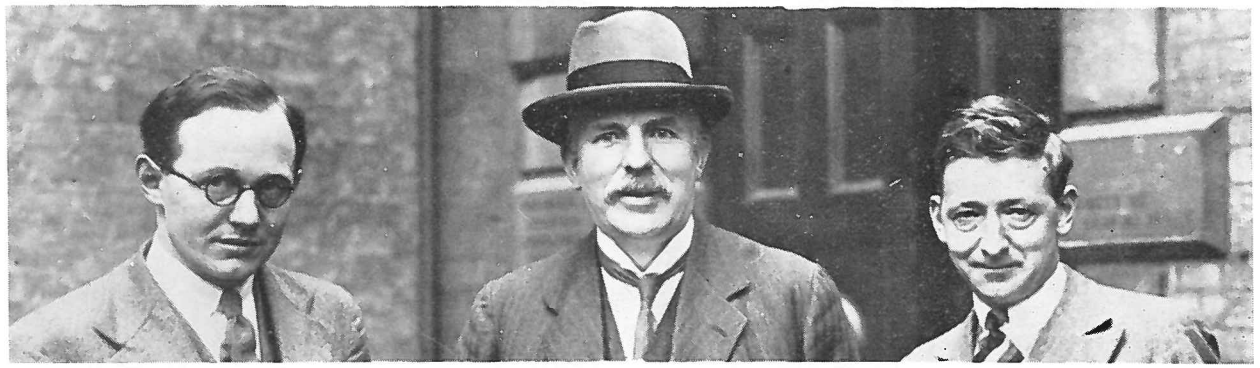
One of his greatest pleasures was his country cottage retreat at Upper Chute near Andover. Here he was the real countryman: he and Lady Rutherford created from field and woodland a garden which was a constant joy to both, where Lord Rutherford was able to use his abundant energy in chopping down trees and reducing them to firewood with axe and cross-cut saw. They were very hospitable and enjoyed entertaining guests for simple week-ends. Lord Rutherford had a great gift with children and would kneel down on the floor to be on the same level as a small grandchild to discuss toys or some other childish matter – this was typical of his approach to people.

In the Cavendish, Rutherford cultivated a similar informality, though inspiring a certain awe with his booming voice and direct talk. It was above all a happy place, with an atmosphere of infectious enthusiasm which radiated down to the humblest lab boy. Every member of his staff was a person to Rutherford and he was approachable by all. His humanity was above race, politics and language and he believed implicitly in the internationality of science: he was directly instrumental in helping the displaced scientists from Nazi or other régimes to find positions in universities in the United Kingdom and elsewhere,

and the Cavendish always contained a large percentage of men from abroad.

A case in point was Rutherford's backing of Kapitza, who originally came from Petrograd Polytechnical Institute, and for whom he moved heaven and earth to get valuable laboratory equipment sent out to Russia when Kapitza (who had been there on a visit) was compelled by Stalin to stay in the USSR. His laboratory remains, decorated by Kapitza's wish, with the crocodile mentioned earlier. The story was that in Russia the crocodile is admired as a creature who never turns back; this, and the name of the Russian humorous magazine 'Krokodil' (a kind of 'Punch') made Kapitza affectionately symbolize the Great Man himself in this way. What more suitable decoration could there be to grace his splendid new Mond Laboratory than Eric Gill's rampant crocodile which still stands to remind the visitor to the Cavendish that its most eminent professor had a sense of humour which he could share with one of his brilliant 'young men'.

The old nucleus of the Cavendish Laboratory still remains in Free School Lane: modern laboratories have grown up alongside, but it is still possible to see the building in which so much was initiated by Rutherford to change the face of the world, and to provide the possibility of peaceful uses of atomic energy for the service of mankind.



l to r Dr. E. S. Walton, Lord Rutherford and J. D. Cockcroft at the Cavendish Laboratory in May 1932.
Central Press Photo.

BIOGRAPHICAL NOTES

The article on the Cavendish Laboratory was contributed to mark the centenary of the birth on 30 August 1871 of Ernest Rutherford, later to become President of the Royal Society, first Baron Rutherford of Nelson and the holder of many other honours conferred in recognition of his discoveries in nuclear physics.

The writer Mrs. Joy Clarke (née Stebbing) was private secretary to Lord Rutherford for six years in the early thirties during her employment at the Cavendish Laboratory, having started off as secretary to Dr. Cockcroft and Professor Kapitza. Mrs. Clarke left the Laboratory on her marriage and it was her brother Mr. John Stebbing, employed at UKAEA Culham, who asked if she would contribute her article to 'Quest'.

Rutherford became Director of the Cavendish Laboratory in 1919 as successor to Sir J. J. Thomson, OM FRS who had laid the foundations for the work that made the Laboratory famous. Between 1895 and Thomson's retirement the Cavendish had produced three Nobel prize winners, twenty-two Fellows of the Royal Society and more than fifty university professors of physics.

From 1895–98 Rutherford had worked under Thomson and they produced together a paper on conductivity produced in air by the (then) newly discovered x-rays. From 1898–1907 Rutherford was MacDonald Professor of Physics at McGill University, Montreal and from 1907–19 he was Langworthy Professor and Director of the Physics Laboratories at Manchester University (the post held by Sir Brian Flowers, FRS since 1961).

Rutherford became a Fellow of the Royal Society in 1903 (at 32), President from 1925–30, received the Nobel prize for Chemistry in 1908, was knighted in 1914, awarded the Order of Merit in 1921 and was raised to the peerage in 1931, as first Baron Rutherford of Nelson (after his birthplace in New Zealand).

Like Thomson, Rutherford was a most successful team leader. Assisted by H. Geiger and E. Marsden he formed his nuclear theory of the atom. In his later years at the Cavendish (he died in 1937) the most important discoveries were made by his co-workers. Among them were James Chadwick (who discovered the neutron) and John Cockcroft who worked first with P. Kapitza and later with E. T. S. Walton, with whom he achieved the artificial splitting of the nucleus, created the Cockcroft-Walton type particle accelerator and gained the Nobel prize for Physics in 1951.

Cockcroft afterwards became a leading figure in the UKAEA and in the use of atomic power and Chadwick set up the nuclear physics research centre at the University of Liverpool. Kapitza was Director of the Mond Laboratory from 1930–34. Back in Russia he became Director of the Institute of Physics Problems, USSR Academy of Sciences and this year he spoke about Rutherford at the History of Science Congress held in Moscow. A special session was devoted to the centenary of Rutherford's birth.

council members

Two new Council members have been appointed from October 1 1971. They are:

Professor H. Elliott	Professor of Physics at Imperial College of Science and Technology, London
Professor R. Mason	Professor of Chemistry, School of Molecular Sciences, University of Sussex

The retiring members were Professor Sir Ronald Nyholm, FRS and Professor P. A. Sheppard, CBE, FRS.

