orbit

Number 45 March 1966

Journal of the Rutherford High Energy Laboratory

Editorial

It has often been said at meetings of the Editorial Board that one can get away with anything in ORBIT. The reception of our editorial of last month shows emphatically that this is not so. We made certain criticisms of the Popular Lectures: in particular we said that the venture had failed. David Salter points out in his letter on page (10), that although there was a decline during the early part of the series, it revived very strongly and has undoubtedly been of great value. We were quite wrong to have said that it failed.

Cover: Counter-attacking scientist. Dr. Ian Blair answers Orbit criticisms on Page 8.

We also criticised the presentation of the introductory lecture and, unfortunately, this criticism has been taken to mean that the lecturer Dr. Ian Blair had not put much effort into it. Such a suggestion was never intended and we offer our apologies to Dr. Blair for having inadvertently made it. Had we elaborated our criticism on this point it would have been very much in line with Mr. Salter's observations on the same subject. We are happy to give Dr. Blair an opportunity to reply, which he does with spirit on page (8). We shot our arrow o'er the house and hurt our brother ..... fortunately the wound was not fatal. We feel that his charge of anonymity calls for some qualification since the acting editor accepts full responsibility for the publication of the editorial.

Acting Editor:
T.R.Walsh, Building R.20,
Rutherford Laboratory,
Chilton, Didcot, Berkshire.

Assistant Editors:
H.F.Norris
F.J.Williams

Manager:
R.C.Pepperell

We are grateful to Mr. Salter for his apology on our behalf to all the lecturers in the series and would like to associate ourselves with it insofar as it is necessary, although we have been unable to assess the reaction of all of them. We would point out, however, that alternative opinions of our editorial are possible, as witnessed by E.G. Higgins' letter published in this issue.

Most important of all, we would like to thank the contributors to the series for the trouble they have taken to prepare their lectures and arrange demonstrations. Our main intention was to stress the need to communicate the Rutherford Laboratory's purpose to its own staff and to a wider public. We are quite sure that the Popular Lecture series is a substantial contribution to the former need.

In view of the General Election we have once again asked the three main political parties for statements on Science. We asked particularly for comments on the first year of the SRC, the relative importance of technological and pure research, pure nuclear research, and computer policy. Hopefully we suggested a statement on the proposed European 300 GeV accelerator.

It would be unwise for us to comment on the three contributions individually, but it is worth pointing out that, collectively they represent a cross-section of "influential opinion" on Science and, as such, invite the questions: is the place of pure research in science generally understood, and as Ralph Thomas (page 12) would have it, do we do enough to "sell science".

Popular Lecture

THE POLARIZED PROTON

TARGET

DR. H. H. ATKINSON

3.30 p.m. 20th APRIL.

Science and Technology– Liberal View

The Liberal Party recognizes that the development of science and technology is essential to Britain's growth and has proposed a series of measures designed to encourage both pure and technological research.

Liberals have urged a more open and thorough examination of major government projects. Almost two-thirds of the total research and development expenditure of this country is on the government account but the machinery for examining scientific and technological policy is fragmented and inadequate. The Liberals want a Select Committee on scientific and technological policy in the House of Commons and a Council for Scientific Policy with wider terms of reference than the present one.

There is need for better co-ordination of resources in research associations, government establishments and universities. Rationalisation and amalgamation could result in the release of valuable scientific manpower for use elsewhere. The ties between these institutions could be strengthened by suitable siting, common use of facilities and staff interchanges. Mobility of scientific manpower should be encouraged by full transferability of pensions.

Liberal proposals include the expansion of the Atomic Energy programme. The Atomic Energy Authority could play an important role in various fields of research other than those in which it has been traditionally engaged.

The Liberals advocate greater involvement in Europe in all spheres. The proposed European 300 GeV Accelerator is an important avenue of co-operation but as the project is still in the design stage it is too early to know whether suitable financial arrangements can be worked out between the participating countries.

The Liberal Party feels that the proposals of the Flowers report on computers for research should be implemented without delay. The existing pattern of computer use is too complex and should be replaced by a regional hierarchical system based on universities and research centres. In setting up this system care should be taken to ensure that American computers used now will not be incompatible with British computers manufactured in the future. The government should take the initiative not only in the provision of better facilities for universities and research but also in making people in industry and other aspects of life aware of the contribution which the proper use of computers can make to increased efficiency and modernisation.

Science - Conservative Policy

A.G.M. Greenlaud,
Conservative Research Department.

Between 1955/56 and 1964/65 total national expenditure on scientific research and development in Britain went up from £300 million to an estimated £750 million; and during the 13 years of Conservative Government support for civil science rose sixfold, which is a measure of the priority which the Conservatives gave to science. It is curious that there is virtually no mention of science in the Labour Government's National Plan, especially in view of what Mr. Wilson said at Scarborough in 1963 about how he would "forge a new Britain in the white heat of the scientific revolution". The National Plan lumps advanced technology and scientific research together with "other miscellaneous central government activities" and goes on to say "some of these will probably have to be slowed down to make room for the high priority services."

