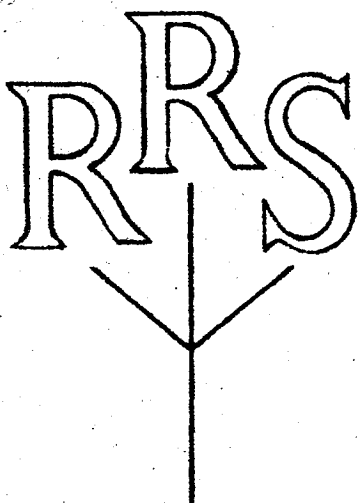


RRS Newsletter



(For the Use of R.R.S. Staff Only)

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RADIOACTIVITY AT R R S.

Strange as it may sound, until recently radioactivity has had nothing to do with the Radio Research Station. The black propeller symbol which is the standard indication of radioactivity has now appeared in Spur D, and signs of fear have appeared in visitors to that end of the building. This is natural, for of all the dangerous forces handled by scientists, radioactivity is the most fearsome because there is no way of detecting it with our senses. A lethal dose of radiation would cause no pain or discomfort while it was being absorbed, preventing the natural reflex for self-preservation from acting. The best protection from radioactivity is knowledge of the dangers involved and the nature of the activity being used.

Radioactivity is the disintegration of an unstable nucleus to achieve a state of stable equilibrium in which the total binding energy is a minimum. The excess energy is lost by splitting off a small piece and sending it on its way with a hefty push. The nucleus then rearranges itself more neatly. There are two different sorts of particle thrown off by a nucleus, called alpha and beta particles by their discoverers. A third sort of radiation called a gamma ray, is a high energy packet of light waves emitted during the rearrangement of the nucleus. An alpha particle is a light packet of two protons and two neutrons. Protons and neutrons are the building blocks of a nucleus. A beta particle is an electron.

The purpose of the radioactive materials at R.R.S. is to provide electrons of the same energy as the satellite ESRO I is expected to find above an aurora. This will enable the particle detectors designed for the satellite to be tested in the laboratory. The only other way to produce fast enough electrons is to take those emitted by a hot filament, as in a radio valve, and use several hundreds of thousands of volts to accelerate them. This is more expensive and more dangerous than the radioactive sources sold by the Atomic Energy Authority. These sources have a thin deposit of radioactive material on an aluminium disc. The material is selected to give electrons of the right speed to test the detector. Unfortunately, since the radiation is the natural radiation of a nucleus, other sorts emitted at the same time have to be accepted as well. Gamma radiation is very often found with electrons and some of the sources used here will emit gamma rays.

The speed of the electrons from these sources is more than one tenth of the velocity of light. A minute particle with this speed can do a great deal of damage on an atomic scale. Even so alpha and beta particles will only travel a small fraction of an inch into solid material before they are stopped leaving a trail of damage behind them. For a human being the main danger is to the skin and the damage can show itself as burns, warts, skin cancer and cataracts of the eye. Gamma radiation is like X-radiation though more powerful and can pass right through the body causing considerable damage on the way. For example damage to the blood-forming tissues in the bone leads to leukaemia.

The alpha and beta particles can be dangerous in another way. If material from the source gets inside the body it may collect in the bones and damage the blood-forming tissue. The material can get into the body from contaminated hands or through smoking or inhaling radioactive dust. To prevent this it is extremely important to see that none of the radioactive material can be easily removed from the source and the Atomic Energy Authority applies stringent tests to the sources to ensure this cannot happen.

Otherwise the health danger depends directly on the amount of radiation absorbed. The body is quite capable of absorbing small doses of radiation with no harmful effects. Indeed everybody receives a small radiation dose from cosmic rays, and radioactive substances such as carbon 14 which form part of our environment. The study of permissible dose rates has become an important branch of physics and medicine and much more is now known than in the early days of nuclear physics when many scientists suffered for their ignorance. The daughter of Mme. Curie, also a nuclear physicist, died from leukaemia as a direct result of her continual exposure to radiation. Now the dangers are known a close watch is kept on the dose received by everyone exposed to radioactivity ensuring that danger levels are not even approached.