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:

Professor 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. Ford, FRS	Head of Mechanical Engineering Department, Imperial College of Science and Technology. Group Technical Director, Davy-Ashmore Ltd. *(For other appointments see Quest October 1969 p. 6)*
Professor J. C. Gunn	Cargill Professor of Natural Philosophy, University of Glasgow.
Professor F. Hoyle, FRS	Plumian Professor of Astronomy and Experimental Philosophy and Director of the Institute of Theoretical Astronomy, University of Cambridge. Also Vice President of the Royal Society and President of the Royal Astronomical Society *(For other appointments see Quest April 1971 p. 20)*
Professor H. L. Kornberg, FRS	Professor of Biochemistry, University of Leicester *(For other appointments see Quest October 1969 p. 6)*
Professor P. T. Matthews, FRS	Professor of Theoretical Physics and Head of the Physics Department, Imperial College of Science and Technology.
Dr. J. W. Menter, FRS	Director, Research and Development, Tube Investments Ltd.
Professor E. W. J. Mitchell	Professor of Physical Properties of Materials, University of Reading
D. L. Nicolson	Chairman, BTR Leyland Industries Ltd.
Dr. E. J. Richards, OBE	Vice-Chancellor, Loughborough University of Technology
Professor M. M. Swann, FRS	Principal and Vice-Chancellor, University of Edinburgh
Dr. W. L. Francis, CBE	Secretary, Science Research Council

sports day 1971

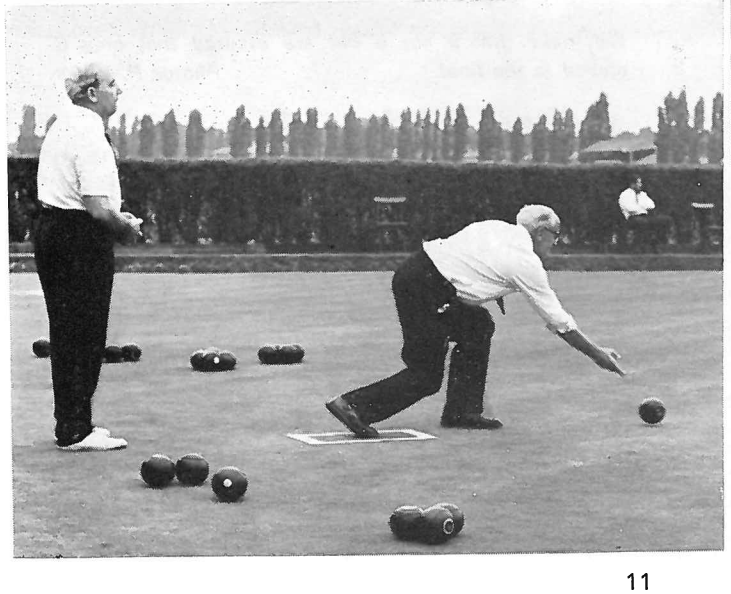
Photos by Peter Hicks (PH) RSRS and Quest.

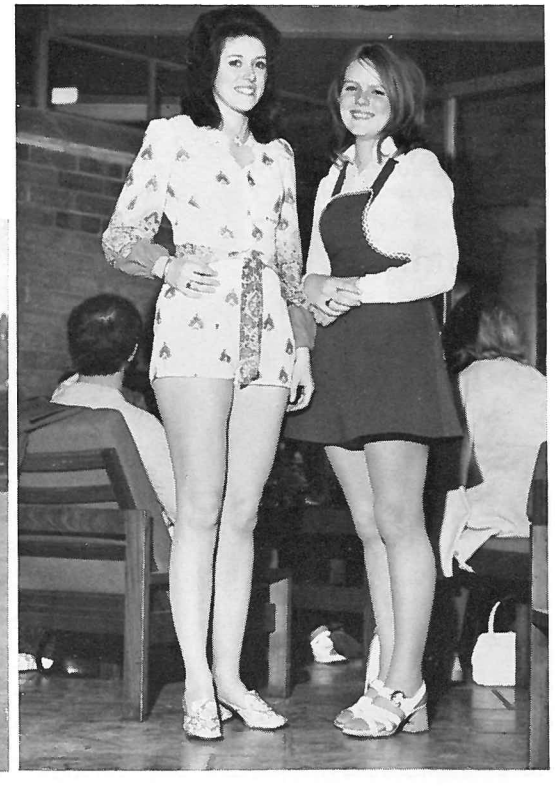
Sports Day 1971 was better than ever. More people came and more stayed longer so the SRC Sports Association who organised it must feel well rewarded for their efforts.
Dr. F. Horner, RSRS, is Chairman of the Sports Association, W. Nicholson, RGO, is Vice-Chairman, H. Cook, LO, is Treasurer and Yvonne Taylor, LO, is Secretary.
With members from all establishments they arranged a very full day. Bowls, chess, cricket, football, netball and tennis were all fitted in. The players gave of their best and then threw themselves into full swing again for a party that ended only when the last coaches had to leave at 11 p.m.

the chess players

Top Eric Bramley, RSRS, the winner of the chess competition who is also Bucks County Champion.
Above left Brian Ferry, DNPL, who played a large part in providing clocks and chessmen so that all the games in each round could be played at the same time.

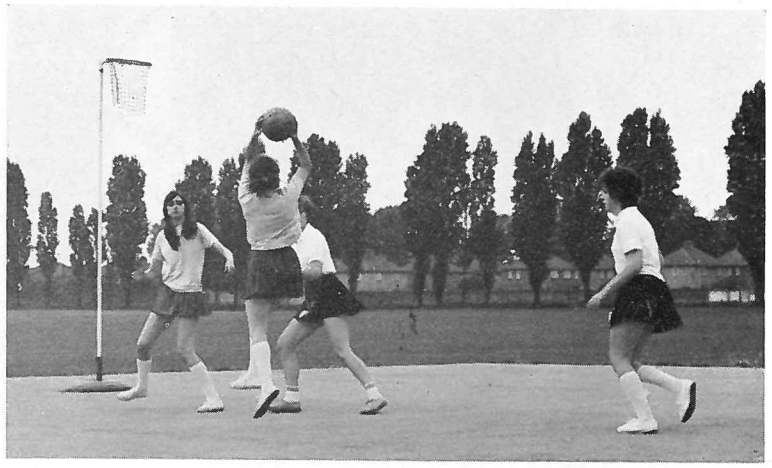
Lady Flowers kindly came along to present the prizes and pictures above show that it was a happy occasion.
Above left Dorothy Hobden and Dr. G. A. Wilkins, RGO, receive the Mixed Doubles Tennis Cup. The Men's Doubles was won by A. Roberts and A. Gordon-Smith of RSRS.
Above right, the winners of the Bowls Team Shield — Bill Rouse, Dicky Blunt, Eddie Gray and Ron Hogan from RHEL. The Pairs Cup was won by Cyril Richardson and Roy Price, also of RHEL, who beat the DNPL pair by 4 shots.
Left, two moments in the bowls tournament.
Below right, two for the party. *Photos P. Hicks*





Cosmos for the Cup

It appears that there is no truth in the rumour that one of the Observatories fielded a side of six white dwarfs. However, the day being very hot, many of the football teams were seen to contain a number of red giants.