The next Conservative Government will continue to stimulate scientific and technological advance, while recognising that however much money we spend on science there will never be enough to pursue on our own every potentially fruitful line of scientific enquiry. In our policy statement, 'Putting Britain Right Ahead' we referred to the immense scope there is for much closer technological co-operation in Europe. Indeed, one of the reasons for our determination to join the European community is that we believe such a step is a scientific as well as an economic and political necessity.

There is a basic difference between the Conservative and Socialist approaches to the encouragement of scientific advance. The Labour Party's main concern seems to be with finding modern sounding reasons for more state-control and nationalisation. After all, it was Mr. Wilson himself who said at the Labour Party Conference at Scarborough in 1963, "we must harness socialism to science and science to socialism." Conservatives do not believe that all scientific development should be centrally planned; nor on the other hand do we believe that the Government should adopt an entirely neutral attitude. Our view is that the role of Government should be that of a catalyst and we recognise that science can flourish only in an environment of freedom and integrity.

The governmental organisation of civil science, which has been operating since the passing of the Science and Technology Act, 1965, is based, in the main, on the proposals put forward by the Conservative Government in 1964 following the publication of the Trend Report. We do not, at present, envisage any major change in the organisation, but we are aware that the present form of accountability to the Treasury in the use of public money for scientific research has been a great burden on working scientists. In our Manifesto, we state that we will establish a Cost Effectiveness Department in order to introduce modern techniques of management accountability, in which, for instance, current and capital expenditure would no longer be regarded as entirely separate entities.

We believe it is important that industrial research and development should be stimulated by constant contact with academic research, and vice-versa. We shall, therefore, encourage a much greater two-way movement between universities and industry, than is now taking place. More post-graduate students, for example, should be able to study for their doctorates in the research laboratories of a large industry. We should also like to see more university scientists being employed as consultants in industry and government service, and more of the leading scientists in industry joining the faculty boards of universities on a part-time basis.

Our Manifesto states that we will restore the university and further education building programmes cut by the Labour Government. This is vital if we are to achieve the Robbins expansion on which so much depends for getting more graduates, particularly in science and engineering, for teaching and research in the universities and other institutions, for industry, and not least for the schools.

Conservatives believe that economic advance and technological advance are complementary to each other. Our policy is to create the right conditions for economic advance, by introducing a more competitive climate into industry, by providing more incentives, by better management training etc. In this way we shall stimulate technological advance throughout industry and so strengthen Britain's competitive position in the world.

Science - Labour Policy

Richard Marsh,
Parliamentary Secretary, Ministry of Technology.

At the last election, the Labour Party promised that if it was elected to power there would be strong Government action to give a renewed impetus to science in this country.

In particular we had in mind the serious problems created by the sluggish pace of commercial exploitation of the discoveries unearthed by the excellence of pure science in this country. This led to the absurd situation where many new ideas were not made use of. And, worse still, others (e.g. in aviation the swing-wing of Barnes Wallis, the brains behind the dambusters raid) were taken up by our competitors and sold back to us!

To tackle this problem, we set up a Ministry of Technology, as outlined in an 'Orbit' article before the last election. Now, fortunately, the bias which we have had for the past 100 years against technologists in this country, has been recognised and is being overcome. In fact it goes without saying that unless our existing scientific and technical knowledge is applied within industry, we cannot make maximum economic progress - the 25% growth laid down in the National Plan.

This means, among other things, mobilising the full resources of the State Corporations and their concentration of highly qualified scientific and technological manpower. The Atomic Energy Authority has been allowed to undertake work outside its immediate field, on projects ranging from the design of equipment for medical research, an improved process of metal forming, tendering for a nuclear power station in Finland and keeping British industry in the lead in the production of desalination plant.

In the past eighteen months Labour in Government has made great efforts to keep alive our own computer industry - the only one in the western world outside the United States. Plans have been made for a National Computing Centre at Manchester. Other decisions on computers have also been announced: to co-ordinate public buying of computers; to help encourage the spread of computers to industry; to encourage the computer industry itself to keep making new advances; for the Government to buy British computers wherever possible; and to provide more money for computers in universities where they have a three fold use - forwarding research, training technologists, and serving industry.

There have been advances too in nuclear research, perhaps the most spectacular in power stations. On January 21st this year, the Daily Express felt compelled to comment: "Britain's nuclear power stations lead with a total output which is virtually equal to the contribution of the rest of the world".

A second programme of nuclear power stations has been announced to be commissioned in the period 1970-1975. These will be of the Advanced Gas-Cooled Reactor type. Meanwhile there are other plans for Prototype Fast Reactor at Dounreay, an essential intermediate step between the present experimental fast reactor and the large reactors likely to be required in the 1970s.

