# QUEST

Vol 9 No 2

Viking mission to Mars

Franco-British scientific agreement

Angus underwater explorer

# QUEST

**House Journal of the Science Research Council**

**Vol. 9 No. 2**
**1976**





*Quest* will be issued four times this year by the Science Research Council for members of staff only. The Council is not necessarily associated with any individual views expressed.

Published by the Science Research Council, State House, High Holborn, London. Set in *Times* and printed by Swindon Press Ltd., Swindon.


*Cover*

Picture shows the launch of Angus from the Ministry of Agriculture, Fisheries and Food vessel '*RV Clione*' during trials off the coast of Norfolk in July 1975. For story see opposite.

**Contents**


| | |
|---|---|
| Angus, underwater explorer | 1 |
| Franco-British Scientific agreement | 2 |
| CompAir, the first teaching company | 2 |
| Council Commentary | 3 |
| Flare studies during the Solar Maximum | 5 |
| Viking mission to Mars | 6 |
| CERN SPS | 6 |
| First metioscope at Leeds | 7 |
| Newsfront | 8 |


# Angus, underwater explorer

Angus, a small, unmanned, navigable vehicle for underwater surveying is the creation of the Department of Electronic Engineering at Heriot-Watt University. It was built in 1972 with a Council grant and further Council funds this year have meant that work on the design and construction of the more advanced Angus 002 can begin.

**Unmanned vehicles**

The advantages of un-manned cable-controlled underwater vehicles are numerous. The very fact that they are unmanned means that, in an emergency, they can be considered expendable. Their size means that they are more manoeuvrable in confined spaces. They can be operated 24 hours a day, seven days a week by a crew working shifts. Because they are small and light, surface support can be provided by any small 'ship of convenience' equipped with an adequate derrick. Finally, by removing the need for heavy pressure-proof spheres and banks of massive storage batteries, the cost of designing, constructing and operating can be reduced by ten per cent.

**Potential uses**

There are many potential applications for these vehicles. They could be employed by oil and telecommunications companies for inspecting oil and gas pipelines/submarine cables. They could be of use in seabed search missions by, for example, oil companies relocating equipment or by salvage companies looking for ship/aircraft wreckage, etc. They would be particularly advantageous in hazardous environments – searching for explosive devices, gas or oil leaks or where there were radioactive fallouts. They would also be of use to universities, government laboratories and private companies interested in marine-resources exploitation and in the effects of pollution on marine ecology.

**Angus system**

The vehicle itself is designed on the pressure-compensation principle, which allows a thin-shell hull to be used, with consequent advantages of weight and cost. The system consists of the following modules: vehicle; control console; navigation transponder buoys; earth-leakage protection unit; set of tools, spares, handling gear; compressor; and video recorder.

An important design feature of the Angus system is its modular construction which makes it much easier to handle. The vehicle itself can be handled by about six men and the other units by about four. The surface support required is minimal, and the vehicle is small and light enough to be operated from a 20 m fishing boat equipped with a small derrick.



**Angus 001, in 1975 state. Manipulator is experimental, attached for photograph only**

At the outset it was decided, where possible, to use readily available low-cost components modified for the unusual environment, rather than high-cost components designed for underwater applications but available only in small quantities from abroad. Apart from one or two specialised items, eg the television camera and the main umbilical-cable connectors, the idea has proved successful.

While Angus is capable of roaming over selected areas of the seabed at will, this is of little value unless its exact location is known. For this reason, considerable effort has been devoted to designing an effective, low-cost navigation system.

**Sheltered-water trials**

In the early stages of development, tests were carried out in pressure vessels, diving pools and the open sea to check the control of the propulsion units, methods of buoyancy control and pressure compensation. During the summer of 1973 the vehicle was operated in Loch Linnhe in water depths from 10 to 150 m and excellent closed-circuit television pictures were possible.

The Angus vehicle is designed to operate to a depth of 300 m, although the principle on which the hull construction is based does not in itself impose any depth limitations and during December 1973 the vehicle was submerged to a depth of 335 m in a flooded mineshaft at Rothes, Scotland. The deep dive was a total success, proving the soundness of the design philosophy. (It is also believed that this dive is a record for a vehicle of this type in the UK).

In 1974, the acoustic-navigation facility became operational and the whole system was successfully tested at Loch Linnhe. Then Angus was operated in the Moray Firth and off Aberdeen during joint trials on the Ministry of Agriculture Fisheries and Food Vessel *Clione* and later took part in joint submersible trials in Scottish and Norwegian waters on RV *Challenger* under the auspices of the Institute of Geological Sciences. During 1975 a total of thirty dives were carried out, including assignments for MAFF in the southern North Sea, filming near Oban for a 'Tomorrow's World' television feature and inspection work for Admiralty Research Laboratories, in Loch Long. The integral navigation system with a demonstrated position-fixing repeatability of 1.5 m proved to be a unique and invaluable asset on these trials.

**The future**

The difficulties of carrying out detailed remote-controlled inspection in depths of hundreds of metres of water in the open sea are immense, but the demand for such work is increasing daily and technology is barely keeping pace. The designers are now looking to the likely demands of 1980/85 and are embarking on studies which they believe will lead to the capability of submersible operations under computer control, with advanced viewing and manipulative facilities.

## CompAir, the first Teaching Company

Work on the first practical project under the Teaching Company scheme, is already under way at CompAir, the UK's largest manufacturer of air compressors and associated equipment. The aim of the project, which is under the direction of Professor R H Thornley of Aston University, is to determine the most economical methods of producing the volume and variety of replacement parts for CompAir equipment in use throughout the world.

Three graduate engineers, two appointed from outside and one seconded by CompAir, are working to a three-year schedule to produce a scheme of reorganisation. Research at the plant is being complemented by instruction at Aston's Department of Production Engineering. Progress on the project will be regularly monitored both by the Department and the company to ensure that it is taking the most practical course.

# Franco-British scientific agreement

An agreement for scientific cooperation between Britain and France represented by the Council and the Centre National de la Recherche Scientifique (CNRS) was signed in Paris on 14 June, by Sir Sam Edwards, Chairman and Mr R St J Walker, Secretary and M Bernard Gregory, and M Pierre Creyssel, Director General and Assistant Director General, CNRS.

During the last few years close ties have been established between the two organisations. A joint SRC-CNRS committee meets annually either in Paris or London to discuss problems of mutual interest and to organise a programme of seminars.

The agreement which has just been signed will enhance this bilateral cooperation in three fields: facilitating visits each way by scientists; joint seminars; and collaborative research projects.

**Research Worker Visits**

Each year the joint SRC-CNRS Committee will make arrangements to finance a scheme of visits by research workers. The aim of the visits will be to formulate or carry out collaborative research schemes.

**Joint Seminars**

The CNRS and the SRC will organise joint seminars for about twenty people to examine areas of co-operation and to measure progress. These seminars, which will meet by invitation only, may in certain cases be open for European participation.

**Collaborative Research Projects**

The joint SRC-CNRS Committee will examine suggestions for collaborative research projects, which may be made during research worker visits, at seminars or by any other means.

The CNRS and the SRC already participate in many multi-lateral activities; examples are: European Millimetre Wave Diode Laboratory at University College, Cork, S Ireland; Institut Max von Laue-Paul Langevin, high flux reactor institute at Grenoble; and EISCAT, a scientific project to construct a European incoherent scatter facility in the auroral zone.



# Council Commentary

January to April 1976

**Membership**

In January the Council welcomed Professor Reddish, Astronomer Royal for Scotland and Director of the Royal Observatory Edinburgh, who succeeded Professor Ashmore, Director of the Daresbury Laboratory as the Establishment Director in attendance at Council meetings.

**Finance**

(*i*) *Provisional Outturn 1975/76*

The provisional outturn for the financial year 1975/76 was £106·39M compared with Supplementary Estimates of £106·37M. The Council noted that the maximum possible supplementaries had been claimed and subsequently spent.

(*ii*) *Estimates 1976/77*

The Council's Printed Estimates for 1976/77 totalled £117M, this was about £4M above the Estimates submission (see Quest Vol 8 No 1), due to supplementation for inflation and depreciation of sterling and did not provide any increase in Council's funds in real terms.

