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THE BRITISH ANTARCTIC SURVEY

The British Antarctic Survey (formerly the Falkland Islands Dependencies Survey) maintain several permanent bases in British Antarctic Territory; except for Halley Bay, all the bases are in Graham Land.

Antarctica is largely covered with snow and ice, and is surrounded by hundreds of miles of sea ice. In summer the sea ice breaks up sufficiently to allow suitably strengthened ships to penetrate to the continent. In contrast to the lack of flora and fauna on the land, the seas surrounding it are rich in animal life. Seals, whales, penguins and sea birds are found in large numbers near the coast.

British Antarctic Survey operate two ships in Antarctica, the "Shackleton" and "John Biscoe" and normally charter a third ship for the relief of Halley Bay. The "Shackleton" and "John Biscoe" supply and relieve all the bases in Graham Land. These ships sail from Southampton in the late autumn of each year for Port Stanley in the Falkland Islands before proceeding to the bases - which lie between 600 and 1,200 miles south of Port Stanley. Although Halley Bay is roughly 2,000 miles away the route taken often involves a journey of over 3,000 miles to avoid the notorious Weddell Sea pack ice. The ship normally enters the pack ice near the South Sandwich Islands (58°S 28°W) and heads for Kapp Norvegia (72°S 12°W) and then follows the coast south to Halley Bay. Often near Kapp Norvegia one enters an open shore lead which gives complete freedom of navigation along the coast. Occasionally the pack ice closes up and prevents normal ship navigation; the ship may come under pressure and explosives are used to avoid damage to the ship by the ice. Ships are frequently beset in the ice for days and drift with the pack which can be dangerous in the Weddell Sea due to the clockwise spiral rotation which tends to take the ship towards the very thick pack ice in the centre. Shackleton's "Endurance" was lost in this manner. This year, Halley Bay will again be supplied by the Danish ship "Kista Dan" sailing from Southampton in December via Montevideo and Port Stanley.

Life at the bases mainly depends on the two seasons winter and summer which can be defined as periods when the sun is either always above the horizon or always below. At Halley Bay, for example, the sun sets for approximately 100 days. During winter the static experiments are in full swing and field personnel are preparing equipment for the journeys in the summer. Good planning and preparation are important for sledge journeys where one is entirely dependent on one's own resources. Everything carried on the sledge must be weighed if maximum efficiency is to be achieved particularly when dog teams or man-haul methods are used.

In summer the sledge parties are away from base for weeks at a time and this means only a skeleton staff at base to continue the programme. In addition, these men will have to dig out all the buried stores for restacking on

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the surface in preparation for the next winter. Normally a year's reserve stores are held and on a base such as Halley Bay where two forty gallon drums of diesel fuel are used each day the task is often enormous. Everyone must take a turn with all the chores and in winter this is often welcomed as a break from routine. Clothes have to be washed and as water is obtained by melting snow which then has to be raised to a reasonable temperature, the labour required to complete one's laundry is considerable. Although many tasks take considerably longer than in U.K. most people find that they can work much longer hours. There is very little sickness and there are few distractions or pressures such as one experiences in normal society. This allows one to concentrate for much longer on a problem without a break. Everyone soon becomes interested in each others work and after a two year stay one obtains a general knowledge of all base work.

The most important event of the year is the arrival of the relief ship bringing mail and a few luxuries to be kept and enjoyed in the long winter. New faces arrive and some friends depart, conversation revives for a short period and one appreciates the links with civilization; but the routine has been upset and the departure of the ship is welcomed with some relief.

Antarctic Research is organised by the Scientific Committee of Antarctic Research (SCAR) of the International Council of Scientific Unions (ICSU). The British programme includes auroral studies, geomagnetism, geology, Glaciology, ionosphere, meteorology, oceanography, seismology, gravity, terrestrial biology, physiology and Survey.

Prior to the International Geophysical Year 1957-1958, Survey, glaciology, meteorology and geology were the major disciplines and considerable work was successfully completed by a relatively small staff. Since the IGY the importance of high latitude work particularly in upper atmosphere studies has been appreciated and with the appointment of Sir Vivian Fuchs as Director of the Survey, the field of study has been expanded.