All of this action to make the most of our scientific assets fits in with the requirements of the National Plan: Britain is an overcrowded little island with 54 million people who enjoy, and rightly expect to go on enjoying, one of the highest standards of living in the world. Because of this, the misuse of our resources is not only wasteful but positively dangerous.

200 GeV Accelerator News

Ralph Thomas

Since the publication of the Lawrence Radiation Lab's Report on the 200 GeV Design Study in June last year much political water has passed under the high energy physics bridge. It was hoped at that time that a list of 126 proposals involving some 200 sites would be reduced in size to about 30 possible sites, which would then be evaluated in detail by a site selection committee organised by the National Academy of Sciences. By September it became clear that the U.S.A.E.C. was finding the paring down of the large number of sites more difficult than expected and 85 sites were handed over to the National Academy. At that time a U.S.A.E.C. spokesman expected "a final site recommendation to be made early in 1966 and a request for authorization of the project to commence in financial year 1967". All 85 of the proposed sites had been visited by the Academy committee by the end of 1965.

In the last three months of 1965 differences of opinion between high energy physicists themselves have emerged. R.R.Wilson of Cornell criticised the Berkeley proposal on the grounds that it is too ambitious and expensive - he would build an accelerator of only 150 GeV energy with an intensity of 10^{12} protons per pulse at a cost of 150-200 M$. (Not included in this cost, however, are any experimental facilities). An alternative proposal from S.Devons of Cornell (ex Manchester) is to construct a 130-150 GeV ring adjacent to the Brookhaven AGS at a cost of 150 M$ with the AGS as an injector. This proposal would be unlikely to produce intensities greater than 10^{12} protons/sec. Wilson would use his accelerator as an injector for a future 500 GeV synchrotron whereas Devons would go ahead immediately with the construction of a separate 500 GeV facility.

The airing of these issues in public by the physicists has given strength to the elbows of those congressmen who feel uneasy in funding expensive high energy physics programmes at a time when defence expenditure is rising rapidly in the United States due to the Vietnam war. Professor McMillan drew attention to this feeling among some politicians in a paper read at the American Physical Society meeting just after Christmas.

The U.S.A.E.C. budget for 1966 is not too discouraging, however: although total expenditure is cut, two high energy projects have been funded - the Los Alamos Meson Factory and the AGS improvement programme. Reference to the 200 GeV project is made - "Design funds for the machine will be requested once a site has been selected and the design has been authorised". News is awaited any day now on the final site selected.

Meantime, while the politicians play, the design study continues. January saw the issue of a progress report from the Radiation Laboratory discussing recent developments. Cost estimates of the June report have been confirmed, improvements made in the magnet design, cost cuts made in accelerator building. Alternative injection systems have been studied but so far no reason has been found to change the original proposals. Finally, radiation problems and the experimental areas have been the subject of continuous study leading to a better understanding of the new problems which have to be faced in using this accelerator for high energy physics.

We all wish our colleagues in Berkeley a good journey through the turbulent political seas no doubt yet to come. The success of the 200 GeV project will have a significant effect on the attitude of European Governments on the 300 GeV proposal when they are asked to provide hard cash for it!

Physicists join U.K. 300 GeV Site Team

Readers of Orbit will probably know that a site at Mundford, in Norfolk, has been proposed to CERN by the U.K. Government as a possible location for a European 300 GeV proton synchrotron. There are still a number of problems requiring detailed investigation by the U.K. team concerned and Drs. Ralph Thomas of Radiological Protection and Leo Hobbis, Head of Nimrod Division have joined it to help in this work. Dr.Pickavance has also authorised them to draw further on the Laboratory's resources if required.

The Nuclear and Radiochemistry Group (2)

J G Cuninghame

It is now just over two years since the first report of the new Rutherford Laboratory Nuclear and Radiochemistry Group was given in Orbit (January 1964). We are now an established part of the life of the Laboratory, and there is no need to explain again the reasons for our existence. This short article, then, has been written to report what has been going on in the Group over the past two years.

The work can now be seen to be falling into three roughly equal divisions. The first of these is nuclear chemistry, of fission which is mainly carried out by the A.E.R.E. section, and of spallation reactions at GeV energies which has begun since the arrival on a fixed term appointment of Dr. K. F. Chackett from Birmingham University. The second is the use of Mössbauer techniques to unravel the electronic structure of chemical compounds, while the third is a motley group of experiments on aspects of radio-chemistry, medicine, geology, etc.

The work on fission is mainly concerned with trying to unravel the mechanism of the complicated fission reaction itself. The A.E.R.E. section of the Group, with the assistance of Dr. K. Fritze of McMaster University, Canada, who was here on sabbatical leave, has just completed a long and rather trying series of experiments in which five gramme targets of Pu^{239} were irradiated in beams of monoenergetic neutrons from van de Graaf accelerators, dissolved, and processed chemically so as to produce certain pure fission product radioactivities. From the results of this experiment certain conclusions can be drawn about the level scheme of the transition state nucleus at the instant before fission takes place. The high energy spallation experiments are aimed at attempting to throw new light upon the systematics of such reactions, and involve the use of the Nimrod extracted proton beam and, when it finally becomes available, of the probe in the circulating beam which will be operable through a vacuum lock.