(*iii*) *Forward Look 1978/82*

At its March and April meetings, the Council discussed the Forward Look proposals of the four Boards. The Forward Look has now been submitted to the Advisory Board for the Research Councils whose advice to the Secretary of State on the allocation of the Science Budget should be known by the late summer.

**Regrouping of Central Computing Facilities**

In April the Council approved the proposed distribution of computing work between the Rutherford and Daresbury Laboratories. This involved the transfer to Daresbury of Science Board computing for X-ray crystallography and related subjects, together with applications group staff posts.

The Council agreed to take direct responsibility for central computing and to establish a single Facility Committee to supervise the management of central computing at both Laboratories. This Committee will, when it is set up late in 1976, take over the continuing functions of the Atlas Computing Committee and the Computer Regrouping Co-ordinating Committee. This completed the Council's planning of the SRC computing regrouping.

The Council also approved the purchase of a second IBM 360/195 processor and one Mbyte memory store at a cost of up to £1·6M (subject to DES approval) and the transfer of the existing 360/195 at Rutherford into the Atlas Building. This will allow the two processors to be run as a coupled system sharing the existing peripherals. The existing 1906A will continue in operation with only a small additional staff. An 80% increase in Chilton capacity is expected in the upgrading without any increase in the recurrent costs. Enhancements to the Daresbury IBM 370/165 were approved to allow purchase of an additional Mbyte memory and a third channel and enhancements of the tape and disk drives at a capital cost of £275K. Proposals for further upgrading of the Daresbury computer are awaited.

**Select Committee on Science and Technology**

The Council noted the second report from the Select Committee on Science and Technology, which on the basis of an unsound statistical analysis of SRC current grants had implied that a handful of highly favoured university scientists might have undue influence on the formulation of SRC policy. At the request of the Committee the SRC has recently submitted a memorandum on the statistical analysis contained in Annex II of the Report which explains why the implication was unwarranted.

**Postgraduate Training**

(*i*) *SRC Regional Meetings*

In April, the Chairman reported on the first two SRC regional meetings held at University College, Cardiff and Aston University to discuss future SRC policy for support for postgraduate training and new SRC methods for funding research. The meetings had been well attended and the discussions had been most helpful. Further meetings in the series have been arranged at Glasgow University, Leeds Polytechnic and London (CBI).

(*ii*) *Senior Fellows hips*
The Council was informed that six senior fellowships have been awarded in 1976. These new Fellowships allow outstanding academics or research workers in industry to devote themselves full-time to research and scholarship in any suitable laboratory, for a maximum of five years, free of their normal teaching and administrative duties.

**Support for Science-Based Archaeology**

The Council at the request of the Advisory Board for the Research Councils has agreed to establish a research grants committee for the support of the scientific and technological aspects of research and development in archaeology. The Committee will have the normal delegated powers of an SRC committee and will also advise the other funding agencies concerned, namely NERC, SSRC, the British Academy and the Royal Society. Financial provision has been made for SRC expenditure of £30K per annum.

**Astronomy, Space and Radio**

(*i*) *Mirrors for X-ray Telescopes*
The Council has improved contributions totalling £195K towards a National Physical Laboratory facility for the figuring of mirrors for use in X-ray telescopes. The NPL has already carried out the figuring of a 70 cm mirror for a joint NASA/MSSL experiment.

(*ii*) *UK participation in the NASA Solar Maximum Mission*
In March approval was given for UK participation by the Mullard Space Science Laboratory (University College, London) and the Appleton Laboratory in the provision of an X-ray polychromator for solar flare studies from the NASA Solar Maximum Mission satellite to be launched at the end of 1979. The UK experiment will be developed jointly by consortium of the two UK groups together with a group at the Lockheed Palo Alto Laboratories, USA. The Council approved expenditure totalling £166K on a detailed design study and purchase of long-lead items and in principle approved further expenditure of £450K for construction of the payload subject to the final US approval of the NASA satellite.

(*iii*) *Millimetre Radio Astronomy*
Problems areas identified in two independent feasibility studies on the proposed millimetre radio astronomy facility were the selection and method of fabrication of the panels, and the disc surface alignment. The Council approved further studies at a cost of a further £56K.

(*iv*) *UK Use of the Kottamia Telescope*
The Council agreed to seek an initial three year agreement with the Egyptian Academy of Scientific Research and Technology for the use of the 74 inch telescope at Kottamia by UK astronomers. The agreement would cover the period 1977/79 during which it was planned to move the Isaac Newton Telescope to the Northern Hemisphere Observatory site.

**Research Grants**

The Council approved the following grants:

*Astronomy, Space and Radio*
A consolidated grant of £415K for the year ending July 1977 to Professor Boyd, University College, London, for space research at the Mullard Space Science Laboratory.

*Engineering*
(i) £130K over three years to Professor Butters, Loughborough University, for work on new and improved measurement techniques for engineering;

(ii) £107K over three years to Professor Keller, Bristol University, for work on polymer crystallisation and micro-structure in relation to mechanical properties, molecular homogenity, flow and processing.

(iii) £109K over five years to Professor Maver, Strathclyde University, for research in computer-aided architectural design. Support in the final two years will be conditional on satisfactory progress during the first three years;

(iv) a supplement of £231K over three years to Professor Edels, Liverpool University, for research into arc phenomena in industrial devices.

*Nuclear Physics*
Annual consolidated grants totalling £424K to Glasgow and Oxford Universities for the maintenance of their nuclear structure accelerators.



# Flare studies during the Solar Maximum

A H GABRIEL

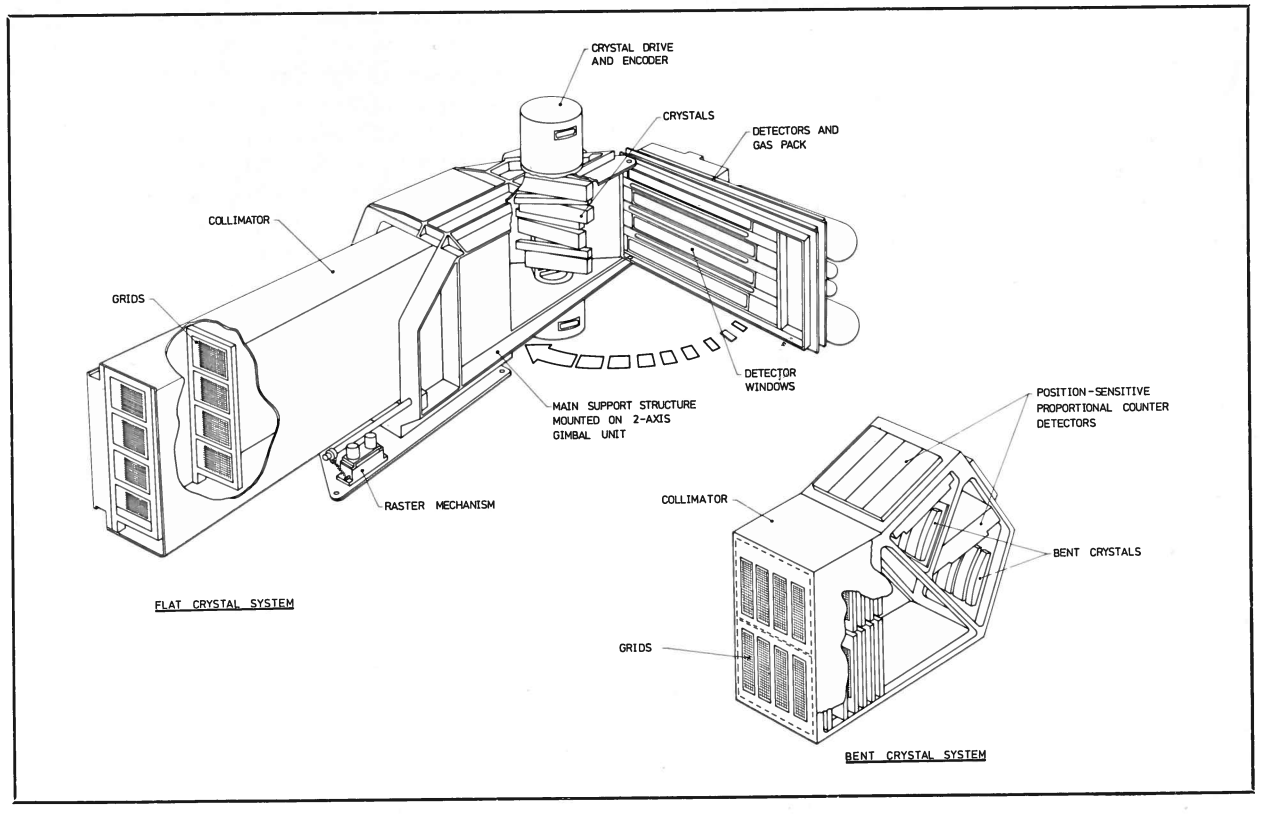
The Appleton Laboratory Astrophysics Research Division at Culham is collaborating with two other research groups to build a new and complex X-ray spectroscopy payload. This will be launched on a NASA satellite during the next period of maximum solar activity in 1979/80.