Halley Bay (Base Z), the Southernmost base of the Survey, was established by the Royal Society Antarctic Expedition in 1956 and some of the results of the work during the IGY have recently been published. This base, situated just outside the auroral zone, is perhaps the most important for upper atmosphere studies. Being relatively near the South Pole the slow change in solar angle allows experiments which would be impossible at lower latitudes. The IGY programme included h'f vertical incidence soundings, measurements of absorption and E and F region drifts. In 1960 h'f vertical incidence soundings recommenced and these will be continued at least until the end of the IQSY.

A special D.S.I.R. grant has been made for Ionospheric work at Halley Bay during the International Years of the Quiet Sun 1964-65. Preparations have been in progress at R.R.S. since last autumn and should be complete by the late summer. The team of four will carry out a much larger programme than during

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the IGY. The h'f soundings will largely be on a routine basis of $\frac{1}{4}$ hourly recording but absorption and drift will be measured on two frequencies at each hour throughout the IQSY. Methods are being tried to speed up the reduction of the drift records in addition to improving the accuracy. Drift records will also be made on magnetic tape using the data recording now being developed at this Station.

The tapes will then be brought back and digitised for full correlation analysis using the computor. Another experiment in absorption will be added to the programme, measurements of total ionospheric absorption will be made using extra-terrestrial noise as the signal source. The equipment used has been developed in the United States of America and has been given the delightful name of 'riometer' (Relative Ionospheric Opacity Meter). The riometer will be the latest sweep frequency type varying from 10 to 50 Mc/s and it is hoped to operate it at R.R.S. for a few months beginning in May. Many other experiments are planned including the possibility of operating a forward scatter link with the U.S. station at South Pole.

In addition to the two special IGY and IQSY programmes the Radio Research Station has prepared equipment and trained the staff for Port Lockroy (Now Argentine Islands) and Halley Bay as well as providing facilities for completing the deduction and analysis of the ionospheric work.

W. H. Bellchambers

SOME IMPRESSIONS OF NORTH AMERICA

Previous contributions to the Newsletter have already given other travellers' experiences on visits to North America, and the only legitimate excuse for this further note is the Editor's desperate plea for "copy".

A first visit to the U.S.A. is certainly a memorable experience, and in my case this began on 25th September last year and extended over a period of $4\frac{1}{2}$ months. Most of this time was spent in C.R.P.L. at the N.B.S. (Boulder) Laboratories in Colorado as an exchange visitor. Some technical points of interest have already been summarized in other reports, and it is difficult to select any particular topic for special comment in this article. However, I shall always remember the visit on the outward tour, to the Geophysics Research Directorate, Air Force Cambridge Research Centre, in Massachusetts where David Atlas of the Weather Radar Unit has a group studying radar meteorology, especially "angel" echoes from the troposphere. Atlas is firmly convinced that there are irregularities in the refractive index structure of the troposphere with gradients much sharper than have yet been detected experimentally: changes of several parts in 10^5 over a centimetre are suggested. Also impressive was the scope of the research in progress in the Electrical Engineering Department at the University of Texas, visited on the homeward tour. The work

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extends from studies of magneto-telluric fields at frequencies of 0.01 to 10 c/s., to investigations of the absorption of atmospheric gases at frequencies up to 1.5 x 10" c/s.

The period from early October to the end of January was spent in the Tropospheric and Space Telecommunications Division at C.R.P.L. As at R.R.S., the work in C.R.P.L. is undergoing some modification of emphasis in accordance with the changing needs of radio applications. In tropospheric work, this is evident in the increasing attention now being given to studies of irregularities in refractive index structure and their effect on communication links and tracking systems. One limited aspect of this subject, an investigation of the effect of elevated layers on V.H.F. propagation over a 200 km. path, formed part of a joint study programme during my stay in the Radio Meteorology Section.

Having arrived in Idlewild Airport, New York, on the same plane as Sir Oswald Mosley it was perhaps not surprising to find that all the passengers were regarded by the Immigration Officers with even more than normal suspicion. However, with the aid of an impressive-looking visa from the U.S. Embassy in London I eventually gained admission to the New World. Thereafter, all went well except for a disturbing incident in up-state New York in which Mowhawk Airlines lost my entire baggage for 48 hrs. The New England "fall" was a photographer's dream, and a welcome contrast to the dark canyons of New York City. However, even the fine weather of New England was surpassed by that in Colorado, at least in late 1962. No more than 0.01" rain fell in Denver between 1st October and 30th November; no wonder Jim Wait kept reminding me of his experience of an English summer. Later on, the temperature fell to $-25^{\circ}F$, and I suppose there are few areas in North America or elsewhere in which one can experience a temperature change of $100^{\circ}F$ over a period of a few days, as in Boulder in January 1963.