The Mössbauer bandwagon in chemistry seems to be developing fast. The original group from Chelsea C.A.T., which is working on compounds of tin, has now been joined by one from Kings College, London, while a third group from Leeds University is also trying to get money to participate. The reason for this interest is that the technique is very sensitive in revealing changes in the configuration of the inner electrons of chemical compounds.

Miscellaneous experiments have included a collaboration with the β-ray spectroscopy group of the Risø research establishment in Denmark in preparing sources of Np^{234} by irradiation of U^{235} in the P.L.A. The ultimate aim of these experiments is to establish whether or not T is a good quantum number in the region of the heavy nuclei. We have also had a doctor from a London hospital experimenting with irradiated blood plasma in an attempt to develop a diagnostic method for a particular type of cancer, and several groups of physicists from Nimrod have made use of our very accurate α- and β- counting procedures for beam intensity measurements. We have also supplied many 8 MeV a-sources for detector calibration purposes.

A look into the future suggests that the present pattern of fundamental nuclear chemistry experiments and of Mössbauer work will continue to be the main preoccupation of the Group. The former will undoubtedly be more and more influenced by the V.E.C. and by the availability of normal irradiation facilities in the Nimrod circulating beam, while the latter has grown to such importance that one of our four suites is being adapted to be especially suitable for this type of work.

Physics and the Layman

I was prompted to write this article by the Editorial in last month's ORBIT which criticised in general the attitude of physicists towards laymen, and in particular the introductory lecture of the Popular Lecture series being run currently in the Laboratory. As the author of this introductory lecture, I feel that the comments made about it amounted to a personal attack on myself, and so I consider myself honour-bound to make a personal reply. Let me first of all say that I do not object to anyone saying anything he likes about me, or what I have said or done, provided (a) that the person concerned is at least man enough to put his name to what he has written, and (b) that I should have the opportunity to reply. Condition (b), at least, is being fulfilled. As for condition (a) the Editorial could have come quite legitimately from any one of the editorial staff. But as it was, to say the least, controversial, I feel that it should have been signed by the author, irrespective of normal practice.

He stated: "The venture (Popular Lecture series) failed. Why? We would say it failed because not enough thought had gone into the presentation of the introductory lecture". Just a bald statement, with not a word of explanation or a step of reasoning to support it. After this he plunges into a tirade against high energy physicists in general, concluding with what amounts to a motion of no confidence in the Direction of the laboratory. This is irresponsible and ill-informed journalism at its worst. Does he have facts and sound reasoning to back up his statements? If so, let us hear them, if not then let him leave the writing of editorials to persons better informed than himself.

The high energy physicist requires the enthusiastic support of a large number of non-physicists, each with his own personal know-how, in order to conduct his research. It has been my experience that such support has been very much in evidence in this laboratory. It was in order to maintain this satisfactory state of affairs that the Popular Lecture series was conceived; clearly the more the non-physicist understands about high energy physics, the more meaningful his own particular contribution will appear. This is the first venture of this nature that has been attempted in this laboratory, so consequently it is not perfect. Future series of this type will obviously gain from the experiences of the present one. However, I see no value at all in casually condemning the whole venture as a failure. Constructive criticism is one thing, gutter-press iconoclasm is another. If the Anonymous Author has any useful suggestions as to how the series might be improved, let us hear them.

To return to my introductory lecture: let me first outline the task with which I was presented. I was requested to review the basic ideas and techniques of high energy physics in such a way that subsequent lecturers in the series could assume that this much at least was familiar to their audience. Also, I had to bear in mind the heterogeneous nature of the audience, ranging from non-high energy physicists and engineers, having a grasp of the basic principle of at least classical physics, to administrators and typists, who could not reasonably be expected to have had any scientific training. At first it seemed impossible. However, when asked to achieve the impossible, it is in the nature of Englishmen to attempt to do so. I set about the task in the following manner. Realising that I had to cover more or less everything and could not be selective in my material, and that I had only one hour at my disposal, it was obvious that I would have to go extremely quickly. As most of the material would be unfamiliar to the audience, it meant, therefore, that not much of it would stick at the first hearing. So I went to the trouble of producing printed lecture notes that were distributed to the audience at the commencement of the lecture. It is manifestly obvious that several weeks of hard thought and hard work went into the preparation of these notes and the lecture itself, and to suggest that this was not the case I regard as a personal insult. To say that I have failed in my task is one thing, to say that I have not even attempted it is quite another. Might I ask the Anonymous Author if he took the trouble, after the lecture, of carefully reading through his printed notes to get a better understanding of what had been said? Did he go to the trouble of asking a physicist to explain in more detail any particular points which he found obscure? Or did he expect, with no previous scientific training, to pick up casually in one hour the basic principles of a branch of science which has taken many hundreds of physicists over a half a century to establish? If so then it is he, not I, who is arrogant.