**Solar flare**

Perhaps the most puzzling phenomenon occurring on the sun is the solar flare. Flares occur as random explosive events, resulting in intense emissions over a wide range of photon and fast particle energies, arising from small regions on the sun. In visible light these appear through a telescope as tiny brightened filaments. However, in the X-ray region the emission from the flare often exceeds that from the entire remainder of the sun. The streams of particles, as well as the X-rays, can be detected at the earth where as well as being observed directly, disturbances are produced when they collide with the ionosphere and magnetosphere. Much of this has been known for years, yet the precise mechanism that leads to these flare is still not understood. It is broadly assumed that stored energy is built up in solar magnetic field configurations, and that this is released explosively by means of some plasma instability.

**Solar Maximum Mission**

The occurrence of flares is linked to the solar activity cycle and rises to a maximum every eleven years. With the next maximum due in 1979/80, NASA is planning a co-ordinated study, by launching a dedicated satellite; the Solar Maximum Mission (SMM). The most complex experiment on board will




**Layout of the proposed solar flare X-ray polychromator**

be a soft X-ray spectrometer system, and this is to be provided by a consortium of two UK and one US groups. The other two are the Mullard Space Science Laboratory of University College, London, and the Lockheed Palo Alto Research Laboratories.

**XRP experiment**

The experiment known as the X-ray Polychromator (XRP) consists of an array of seven flat-crystal and eight bent-crystal spectrometers, covering between them the wavelength range 1·3 Å to 23 Å. The array includes the capability of a wavelength resolution of 0·0001 Å, spatial resolution of 10 arc sec and time resolution of 0·1 sec, and is far in advance of X-ray instruments flown previously. Particular emphasis will be placed on the narrow waveband 1·8 Å to 1·95 Å, known to contain many lines of highly ionised iron which have a powerful diagnostic capability. Operation of the experiment, including data formatting and compression will be carried out by a microprocessor which forms part of the instrument.

The project is now entering a detailed design phase, prior to manufacture of flight equipment which is due to be delivered to NASA at the end of 1978. Participation by the UK groups was approved by Council in March, and now awaits endorsement by DES.

**Dr A H Gabriel is a principal investigator in the NASA XRP experiment for the Solar Maximum Mission.**

# Viking mission to Mars

Using the 250-ft telescope at Jodrell Bank, under the direction of Professor Sir Bernard Lovell, British scientists will be playing an important part in the Viking spacecraft mission to Mars. The first of the two US Viking spacecraft, launched by NASA last year, is scheduled to land on Mars this month after an eleven month journey through 736 million kilometres (460 million miles) of space. Jodrell Bank's participation in the Viking project is funded mainly through a Council grant.

Viking I was placed in orbit around Mars in June and the second spacecraft should arrive in August. After surveying the surface of the planet for suitable landing sites each spacecraft will separate into two parts, an orbiter and a lander. Each lander, containing its own package of scientific instruments, will descend to the Martian surface to carry out a number of experiments and televise its surroundings. It will also take measurements of the atmosphere as it descends to the surface. The orbiters will observe and map Mars from above and relay to Earth some of the data transmitted from the landers.

An important feature of any space mission is its radio communications system for the transmission of data back to Earth. In the Viking mission this system will also be used as a scientific instrument which, together with a radar altimeter on the lander, will be used for measuring the gravitational field of Mars, determining the axis of rotation, measuring surface properties and performing certain relativity experiments. It will also be used to determine the location of the lander on the ground. A special radio link will provide a useful tool for studying charged particles in the Martian atmosphere, particularly studies of the ionosphere of Mars. It will also be used for studies of the solar corona when Mars and the Earth are lined up with the Sun.

# Commissioning of the Super Proton Synchrotron at CERN

The 400 GeV Super Proton Synchrotron (SPS) at CERN in Geneva reached its design energy at 15h 35m on June 17 and progressive commissioning has begun. Construction of the machine began on 19 February 1971 and will officially end on 19 February 1979. The cost of the project when completed will have been some 1150 million Swiss francs at 1970 prices.

The machine, which will be the largest accelerator available in Europe, has been built in a doughnut shaped tunnel almost 7 kilometers in circumference about 40 metres underground beneath the French-Swiss border near Geneva.

In mid-March ejection tests were begun with protons of 10 GeV from the injector, the 28 GeV proton synchrotron (PS), which has been in operation at CERN since 1959. On the 5 April the first beam of protons was successfully brought from the PS to the end of the 1 km long transfer tunnel leading to the SPS and on 3 May protons were successfully brought to the SPS, injected into the machine and bent around the main ring within the confines of the vacuum chamber. The next stage in the commissioning will involve the radio frequency acceleration unit and it is expected that the SPS will be available for experiments at the end of 1976.

Preparations for experiments (involving Rutherford and Daresbury labs as well as a number of universities) are now well under way.



# First metioscope at Leeds

Britain's first PEEM (photoemission electron microscope or metioscope) was switched on for the first time in Leeds University's Metallurgy Department in March. The PEEM was provided by the Council at a cost of £130,000 and Professor Jack Nutting who has a five-year Council grant to study polymers using electron microscopic techniques, is directing the research effort with Dr Alan Baker.



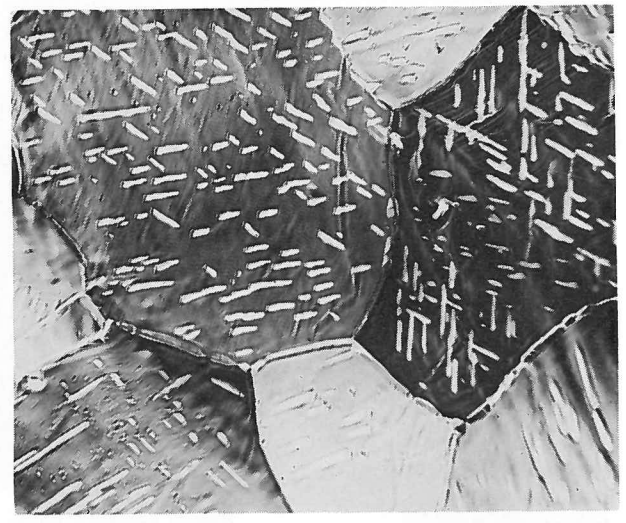
Pictured here with the PEEM, are left to right: Sir James Menter, Director of Research for Tube Investments, who officially inaugurated the metioscope and Dr Keith Parker, Research Fellow in Leeds University's Department of Metallurgy

**First permanent facility**

Now that the PEEM is operational British electron microscopists will have their first permanent facility for studying high temperature structural changes of metallic and ceramic materials and even plastic and bone.

**Ultra-violet rays**

The PEEM works by means of ultra-violet rays which are shone on to a target of the metal to be observed which then gives off electrons. These are collected and focused into a kind of television picture. The instrument can pick out features less than one millionth of a centimetre across.



