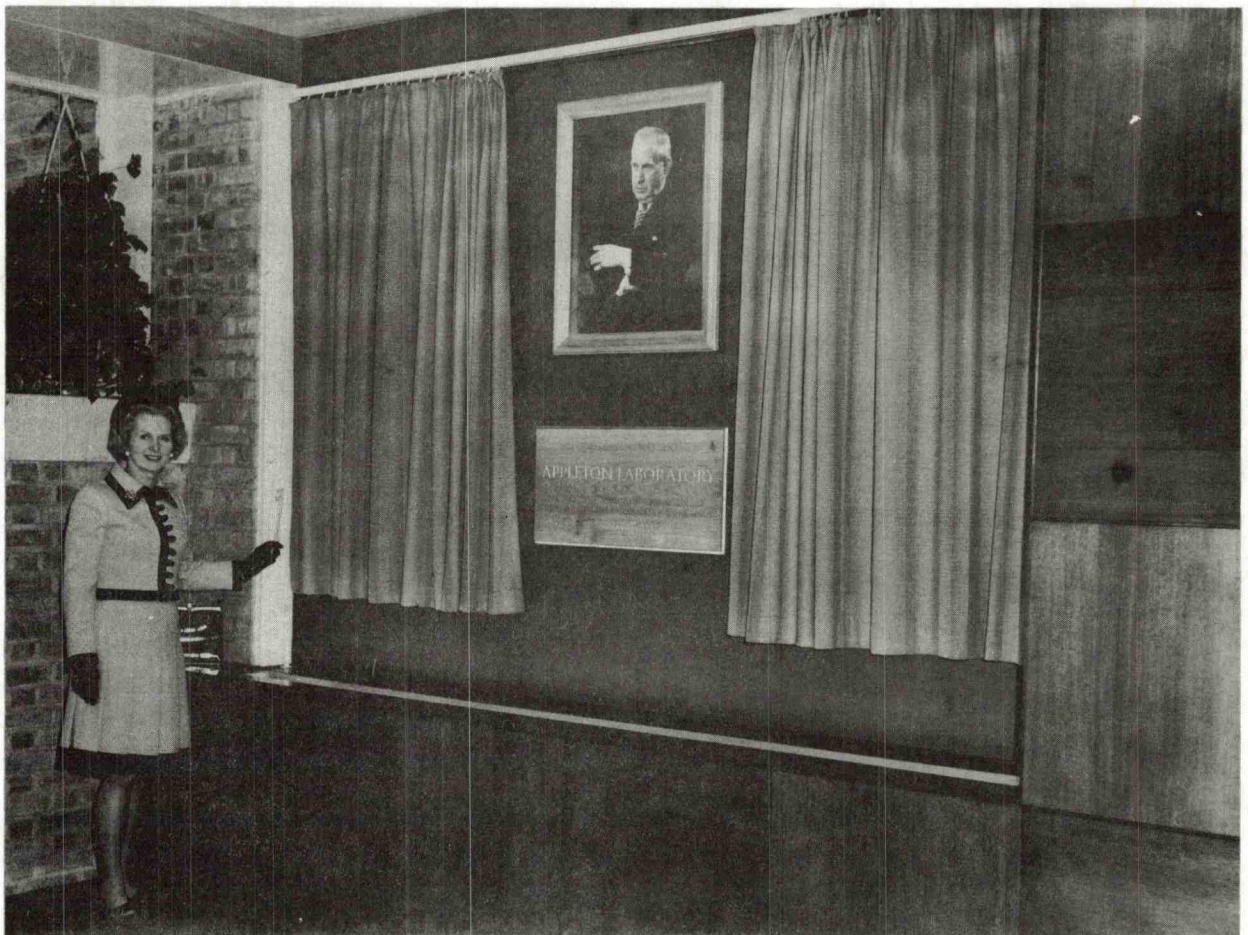




APPLETON LABORATORY NEWSLETTER

No. 150

November 1973



Mrs. Thatcher unveils the Commemorative Plaque
and Portrait

THE RENAMING CEREMONY

At the renaming ceremony which took place on 7th November, The Secretary of State for Education and Science, The Rt. Hon. Margaret Thatcher M.P., addressed members of staff prior to unveiling the commemorative plaque and portrait of Sir Edward Appleton. Among the visitors present were Lady Appleton; Professor S. F. Edwards (Chairman SRC) and Sir Eric Eastwood (Chairman of the Laboratory Committee and of the Astronomy Space and Radio Board).