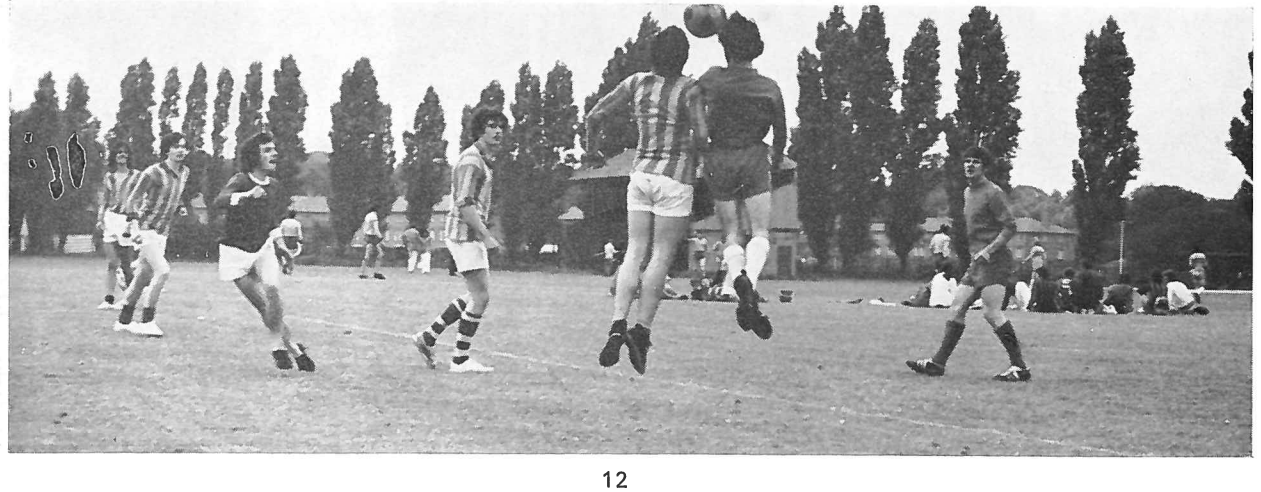


netball

Above the Atlas Netball team who won all their games and the cup.
l to r (back row) Judy Wilson, Nora Rowland, Elizabeth Ellaway, Julie Bryant and Gill Weedon.
(front row) Anna Thompson, Ann Walter, Lorna Claringbold and Judy Herring.

Above Rutherford 'C' Six-a-side Football team who beat Edinburgh Observatory in the final to retain the cup they won last year. Bissell, Shand and Taylor scored the goals.
l to r (back row) John Whittaker, Leslie Patton, Nigel Henderson, Jim Taylor, John Carr and Gordon Howard.
(front row) John Mackerness, Jeff Bissell and Gavin Shand.
We make that 9 not 6 but are assured that only 6 played in the final. *Photos P. Hicks*

football



the cricketers

HOWZAT!

Above an Atlas batsman caught out by Mike John RSRS (wicket keeper) with John Halley (r) fielding. Photo P. Hicks

Below the Rutherford Cricket Team who won the Cup.
l to r (back row) Ray Smith, Mike Watson, Roger Wolfenden, Steve Hancock, Tudor Morgan and Dave Price.
(front row) Brian Goodenough, Martin Donald, Peter Craske (with the cup), Bob Blowfield and Harry Jarvis. Photo PH.

Above spectators at an exciting moment in the cricket final between RHEL and RGO.
In foreground, l to r, Ray Edmonds (former Sports Assoc, Chairman, now seconded to DES), Mrs. Edmonds, and Mrs. Saxton (wife of Dr. Saxton, RSRS).
Behind them, waiting to bat, Brian Goodenough and (in cap) Ray Smith of RHEL whose team beat RGO by 7 runs to win the cup.
In the semi-finals RGO beat DNPL, who won the cup last year, and RHEL beat RSRS. *Quest photo.*

special merit

Four of the Council's research staff have this year gained special merit promotion in recognition of outstanding individual work. They were among thirty throughout Government and public service establishments who were selected by a special panel set up to review scientists who are engaged on research of very high calibre. The promotions are at Deputy Chief Scientific Officer level, equivalent to university professor or reader. They allow the scientist to continue his research without necessarily imposing the extra administrative responsibilities normally associated with the grade.

Dr. A. H. Gabriel, Astrophysics Research Unit
Fundamental contributions to the atomic physics of multiple ionised species and their application to astrophysics is Dr. Gabriel's special achievement and of particular note are his researches into Helium-like systems. These have included the measurement of electron impact cross-sections from the ground level, the classification of groups of satellite lines as inner shell transitions in the Lithium-like state produced by dielectronic recombination of the Helium-like state and the classification of strong lines in the solar x-ray spectrum as the single photon forbidden transition from the meta-stable level and the application of this to the only means of determining electron density in active regions.

Dr. Gabriel is at present a Group Leader with responsibility on the scientific side for the ARU solar programme. The programme is based on the study of the ultraviolet solar spectrum by means of experiments launched in rockets (from Woomera and other ranges). He is also continuing his studies of the Spectra from Laboratory plasmas and is an Honorary Lecturer of the Physics Department of University College London, where he gives courses to post-graduate students on Plasma Spectroscopy.

Dr. B. E. J. Pagel, Royal Greenwich Observatory
Dr. Pagel is distinguished for his work on the abundance of elements in stellar atmospheres. He was a Research Fellow of Sidney Sussex College, Cambridge, and joined the Royal Greenwich Observatory in 1956. He has remained on the staff ever since, but spent six months at Sacramento Peak Observatory, New Mexico in 1960 and nine months at the Mount Stromlo Observatory in Canberra, Australia, in 1963. During most of this time Dr. Pagel has devoted himself to the analysis of stellar spectra – in the last few years these have been taken with the Isaac Newton Telescopes. He has also been an active supporter of the Astronomy Department of the University of Sussex since it opened in the 1960's and is a Visiting Professor. He is married with three children and lives at Ringmer, Sussex.

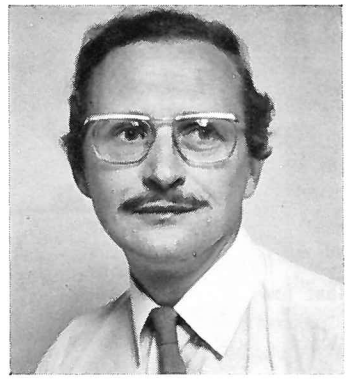
Dr. P. F. Smith, Rutherford High Energy Laboratory
Dr. Smith heads a research team engaged on the development of super-conducting magnets. His contributions in recent years to the theory of twisted filamentary superconductors and their subsequent experimental verification have resulted in the development of superconducting composities which for the first time are completely stable in operation and also have a low heat dissipation under pulsed operation *(as reported in Quest July 1971 p. 12)*

These new materials have revolutionised the construction of superconducting magnets suitable for high energy proton synchrotrons. Earlier on Dr. Smith was responsible for the first feasibility studies of superconducting synchrotrons, and for devising a new type of synchrotron power supply using superconducting energy storage.

Although the work recognised in his special promotion relates to a specific area of technology, this is a means to an end – the primary objective being to advance ways of exploring fundamental physics. Dr. Smith's interests are directed towards any new ideas which may help to remove present practical or theoretical limitations in this field of research.

Dr. Smith is 37, married with two daughters and his leisure activities include elementary particle theory, fencing and music (he was at one time musical director for an amateur dramatic society in Oxford). He joined the 'Accelerator Division' of AERE Harwell which has since grown into the Rutherford Laboratory, in 1955.