Ian Blair

One does not have to be a genius to be a high energy physicist. Merely a moderate intelligence, combined with a passionate interest in the subject and a willingness to serve one's apprenticeship, is sufficient. But it takes a physicist nearly ten years of blood, sweat, toil and tears, not to mention privation, to master the tools of his trade. It is not unreasonable, therefore, for a layman to have to spend a few hours of study in order to grasp the basic principles of the subject. The organisers and lecturers of the Popular Lecture series are making the attempt to bridge the gap between physicists and laymen in the laboratory. Surely it is not too much to expect laymen to respond, if they are interested, by doing a small amount of "homework" between lectures. The study of any subject, even to an elementary level, can never be completely painless.

PLA Polarized Proton Source

The polarized proton source is used for about 40% of the scheduled experimental time on the P.L.A. Development work has continued since the source was first installed five years ago. The latest improvements have resulted in a fourfold increase in the figure of merit (beam current times polarization squared) over the previous best figure recorded five months ago. The source embodies a radiofrequency spin flip unit and ionisation in a strong magnetic field, and the recent improvement in performance is due mainly to increased ionisation efficiency and a more intense atomic beam. Measurements at 30 MeV indicate a mean beam current of 4×10^8 protons per second, with a polarization of 56%. A current of about 0.3 microamps can be extracted from the ioniser, but the 30 MeV current is much less than this due to the 1% beam duty cycle of the P.L.A. and its low transparency (mainly due to the grids in Tank 1). The higher figure of merit will result in an increase in the accuracy of nuclear physics experiments which use the polarized beam.

Mathematics Seminar
Bob Hopgood

On Thursday 24th February an afternoon seminar was held in the Lecture Theatre on "What constitutes the most useful undergraduate mathematics syllabus." First of three speakers was A.R.Curtis of A.E.R.E. who gave "An Employers Opinion". This was that the present Applied Maths part of the syllabus is too much divided into fields of application rather than into the fundamental mathematical ideas that these fields are based upon. More emphasis should be put on developing Pure Mathematics for the fields in which it would be applied. This might best be done by introducing a branch consisting of subjects like Partial and Ordinary Differential Equations, Matrix Methods and Theory of Approximations with attention paid to useful methods for computation.

The second speaker Dr.J. de Wet of Oxford University gave "A University Opinion" which agreed fairly closely with the views of the previous speaker although he was perhaps more outspoken in describing how the Applied Maths part of the syllabus could seriously affect the worth of the student in his future career.

The last speaker, Dr.A.G.Howson from Southampton gave a concise informative description of the new school syllabi which, for the first time this year, are the basis of A level examinations (about 300 will be taking A levels this year). The aim has been to maintain the interest of the pupil by keeping the subject as alive as possible. Changes include the removal of most Euclidean Geometry and replacing it by Co-ordinate Geometry (introduced as early as 11 !) Vector algebra is also introduced much earlier causing considerable change in the method of teaching. Normal Algebra has emphasis placed on understanding of basic ideas rather than manipulative techniques. Although the introduction of computing techniques has been limited by the lack of desk calculating machines, some work is done on flow diagrams, and examples of techniques for producing approximate results are encouraged.

School mathematics seems to be in a much healthier state than mathematics at University level, and it is hoped that the revolution already apparent in the Sixth Form will be extended to include undergraduate teaching. Regardless of the excellence of the new school mathematics, unless this happens, the end product of the Universities will probably be no better.

Letters to the Editor

Sir,

Since I was responsible for organising the Popular Lecture Series I would claim the right to reply to your attack on this series in the February editorial.

Your bold conclusion that "the venture failed" is an extreme case of journalistic licence presenting, as it does, an opinion for a fact. It is an opinion, moreover, which I suspect is not shared by the thirty to forty people who have been regularly attending the lectures. Judging from their comments, several of these lectures really "came alive" and managed to convey to some of the audience, something of the excitement and challenge of experiments in high energy physics.

The comment of the first lecture is not only extremely discourteous to a visitor to the Rutherford Laboratory, but is, in my opinion, quite unjustified. This lecture was intended to explain some of the facts that were common to most of the following lectures in order to leave subsequent speakers more time to concentrate on their particular experiments. The lecturer did exactly what was asked of him and this proved to be too much for the allotted time. If the series were repeated I would recommend that the introductory lecture should be given in two or three parts. This was an organisational fault and one for which the lecturer cannot be held responsible. A lot of time and thought was put into this lecture as should have been obvious from the eighteen pages of notes handed out at the time.

The later lecture attended by six people was on December 15th near the Christmas leave period It followed a break in the series due to the unavoidable cancellation of the previous lecture and coincided with a breakdown on Nimrod involving some of the people who would normally have attended the lecture. This lecture was eventually given on January 12th to an audience of about forty people.