Henry Rishbeth, formerly of R.R.S., arrived to occupy the apartment next to mine, in our motel near N.B.S., just before Christmas. We shared amny meals together, and I found Henry was particularly good at locating sources of supply of such rare Boulder commodities as Camembert cheese and crumpets (known locally as "Old English Muffins"). To the students in the rest of the motel we were known (until we acquired automobiles) as "those mad Englishmen on bicycles".

To one separated from his family by 5,000 miles, the Cuban crisis brought some anxious moments. However, after it was over there was some light-hearted leg-pulling from N.B.S. colleagues on the advantages they though would result from the U.K. becoming the 51st state. Local hospitality was all that one would wish for, and there seemed much sympathy for the English residents in Boulder at a time when their country was taking a few hard knocks from a severe winter and General de Gaulle at the same time.

One point of terminology still puzzles me. If the natives call milk "cream", what do they call cream?

J. A. Lane

HISTORIC PHOTOGRAPHS: "BEFORE ... DURING AND AFTER."

Nearly two years have passed since that day in May 1961 when grimfaced men started the upheaval at the approaches to R.R.S., and the cacophony of their machinery disturbed the sleepy air of Ditton Park. Trees and cottages fell to their onslaught, paths were severed, trenches and holes excavated.

But destruction soon gave way to construction: new bridges appeared, and the road surface grew higher and higher in spite of frantic efforts by massive rollers to push it down again. Now everything is ready, the fences are up, the white lines marked, and the grass is sprouting in the appropriate places. A gigantic road sign outside our new gate proclaims: 'End of M4 - 1 m' (M4 is another name for what we like to think of as the R.R.S. by-pass). To 'cross the road' now means a detour of $\frac{1}{2}$ mile - a small price to pay for progress in this motor age. When this appears in print the present lussl will be ended, and the constant din of traffic will only occasionally be drowned by the roar of aircraft.

As older readers may remember, a pictorial record of these activities was promised in R.R.S. Newsletter No.3. The 43 photographs selected are now on display and for sale to benefit the ever needy Sports Club Fund. Perhaps the future will bring new changes to Ditton Park - a super-highway maybe, which will <u>not</u> by-pass R.R.S., or, following a violent reaction to B***ch*ng's Plan, a new British Railways branch line through North Park - time will tell the tale and the camera record it!

W. S. Newman

Odd Ode To The Exchequer

Here is a tale that ought be told
Which some it may make blow hot and cold.
You go abroad to do your bit
So treatment should venture fit.

It makes you laugh at the expense,
Some outside firms seem very dense
To understand how things work out,
And leaves such folk in many a doubt.

This ode is written about expense,
They lash out pounds and watch the pence.
To even me it makes not sense
But exchequer's job is so immense.

A lad I know went with his dad,
But even in this there is a fad.
They pay his fare from the Far East
Which must have cost a mint at least.

But when the lad returns to England
There is trouble dealt at every hand.
They pay his fare from Singapore
But not from Tilbury to our front door.

L. A. Bonvini

An unsuspected talent for piracy was revealed by two members of our staff, namely, Dr. Hopkins and our Editor, Mr. Gardiner. The occasion was a colourful production of Gilbert and Sullivan's "The Pirates of Penzance" by the Ashford Operatic Society. Mr. Gardiner, however, changed 'camps' during the performance joining the more sober ranks of the police force and brandishing his truncheon with expertise. The toe-tapping music and excellent voices of the case made this an enjoyable evening for all who attended.

Eileen Barnes

STAFF NEWS

Congratulations to:-

Mr. J. C. Warkentin and Miss J. Mather on their marriage at Newchurch in Rossendale, Lancashire, on 9th March.

Mr. G. Douglas and Miss M. Pratley on their marriage at Malvern, Worcestershire, on 30th March.