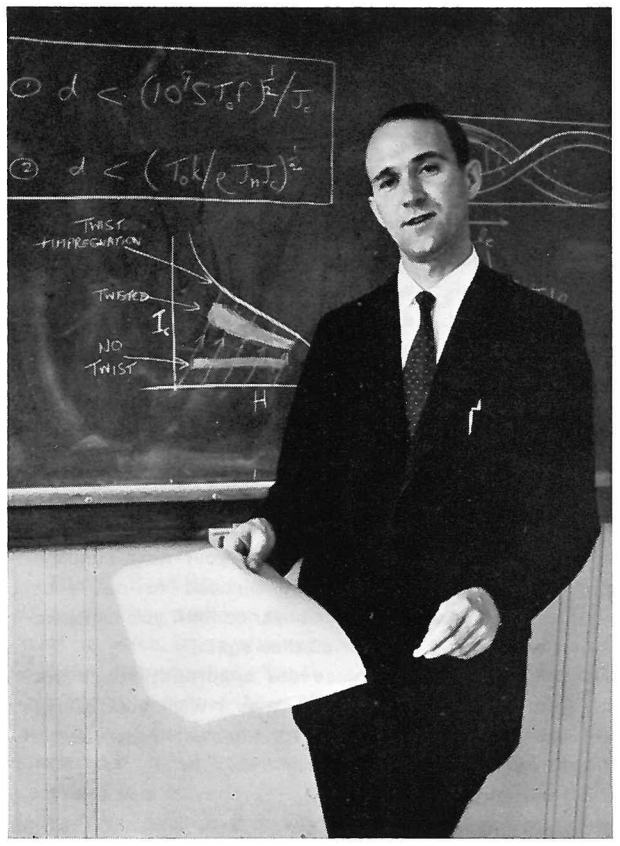
Mr. N. M. King, Rutherford High Energy Laboratory
Mr. King is a high energy accelerator theorist, currently engaged in the design of a 1000 GeV proton accelerator based on the new superconducting magnet technology. This is conceived as a possible development of the 300 GeV accelerator which has just been approved by CERN Member States. He is the convenor of a small design working group drawn from the three European Laboratories – Karlsruhe, Saclay and Rutherford – who are jointly studying the problems of superconducting synchrotrons.



Marshall King, Rutherford High Energy Laboratory.

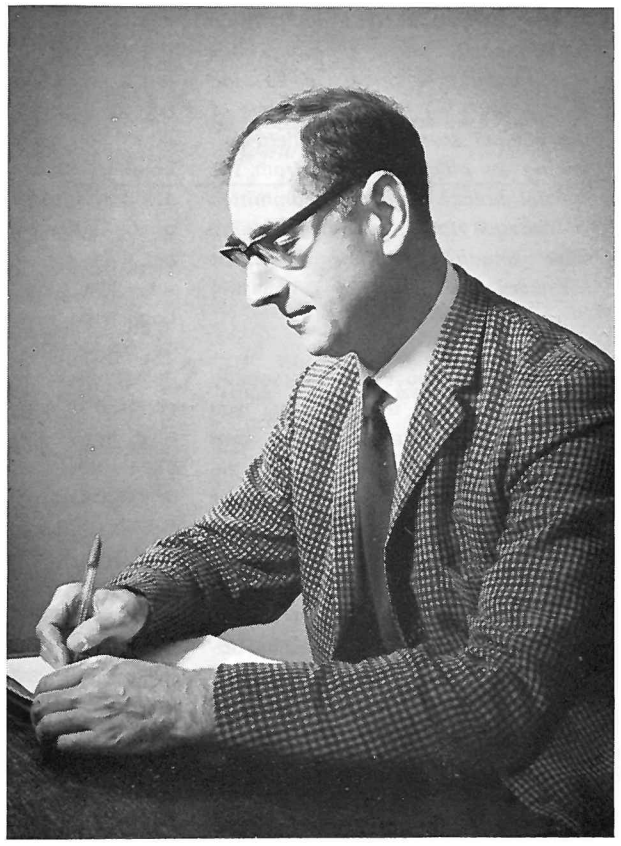
Dr. A. H. Gabriel (ARU).

Dr. P. F. Smith, RHEL, Rutherford High Energy Laboratory.



Professor Bernard Pagel (RGO).

Photo by E. A. Meyer, Lewes, Sussex.



Q column by 'observer'

Sports of all sorts in the last few months. The pictures that passed the Censor are in the centre pages, the rest are now on tour to all establishments (or available we suppose from the usual sources). Copies may be found at Peter Hicks's (RSRS Photographer) or Quest office.

Quest Quarterly Quote

'. . . the 8 Miladies on-line have been operating in the TC Division since 1971. A total output of at least 500,000 measured events is expected.'

CERN Scientific Policy Committee paper.

Happy ones we hope.

All rounders

Congratulations to the Rutherford Laboratory Rounders Team who became champions of their league without conceding a match. They attribute their success to dexterity, agility, holding on to the ball and a good sense of direction – you have to play to understand the subtleties! Where else can you chase a girl round the field legitimately. Congratulations also to the team captain Tony Stevens who bowled a maiden over in each match – and caught a fella by mistake (we hope).

The Christmas Card competition (see opposite page) prompted one of the committee secretaries to send in the following letter. The name of the alleged student is withheld following an official request from the special branch (grants?) committee at Tintagel House who are pursuing their enquiries among associate members of the NUS.

Dear Mr. X

I felt that I must write personally to apologise for the fact that you did not receive a Christmas card from us last year. The fact of the matter is that I had not seen your file before I used it to find out your current address, and I became so engrossed in the correspondence which you have had with the Council that I quite forgot why I had obtained the file in the first place.

The first exchange of letters which caught my attention was the one in which we queried whether Miss A or Miss B was in fact your common-law wife and, if so, whether the relevant liaison had begun during a period in which you had supported yourself by your own earnings. The question of whether the earnings should properly have been attributed to you or to one or both of the ladies was a fascinating point, as was the question of whether time spent as a 'trusty' in a mailbag shop could qualify as a period of responsible employment in industry. Again, the total number of children of which you claimed paternity was quite outside our normal experience. Your arguments concerning your enforced absences from the University were, I feel, very well put, though I am sure my colleagues were correct in their decision that since you were receiving board and lodging at public expense during these periods your award should be abated. Your contention that the benefits received should be regarded as prizes (i.e. resulting from past achievements and having no direct relationship to future work) undoubtedly caused some consternation here for a while, though. I can understand how it was that from time to time you became a little exasperated at what you felt was our rigid interpretation of regulations but I feel that our general flexibility was demonstrated by our willingness to pay your field work expenses in connexion with your botanical studies in Mexico. Perhaps this is a convenient point at which to deal with your recent query and to say that the sum which the United States authorities have sought from you cannot be regarded as a legitimate cost for SRC to bear. If I may anticipate your next enquiry, we shall be pleased to put your award in abeyance until you can take up your studies again.

In case the opportunity does not occur again, may I wish you 'Merry Christmas' for the next three years?

Yours etc.

Competition result

Competitors were asked to design a Birthday card or Christmas card for SRC-supported students and to supply good reasons that could be offered as an explanation, in keeping with the high tradition of SRC, for having forgotten Christmas.

The results which appear here have been referred to the appropriate Grants and Awards Sub-committee (Chairman S. Nicholas) with our recommendations. A report can reasonably be expected within five to ten years.