The hysterical outburst in the second part of the first paragraph is inconsistent with the fact that the initiative for this series came from within the High Energy Physics Division. The project was not undertaken reluctantly, but was something that all the lecturers have been very happy to do believing that this, in some small way, repaid the many people in the Laboratory who support the experimental teams in various ways. There are nearly 150 visiting physicists and research students working on or around NIMROD in addition to over twenty resident physicists. The enthusiastic and excellent collaboration that exists between Nimrod crews and the large numbers of support staff directly and indirectly involved and experimental teams is very much appreciated. Several of the lecturers have devoted time and effort not only to preparing the lectures and slides, but also to mounting working displays of apparatus in the Lecture Theatre to illustrate particular points.

Sir, if you genuinely wish to stimulate enthusiasm in the Laboratory, might it not be better to encourage those efforts that have already been made? Constructive criticism and comments would be welcomed but I, for one, found neither of these, in what to me was a thoroughly ill-considered editorial.

Finally, I would like to take the opportunity of apologising publicly to all the lecturers in the Popular Lecture Series for the embarrassment that I feel sure this editorial must have caused.

D.C.Salter.

Sir,

I too hope that Mr.McAinsh will feel obliged to apologise for having written the letter which you, he and your colleagues saw fit to publish last month and even to dignify with editorial comment. Never have I seen such unconscious self-criticism as in these two items. Factual errors, biassed comments and plain ignorance abound and are rounded off very prettily with the statement "We still need to do a lot of hard thinking about what this Laboratory is trying to do". Clearly "we" (the Editorial Board) would not recognise a high energy physic if one fell on them.

I was fortunate enough to attend most of the popular lectures and I found them extremely interesting. As an example of a carefully prepared and well delivered lecture covering what must have been the highest volume of material ever attempted in one hour, the first lecture was a classic. The level at which it was pitched was of necessity above that of a backward seven year old and so it should have been. Although heavy going, I, an accountant, found no difficulty in following, but subsequent falling off of attendances shows that I was in the minority although the later lectures were pitched at even lower levels.

The reason is simple. The majority are not prepared to put themselves out to find out what high energy physics is all about. They expect to have it given to them in "instant learning" form. Teaching amongst other things requires a listener who is prepared to make the effort to learn. I have never had any difficulty in understanding either physicists or any of the layman books and magazines dealing with high energy physics in the library. The failure of communications cannot be laid at the door of the experimental physicist. It is I fear just another example of the welfare state disease - "it should be done for us".

Finally, I deplore the situation where a magazine which has an international circulation and displays a public image of the Laboratory can be published containing such irresponsible and misleading opinions as this letter and the editorial.

P.S. It isn't the first time Orbit has let the Laboratory's dirty washing show.

Ambrose Miller.

The Editorial Board is advisory and not included in the 'we' Ed.

Sir,

How refreshing it is suddenly to find two new and enthusiastic allies rushing to my aid in what I was beginning to think was a lost cause.

I agree most wholeheartedly with Ken McAinsh and yourself, Sir, that if we are not to have our colours downed before our eyes we must have inspired leadership and effective communication. Our potential is, I am convinced, unequalled; we have only to use it.

The real problem then is how to achieve such obviously needed stimulation, starting from things as they now exist and without wasting time on recriminations.

May I therefore suggest, in all seriousness, the following:

Let someone from within the existing staff, not so high that he (or she) has lost the common touch but who can at least understand managerial problems, be carefully chosen by Staff and Official sides and quietly asked and be given time to improve communication and leadership at all levels in the Laboratory.

Proposals arising must then be given fair trial: if they are good they will quickly show, if not good they will wither and die but at least we shall be no worse off than now.

But for heavens sake lets' try to DO something now.

E.G.Higgins.

Sir,

Yes Mr.McAinsh you are quite right! The enthusiasm displayed by Dr.Feynmann and his colleagues in the film "Strangeness Minus 3" is rarely displayed by Scientists in this country. One is overwhelmed when working in the United States with the sheer excitement people - ordinary people, as well as scientists - have about the "scientific frontier". Scientists and Engineers are regarded as important members of society contributing to the well-being of the community.

Compare this with prevailing attitudes to science and scientists in this country. The "Times" in a recent editorial patronisingly referred to "a boyish enthusiasm about the wonders of science" Scientists in the past 20 years have lived in a state of increasing frustration and alarm at mid-stream changes in policy on scientific projects by successive governments.

Be all this as it may - and it is hard, Mr.McAinsh, to be enthusiastic about science given these ingrained attitudes within the country - scientists have been prepared to go along with this situation all too quietly and consequently are partly to blame for it.

The Science Departments of Universities and the various Government Departments concerned with science should be powerful lobbies within the country persuading, cajoling, pressurising. We should go out to industry and commerce, take them by the hand, and explain "with boyish enthusiasm" the wonders of science. The public must be made aware of the dangers of reinvesting too small a proportion of the nation's wealth in fundamental research.