In her speech the Minister referred to Sir Edward Appleton's particular links with radio science at Ditton Park; to the changing role of the establishment as space science technology made new research methods available, and to the international reputation achieved over the years by workers at the laboratory.

The ceremony was followed by visits to a number of exhibits displaying some of the current work being undertaken. Staff involved were impressed by the Minister's grasp of the nature of the various investigations and her appreciation of problems, not necessarily all scientific, which arise in the pursuit of our particular aims.

Visits and exhibitions of any sort require coherent action on the part of many; all involved in the renaming of the Laboratory have cause to feel that it was a more than usually rewarding exercise.

SIR EDWARD APPLETON

Sir Edward Appleton's work as a man of science and as an administrator needs no recounting to those engaged in the physics of the upper atmosphere. It may be of interest nonetheless, to members of staff who are not scientists, to read a little about the work of a man who has been described as one of the architects of modern physics.

Appleton was born in 1892 in Bradford and after distinguishing himself in his school career, he proceeded to St. John's College Cambridge and, in 1914, obtained a first-class degree in physics. On the outbreak of the First World War he joined the Army and eventually became a signals officer in the Royal Engineers. It was then that he became interested in the newly developed triode valve, and in radio communication which was being revolutionised by its use.

At the end of the war he returned to Cambridge, to the Cavendish Laboratory under the direction of Rutherford. It appears from notes he kept at this time that he found three main interests to which he might apply his talents for research,

they were, in order, phenomena related to valves, atmospheric radio noise, and radio-wave propagation. At first he worked mainly on the valve problems but was also giving some thought to the possible causes of fading of radio signals and what it implied.

In 1901 the ability of radio waves to be detected far beyond the visible horizon was strikingly demonstrated by Marconi. For the next two decades a considerable quantity of circumstantial evidence, backed by some controlled experiments, had suggested that the waves travelled by reflection from regions of electrically conducting gases in the atmosphere high above the earth's surface. There were, nonetheless, those who did not agree with this hypothesis and what was required was a crucial experiment to prove - or dispose of - the concept of the 'upper conducting layer' originally suggested by Heaviside in this country and Kenelly in the U.S.A.

Such an experiment was devised by Appleton. His training had included a thorough knowledge of optics and, bearing in mind the fact that light and radio are all part of the family of electro-magnetic wave phenomena, and obey the same laws, he recollected the following experiment which demonstrates the phenomenon known as 'interference'. Under particular conditions, using two rays of light from the same source, and observing at a common point, one may look at the mixture of light from the direct ray and from a ray, reflected by a mirror, which has, therefore, had to travel along a longer path. According to the relative path lengths (i.e. the position of the mirror) the light waves will tend to reinforce or cancel one another. Thus if the mirror moved toward or away from the direct ray path, the brightness of the light would alter. 'Fading' would occur.

It dawned on Appleton and his co-worker, a New Zealander, Miles Barnett, that if the 'upper conducting layer' existed, the optical experiment would be reproduced on a vast scale and give rise to the fading observed on radio signals. Furthermore, they reasoned, if the signal wavelength was altered slightly over a short time, controlled fading should be observable at the receiver and, most important of all, it should be possible to calculate the height of the reflecting layer from known data.

On the 11th December 1924 using a BBC transmitter at Bournemouth and a receiver at Oxford they attempted the experiment. The signal wavelength was altered - the controlled fading was observed at the Oxford receiver. Calculations showed that the wave was being reflected from a zone about 100 km above

the Earth's surface. The layer was not the "mathematicians myth" that some sceptics had supposed it to be.