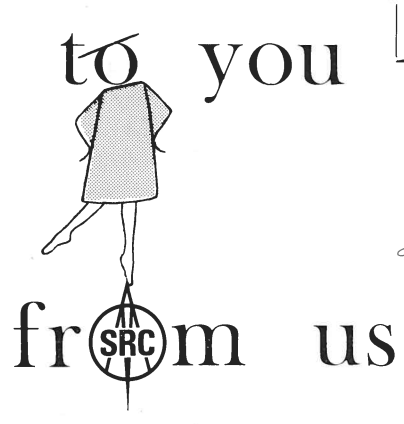
HAPPY NEW YEAR DEAR STUDENT

It is regretted that it was not possible to wish you the compliments of the Christmas season. This was due to the fact that the Chairman and Members of the Committee, and such supporting office staff as could be spared from their duties, had chartered a Boeing 707 and gone to Morocco.

May I take this opportunity to say that our funds are rather low, as I am sure that you would like to show your appreciation of our generous support over the last year by a small donation. For instance, did you know that just £550 from every student would bring in a handsome addition to our meagre salaries.

Merry

Christmas



INSIDE:

1. The Council intends that its greetings shall be received by the person whose name appears on the accompanying envelope (hereafter called the Student).
2. The Student will provide the facilities normally required for the achievement of the situation described in the greeting, e.g. accommodation, heat, light, food, alcohol, etc. These are not precisely defined since they may vary with the circumstances of the student.
3. The Council will have no responsibility financial or otherwise for expenditure or liabilities arising from the Students attempt to achieve or his successful described in the greeting.

Here's a card 'spec'ly for you

(A standard form's with it too)

Just complete and send to us

Thus avoid delay and fuss

(a multi-purpose standard personal goodwill card by ϕ).

We're sorry you didn't get your Christmas card, but . . .

The decision to move all the Council's closing dates to October 1 produced an unexpected burden of work in the pre-Christmas period.

The ASR Board argued that the whole exercise was a waste of money, and also queried the accuracy of the astronomical event depicted on the cards.

The O & M Unit calculated that it would be cheaper to send one card to each university with a circulation list attached. Those receiving the card before June 25 should take it as applying to the previous Christmas; those receiving it later to the next one.

The recent pay award which raised a CO's starting salary above the SSO's maximum has caused a certain amount of friction over who should address the envelopes, but it is expected that this problem will be resolved in time for next Christmas.

The punched card system at NPL of which details of students are recorded was declared an ancient monument and immediately demolished by a speculative builder.

The question of whether the card should read 'Happy Christmas' or 'Merry Xmas' was referred to the IDC. The final compromise solution (Happy/Merry/Christmas/Xmas – delete as appropriate) was unfortunately not reached until mid-March.

'F' Division favoured the use of 'Xmas' since it would be cheaper to print, but 'E' Division objected that this would leave too much wasteful white space on the card and argued that 'Christmas' would give better value for money overall. the argument is still proceeding.

The design of the card was produced in good time by Mr. St.n W.ts.n. When he received no adverse comments on it, however, he lost confidence in the result and refused to let it be used.

hotel bomb plot HOLIDAY HOTEL
CRISIS HITS CRASHES
TOURISTS take to the boats
BRITONS PLUNGE

Have you noticed that every year there are more dreadful experiences lying in wait for the unwary traveller who sets off with the idea that a charter to Majorca is no greater risk than taking the Piccadilly to Holborn. Up till now we had dismissed the lot as stories to spin out the silly season, on the level of the one that got away.

Perhaps we are wrong. It may be the stay-at-homes who say it's easy. Perhaps those who go really are the first to scale the rising towers of concrete, to sleep where no one has been able to lie down before, and venture on the seas in ships where human hand forbears to turn the wheel when all-seeing radar is on the bridge.

Roger Count

that boat

We wanted a holiday that we would never forget. Looking through the brochures my wife and I were completely seduced by the bountiful descriptions of heaven on earth. Eventually we decided on a cruise. Who wouldn't after reading:

'Jet away to a glistening white ship: slip away through the sparkling seas of the Adriatic, the Aegean and the Mediterranean; explore Greece and her Islands; see Jugoslavia, Cyprus, the Lebanon and Israel.

'Isn't 1971 your year for this kind of holiday? A holiday of sunshine and bracing salt breezes; of balmy nights at sea; of fascinating days exploring ashore; plus ****'s care on an air-conditioned cruise ship. Join the holidaymaking élite and cruise through azure seas, following ancient trade routes to living history. Enjoy the glamour of shipboard life on starry nights as your floating hotel glides on to the centuries old wonder of tomorrow's port of call. Perhaps it'll be the Island of Rhodes. Perhaps the jet-set life of Beirut; possibly Athens by night. Strike out from Haifa to see Bethlehem or Nazareth; gaze at the Acropolis or Olympia.

AND – do it all on the same holiday with no fuss, no unpacking, no wearying overland journeys. Wherever you go your air-conditioned hotel goes too, waiting at the quay to welcome you aboard as you return, aglow with the magic of an unforgettable day, looking forward to a night of fun at sea as you sail away into the sunset. Ready for this kind of holiday? Of course you are. Who isn't?'

The brochure continues in a similar vein but from now on I would like to offer a translation for other would be members of the 'holidaymaking élite'.

Brochure: 'The cruise ship, TSS ————, is being specially prepared for ****'s 1971 cruising season. She will be fully air-conditioned, has an overall length of 495 feet and a maximum cruising speed of 19 knots.'

Translation: *The TSS 'Floating Just' is at present still not ready for ****'s 197? cruising season. She will be as stuffy as hell and will be too slow to get you where you are supposed to be going on time. (They were right about the length.)*

Brochure: 'Below decks the ship will have (*note the future tense*) an exciting discotheque, well-stocked duty free shop and hairdressing salon. A daily information sheet tells you all about the entertainment and things of interest happening on board.'

Translation: *On board you will have an exciting time trying to locate the non-existent discotheque and hairdressing salon. The duty free shop is so well stocked that you will not be able to get inside for the first three days. At breakfast a daily information sheet is issued telling you about the entertainment and things of interest happening on board; at dinner you will be given a supplement telling you why they didn't take place.*

Brochure: 'As a major plus feature ****'s have insisted that all cabins are air-conditioned and have private shower, WC and wash basin. Every cabin is delightfully decorated and will provide ample clothes space and a full length mirror.'

Translation: *The air-conditioning is not working properly, to ensure that you spend as much time as possible on deck and in the bars. As the ship will list to starboard for the first 4 days of the cruise, those on the port side will only be able to have a 5 minute shower to prevent the cabins flooding. Every cabin is decorated and includes a full-length mirror – for midgets!*

Brochure: 'Breakfast is continental but, if preferred, English breakfasts can be ordered for only 20p extra a day. Snacks will be available at the pool bar and in the lounges. In each of the ship's bars, the drinks will be served at duty free prices. The same applies to cigarettes.'

