

root-infecting fungi is being studied by the Soil Microbiology Department. Such antibiotics tend to be adsorbed and rendered inactive by certain soil constituents, particularly the clay fraction, and attempts are being made to ascertain which Actinomycete antibiotics are least affected in this way and to measure their activity in various types of soil. Pot experiments have definitely confirmed that root rot by *Helminthosporium sativum* is significantly reduced by some of the Actinomycete strains.

The work on the nodule organisms of legumes has reached an interesting stage. The number of nodules developing on the root is apparently determined more by the susceptibility of the root to infection than by the population of the nodule bacteria surrounding it, and in the case of clover it has been shown that hereditary factors influence the time at which the nodules first appear, the number of nodules produced and their effectiveness in fixing nitrogen.

In the Botany Department it has been established that some of the ill effects of excess of manganese, vanadium and molybdenum may be prevented by increasing the supply of iron, and farmers troubled with wild oat infestation will learn with interest that the sowing of winter corn instead of spring corn will result in lessened germination, and production, of new seeds by this plant pest.

Heat therapy as an aid in the control of plant viruses has received the attention of the Plant Pathology Department, with variable results. It would appear that viruses of spherical shape are inactivated by heat treatment but not rod-shaped viruses. Much information on other aspects of virus infection is contained in the report.

The study of enzyme action is the main concern of the Biochemistry Department. Special attention is being paid to ribonuclease in view of the fact that every plant virus hitherto obtained in a pure state has proved to be a ribonucleoprotein. Oxidative enzymes are also being studied, since plant hormones and growth regulators are subject to enzymatic oxidation, and such enzymes by their effect on the concentration of these substances may play a part in the regulation of plant growth. The enzymic breakdown of cellulose and chitin is also receiving attention.

Eelworms, which are becoming an increasing menace to cereal and potato growers, are being intensively studied by the Nematology Department. In attempts to combat this pest, endeavours have been made to discover resistant crop varieties and suitable crop rotations for infested land. One spring and two or three winter oat varieties appear to be resistant to stem eelworm attack, but no commercial variety of potato resistant to potato tuber eelworm was discovered. Attempts are being made to obtain resistant varieties by crossing commercial strains with *Solanum indigenum*, which is resistant to eelworm attack. Work is also in progress on root diffusates which stimulate the hatching of eelworm cysts, and on the control of eelworm by the application of chemicals to infested soils.

In the Entomology Department the work on insect migration, on the influence of weather on insect populations, on gall midges of economic importance and on aphid problems has continued. Three points of interest may be singled out: lepidopterous larvæ apparently develop and grow more rapidly when crowded together than when solitary; aphids do not normally reproduce unless they have previously made a flight, however brief; and wheat bulb flies have been successfully bred under laboratory conditions.

The Bee Department's report contains much of importance to apiarists. The fumes produced by adding small quantities of ammonium nitrate to burning smoker fuel provide a simple anaesthetic for use when transferring bee colonies from one site to another a short distance away, since on recovery the bees lose their tendency to drift back to the original site. The known ability of worker bees to cluster together when dispersed in an area in total darkness is associated with their search for warmth and food, and, if a queen is present, for 'queen substance'. Queen honey bees secrete on all parts of their bodies this 'queen substance' which is eagerly sought for by the worker bees, and is considered to be most important in the maintenance of colony cohesion. A temporary shortage of supply of this substance or a breakdown in its distribution leads to toleration by the workers of eggs and larvæ in the queen cup cells and a consequent tendency to swarm. The report contains suggested rules, based on this work, to be followed when introducing to colonies mated queens of any age or strain.

The Insecticides and Fungicides Department has continued its work on particle size and toxicity of suspensions of contact insecticides, and on insect esterases and their inhibition by organo-phosphorus compounds. The work on the relationship between the insecticidal activity and the chemical constitution of pyrethrin-like compounds has now reached an important stage. By means of displacement chromatography four known active constituents have been separated from each other and from some inactive constituents of pyrethrum extract, and their relative toxicities compared. The report also contains much useful information on bio-assay techniques, toxicity-persistence of insecticidal deposits, the mechanism of the selection of strains of insects resistant to insecticides, and, in the field, on the control of *Aphis fabæ* on field beans, control of the vectors of potato virus and control of wireworms.

## CITY MUSEUM, BRISTOL

### REPORT FOR 1953

THE two well-produced and excellently illustrated booklets\*—the annual report of the City Museum, Bristol, for 1953 and the new handbook to Stratford Mill in Blaise Castle House Folk Park—bear unmistakable testimony to that invaluable tripartite combination, an appreciative committee, an understanding and far-seeing director and a loyal and enthusiastic staff.