All this, of course, means that the Scientific Community must first look within itself and get its own priorities right - we have to ask some hard questions and do our homework. Having done this we have to "sell science" - perhaps a task too distasteful for some.

We might perhaps say with Shakespeare -

"The fault, dear Brutus, is not in our stars
But in ourselves, that we are underlings"

Ralph Thomas.

L B Mullett

Professor P D Dunn

With the secondment of Mr.Mullett to the Ministry of Technology, the Rutherford Laboratory loses one of its key figures; a man who has contributed much both to the building of the Laboratory and its technical facilities. It seems an appropriate time to outline some of the highlights of his career to date and to show some of his remarkable contributions in the Accelerator field over the period of 20 years.

I first met Les Mullett when I joined the Linear Electron Accelerator team at Malvern in 1949. After work on radar during the war he joined the newly formed Atomic Energy Establishment and applied his knowledge of microwave techniques to the design of Linear Electron Accelerators. This was a time when it was possible to be both a theorist and experimenter and he showed his remarkable versatility in both fields. Perhaps less well known is his considerable constructional ability: for example, a reflex klystron co-axial circuit was made on a lathe within a day and became a prototype for a widely used power source. Even the original was still in use several years after it was made.

His reputation was, of course, made by his contribution to the new applied science field of accelerators. Waveguide feed-back systems, rat-races, particle dynamics, dielectric loading are only a few of the topics to which he contributed, and the 4 MeV machine was the prototype for the present deep ray therapy machines.

In 1953, a team at the Lees, the curious little sub-establishment at Malvern was moved to Harwell and became the nucleus of the new Accelerator Group under Dr. T. G. Pickavance with Mullett as the Deputy Group Leader. The project was to design a 600 MeV Linear Proton Accelerator. This project required not only the skill needed in the smaller machines but, due to the scale, it was necessary to bring in industrial help with its consequent organisation and liaison problems. In spite of the increasing commitments Mullett still found time for the original idea, and one thinks, for example, of the multi-pactor valve amplifier which he devised and which was later constructed at University College London. To the regret of the team, in 1955 it was decided to stop short at 50 MeV, the present PLA, and turn our attention to a higher energy circular machine of novel design.

The first Geneva Conference on Accelerators in 1956, in addition to reporting developments in the West, revealed the Russian work on the Budker and other plasma machines. This was a most exciting period in which Mullett featured prominently producing fundamental papers on FFAG machines, plasma waveguides, the resonant synchrotron, gas scattering, and many other topics.

After consideration of the various possibilities, the principle parameters of Nimrod were agreed on. In 1957 the National Institute for Research in Nuclear Science was established and Dr. Pickavance was appointed Director of the Rutherford Laboratory. The Accelerator Group

became Accelerator Division and Mr. Mullett was appointed Division Head. He became heavily committed both in the detailed design and construction of Nimrod and also in the various problems associated with the setting up of a new Laboratory. In spite of this he still managed to find time to keep aware of other developments and in particular recognised the possibilities of direct conversion for nuclear power, and set up the Direct Conversion Group. This was not an easy decision to justify particularly in an Accelerator Division. Les Mullett was not a man to worry about such trivialities of administration. He constantly supported and encouraged work on direct conversion until 1963 when other organisational arrangements were made. Again in spite of heavy committments Mullett was always prepared to spend time in helping staff with their career and training problems and many people in the Laboratory have reason to be grateful to him for his sympathetic advice and assistance.

In 1961 Mr. Mullett became Assistant Director of the Rutherford Laboratory and in this position he demonstrated his flair for administration.

It is, of course, a severe loss for the Rutherford Laboratory but it is clearly right that men of his outstanding ability should be placed in positions where they can influence policy and initiate, guide and control Government scientific and technical planning. Many of us will now look for signs of imaginative thinking and decision in Government technical policy as a result of this appointment.

His friends in the Rutherford Laboratory and elsewhere wish him well in this new and challenging phase of his career.

Orbiting Around

Editor: H F Norris
Building R20, Ext.484.

Free as Air

Would you like to get away from it all, stay in bed if you felt like it, go where you like, when you like? Most of us must have longed for this at times but very few ever succeed. in living this way. One person who is soon to enjoy this kind of life is Doris Cherry, who resigned on the 18 March.

She has been Mr. Venn's secretary since she arrived at the Laboratory at the beginning of 1960, having previously worked at Harwell since 1958. Doris has built herself a motorised caravan which will be her home for the next 7-10 years. Her plans are vague but she intends to tour the British Isles for a start, and after that - the world is her oyster. Of course if Doris feels she would like to give up the roaming life she can always build a house. She has already built a bungalow with the help of one assistant. Bricklaying, tiling, plumbing, wiring, its all the same to Doris. The only job she felt she couldn't tackle was the plastering.