Translation: *An English breakfast costs 22½p a day extra. If the meals on board do not satisfy your appetite you will have to wait until you go ashore before you can get anything more to eat. Alcoholic beverages will be sold at a little above duty free prices but soft drinks will be very expensive. Cigarettes are cheap, but are cheaper at Dubrovnik airport.*

Brochure: 'There'll be a host of on board activities, day and night. Apart from free deck-chairs in which to turn a lazy brown as you watch the foaming wake, you will enjoy deck-tennis, shuffle board, quoits or a dip in the pool. The games room includes table tennis. Every night will feature dancing in the main lounge and in the atmospheric discotheque (*So that's where it was*) Naturally the Social Director will be arranging Fancy Dress Parties and Gala nights to complement the glamour of your first night's Captain's cocktail party.'

Translation: *There'll be a host of on board activities, day and night. Apart . . . . . as you watch the undisturbed sea, you WILL enjoy deck-tennis, quoits, a dip in the empty pool, suitcase and passport hunting, finding which bar still has some ice, etc. There is as yet no games room but the table tennis table is to be found in the pool. Naturally, the Social Director . . . . . to complement the glamour of your first night's sherry and a crisp with the captain.*

Brochure: 'Each cruise has been carefully planned to ensure you berth at the best possible time to take advantage of the fabulous excursions we have arranged.

Translation: *Because the ship is slower than we thought, you will nearly always arrive late at our chosen ports of call. Don't worry! Jerusalem is well worth a 3 hour coach journey at an average speed of 80 mph!*

In all fairness I must add that ****'s only mistake was to let the ship sail – and I'm glad they made that one. Afterwards they did everything in their power to minimise the inconveniences and, for most of the passengers, they succeeded. The brochure contained much more which was perfectly accurate and I would recommend this type of holiday to anybody. We will certainly not forget it – it was our honeymoon!

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guestimates

Would that someone had the power
To enter into Treasury's bower
And from there extract those pathetic inmates
Who decide on the form of our Estimates

From humble guess after careful thought
Multitudinous figures develop and are wrought
Into schedules and folios of figures sublime
Which have little meaning, but waste hours of time

Beware your guesses in Forward Look
For in five years' time you'll be brought to book
To explain in close detail your ridiculous guess
Without any recourse to years or stress

Explain if you dare why your five-year guess
Is today different and not much the less,
Only eighteen months have since gone by
So you may not now claim differently

But this is nought to the comparisons made
Twixt figures today and the last decade
Should they differ by the nearest jot
The vultures swoop on this terrible blot

Each figure you impose on your original guess
Will be rigidly examined to excess
Your original guess will however remain
'Ne'er mind the ball – get on with the game'

Dare not to claim that rising prices
Now change the mode of your guessing vices
You should have known five years ago
Something the Government did not know

The true position must not be declared
To complicate Estimates already aired
Then finally you will get your due
To spend on items not needed – but 'grew'

And when you come to the annual reckoning
Be sure that the hangsman is not beckoning
For if you Outturn what you expect to spend
Any change from your Estimates – portends your end

The inevitable moral about pennies and pounds
Must still be going the Treasury rounds
One day they'll accept the unwelcome fact
That the reverse position would be more exact.

Philis Tine

Quote quiz

'The duties (of the job) are varied and interesting and will provide successful applicants with experience in administrative procedures and the supervision of junior staff which will be invaluable in the development of their future careers.'

A tricky one this – who said it and when?

answer on page 24

Classified Advertisements

Send entries to Editor of Quest SRC. London Office R1521 with your name, address and tel. ext.

GEORGE – please phone training section as soon as possible.

QUEST jokes explained. Confidential service, plain wrapper. BOX 130.

URGENT – would the subscriber to Box 119 pse collect his mail asap. It seems to have died.

Nutcracker No. 5 — logic

The two perfect logicians Tick and Tock were conversing on the telephone.

Tick: I'm trying to remember how old Tack's children are. I know Perkin's the eldest, and Rosemary is older than Sadie. I know Perkin's not 30 yet, and I'm sure I went to Quentin's eleventh birthday party. I even know that Perkin's age times Quentin's equals Rosemary's age times Sadie's. In fact I can remember Sadie's age, but I still can't solve the problem.

Tock: I know Quentin's age, but I can't complete the list either.

Tick: I still can't solve it.

Tock: Neither can I. Would it help if I told you Quentin's age?

Tick: Not necessarily.

Tock: In that case I now know all the ages.

How old are Tack's children?

Hint Write down all the possible combinations of ages. Which ones can be eliminated after each statement?

answer on page 24

Competition

From what we hear, SRC's reputation for original research owes a great deal to the university groups, visiting Research Fellows or odd students who co-operate in our experiments. Competitors are asked to compose a suitable acknowledgement in the form of a thankyou letter, a confidential report or an official complaint.

Please send in your entries by **November 19** to your local correspondent or to the Editor of *Quest* – address as below.

The victor ludorum this year
Kept his cool and played in top gear
But admitted when pressed
He reported for QUEST
And had only come for the beer

PLAY THE GAME – **TELL ALL**
ABOUT YOUR PLACE IN THE
SRC TEAM

write it for Quest now

physical
metaphysical
or farcical

write it or draw it and send it to your local correspondent or to:

The Editor
'Quest'
London Office
(room 1521 ext 255)

SEND COPY by **November 19** for january Quest (featuring Space) and before **February 1** for the april issue (featuring Technology)

SEND NEWS, PICTURES and ODD ITEMS in at any time

training timetable

Brief descriptions and future dates of courses run by the Central Training Section, London Office, are given below. Managers who are considering attendance by their staff can get further information from local or central training officers.

Induction Course
for all new staff
The course gives information on the formation and organisation of SRC and its work in the various scientific fields; also on conditions of service and staff associations.

Scheduled dates
(up to June 30, 1972)

1971
September 27–October 1 at DNPL
December 6–10 at RHEL

1972
February 28–March 3 at RSRS
May 22–26 (place to be arranged)

Course A
for clerical officers with at least 3 years' experience in the grade. (Initially for LO staff only).
The course covers basic statistics, estimates and accounts, basic organisation and methods (O & M), communication and effective writing.

1972
March 20–24 at LO

Course I
for Scientific Officers, Experimental Officers, Assistant Experimental Officers, Executive Officers and equivalent grades, under age 28.
The course looks at the National organisation of research and development and policy, at organisation and methods (O & M), networking for projects, decision analysis, communications, work-team relationships and basic managerial responsibilities.

1971
November 15–19 at LO

Course II
for Senior Scientific Officers, Experimental Officers, Engineers Grade II, Executive Officers and equivalent grades over age 28.
The course explores delegation, motivation, leadership planning and forecasting techniques, staff reporting and interviewing.

1971
October 18–22 at LO

1972
April 17–21 at LO

Course IIa
a follow-up course to II (new experimental course).
The content of the course will be selected by its members.

1971
September 1–2 at Coseners House Abingdon – residential

Course III
for Senior and Principal Scientific Officers, Senior Experimental Officers, Senior Executive Officers and equivalent grades.
The course wil consider the analytical and sociological approaches to management.

