launchings will be guided by the principle that such projects shall not be undertaken unless sufficient safeguards have been obtained against harmful interference with astronomical observations.

Nevertheless the International Astronomical Union views with the utmost concern the possibility that the band of dipoles proposed in Project West Ford might be long-lived, and it is completely opposed to the experiment until the question of permanence is clearly settled in published scientific papers with adequate time being allowed for their study. The International Astronomical Union is opposed to any experiment which might hamper future developments in astronomy.

If a short lifetime for the dipoles and the harmless nature of the experiment can be assured, and if Project West Ford is carried out, the International Astronomical Union regards it as essential that the fullest observations of, and experiments on, the properties and behaviour of the band of dipoles be carried out by all possible means. The observations and experiments should be performed and analysed according to the highest scientific standards and with the best equipment available, bearing in mind that signals which are barely, or not, detectable to-day will probably cause serious interference with future scientific research because of the development of more sensitive equipment.

The observations and experiments to be made on West Ford are likely to be difficult to perform, and will, in many ways, be similar to those carried out by the authorities responsible for operating West Ford. Moreover, much specific information such as precise and up-to-date ephemerides will be required. The International Astronomical Union will attempt to arrange for rapid and full co-operation among astronomers making observations and calculations, and to provide for world-wide dissemination of their results conforming to accepted standards of scientific research.

The International Astronomical Union welcomes the position* taken by the Government of the United States that any decision on later experiments of the West Ford type will be taken in the light of the results obtained from the presently proposed experiment. To enable the International Astronomical Union to obtain the necessary data, it requests the Government of the United States to grant full privileges to a group of astronomers, acceptable both to the Government and to the Union, to co-operate with West Ford authorities in performing quantitative experiments to determine the properties of the proposed belt of dipoles, its changes with time and location, and its impact upon present and future astronomical research.

* Letter of August 11, 1961, from Dr. J. B. Wiesner to Dr. L. V. Berkner.

THE SWEDISH SEED ASSOCIATION

THE title traditionally given in English translations to the Sveriges Utsädesförening does not perhaps fully indicate the scope of the scientific work in this pioneer research station.

Throughout its development the Swedish Seed Association has had strong support from both farmers and scientists, and when the seventy-fifth anniversary of the Association was celebrated in July 1961, King Gustav VI Adolf welcomed a large attendance of members living within reach of each of the eight branch stations as well as growers and technicians who are directly in touch with the work at the Svalöf headquarters.

Founded in 1886 as a co-operative association of farmers on the initiative of Birger Welinder, who farmed at Svalöf, it reflected a big increase in interest in crop-husbandry problems. During the extension of the arable cropping area in the middle of the nineteenth century Swedish farmers had come to realize that the severity of the winter, the relatively long days and the short summers made demands which could not be met by even the best of the foreign varieties.

From the beginning the pioneer plant breeders at Svalöf fought hard to convince the large body of farmers and seed growers of the importance of using the best scientific techniques in the improvement of crops. As the programme developed under Profs. Hj. Nilsson, N. H. Nilsson-Ehle, A. Åkerman and other distinguished scientists and agronomists it became clear that improved crop varieties could best be obtained through an active programme of research some of which must be of a fundamental nature.

Cytogenetic Research

Practical breeding work is undertaken at Svalöf on the herbage crops, oil and fibre crops, and the root crops for fodder production as well as on the four main cereals.

For this breeding work material is provided mainly from three sources :

(1) By the introduction of valuable genes from primitive forms or wild species, or from cultivated varieties with special characteristics. One of the most marked features at Svalöf is the importance attached to collaboration with crop improvement and other research stations in foreign countries. Valuable plant material has been obtained from a wide range of countries either by exchange or by plant collecting expeditions.

(2) By inducing mutations. The Swedish workers are effectively using this technique to increase the genetic variability of the cultivated varieties and breeding material with which they are working.

(3) By increasing the chromosome number through auto- and allo-polyploidy, thus offering new possibilities for the development of new genotypes. Especially promising are the polyploids of red and white clover, rye and turnips. (Oil rape is an important crop in Sweden. By crossing artificially induced polyploids of turnip rape and different types of kale, new high-yielding and hardy varieties of winter rape are being developed.)

Research of a more fundamental nature is in progress to ascertain the causes of reduced fertility in artificial polyploids and to investigate different methods of using polyploids in breeding programmes.

In the development of polyploids the work at Svalöf has benefited greatly from the close co-operation of Prof. A. Müntzing at the Institute of Genetics situated a few miles away in the University of Lund, and similarly with Prof. Å. Gustafsson on induced mutations in barley and other crops. Mutations have been induced in smooth-stalk meadow grass which have brought a return to cross-fertilization as the means of reproduction in place of apomixis.