Appleton realised that with the positive identification of this layer a whole new field of investigation lay before him, together with a powerful tool with which to carry it out. He abandoned his earlier lines of research in favour of total scientific commitment to the study and coordination of the phenomena of the 'upper conducting layer'. One is reminded of Faraday's work in devoting his efforts to the relationships between electrical, magnetic and optical phenomena, after his 'conversion of magnetism into electricity' in 1831. In both men the follow-through was the mark of true genius as opposed to brilliant talent.

By the end of the '20s' Appleton and his co-workers (prominent among them was Mr. J. A. Ratcliffe, our former Director) had identified another clearly marked region of conducting gas well above the first layer. For a time the lower and upper layers were known as the Heaviside and Appleton layers respectively, but eventually Appleton's own designation of E and F layers became the accepted terms and the region of conducting or 'ionised' gases was named the 'Ionosphere' by R. A. Watson-Watt, the Superintendent of the then Radio Research Station at Ditton Park.

By now Appleton's career had taken him to Kings College London as Wheatstone Professor of Physics and his investigations were being carried out with the help of transmission from the National Physical Laboratory at Teddington and an outstation at Peterborough. Cooperating in this were Staff of the N.P.L. and the Radio Research Board, some of whom were from Ditton Park, a site which had been used for roughly a decade previously by N.P.L. and R.R.B. experimenters. By 1929 the Slough installation was playing an increasingly important part in his investigations and complete on-site (monostatic) ionospheric observations were under way there by 1931. For the International Polar Year of 1932, Appleton organised an expedition, largely manned by R.R.S. Staff, which made valuable observations from a site near Tromsø, Norway.

In 1935 Appleton returned to Cambridge, and the Cavendish Laboratory, as Jacksonian Professor of Natural Philosophy, a position he relinquished three years later to become the administrative head (Secretary) of the Department of Scientific and Industrial Research. He remained with D.S.I.R. until 1949, continuing, so far

as administrative commitments would allow, to influence research as a member of the Radio Research Board or of one of its specialist committees.

At one time he had also to assume the mantle of acting Director N.P.L. within his role of Secretary D.S.I.R. This meant accommodation at Bushey House, Teddington, the Director's Residence at the Laboratory, where staff, regarding his war-time efforts to help food rationing by rearing hens, gave new meaning to the term Appleton layer.

It was during this time that he was mainly responsible for the then Radio Research Station emerging as an establishment in its own right within the D.S.I.R. and having a Director of its own, Dr. R. L. Smith-Rose, whose own work on the direction of arrival of radio waves had done much to complement and confirm Appleton's early work.

In 1949 he returned to academic life as Principal and Vice-Chancellor of the University of Edinburgh, a position whose duties he performed with great distinction for the rest of his life. Despite the many and varied demands on his time he continued to interest himself in that science of ionospheric physics which was so much his own creation. He corresponded frequently (three times in one day on one occasion!) with Slough workers about current problems, and his performance of the opening ceremony of the present main building in 1957 was an apt symbol of his long association with our laboratory. In 1963 he paid his last formal visit here when he spoke to a large audience about his work, under the suitable title of 'Some Radio Reflections'.

Although it was intended that this note should take a village view of a world figure, it is as well to correct the perspective a little by seeing how high he stood internationally. A Nobel Laureate, Fellow of the Royal Society, Knight; he did much to further the International Union of Scientific Radio, becoming President from 1934 to 1952 and thereafter an Honorary President. Apart from his numerous publications he was first Editor-in-Chief of the Journal of Atmospheric and Terrestrial Physics, whilst being occupied as a senior administrator and academic.

He appears as a man who enjoyed his deserved honours but was always glad to exchange ideas with the newest research workers. A man of dignity without pomposity and with the zest of youth. His death came suddenly in 1965 at the age of 72. Among his effects was found a draft of a paper dealing with ionospheric research. The spring he tapped as a young man had sustained him over forty years.

G. Gardiner

STAFF NEWS

CONGRATULATIONS TO:

Mr and Mrs. E. Milner on the birth of their son, James Richard
on 28th August.