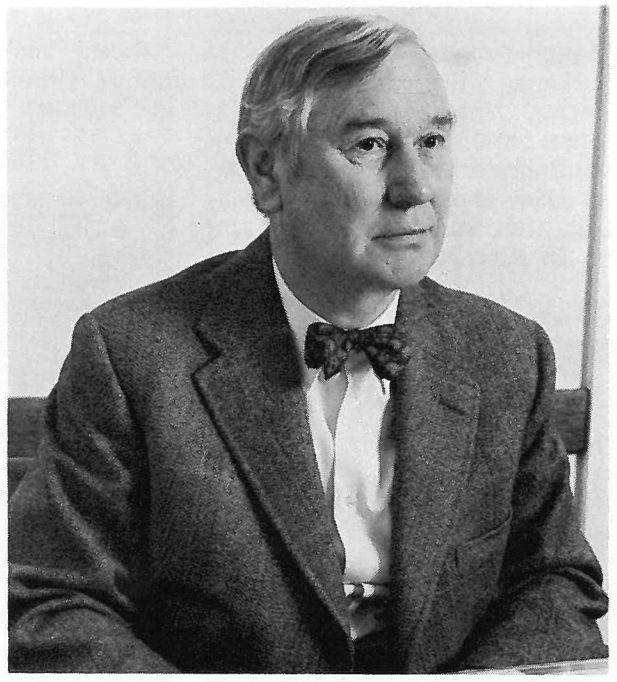
This picture shows the fine needle-like growth of tungsten carbide on a tungsten sample. The carbide was produced by the reaction of metal and acetylene gas in the microscope at 1200°C. Magnification is x 1000. Temperature 1650°C

**Projects underway**

Four projects are already using the facilities, these include one on grain growth in steels which is being carried out in close co-operation with the British Steel Corporation. Another concerns controlled rolling and heating where the direct observation facility is likely to remove much of the guesswork and give finished steels greater strength. This could be of particular benefit to Britain's natural gas distribution pipeline system. An examination of die steels has been started as part of a national programme aimed at the improvement of metal cutting and forming operations. An oxidation and reduction study of iron ore aimed at making iron smelting more efficient through fuel and other savings has also been started.

# Newsfront

**Birthday Honours**
Her Majesty the Queen has been pleased to award Honours to the following: Professor W J G Benyon and Professor G Wilkinson were made Knights Bachelor; Dr G H Stafford and Professor J C Gunn were awarded the CBE; and Mr R M Jenkins received the OBE.
Professor W J G Benyon, Professor of Physics, University College of Wales, is a Member of the Astronomy, Space and Radio Board.
Professor G Wilkinson, Professor of Inorganic Chemistry, Imperial College of Science and Technology, is a former Member of the Chemistry Committee.
Professor J C Gunn, Cargill Professor of Natural Philosophy, Glasgow University is a former Member of Council and former Chairman of Nuclear Physics Board.
Mr R M Jenkins is former head of personnel at Rutherford Lab.



**Mr R M Jenkins 'JENX' (see below)**

**Fellows of the Royal Society**
We offer our congratulations to the following who are among those who have been elected to the Royal Society:
**Dr T G Pickavance CBE,** ex-Director, Nuclear Physics Division, previously Director Rutherford Lab, distinguished for his contribution to the design and construction of accelerators for high energy particles and for his exceptionally effective direction of the Rutherford Lab.
**Dr J H Horlock** Vice-Chancellor, Salford University (Member of Council).
**Sir William Henderson** Secretary of the Agricultural Research Council.
**Professor D J Bradley** Imperial College London (Chairman of Laser Centre Steering Committee).
**Professor G Allen** Imperial College London (Member of Engineering Board).
**Professor J I G Cadogan** Edinburgh University (Former member of Science Board, former Chairman, Chemistry Committee).
**Professor G Eglinton** Bristol University (Member of ASR Board).

**Salford honours**
Congratulations to both Professor Sir Sam Edwards and Professor Sir Hugh Ford who have been awarded the honorary degree of Doctor of Science by the University of Salford. Professor Ford, who is Professor of Mechanical Engineering at the University of London, is Chairman of the Engineering Board's Total Technology Panel.

**New Director for AAT**
Professor Donald Morton has been appointed as the new Director of the Anglo-Australian Observatory. Professor Morton, a Canadian, is senior research astronomer and lecturer and also director of graduate studies in the Department of Astrophysical Science at Princeton University, New Jersey, USA. He is expected to take up his new position in September. He succeeds Professor E J Wampler who will return to the Lick Observatory in California.

**Cymru am Byth**
Mr R M Jenkins – JENX to all his friends – retired at the end of 1975 as Chief Personnel Officer at the Rutherford Laboratory. Mr Jenkins served in several Departments of the Civil Service before he joined AERE in 1950. Towards the end of 1960 he was invited to transfer to the Rutherford Laboratory and took up what was virtually the post from which he retired. He had therefore seen the Laboratory through the transition from AEA to NIRNS and then to SRC. On leaving Rutherford he said that he could always be contacted at Ascot, Newbury, Twickenham or Cardiff Arms Park.

It will be seen therefore that Mr Jenkins had been actively involved over a long period with the Staff Side at both local and central levels and when the SRC Central Staff Side heard of Mr Jenkins retirement they felt that they should present him with a gift, notwithstanding all his involvement being "on the other side of the table".

The result was that a small Staff Side team consisting of Harry Aram, Vince Foley, Wally Bray, Ron Morgan and Roger Childs together with Jack Wyatt, the new Chief Personnel Officer at the Rutherford Laboratory, presented Mr and Mrs Jenkins with a miniature rugby ball signed by the Welsh Rugby Team and dated 17 January 1976, the day that Wales defeated England at Twickenham by a record score and then subsequently went on to the Triple Crown and Grand Slam.

Needless to say both Mr and Mrs Jenkins were delighted with the present and Mr Jenkins' reply to Mr Aram, Chairman of the Whitley Council Staff Side is reproduced below.

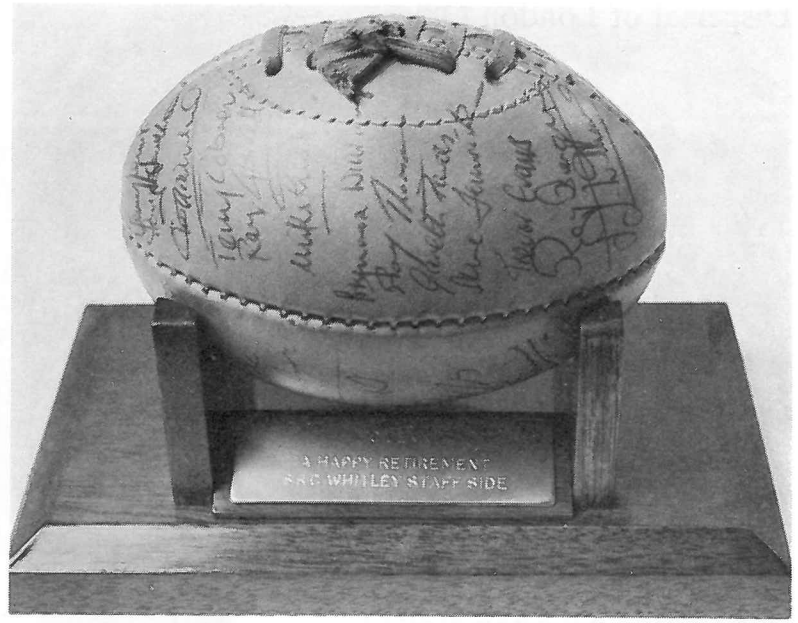
"Dear Harry,

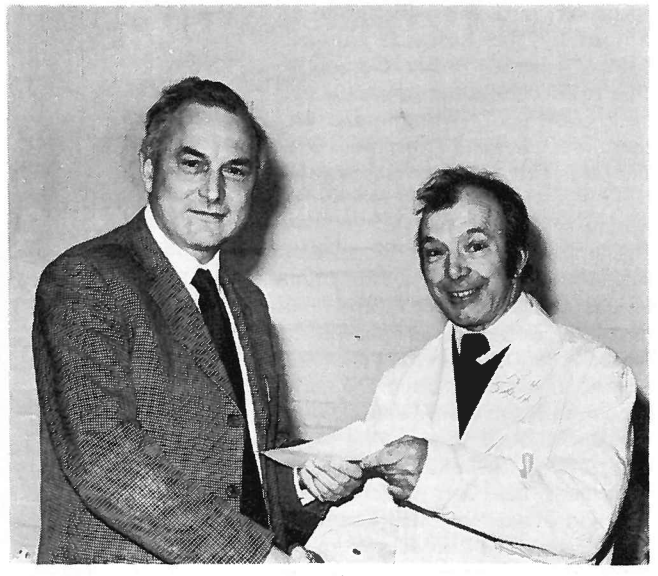
Richard Plantagenet led the first touring side to leave these shores: they played the Saracens in the Middle East and won a fine test match at Acre in 1191. It was there he was dubbed 'Coeur de Lion'; the sobriquet spread to cover the entire party, thereby giving us our earliest reference to British Lions. Their baggage-man and physio was a fellow called Blondel and he it was who remarked that if all the relics of the true cross then being hawked around the ballparks were laid end to end there would be enough material to erect the Eternal Goal-posts in the Sky.