The best way to keep dose rates low is to use sources whose activity is incapable of providing a measureable dose. If this is incompatible with experimental requirements then there are two other ways of keeping the dose rate low. The first is to stay as far away from the source as possible, using tongs for handling and to spend the least time necessary in its company. It is thought that the sources obtained so far at R.R.S. will be too weak to be dangerous, but to make quite sure, the dose rate of those most closely concerned will be measured until it is known not to be dangerous. For those not working in the same room as a source there will be no danger. Notices placed on doors will warn of the presence of sources and in such rooms strange objects should not be examined too closely. They may be dangerous.

A. Johnstone

FINDING A PATTERN

The ingredients of modern scientific inquiry are, to most of those involved in it, as familiar as the recipe of a staple diet. When, therefore, the investigator has amassed a wealth of results, or other recorded information which seem to contain results, he is confronted with an immediate problem - that of finding a pattern, or "sorting things out".

This stage of the job may not quite provide the rest which the investigator might have imagined to be a due reward for his labour, for, not infrequently, one after the other, each fresh piece of evidence invalidates the previous conclusion, and the ultimate pattern, if any does emerge, may depend on the psychological make-up of the inquirer. Some believe in matching current events with the past; others go in for innovations. Some are good in spotting results that have doubtful bearing on one another, others revere what fellow-workers may think of an unconventional but otherwise logical pattern. Yet others prefer only to transmit the information in its most native form. With all possible shades and gradations between the above-mentioned categories, there is little need stating what a variety of results may arise from data so carefully acquired at the initial stage.

A probable next stage in the inquiry is further acquisition of ideas, this time from published material. This is often made easy by people whose special job it is to classify, index or re-index learned publications which are made available in ample numbers. Condensation and juxtaposition of these are sometimes necessitated by the continuous and serialized inflow of information which is often a re-appraisal of a chosen set of ideas familiar to workers in the same field. If, at the end of this stage, the inquirer gets better informed, he feels ready to give his own account of the same events, having performed the analysis himself. The settled pattern may thereafter appear in fresh form in print for others to re-examine.

The extent to which knowledge derived from the above customary process is influenced by social, economic or political considerations is a whole question by itself and cannot be detailed out here, to do it justice. Fitting each pattern within an ever-widening framework is a problem that will continue to engage and tax the attention of many a scientist, and if the present mushroom-like structure is to grow into a firmer close-knitted fabric, the current techniques and processes of modern scientific inquiry can themselves be made the subject of useful inquiry.

E. O. Olatunji

STAFF NEWS

Obituary

We are very sorry to learn of the death of Mr. William Collings on 21st February. He retired in 1959 after some thirty years' service at R.R.S. The exercise of skill and patience was both work and relaxation to Bill Collings. Many members of staff will remember him as a keen fisherman and a craftsman of the old order whose work gave pleasure to him and to those who saw and used the finished product.

A tribute was sent from old colleagues at Ditton Park, some of whom attended the funeral.

Congratulations to:-

Mr. and Mrs. David Croom on the birth of their daughter, Alexandra, on 12th February.

Jean Scott and Geoff. Fooks on their engagement.

Malcolm Purvis on his engagement to Miss Sylvia Roche.

Mr. J. K. Oatley on his promotion to H.E.O.

Welcome to:-

Mr. I. R. Pearson T./A.E.O.

Mr. W. J. Hussey T./A.E.O.

Mr. D. P. Beeson T./E.O.

Mr. R. R. Lucas T./S.A.

SPORTS AND SOCIAL CLUB

Annual General Meeting

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

Monday, 13th April, at 1700 hrs.

in the Canteen.

It is hoped that members will make every effort to attend.

Election of Committee Members

At the close of nominations the following people had been proposed -

Mr. J. Juleff

Mr. C. Lovett

Mr. J. Hancock

Mr. A. Lowe

Mr. M. Edwards

Miss J. Scott

Miss A. Jones

Miss M. Peart

As there are 8 nominations for five vacancies, there will be an election, the results of which will be announced at the Annual General Meeting (13.4.64).

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

M. Horwill