Mr and Mrs. D. W. Hardy on the birth of their daughter Corrina Frances
on 22nd September

Mr and Mrs. S. Beatson on the birth of their daughter Marie Louise
on 15th November

WELCOME TO:

E. H. M. Rayner	SSO
P. H. Moffatt,	SSO
G. D. Fleming	ASO (Chilbolton)
J. E. Smith	Sen. Photographer
Mrs. C. S. Harries	Typist II P/T
R. N. Sipes	HSO (Goddard Space Flight Center, U.S.A.)
A. J. Irvin	Craftsman I

RESIGNATIONS

Miss W. Harrington	SO (Act)	
J. G. Wardrop	Vacation Worker	
Mrs. P. L. Elvins	Typist I	
T. Bagnall	ASO	
C. R. Negus	R.A.	End of Secondment (Fixed Term)
Mrs. C. E. Walsh	CA	" " " (returned to UKAEA)
W. N. Rees	Craftsman I	

OTHER CHANGES

D. M. Boys PTO IV	Changed from Divn 6, Grp 4 to Divn 2 Grp 2 (A.J. Roger's Group) on 1.10.73
J. E. Stenning HSO	" " " 1 " 3 to " 2 " 2 " " "
C. Murphy PTO IV	" " " 1 " 3 to " 6 " 4 (D.R. Howard's Group on 1.10.73)
E. P. Dyer PTO III	" " " 7 " 5 to " 1 " 2 (P.A. Vaughan's Group at Culham) on 31.10.73

SPORTS AND SOCIAL CLUB NEWS

FORTHCOMING EVENTS:-

SATURDAY 8TH DECEMBER - CHILDRENS CHRISTMAS PARTY

SATURDAY 15TH DECEMBER - CHRISTMAS DANCE.

WINE CIRCLE

CHEESE AND WINE PARTY

This year the party will be held on Wednesday 19th December at 12.45 in the Bar.

Tickets will be on sale in early December. Watch the Sports Club Notice Board for further details.

F. Bennett

BONFIRE NIGHT

Once more the magical promise of fireworks pulled in the crowds and on a fine November 5th evening the old Radio and Space Research Station was given a fiery send-off into the Appleton era. Over 500 came to watch, listen, eat and drink, and it is a tribute to the ladies of the committee and their helpers that everyone was "fed and watered" in under forty minutes. The experiment of doing all the cooking on-site was very successful and I should like to thank those who lent us their camping gas cookers (Doreen Baldwin, Chris Gibbins and Piers Eggett). The coffee, I must confess, was "pre-cooked" in the canteen kitchen, and my thanks to Mrs. Loudensack for not only letting us use the kitchen for this purpose, but doing it for us.

The fireworks as usual were excellently presented by Paul Dickinson, helped this year by Chris Gibbins, John Cathrew and Mike Farman, although, Paul, Chris and I had serious doubts about the evening five hours previously as we played musical cows with a couple of Charolais bulls. In the end the bulls won, the farmer was placated, and we were left with our dexion frames intact. Meanwhile, Norman Woodall and what looked like the majority of the workshop staff were trundling huge tree trunks onto the fire. The end result being that the fire was still alight when Mrs. Thatcher left, after renaming the laboratory forty hours later. My thanks to them all and not least to John Halley who made

a splendid guy to put on the bonfire.

Finally I should like to thank all those who performed the little noticed chores. The drivers who ferried the children. Their kindness was much appreciated by the children who so clearly enjoyed themselves. Daphne Robertson for arranging the donation of the fizzy drinks: British Airways (?) for their ten tons of pallets (Doreen once again) Ron Halton for another excellent publicity poster. Betty Nutley and her daughter who sold the raffle tickets. Bert Childs for his behind the scenes work, and to the two people who always come to bonfire night but never see the fireworks, the Fireman and the Ambulanceman. Luckily Ivor Eyre's services as an extinguisher of fires were not needed but unfortunately Frank Bennett had a serious casualty to tend when Mrs. Payne fractured her leg. I am sure you will all join me in wishing Mrs. Payne a speedy recovery.

The third prize from the Bonfire Night raffle is as yet unclaimed. The ticket number is (White)85, ref.no. K03042. If unclaimed by the time of the Christmas dance it will be included in the raffle prizes for that function. I should also like to remind you that Doreen Baldwin and Ellen Scammell are running a weekly raffle in aid of the Childrens' party on December 8th. Please give them all the support you can.