This Levinesque opening was merely to provide the allusion to blessed relics – you presented me on Friday last with an object that commands immediate veneration and whose reverential value will increase through the generations.

The inventive resource in obtaining this magnificently autographed ball is much to be admired, both in idea and execution: certainly a double first.

Once again, thank you. It remains for me to thank Mr Clement, through you, for his kindness and the 1975/76 Squad for their cooperation."



**Ron Russell (left) presents Peter Champ with the cheque**

**Suggestions Award**
Peter Champ, a skilled craftsman in the Mechanical Engineering Group of the Nimrod Division (RL), has been awarded £125 under the Suggestions Award Scheme, for his suggestion for a transducer support platform.

When Ron Russell, Nimrod's deputy division Head presented the cheque, he spoke of the money which would be saved by using the platform. It would reduce technical and craft effort and cut down time spent working in very cramped and awkward conditions.

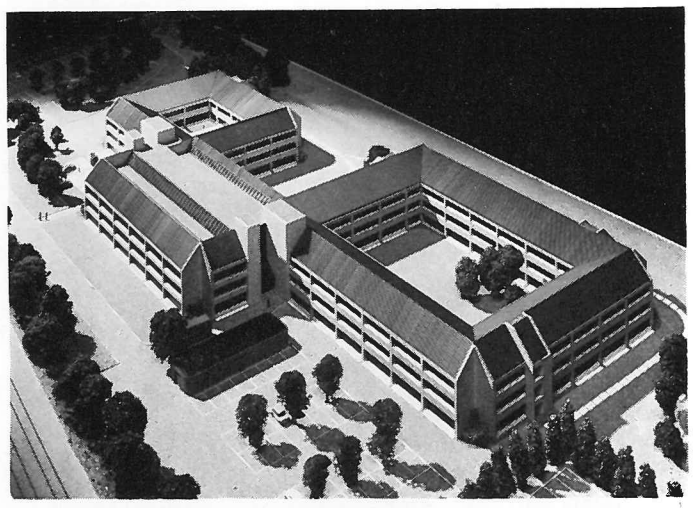
# Dispersal of London Office

In recent months the London Office dispersal programme has made considerable strides forward.

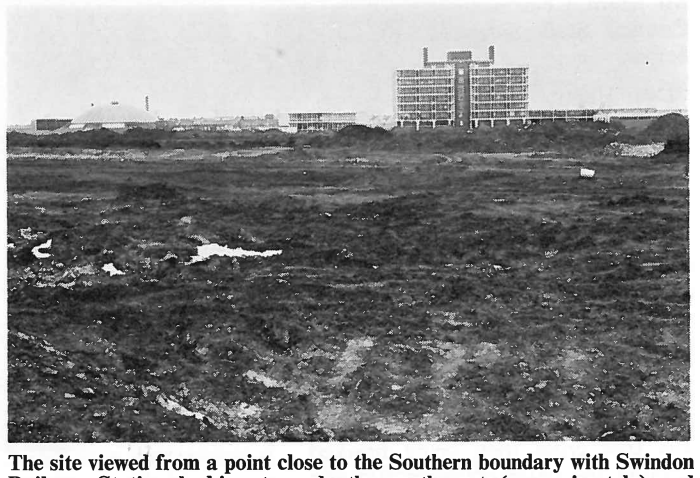
Towards the end of 1975 negotiations for the purchase of the site for the new offices, alongside Swindon Railway Station, were successfully concluded with Thamesdown Borough Council. This was followed early in the New Year by the formal conveyance of the land into the ownership of the Science and Natural Environment Research Councils.

In mid-April the main contract for the erection of the new offices for the two Research Councils was awarded to W E Chivers and Sons Ltd of Devizes, Wilts; the site was formally handed over to the contractor on 3 May. Chivers will be placing major sub-contracts for the provision of specialist services with firms approved by the Research Councils' Joint Dispersal Policy Committee. The main contract stipulates a two-year construction programme and, therefore, planning is proceeding on the basis that the new premises will be ready for occupation by the Spring of 1978.

The Stage II interim dispersal of further units of work from State House and the Oxford Street Annexe, successfully accomplished last Autumn, left the London Office with a small amount of temporary rented accommodation at its disposal within the British Rail Engineering works complex at Swindon. Preliminary agreement has been reached with Division Heads that this accommodation might be utilised by the dispersal this summer of Science Division's Chemistry Secretariat, and part of E & O's O&M Unit followed at the turn of the year by the Research and Training Support Section from Secretary's Department. Thus at the end of Stage III transfers there will be in Swindon an advance party of every Division of the London Office with the exception of Nuclear Physics and Astronomy, Space and Radio Divisions. The staff located at Swindon will number about 155, approximately two-fifths of the London Office.



**The architect's model of the new building looking approximately West. The Council's offices comprise the quadrangle in the right foreground**
*Photo by courtesy of Clifford Culpin & Partners Ltd*



**The site viewed from a point close to the Southern boundary with Swindon Railway Station looking towards the north-west (approximately) and Swindon Technical College and the domed Oasis Sports Centre in the background**

Although final dispersal is still almost two years distant this is about the minimum period which is required to successfully plan and carry out the phased release and replacement of the many staff who require assistance to find other public service employment in the London area as an alternative to dispersing to Swindon. In the months to come these many staff changes will make for an extremely busy but undoubtedly rewarding period for the personnel section of the London Office.



# SRC sponsors walk for NSPCC

Members of the Swindon Sports and Social Club organized a sponsored walk in aid of the National Society for the Prevention of Cruelty to Children on Saturday, 24 April.

The Mayor of Thamesdown, Councillor J R Stevens, Mrs Stevens and Mr Maurice Message of the Swindon Advance Office started off the walk which covered a 15-mile circular route through the beautiful Wiltshire countryside along the Ridgeway and over the Downs.

In addition to members of Swindon Office the walkers (thirty-five in all – the youngest only 5½) included staff from the Employment Services Agency, NERC, DHSS, the Department of Employment and the Post Office.

Geoff Strange (Swindon Office) completed the entire course in good time and would have done it in record time if he hadn't taken a wrong turning and ended up walking eighteen miles!

Refreshments, donated by local hotels, a supermarket, soft drinks manufacturer and brewery, were provided along the route.

'Swindon Viewpoint', the local television company covered the event and screened the programme the next day.

It is hoped that this walk for charity will become an annual event and one which will help newcomers to Swindon to get to know the countryside.

**Pictured above from left to right are: Mr Mick Jefferies (Swindon Office); Mr Maurice Message (Swindon Office); the Mayor of Thamesdown, Councillor John Stevens, cutting the tape for the start of the walk, and the Mayoress, Mrs Mary Stevens.**
*Picture by courtesy of Wiltshire Newspapers*

**Swindon v State House football match**

The first Swindon v State House football match was played on the British Rail Sports Ground, Swindon, on 6 April, and resulted in a 3–0 win for the Swindon team. The Swindon goals were scored by Ian Midson (2) and Martin Lansdowne (1). After the match Ron Rivers, Chairman of the London Sports and Social Committee presented Swindon Captain John Cima with a cup.

# Life in a railway factory

A man who could observe that a fan blade turning at considerable revolutions a minute could be seen on a quick upward glance, likening it to a snapshot (and thus, I believe, recognising a strobing effect), is not so far removed from a Council scientist. Even such a man, however, would have been surprised if told, when writing his book "Life in a Railway Factory",* at about the turn of the century, that in 1974 the Science Research Council, which had interests so varied as Astrophysics and Astronomy, Radio Wave Propagation, Nuclear Physics and Space Research, would set up an office in the Swindon Railway Factory, to which his book was devoted. He would have been surprised, yes, but keenly interested and certainly not surprised that man's ingenuity and intellect had made such rapid strides since the times and conditions for fellow factory workers he was so well recording.