The building was completed in 18 months; the most necessary qualification she assures us was common sense, which in these days of specialisation is refreshing to hear. Now she is off on her travels; destination - unknown; time of arrival - who cares? We hope that one day we shall receive some news; in the meantime, Bon Voyage Doris and may your punctures be few and far between.

Record Programmes

Programmes will be held every Tuesday in April, with the exception of Easter week, at 12.30 p.m. in the Lecture Theatre.

5 April	Selections from "Nabucco", an opera by Verdi
19 April	Transatlantic Session: An amusing Lecture by Dylan Thomas, recorded in America - American Folk Songs.
26 April	"Eine Kleine Nacht Musik", Mozart "Symphony No.5", Schubert

Chalk Downs to Chalk River

By the time this appears in print a reunion will have taken place some 3000 miles from R. 25. The scene is Chalk River in Canada where Pat Rogers is going for the next twelve months on unpaid leave. On this, his first trip across the Atlantic, Pat is delighted to have the opportunity of meeting and working with many of his former colleagues from TRE Malvern. This combined with the chance to see at least some of Canada and to work on an interesting project explains Pat's enthusiasm. He will be working in the Reactor Research Division of the Chalk River Nuclear Laboratories on RF systems applied to accelerators. The work will be closely associated with their intense neutron generator project.

In 1946 Pat was working at Malvern as a member of a Harwell team on electron synchrotrons under D.W. Fry, and moved to AERE in 1949. Since then he has been involved in many projects the latest being the Variable Energy Cyclotron now undergoing final testing at Harwell.

Pat is taking his wife and daughter with him, much to their delight. His son has to stay behind until the summer to take his 'O' level examinations before joining them; but as some compensation he will be able to enjoy the luxury of a sea voyage to Canada. We hope that Pat will find his visit both useful and interesting and we will try to persuade him to give his impressions of Chalk River and its activities at a later date.

Magnetic Personality

Dennis Hutchings who left the Laboratory recently must surely be remembered for the large number of Suggestions Awards he obtained. He joined AERE in 1958 and moved outside the fence in January 1960. During the six years he spent here he has been associated with the building of Nimrod in many ways and for the last 3 years has been particularly concerned with the testing of bending magnets.

During this time he estimates he has collected over £70 in awards. Dennis was apprenticed for 5 years at De Havilands and after two years in the RAF worked at the Royal Aircraft Establishment at Farnborough for a further five years. His new post is with the Sedimentology Department at the University of Reading as a technician. One of his first jobs will be to set up a workshop, order machines and organise supplies. Dennis, who is a keen First Aid worker, will also be remembered for his help in forming the table tennis club. We wish him every success in his new job.

Darts Competition

It is hoped to hold the Annual Darts Competition in April. If you wish to enter a team please contact Tudor Morgan, R. 9 Ext. 6171 or B.P. Keen, Ext. 6615 as soon as possible.

Comings and Goings

D E Gray, C R Hedgecock, J G S Rouse, W G Hughes, K Morgan, E Thomas, D K Cooke and A C Crocker join Nimrod Machine Engineering Group; R M Griffen joins Nimrod HEPE Group; R J Blackford, J J Darius and A J Price join PLA Engineering Group

Dr G Manning joins HEP Division; A K Barlow joins HEP Electronics Group, G L Jones joins Central Engineering Group; R O Mills joins Bubble Chamber Group

P E R Porter, Mrs J Andrews, R A Coffey, K M Gascoigne and S N Graham join General Administration; Miss H Bywater, Miss E E Sweet and K W J Humphries join Atlas Administration; R J A Bevan has joined us as a Student Apprentice

J A Lawton, Miss J A I'Anson, Miss J Dawson and C R Hadwin have left us.

Congratulations to:

Robin Lascelles, Nimrod Mechanical Engineering Group, on his engagement to Joy Aldworth on 26 February.
Irene Foster, General Admin, and Del Devins, PLA Division on their engagement on 5 March.
William Almond (also known as Ginger) Electrical Services R.18 on his engagement to Janet Pridham on 22 January.
Ann Bray, General Admin, on her marriage to David Firth, AERE, on 12 March.

Suggestion Awards

At the Thirty Fourth Meeting of the Suggestions Awards Committee held on Wednesday 16th February 1966 the following awards were made:

£18 to V. Pepper whose proposed method of positioning the quadrupole on the V.E.C. Cyclotron has been adopted.

£10 to D.A. Hutchings whose proposed re-design for pole-face windings had been successfully adopted.

£6 to H. Taylor whose proposal to fit a datum bracket on bending magnets would be adopted, with minor modifications, on new magnets.

£2 to H. Webb whose suggestion had drawn attention to a safety hazard in R. 9 workshop.

An encouragement award of £1 was made to D. Hudson.

B. Briscoe.
Secretary

Printed by XPDO Ltd., Didcot in association with
The Kilburn Press Ltd., Wallingford.