1972
January 24–28
June 26–30
at Coseners House
Abingdon – residential

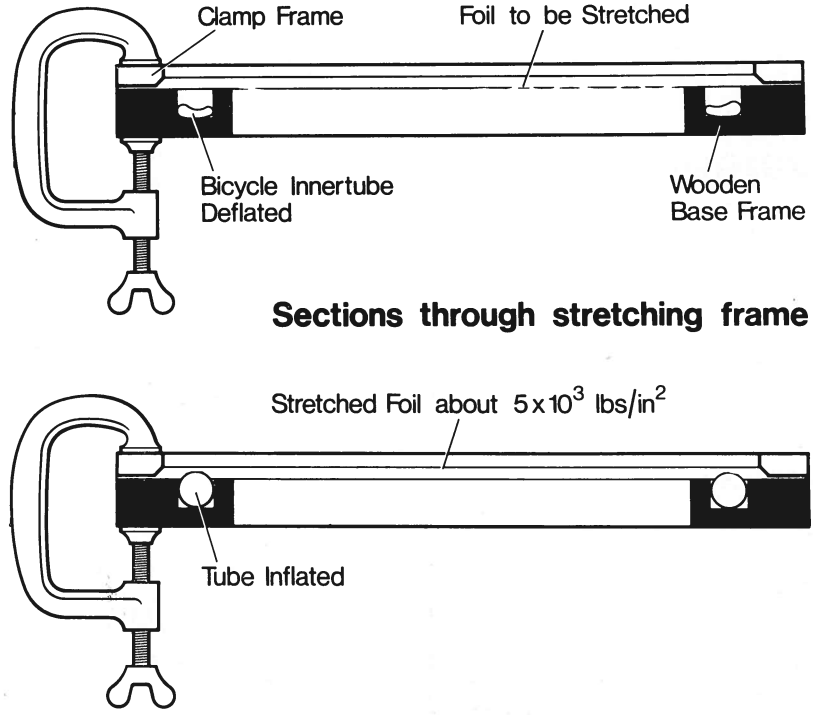
well stretched

Below, one of the five Rutherford Laboratory exhibits at the 1971 Physics Exhibition. The stands for the exhibits of the five Research Councils were designed and produced by the Central Office of Information on behalf of the Department of Education and Science. Other SRC establishments represented were the Radio and Space Research Station, Daresbury Laboratory and the Astrophysics Research Unit (the exhibits were named in *Quest*, January 1971 p5).

The picture shows the Rutherford Laboratory Foil Stretching Technique. By stretching foil over an inflated rubber tube set in a hollow frame, aluminium foil (0.0005 and 0.001 inches thick) and polyester film (0.001 to 0.005 inches thick) can be made wrinkle free at a pressure of up to 5 pounds per square inch and fitted to a frame in one simple operation. Pressure can be increased to 10–15 psi for very tight foils and the present maximum size of 12 by 8 feet is only limited by the size of foils available.

This relatively cheap but positive and controlled method has been developed at Rutherford Laboratory for the framed foils used as particle detectors in spark chambers. The method is more satisfactory than 'thermal stretching' which requires perfect temperature conditions and is in any case not suitable for polyester films which are very heat sensitive. It is also simpler and cheaper than the 'rising table' method which requires very accurate placing of the foil on the stretching frame and very close tolerances from the machine, which is therefore expensive to construct.

In the new method, the rubber tube takes up discrepancies in the tightness of the foil, as it is inflated. It allows a choice of adhesives since they can be applied to the frame which can then be laid directly on to the foil and, providing the pressure of the tube in the stretching frame is kept constant, left to harden over many hours. The frame to be applied is prestressed to balance the tension in the foil (to avoid distortion) by a simple corner pivot and stressing bolt assembly and side clamps as demonstrated in the diagrams on right.



Sections through stretching frame

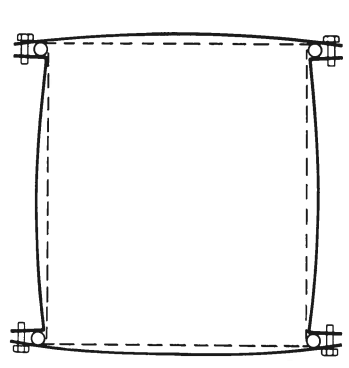


Fig. 1

The frame is distorted about the built-in pivot points at the corners by tightening the stressing bolts.

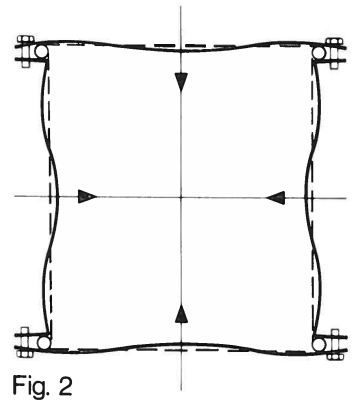


Fig. 2

Clamps are placed on the frames and opposite sides are pulled back as shown by the tie bars.

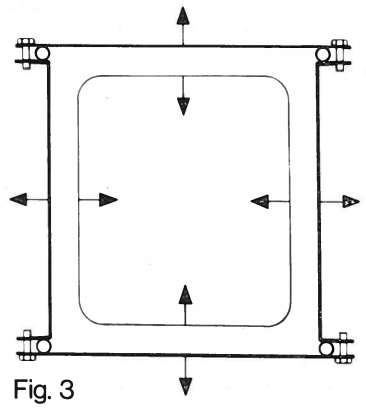


Fig. 3

The pre-stretched foil is stuck to the pre-stressed frame. The tension resulting from the frame members attempting to return to their normal state balances the tension in the stretched foil.

ICA exhibition — unlikely photography

Quest regrets to announce that the exhibition was not held on October 26 as expected (see July issue p. 13). ICA had to postpone it due to financial restrictions but their letter did not arrive until *Quest* was out.

ICA are keeping the material meanwhile and hope to arrange to hold the exhibition within six months of the original date. Anyone who wants to see it should keep in touch with Geoff Gardiner, RSRS, who should be the first to know the new date.

mark VA

A design for a new radio telescope with an aperture of 375 feet has been commissioned by the Science Research Council at a cost of some £250K. Two preliminary design studies begun in 1967 will now be carried a stage further and in a year's time tenders for construction of the major components will be considered.

The specification is for a telescope with a solid membrane across the aperture, to give accurate reception of wavelengths down to a few centimetres that can be operated by remote control from the Nuffield Radio Astronomy Laboratory of Manchester University, Jodrell Bank (Director Sir Bernard Lovell, FRS). The site proposed for the new telescope (the Mark V A) is Meifod in Montgomeryshire, Wales, so that together with the Jodrell Bank Mark I (250 foot) telescope (extensively modified and repaired under an SRC grant) it could form an interferometer with a base-line fifty miles long.

welcome to atlas

families day

About 250 people attended an informal Families Day held in the Laboratory on Saturday 4 September. They had plenty to see – our new Computer Block, Atlas S 2 and SD 4020 operational on normal work, the PDP 15 being run up after its recent move, 1906A undergoing commissioning trials.

Demonstrations by AERE Fire Brigade of rescue from a car crash, and mouth to mouth resuscitation by Ricky Eaton of the Rutherford Laboratory Safety Section attracted many people, so did the SRC film 'Insight'. At the end of their tours everybody appreciated the refreshments prepared and served by Gillian Keats, Trude Trewin, Joan Markham and Synolda Butler.

Thank you Robbie and all the 'Adminers' for a very successful day.

animation

Animation at Atlas

On July 30, the Atlas Computer Laboratory held a one-day symposium on computer animation. The Laboratory's interest in the subject stems from the use of its SD 4020 microfilm recorder in the production of research and educational films. Probably the largest user is the Open University and John Richmond of the BBC gave an interesting talk showing how computer animation relates to the rest of the TV programme. He showed a number of excerpts from the Foundation course in Mathematics which has been screened this year.