The tunnel through which the author tramped with 10,000 others and sometimes, as a lad, ran after lingering rather late in bed following perhaps a late night reading or study session, is probably the self same tunnel that so startles newcomers to the Council's advance office when entering the factory from Bristol Street. He would have appreciated the new strip lighting that has been installed in the tunnel and may have likened the convenience of the catering dispensing machines in various areas of the factory and our offices to the coffee stalls at the entrance where, before the 6 am start, for a ½d "a cup of steaming beverage could be obtained and for a further ½d a large slice of 'lardy' or current cake" might be bought to fortify the worker against the labours of the day. He could, of course, if he were prepared to be a few minutes late – but before the close-out until after the breakfast break – have had a quick draft at one of the local Public Houses, which opened at 6 am. It seems the smiths were the more likely to need the stronger drink.

The principal office staff, even in those days, did not start until 9 am and there was a wide gulf between them and the factory floor workers. On the floor there were also significant social barriers between groups of workers. For instance the Carriage Finishers were classed, and considered themselves to be, well-

to-do. They managed to buy houses in a better part of Swindon and liked to dress smartly. On the other hand should a man in one of the lesser trades attempt to emulate his betters by, perhaps, wearing a slightly smarter suit in Swindon on a Sunday, the author writes he was quickly reminded by his foreman on Monday that he was getting "uppish".

Alfred Williams was obviously intellectually far above most of his fellow workers and a study of his life alone would make interesting reading. For instance he later spent sometime in India and mastered Sanskrit. Throughout the book he makes references to and gives quotations from literature. This knowledge was gained by extensive reading and one wonders how on earth he found time and energy for this and to write the book when he was employed for such long and arduous hours at the factory.

He obviously was keenly interested in observing other people and gives many descriptions of workmates. His description of the smiths as large, strong, slow-moving, easy but effective men, of modest temperament and few words, was much the same as given by many writers before and since. No doubt, this is because smiths are generally the same throughout the country and any true descriptions must be similar. However, the author goes beyond describing the smith and other workers at work and takes us into their leisure hours. He describes the behaviour of apprentices; youthful energy rising above pretty grim conditions and finding time for quick games of football during the breakfast and dinner-breaks. He mentions that the Frame-shed men were best at Tug-of-war and there are other insights of the simple pleasures of those hard times, including the year's climax of the "Trip" in the summer. The "Trip" came when the factory closed for the summer holiday and the railway bosses laid on special trains to take the workers and their families on a day's excursion to the sea. To this day many in Swindon refer to the "trip" meaning the BR Works holiday close down.

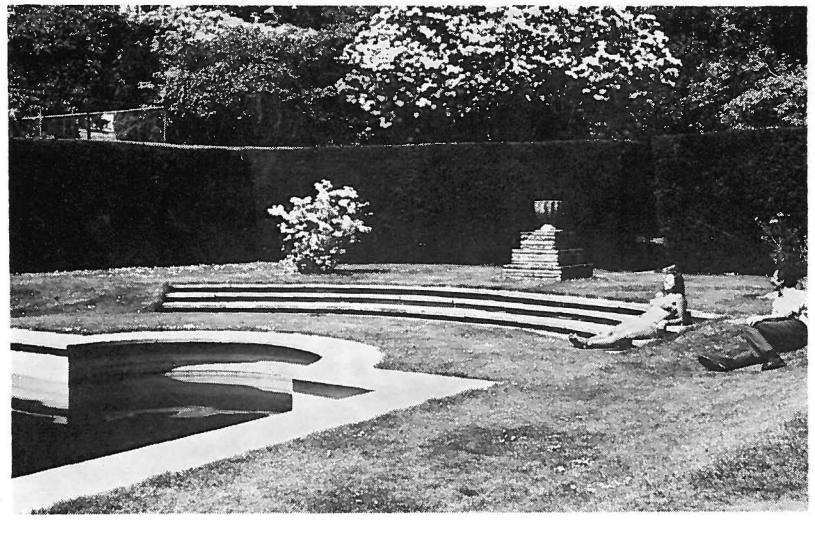
Anyone interested in reading of the conditions under which workers were employed at the turn of the century and interested in looking about the factory at Swindon would find Williams' book well worthwhile. In Swindon, Williams enjoys a reputation second only to Richard Jefferies, a journalist and writer, whose house has been opened as a Museum at Coate on the southern outskirts of Swindon, near his beloved Liddington Hill. Both men's names are likely to crop up at most unusual places and I notice that details and pictures of them are displayed in the new hut that has been erected at Barbury Castle Country Park on the downs. Of the two, my admiration goes to Alfred Williams and I recommend his book, which is in the Swindon Public Library but deserving a better portion than the reserve stock.

**Life in a Railway Factory by Alfred Williams initially published by Duckworth in* 1915 *but published again in* 1969 *by David and Charles.*

**Peter Cook, the author of this review, is Contracts Officer at Swindon Office.**

### RGO's Swimming Pool

When people retire, it is customary for their colleagues to give them a farewell present. However, when the former Director of the RGO, Dr Alan Hunter, retired at the end of last year he reversed normal procedure and gave a present to his colleagues. It was Dr Hunter's wish that any money donated by the staff should be spent not on a personal gift but on a filtration system for the swimming pool (see picture below) in the observatory grounds. This pool is run by the RGO Sports and Social Club. In addition, Dr Hunter generously volunteered to contribute to the fund himself an amount equal to the total sum collected by his staff. In this way about £220 was raised for the fund towards the filtration system which has now been bought.



### COMPUMAG '76

A three-day international conference on the computation of magnetic fields – COMPUMAG – was organised by the Rutherford Lab in April at St Catherine's College, Oxford. It was attended by more than two hundred delegates from fifteen countries.

Highlight of the conference was the specially set up magnet design workstation, shown right. Based on a GEC 4080 computer linked by a 4800-baud Post Office line to the Rutherford Lab's IBM 360/195 computer, the workstation enabled delegates to use the Lab's GFUN magnet design software running on the IBM computer together with additional computer-aided design programs running on the GEC 4080 machines.

Magnet design work began at the lab as part of its High Energy Physics development programme, but its potential for applications in other fields was soon realised, and the GFUN software has now been used by several outside organisations and research centres including British Rail and International Research and Development Co, for applications in such fields as magnetic levitation and Tokamak magnets for fusion experiments.



**Picture shows progress made on the Nuclear Structure Facility (NSF)**

### Progress on the NSF

One of *Quest's* cover pictures last year showed the Nuclear Structure Facility (NSF) under construction at the Daresbury Lab. Dominant was the tower to house the 30 MW tandem electrostatic accelerator which is the focus of the Facility. This picture shows the progress in construction made by the beginning of May this year. The services tower, like the circular accelerator tower, rose very rapidly using the slip forming technique, to a height of 71·5 m. The accelerator tower will be topped by a circular ion source room, with access from the services tower, and the large crane has been installed to lift construction materials for this room. At the foot of the accelerator tower can be seen the semi-circular experimental hall, divided into three areas. The first area is now clear of scaffolding and should be ready in June to be used for assembly of the accelerator stack sections.

### Royal Society Soirée

Exhibited at the Royal Society's Annual Soirée at Carlton House Terrace in May, was a new idea for using superconductors to provide magnetic levitation ('Maglev') which has been demonstrated in experiments at the Rutherford Lab. The result of initial work at the UKAEA's Culham Laboratory, the new development offers significant advantages over other Maglev systems which have been proposed for transport development studies throughout the world. In particular, the Rutherford/Culham system provides full lift force at all speeds, eliminates electromagnetic 'drag' and maintains a large clearance gap between vehicle and track.