Mr. and Mrs. D. R. Madden on the birth of a son, Peter Neil on 26th March.

New Appointments

Mrs. D. M. E. Mays	Cleaner (part-time)	11.3.63
Mr. M. V. Walden	T/S.S.A.	18.3.63
Mr. P. P. Power	T/Gardener	25.3.63
Mr. A. Nazeer	T/Storeman 'B'	1.4.63

Resignations

Mr. T. Roll	T/Unskilled labourer	13.3.63
Mr. R. Christopherson	T/Instrument maker	27.3.63
Mr. I. Matthews	T/Labourer Messenger	27.3.63
Mr. J. J. Denton	T/Storeman 'B'	29.3.63
Mr. D. S. Froome	Scientific Officer	31.3.63

Other Changes

Mr. D. R. Madden	T/E.O. to E.O.

British Antarctic Survey

Since the radio personnel who go to the BAS stations spend some time before and after their tours of duty at R.R.S., we thought readers would like to know something about the BAS. Mr. Bellchambers kindly agreed to write the article on the work of the Survey which appears in this issue. We shall in future include the BAS members in our Staff News.

At present Mr. Bellchambers and Mr. Wright are preparing equipment which they will take with them to Halley Bay in December. Together with a third member of the group who will be joining them in June, they will spend about two years in Antarctica for the International Quiet Sun Years (IQSY).

Back from Halley Bay this month are Messrs. B. Peters and M. Bethel. They will be at R.R.S. for about three months to complete the analysis of records they obtained during their Antarctic stay.

SPORTS AND SOCIAL CLUB

Annual General Meeting

The Annual General Meeting of the Sports and Social Club will be held on

WEDNESDAY THE 24TH APRIL,

at 1730 hrs.

in the Canteen.

Election of Committee Members

At the close of nominations the following names had been proposed:

Mr. A. Baber
Dr. G. Fooks
Mr. D. Hannaford
Mr. A. Lowe
Dr. E. Page
Mr. D. Thorpe
Mr. F. Venables

As there are seven nominations for five vacancies, there will be an election, the result of which will be announced at the Annual General Meeting (24/4/63).

Members at outstations wishing to vote should ensure that their votes arrive at R.R.S. before that date. Official ballot papers will not be distributed to any outstations, except Winkfield.

P.H.G.D.

Tennis Club

The hard court is in good condition and tennis enthusiasts are welcome to chance their arm. Club nights will begin in the week after Easter. For further details see the notice-board.

LETTER TO THE OUTSTATIONS

Dear Colleagues,

The most noticeable phenomenon of the month has been a general increase in ambient audio frequency noise level. This was particularly impressed upon us when the inhabitants of Spur A were suddenly displaced from the main laboratory by the forces of the Ministry of Works and Public Buildings who made their presence felt, and heard, with the aid of pneumatic drills.

They did not do it to annoy, at least not intentionally, but to prepare the way for new data processing equipment referred to in a recent Newsletter. Whatever it is, it seems to need numbers of holes in the walls and trenches in the floor.

That may be called transient noise; a permanent increase began last Tuesday, 9th April, when the M4 Slough by-pass was formally opened by Mr. Marples allowing a stream of vehicles to drain from surrounding channels. After the initial tidal bore the flow now produces a steady background noise throughout the day.

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Due transport facility having been improved, another has ceased to operate. The Victoria Bridge has had to be closed, an extensive crack having been found in the main girder. It is reported that temporary repairs may be made for the duration of the Windsor Horse Show but the long-term future of the bridge remains in doubt.

You will see from the list of staff changes that Mr. D. S. Froome has left R.R.S. to become a lecturer at the R.E.N.E. college at Arborfield; our good wishes go with him. There is little doubt that, whatever his students may have in mind to try the mettle of their new mentor, he will have a trick worth two o'theirs.

Yours sincerely,

The Editor

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E V E N I N G

WHEN? FRIDAY 26 APRIL 7.30 - 11.30

WHERE? CANTEEN AT STATE HOUSE, LONDON

DANCING (SPOT PRIZES)

TWIST CHAMPIONSHIP!

WINE TASTING AND

HOME - BREWED WINE PANEL!

ETC., ETC.

ADMISSION 3/-

REFRESHMENTS FULLY LICENSED

ALL RRS STAFF WELCOME