J. E. Allnutt

BRIDGE CLUB

The club has continued its run of success in the Great West Road teams-of-four competitions, as follows:-

Felixon Cup	29 Oct.	Away win on handicap	vs Alchemists; team Johnson, Paterson, Bain, Zavody.
League	8 Nov.	Away win by 8-2 points	vs Unilever. team Martin Johnson, the Bains.
League	13 Nov.	Home win by 10.0 points	vs Quaker Oats, who withdrew from the match.

On 21 November a club evening was held. The Smith-Rose contest was won by the South team consisting of Martin, Johnson and the Gordon-Smiths; the margin of victory was the enormous one of 98 IMPs.

The next match is the second round of the Felixon Cup on 28 November, at home to Ealing V. The next club evening will be held during the week commencing 17 December.

W. C. Bain

AMATEUR RADIO CLUB G3RRS

At the AGM in October, last years' committee was re-elected with the exception of John Crawford, whose position as Hon. Sec. is taken by Piers Eggett.

Results of the worldwide competition we entered in October 1972 have been published. The long delay in producing results occurs because over 2,000 world entries have to be checked. In the telephony section our team of operators provided us with 8th position in the UK. In the morse code section we were placed first in the single band, single operator section, having chosen 3.5 MHz as our frequency. A lack of morse operators prevented us from a full multiband entry but allowed myself a bit of code practice.

Recent months have been spent preparing for the erection of our new 3- element rotatable Yagi array for the 14, 21, 28 MHz bands. With the financial help of the SSC. and contributions from members, a commercial antenna kit was purchased. The additional loan of a motor from Les Mitchell, and considerable help from workshops in the preparation and erection of the mast completed the task. Although the final touches have yet to be put to the control system, initial tests show that the antenna is performing very well. We were fortunate to contact John Wright, a member of staff in Port Stanley, who wishes to pass regards to his friends here. Incidentally petrol is now over 70p per gallon out there!

During the winter months the lowest frequency available to us (1.8 - 2.0 MHz) is to be used for trans-atlantic and trans-pacific tests organised by USA radio amateurs. We are hoping to take part in these this year.

May I take this opportunity to remind members that subscriptions for the coming year are now due and remain at 50p. As always we welcome new members, please contact Piers Eggett or myself for information.

D. R. Vizard
Chairman

CAR CLUB

The anti-freeze arrived just before the appearance of last months Newsletter, so there was no time to alter the copy. At the time of writing there is still some anti-freeze left although the advent of several frosty mornings brought a rush of customers.

New oil stocks have been ordered but there are still some 1 gallon 10W/40 cans available at pre-July prices. As with other goods the price of oil is steadily rising. In order to keep costs down the Car Club will sell 20W/50 oil in multiples of 1 gallon, loose from 5 gallon drums if a container is provided, that is, if anyone will be needing oil at all in the near future.

P. Muzlish (Hon.Sec)

TABLE-TENNIS

The season is now in full swing. In spite of the Station's change of name the table-tennis teams remain RSRS 'A' and 'B' in the Slough League as a change would mean re-registration. In any case our opponents generally have no idea what "RSRS" stood for.

The 'A' team have played 5 league games and have won 2. They were also eliminated from the Dilger Cup by a 1st Division team. The 'B' team have now played 5 games and won 5. F.H.D. were beaten 7-3 thanks to John Delury who won his 3 singles easily. Slough Angels, a team of 15 year olds from a local youth club were just beaten 6-4.

P. Muzlish (Hon.Sec)

WINE CIRCLE

An interesting and informative talk entitled "The Production of Sparkling Wines" was given by Dr. J. Hall on 6th November.

The talk was accompanied by a very palatable sample which certainly stimulated the interest of those present.

Copies of two receipes and a summarised procedure for the production of sparkling wines was made available.

D. G. Carter

Skylark and Petrel High Latitude Campaign

Since our previous announcement the auroral campaign has been referred to on BBC 4 where it was announced that a United Kingdom campaign was in progress to investigate the Aurora Borealis.