**Graham Homer, Rutherford Lab (right) explains the Maglev demonstration to journalist C L Boltz**

*Photo: UKAEA*

### Solution to Maxim 11

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | I | N | G | T | A | D | P | O | L | E | S | E | | |
| I | R | A | T | E | N | I | T | R | O | G | E | N | | |
| C | O | M | I | N | G | S | L | A | N | T | E | D | | |
| O | N | E | R | O | R | E | I | N | G | S | K | U | | |
| S | Y | N | O | N | Y | M | A | G | A | P | E | R | | |
| E | N | E | T | I | C | B | B | E | W | A | R | E | | |
| M | A | C | E | P | O | O | L | S | T | R | O | D | | |
| O | S | T | L | E | R | W | E | X | O | T | I | C | | |
| A | P | A | C | E | N | E | P | I | T | A | P | H | | |
| C | I | R | S | W | E | L | L | O | S | L | O | I | | |
| I | N | I | T | I | A | L | A | T | H | O | L | L | | |
| N | I | N | E | T | E | E | N | A | P | P | A | L | | |
| G | T | O | P | S | I | D | E | S | T | E | R | A | | |

The winner was R D Eberst (ROE) who wins a £2 book token.

## A land often heard but seldom seen

Last year, when browsing around the "Holiday 1975" exhibition, I came across a tour company offering holidays in Albania, apparently the least accessible country in Europe. With my interest already whetted by Radio Tirana (their national broadcasting commission, whose powerful transmitters broadcast abroad in seventeen languages), I was hooked.

Albania is situated where the Adriatic Coast meets that of the Ionian between Yugoslavia and Greece, across the water from the 'heel' of Italy. Only a few hours by air from London, it is not as remote geographically as it is politically. Unlike the other Eastern bloc states, Albania has completely rejected the Russian de-Stalinisation policies. Although a small country of some two million people, roughly the size of Wales, it has become a big voice in the international propaganda game. Albania is also an active member of the United Nations.

At last the day came. Tirana Airport seemed hardly that of a capital. After London or Belgrade, it looked more like a country stately home. In groups of three, we went through customs; every case was opened and searched for books. No "Playboys" or Bibles are allowed into Albania! A few lads whose hair was even shorter than mine had to be trimmed by an airport barber and they had to pay!

Then we boarded our 'Albturist' coach. As we drove through flat farming country down to the sea, we were given a brief history of the modern People's Republic and told how to make our stay in Albania happier – don't photograph anything military, don't give tips, or give chewing gum to children!

Our hotel, in the resort of Durres on the Adriatic, was right on the beach. It was a grand stone building, not one of the latest concrete blocks, with long terrace-like balconies on each floor overlooking the sea. It was early in the season and the resort was almost a ghost town as the other hotels were not yet open.

Durres town, the country's main port with 60,000 inhabitants, was a few miles away but out of bounds to tourists except on excursions. I had booked an excursion on the first morning and visited the Liberation War Museum and the Roman amphitheatre. Every convenient point was decorated with slogans and posters proclaiming "Glory to the People's Republic of Albania", "Long Live the Party of Labour" (Communist Party) or "Enver Hoxha" (the President) and so on! Throughout the holiday, we would see them almost everywhere, even in the countryside.


**Mural at Fieri, Albania**

In the morning we set off towards the hills. After Elbasan, an industrial town, the scenery became more mountainous. We had been following a railway, which was now being pushed onwards by volunteer labour towards the Yugoslav border. We frequently waved to gangs of workers digging, levelling and earthmoving, many of them women. (Albania's railways have all been built since Liberation and much of the country is still uncovered. There is no connection with the railways of the neighbouring countries.)

Next on to Korca, the largest town of Eastern Albania, with a population of some 60,000. It was a dusty, old town of little yellow stone houses and a few wide, trafficless boulevards in the centre. Trafficless, that was, apart from buses, lorries, a few donkey-carts and a great many bicycles. This is typical in this country, where family cars are virtually unknown. There were not very many shops and those that we saw were uninspiring, selling little more than essentials.

There was a day-long excursion to Tirana, the capital of Albania, which has a population of some 200,000. Our first call was to an exhibition of "Albania Today", which I greatly enjoyed, with displays of industrial products, machinery, models and consumer goods, etc. Much of it must be for export as little of it was seen in the shops. There was a good display of radio and TV sets; those I had seen so far were made in China or Germany. (Almost all manufactured goods we had seen were made in the People's Republic of China.)

When we returned home to Britain I found I had mixed impressions of China's beach-head in Europe. Although I enjoyed the experience, I don't know if I would go again!

**The author, Ian Wadman, is an Assistant Scientific Officer at the Rutherford Lab.**



## Schoolboy Scrambling

What?, you may say! Well, motorcycling by school children, mostly boys, of course, is a sport which has grown rapidly in popularity over the last two or three years. This year our son's club has just over two hundred members from an area stretching from Essex to Kirkcudbrightshire. There are at least thirty similar clubs in the country and many run events under nationally-agreed regulations which allow riders and machines in the ranges:

| Age | Class | Max. engine cap cc | Typical quoted hp |
|---|---|---|---|
| 6 to 7 | – Cadets | 50 | 7 |
| 8 to 10 | – Juniors | 80 | 11 |
| 11 to 13 | – Intermediates | 100 | 16 |
| 14 to 16 | – Seniors | 125 | 23 |


**Picture shows an 'Inter-Class' (ages 11-13) competition in April 1976. Rider 42 is Tim Hopkins (aged 12½)**

### Counting the cost

It is possible to scramble on a bike bought for less than £100. However, the excellent competition bikes now available in suitable sizes, say of 100 cc, start at over £500 new, though good second-hand ones can be obtained for £300 to £400. Other sizes cost roughly pro rata. Is it complete madness to put a £400, 16 hp, 10,000 rpm, 60 mph bike in the hands of a twelve-year-old? Perhaps it seems so but the growth of skill and achievement is a great reward, the whole family has fun over a long season and makes a lot of friends. The dangers are more apparent than real. Anyway, annual depreciation can be less than the cost of a new push-bike.

Clubs vary considerably in activity but ours gives a good general picture. We put on about twenty scrambles a year between February and November and including a few 'National' events. A typical meeting includes forty-five Seniors, thirty-five Inters, twenty Juniors and ten Cadets.

### The tracks

We have eight tracks for proper scrambling plus a nursery track for novices Each proper track covers up to about twenty acres and preferably includes moderately-rough ground with slopes and hills offering rises and falls up to sixty feet or so. A few patches of mud, shallow water and a whoop-dee-doo or two are also desirable. What's a whoop-dee-doo? It's a set of corrugations on the track with a wavelength of about a wheelbase and amplitude up to a foot or so. When not a natural formation, they seem to be generated by the racing and act as very effective skill filters.

### Riding techniques

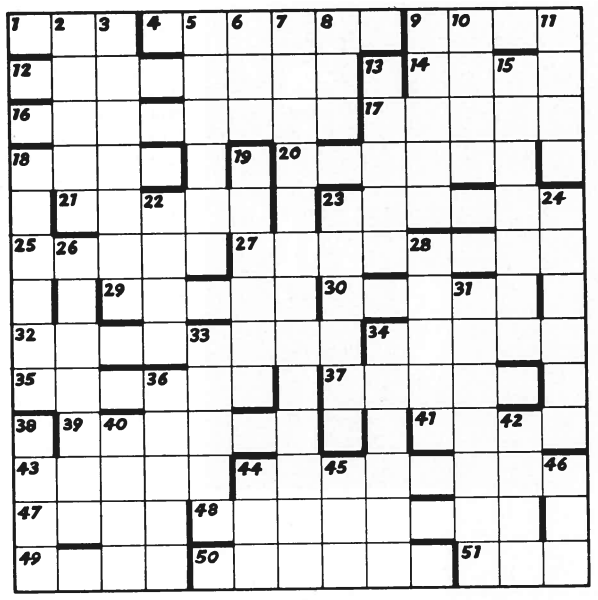
Among the riders themselves, there is much chat about riding techniques including, of course, the 'fun' portions which look spectacular but are not necessarily the fastest method of getting round the track. These are the 'wheelie' (front wheel in the air) and the jump (both). One must admire the ability of lads from six upwards who can put a 150–200 lb motor bike in the air for a few feet or yards, put it down under control and proceed without fuss, all at speeds of 20–40 mph, and with a sharp bend perhaps only a few more yards away.