In this way the range of genetic variation has been greatly increased.

The nature of yield in some species is being investigated genetically and physiologically with the aid of special growth chambers.

Biochemical Investigations

Great importance is attached to the breeding of new varieties of improved quality and in this the chemical laboratory is closely concerned.

More fundamental studies are concerned with the enzyme changes associated with the ripening of seeds. In a country extending as far north as northern Iceland, and as far south as Northumberland, the ripening of grain and other seed crops is of special importance.

Cereal Breeding

The breeding of spring oats at Svalöf has been of inestimable value to Britain.

Victory, Eagle, Star, Sun II and Blenda all came from Svalöf, and these represent some of the best-known varieties grown in Britain during the past fifty years. (A peculiar rhythm of growth is needed in oat varieties grown around Lake Mälaren, where severe drought conditions are likely to occur in spring, and the most successful varieties are those in which the shooting of the tillers is delayed for a period.)

Barley varieties in Sweden cover a wide range of climatic conditions, and Svalöf has been successful in breeding early six-row barleys for middle and northern regions as well as the varieties for southern Sweden, of which Ymer and Freja have been successful in Scotland and England.

Barley has been used as a convenient subject for experiment at Svalöf to find how the mutation process may be directed towards the production of desirable mutants. Much is being learnt by the association of cytogenetical analysis of the mutations with a close observation of field characters in barley.

Herbage Crops

The ecotype concept was largely developed in Sweden, and it is not surprising that special attention has been given to the interesting range of regional types of red clover growing between southern Sweden and the northern limits of the crop. Day-length reactions are being studied in relation to growth rhythm, time of flowering and to the stage at which reserve nutrients are stored. Of notable success is the work on resistance to stem nematodes in red clover.

The Filial or Branch Stations

Most of the new varieties introduced in recent years have been the result of collaboration between the main station at Svalöf and one or more of the eight 'filials' or branch stations. At Ultuna (Uppsala), for example, some of the main work on red clover, lucerne and peas has been undertaken. Vegetable crops, if one excepts the important pulse crop of dried cooking peas, are not at present included in the programme of work of the Association.

Seed Certification and Distribution

To relieve the Swedish Seed Association of the task of multiplying and distributing seed of the Svalöf varieties, the General Swedish Seed Co. was established in 1891. In Sweden, the seed trade is organized differently from Britain, and the Seed Co. at Svalöf finds it necessary to produce large tonnages of seed. This is done partly on the farms owned by the Company.

The Swedish Seed Association co-operates closely with the Central Government Seed Testing Station in the production of State certified seed, and all the seed which leaves Svalöf is of certified grade.

From the beginning the Swedish Government has given monetary support to the plant-breeding work, and this at present amounts to about £135,000 a year. Other sources of income are the profits from the General Swedish Seed Co. at Svalöf, research grants and donations from foundations and private organizations, and fees for analyses made in the laboratories.

Links with Britain

By the year 1919 Svalöf was already well established, and it was natural that representatives of the National Institute of Agricultural Botany, founded in January 1919, should visit Svalöf to take advantage of the unique experiences gained there in crop improvement work. In the party representing the Council of the National Institute of Agricultural Botany was Prof. R. G. Stapledon, then newly appointed to Aberystwyth. The value of the ecological approach to variety testing, and to the collection and use of local varieties and ecotypes developed in Sweden was particularly appreciated by the visitors from Britain. The ecotype concept was to be further developed by Stapledon at the Welsh Plant Breeding Station, and by J. W. Gregor in Scotland.

Exchange visits between Svalöf and the crop improvement stations in Britain have been numerous in recent years during the directorship of Prof. E. Åkerberg, and they have undoubtedly been of great benefit to both countries.

All workers in crop improvement, whether agricultural botanists, plant breeders, farmers or seedsmen, will join in congratulating the Swedish Seed Association on the remarkable achievements of the past seventy-five years and in sending good wishes for the future.

F. R. Horne

OBITUARY

Prof. Eric Bradshaw, M.B.E.

Prof. Eric Bradshaw died suddenly at his home in Marple, Cheshire, on August 15. He was aged fifty-two and was professor of electrical engineering and director of the Electrical Engineering Laboratories in the Faculty of Technology of the University of Manchester at the Manchester College of Science and Technology.

Eric Bradshaw was the son of Lady Bradshaw and the late Sir William Bradshaw, and was educated at King's School, Grantham, and in the Department in which he later became professor. He was a student under Prof. Miles Walker and graduated in the University of Manchester with a degree of B.Sc.(Tech.) with honours in 1930, and with the degree of M.Sc. (Tech.) in the subsequent year. Following his graduation he spent some time with the British Thomson-Houston Company at Rugby.

He became a lecturer and afterwards special lecturer in high-voltage engineering at the Royal Tech-