The campaign has been extremely successful; 3 Skylarks and 11 Petrels have been launched to date. An indication of the results so far obtained will be given in the next Newsletter.

E. W. V. Acton

LETTER TO THE OUTSTATIONS

Dear Colleagues,

Due rites, ceremonies, feasts and such, proclaim our translation to the Appleton Laboratory. The title of Appleton Laboratory Newsletter proclaims the breadth of your Editor's imagination. The press, both national and local has marked the change, and letters have started to arrive addressed in a variety of variations on the theme. The first envelope of this kind, and the best to date, managed to miscall us in a gloriously wrong-right phrase. "The Appletree Compass Observatory" it said. Joyce, himself, could not have better suggested usefully applied knowledge in an ambience of wholesome country innocence.

A day or two later, however, the curious might have glimpsed an older, darker, side of the rural approach to re-birth and the naming of names. It was late afternoon with darkening skies and the moan of the chill wind, (not really, but hell, this has to be filled somehow) when, at a pre-arranged signal, a group of initiates rushed from concealment at the far end of the main corridor. They disappeared into the yard, appearing again shortly, bearing a human figure, female, blonde and fine, trussed up in some sort of ceremonial cage arrangement. Doubtless a mimic goddess/victim destined for grisly immolation to ensure fertility of ideas.

Things had a touch of your druids, golden boughs and what-not, to which was added a touch of eastern promise. A sub-group clustered about a youth, seemingly self-sacrificed to jagannatha, lying beneath the wheels of the low-loader. For a moment he was hidden from profane eyes, then drawn forth on a hurdle to the murmur of the celebrants. A word from their leader and he sprang up, whole and unharmed, symbolising the new-born age no doubt. Not so the maiden; her fate was not immediately clear, but seven days later, at the same hour, a head, blonde,

detached, was glimpsed being carried along that same corridor

Prompted by feelings that an anthropologist, if not the police, should hear of this carry-on, enquiries were instituted. They got no further than an ingenious and well-rehearsed cover-story which could not be shaken. 'A first aid exercise', they said; the man was a volunteer, the girl a lay-figure. A likely tale.

It wanted but one thing more to seal our status. It came. Excavators, carefully provided with maps and soundings, dug skilfully through the telephone cables. Thus were the links with the past cut. We must acknowledge 'tis well an old age is out, and time to begin a new". Poets and workmen can demonstrate these things much more succinctly than can,

Yours sincerely,

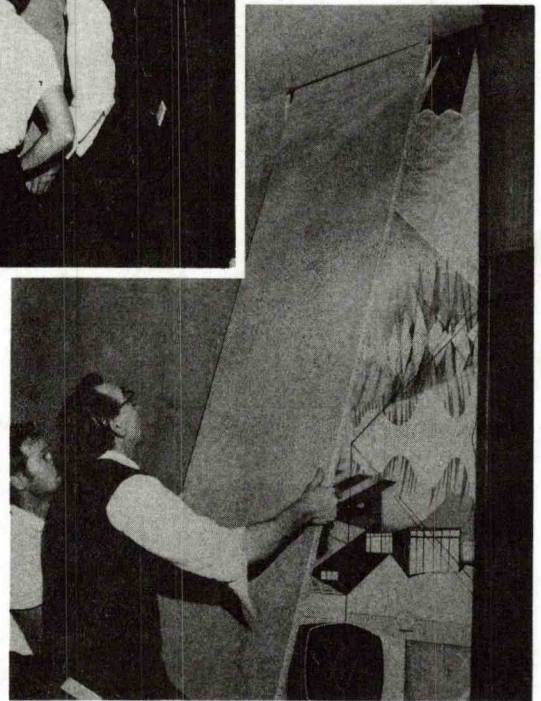
The Editor

List of Reprints - November 1973

P. A. Bradley . A simple model of the vertical distribution of electron
J. R. Dudeney. concentration in the ionosphere. J.A.T.P. 1973 Vol.35
Pages 2131-2146.

Internal Memoranda

NIL



The Mural Immured

'Going' 'Going' 'Gone'