Films were given by Jon Ogborn of the Nuffield Foundation's Science Teaching Project and Professor Judah Schwartz of the Massachusetts Institute of Technology. Professor Schwartz spent the summer at the Laboratory and showed a number of the films he had made to demonstrate electric fields of moving charges. These have an artistic beauty independent of the content of the film. This also applies to the work of Professor Roger Hockney of Reading University who stimulated the evolution of galaxies of 50,000 stars – on a severely contracted time scale!

The symposium was held in the Rutherford Laboratory Lecture Theatre from 10.30 am to 8.00 pm. It was attended by about 150 people and a repeat of the film portion drew over 100 people the following week. The Symposium received, on the whole, favourable press reviews. Here are two of them:

'It was also one of the best organised meetings that has been attended recently running very close to the scheduled timing and with a standard of presentation of a very high order – for once the visual aids were well handled, part of the proceedings and not a makeshift addendum to them. One might well add "Others please copy" . . .'

Film User Sept 1971.

'The subject of computer animation flared into prominence in the last fortnight when a one-day symposium was held by the Science Research Council at the Atlas Computer Laboratory in Didcot. This seems to be the spiritual home of the craft in Britain . . .'

Financial Times 10 August 1971.

answers

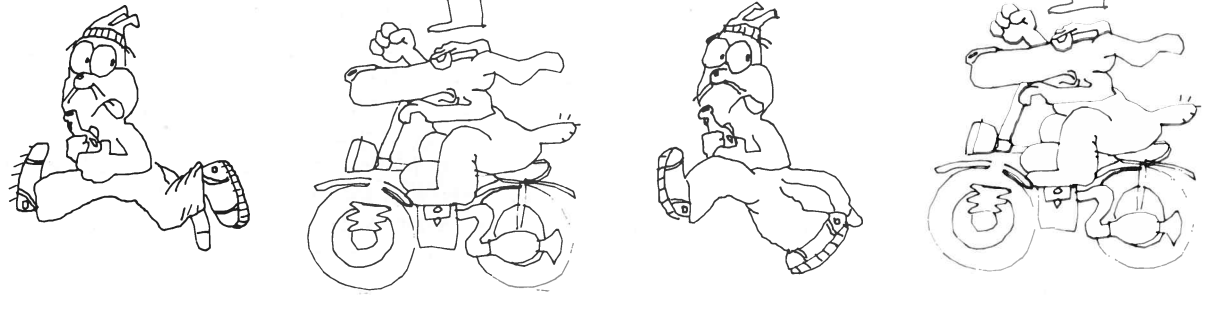
— see page 20 before you look at these.

Solution to 'logic'

Perkin is 28, Quentin 11, Rosemary 22, and Sadie 14.

Answer to quote quiz

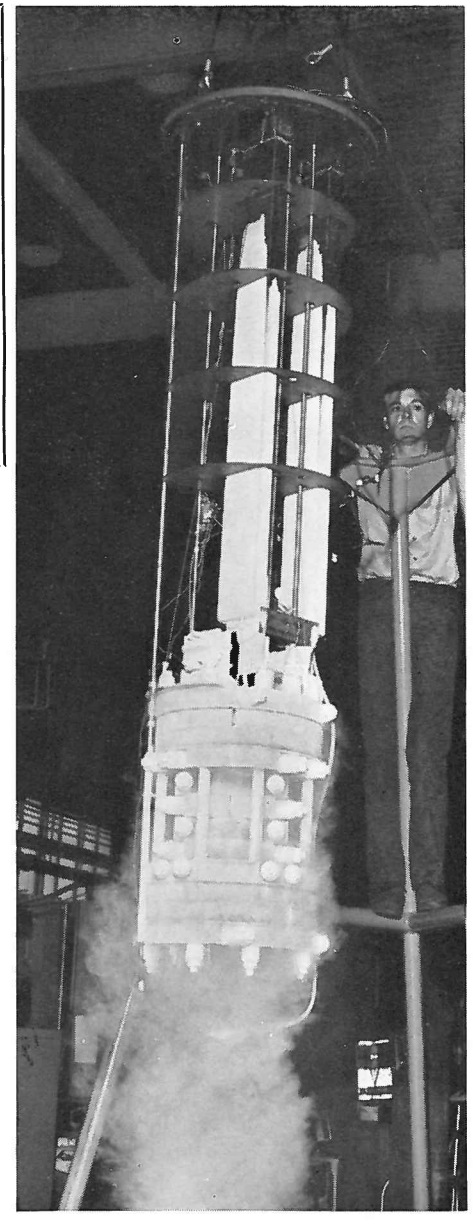
Extract from an SRC advertisement for Executive Officers for LO published early in 1966.



atlas aids BBC

In July the Atlas Laboratory was approached by the BBC's Tomorrow's World programme for help in producing a sequence on Computers and the Animation Industry. The aim was to show how a computer could be used to aid the professional animator in the design stage of his work. The Laboratory's facilities were used to show how a D-MAC pencil follower could be used to input the key frames in an animation sequence. Sample timing of the animation was done using the display on the Laboratory's PDP 15 and final pieces of film were produced using the SD 4020 microfilm recorder (see Quest Oct 1970 p. 6 for technical details). The operators certainly enjoyed seeing bloodhounds and cats coming out on the film in place of the more conventional scientific plots. The programme was televised in September.

milestone



picture shows the AC 3 magnet, still cold, being lifted out of its cryostat – low temperature enclosure – after the first test run. Up aloft is John Brown, a member of the experimental team.

Successful tests have been carried out at Rutherford Laboratory on the pulsed superconducting dipole magnet known as AC3. We believe this is the first pulsed dipole which has an aperture, field and operating current comparable to the requirements of a high energy superconducting synchrotron – such as the CERN 300 GeV machine converted to 1000 GeV or an uprated Nimrod. Developments along similar lines are well under way at most of the big accelerator Laboratories.

AC3 is capable of cyling continuously with rise times as short as 1–2 sec and is designed to produce a magnetic field of about 40 KG in a 10 cm bore, or (with an additional insert now under construction) about 45 KG in an 8cm bore. In the first tests AC3 was pulsed at about 90% of its 5400A critical current, with rise times down to 1 second. The measured ac loss was approximately 10 watts at a 4 sec cycle time – close to the predicted value for the conductor used. The magnet was quenched many times, without affecting its performance. Some 'training' was observed – a characteristic feature of the 'running in' period of a pulsed magnet – the maximum central field reached in this cooldown being 38KG (without the assistance of an iron shield which would increase the field by 20–40% in an actual synchrotron).

The successful testing of this latest magnet represents another significant milestone in demonstrating the feasibility of superconducting synchrotrons. Further dipole models AC4 and AC5, are planned for 1972-73. These will incorporate improved types of cable, iron shielding and higher winding precision.

The conductor for AC3 was made from a 1045 filament 0.4mm diameter composite supplied by IMI formed into a 90 strand transposed cable and subsequently compacted to a 5mm square section. The coil was of the 'sector geometry' type, wound in six concentric layers and fully impregnated with epoxy resin. Mats of copper wire, sandwiched between the winding layers, are used to conduct the ac heat out of the coil to the liquid helium.