The inside of the cover of the Museum report details activities and offerings of specimens, collections and services of which Bristol can justly be proud, and the report shows the gratifying and growing response received. The main duty of the Museum is rightly taken to be the portraying of local history and local natural history, and the commendable progress made is recorded in the succeeding departmental reports. Rearrangement of the collections is being made to bring the exhibition series into accord with both modern scholarship and contemporary museum display methods. The new

\* City Museum, Bristol. Report of the Committee for the Year ended 31 December, 1953. Pp. 16+2 plates. Stratford Mill in Blaise Castle House Folk Park. Pp. 8+2 plates. 6d. (Bristol: City Museum, 1954.)

gallery of geology has been opened, and the famous series of Lias and Inferior Oolite ammonites in the Tatcher Collection classified and labelled. Popular study of botany has been encouraged by the wild plant table throughout three of the seasons, while even winter had its offering of displays of twigs. British birds and their nests have been prepared for exhibition, while for students accessions include skins of mammals and birds from the region and the Marle collection of shells, many from the district.

The work of the department of archæology ranges from salvaging small Romano-British relics to erecting "an unclimbable fence" around the Roman villa at Kings Weston, and one wonders if there is any connexion between this and the reference to the unruly behaviour of certain young visitors on Sunday afternoons—a time-honoured complaint that belies "The better the day, the better . . .". Bristol played its part during the year by organizing an administration course for students for the Museums Association diploma, and in its turn sending members of its own staff to technical courses elsewhere. Twenty major temporary exhibitions were staged in the Museum, 3,420 cases of specimens were circulated to schools, etc., and 8,118 children attended for lessons—an entirely creditable performance.

The little handbook to Stratford Mill, costing sixpence, gives on art paper some five pages of text on the history and mechanism of corn-mills in general, and this one in particular, together with a photograph of the mill on its new site and an attractive drawing of its working parts. May we have others on the thatched dairy and the gypsy caravan?

## BLUE HILL OBSERVATORY OF HARVARD UNIVERSITY

THE report of the visiting committee to the Blue Hill Meteorological Observatory, Harvard University, Milton, Mass. (Reprint No. 7, 1953), includes the activities of the Observatory over the previous five years. During this period the facilities of the Observatory have had many users, among which may be noticed not only students working on research problems but also a number of Harvard departments, the United States Weather Bureau, the United States Air Force, the Massachusetts Institute of Technology, Clark University, Illinois State Water Survey, American Meteorological Society, Woods Hole Oceanographic Institution, Mt. Wilson Observatory, the Lowell Institute's Cooperative Broadcasting Council Station *WGBH*, and various business corporations and local towns.

The work of the Observatory staff is concerned with the following topics: evaluation of the Blue Hill and other climatic records, especially as indicators of climatic change; development of statistical aids to the forecasting of snow-storms for Greater Boston; designing and comparing station equipment and exposures; researches concerning clouds and the physics of precipitation; training of graduate students; and improvement of the library and its service. A very complete and mostly automatic record of the weather has been kept since the winter of 1884-85, when it was started by Abbott Lawrence Rotch. A record kept of the temperature in Milton by the Rev. A. Breck from 1849 has supplied further

data on temperature conditions, and it appears that during the past hundred years there has been a remarkable amelioration of the climate. In recognition of the value of the Observatory's current work on climatology, the United States Weather Bureau is supplying it with standard instruments, broadcasting its monthly data and publishing its records. Under instrumentation is included an account of the work of Dr. Wallace E. Howell and Mr. John H. Conover in designing and testing new instruments for Blue Hill and other institutions. In research on clouds and precipitation, work was carried out at Blue Hill before Schaefer's experiment in November 1946 of dropping solid carbon dioxide on a cloud of supercooled droplets to make snow, and a month after this Dr. W. E. Howell successfully repeated the experiment on Mt. Washington.

Finally, mention must be made of the Observatory's Library, which is widely used by professional meteorologists all over the country, but particularly in the large group in Boston; so great has been the demand for the Observatory's research publications that Blue Hill has always received on an exchange basis the publications of weather services, universities, research stations or institutes and individuals from all over the world.

## THE COLLECTION OF DATA FROM FIRMS

THE research workers who need to collect data from firms cover a wide range of studies and use the data for many different purposes. As, nevertheless, they have many difficulties and problems in common, the Acton Society Trust held a conference on April 28 on "The Pitfalls in the Collection of Data from Firms", at which twenty-three research workers attended, drawn from universities, national research organizations, government departments, co-operative research associations and private industry. They included economists, psychologists, sociologists, statisticians and some whose particular speciality it would be hard to define.

After the formal opening of the conference by Mrs. Honor Croome, Dr. T. E. Easterfield (Department of Scientific and Industrial Research) opened the first session with a discussion of some of the main sources of error in data obtained from firms. The firm's own records may not be kept correctly, or may be kept in a form suitable for its own needs but misleading to the research worker. Information supplied in reply to questionnaires is particularly unreliable, as even the simplest question may not fit every case and may be misunderstood in many different ways.

The second morning session was opened by Mr. Stafford Beer (Samuel Fox and Co.), who spoke of the pitfalls found in data by workers doing research inside industry. Many seemingly excellent data are derived from notebooks and scraps of paper filled up by the semi-literate. Measurements may be given a misleading appearance of accuracy by being recorded to too many significant figures. Nomenclature may also be misleading, the same words being used in different senses in different places. But the worst source of error is the pure blunder: Mr. Beer himself recently reached some quite wrong conclusions by analysing a column giving furnace numbers under the impression that it gave the number of ingots in