### Educational trade-offs

There are significant educational trade-offs from what may appear to be simply a very expensive and time-consuming way of keeping boys occupied. With a little ingenuity and grasp of opportunity, there are chances to introduce subjects like maths in the cross-section and volume of cylinders, and in gear ratios, problems of gas flow and mixing, combustion and temperature, voltage generation, transformation and transients, frame design and dynamics, springs and shock absorption,cleaning and maintenance of close-tolerance machinery, and so on. Throw in a bit of geography in finding courses in this country and locating motor bike factories around the world, cost accounting in looking after the necessary and you have a ready-made, highly motivational education package for youngsters.

It is well to think of these benefits when, on a bitterly cold day you are up to your ankles in mud, a small boy is winding on deafening power and you are pushing from behind getting facefuls of moist countryside. Somehow, it still all seems worthwhile.

**Our contributor, John Hopkins, is an SSO at Daresbury Laboratory, an inveterate member of small societies and committees, and presently the Hon Secretary of the North West Schoolboys Motor Cycle Club, the best in the country, he claims.**



## MAXIM 12

### MAXIM 12

The completed diagram contains nine names to which the only clues given are the owners' titles. However, the central column shows where they all come from.

### Clues

ACROSS

1. Source of ready-burned firewood? (3)
4. *Master* (6)
9. How chicken begins to produce an egg of earthenware (4)
12. Try to speed up the receipts (fake) (8)
14. 'His Majesty', in the jungle, knocked about, found on the floor (4)
16. Repair-men produce rubbish when loaded (8)
17. Wrong note, right singer (5)
18. What secretary does when boss is upset? (4)
20. *Mr and Mrs* (6)
21. Called 'Mend a Broken . . . (5)
23. . . . Outcast', song steeped in acidity (6)
25. The three R's, each half-assimilated; not met with so often (5)
27. Carrier of vital fluid must hold up dirt, be in good order (4,4)
29. Hang around nearly all day for re-conditioning (5)
30. Girl left bits: how you might cook them (5)
32. *Miss* (8)
34. Announcer of 18th century, who 18? (5)
35. Was alarmed by something made of iron, with a rusty end (6)
37. Story that come to the point after that other lot (5)
39. *Mr* (6)
41. Water-holes where capillary attraction works in reverse (4)
43. Examinations of solar phenomenon (5)
44. Collectors take in loads after start of auction (8)
47. Score nothing in a six-ball over (4)
48. Garden beside scene of London hangings – in a condition not conducive to eating (8)
49. Always, yet almost not at all (4)
50. *Dr* (6)
51. Maxim is observed (3)

DOWN

2. It's quiet inside, so continue to flirt (5)
3. *Mrs* (7)
5. Better lubricated, or drunk or I lie! (6)
6. Eggs of Auld Reekie? (3)
7. (*See preamble* – 7,6)
8. Bend that goes one way, then another, then repeats (3)
9. About 'His Majesty'? It's obvious! (5)
10. Non-U until broken, then bandage (4)
11. *His Grace* (4)
13. Band divides up (5)
15. Lacking the capability, yet standing out from the crowd (7)
18. Rebellious cur's very loud – grab him by this (6)
19. Tot conducted, in a mess (6)
22. One surrounded by males? But I'm normal! (4)
23. Show compassion about rear of building's unattractive accommodation (6)
24. *Her Majesty* (6)
26. French and English go in Leyland vehicle (7)
28. I rest uncomfortably – it is fatiguing (5)
31. They are flexible and set askew, but renowned for tenacity (7)
33. Viscous river flows round two points (5)
34. Pursued, we hear, but apparently remaining uncaught (6)
36. 'His Majesty', perhaps, known for straightness (5)
38. *His Majesty* (4)
40. Go mad about pop-star in opera (Verdi) (4)
42. A measured region of the near east (4)
44. Notice nothing – with much of this? (3)
45. Half of us want nature's Stakhanovite (3)
46. Stitch in three different directions (3)

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

**Solution to Nutcracker 20**

Refuse both the first two posts drawn. After that, accept any post which is as good as or better than the better of the first two. This gives a probability of 0·3856 of getting the best post. There were no correct solutions.



### NUTCRACKER 21

It was time for the annual staff reshuffle in the Council's Parascience Division. Each of the five Committee Secretaries moved to a new Committee, no two of them swopping places. Fuddle moved to Telepathy, whilst the Secretary of Ufology moved to the Committee vacated by Idle. Goggle moved to the Committee vacated by the Secretary who moved to the Committee vacated by Huddle. Jumble moved to the Committee vacated by the Secretary who moved to the Committee vacated by the Secretary who moved to the Committee vacated by Fuddle. The Secretary of Radiesthetics moved to the Committee vacated by the Secretary who moved to Spoonbending (the Secretary of which incidentally, was very disappointed not to have got Huddle's old Committee). Who became Secretary of Vampirics?

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

**Cribbage pairs competition**

Two members of the London Office Sports & Social Club Committee, Veronica Harris and Graham Tidmarsh, were runners-up recently in the London Region CSSC Annual Cribbage Pairs Competition. A tie in the first round was followed by a 2–1 victory in the quarter-finals but after a convincing 2–0 win in the semi-finals the tables were turned in the final and they lost 2–0.

### Safe Driving

The Royal Society for the Prevention of Accidents has announced its 1975 National Safe Driving Awards. Our congratulations to the following Rutherford Lab drivers

**Mr H G Patterson** – Bar to 15 Year Medal (19 accident free years)

**Mr E A Smith** – Oak Leaf Bar to 10 Year Medal (13 years)

**Mr A H J Hill** – Oak Leaf Bar to 10 Year Medal (12 years)

**Mr J Culley** – Oak Leaf Bar to 10 Year Medal (11 years)

**Mr D A Stock** – Bar to 5 Year Medal (9 years)

**Mr B T Field** – Second Year Diploma.

**Herstmonceux Conference**

The twentieth annual Herstmonceux conference was held at the RGO on 30 and 31 March 1976. The theme was "Astronomical Results from New Instruments and Techniques". In addition to RGO staff, about ninety-five visitors, including astronomers from seven overseas countries, attended the conference.

### Special Promotion

Congratulations to Dr R J Dickins (RGO) and Dr J B Forsyth (RL) who have been promoted to Senior Principal Scientific Officer on the recommendation of the Individual Merit Promotion Panel.

**Energy Savers**

A joint project to save energy and cut the cost of heating and lighting Oxford's schools and colleges is being undertaken by the County Council and the Department of Education and Science. The Rutherford Lab will be collaborating with Oxford Polytechnic's Department of Architecture to carry out studies for the project.

### Wanted

Rugby players, soccer players, athletes, etc., to represent the Council in Civil Service 7 and 15 a-side Cup Competitions. Willing volunteers and enquiries to Gordon Rowe, State House, ext 7.

### Finite elements

'Finite elements', a 10-minute colour film which is the first engineering film to be generated entirely by computer, had its premiere at the Royal College of Art in May. The film, which was made by the Atlas Computer Division of the Rutherford Lab in collaboration with the Royal College of Art was produced using the specially developed ANTICS computer animation software on an ICL 1906A computer, together with a computer-controlled microfilm recorder. The same techniques were also used to generate the sound-track music.

As well as introducing the engineering technique of finite element analysis, the film sets out to demonstrate the potential usefulness of the computer in solving practical engineering problems. It also illustrates the use of computer animation and film making as a general research tool, showing how masses of numerical information can be analysed and how models can be tested in all sorts of possible situations.

### Observatory directors

Dr Michael W Feast has been appointed as the new Director of the South African Astronomical Observatory (SAAO). Dr Feast, who was educated at Imperial College, London, was an astronomer at the Radcliffe Observatory in Pretoria from 1951 to 1974, when he joined the SAAO. He succeeds Sir Richard Woolley, who is retiring at the end of the year.

Professor Donald Morton has been appointed as the new Director of the Anglo-Australian Observatory. Professor Morton, a Canadian, is senior research astronomer and lecturer and also director of graduate studies in the Department of Astrophysical Science at Princeton University, New Jersey, USA. He is expected to take up his new position in September. He succeeds Professor E J Wampler who will return to the Lick Observatory in California.