

Chichester, at Itchenor and at Selsey. At the latter site, seven miles from the nearest point of the railway, disturbance was quite distinct, although seldom amounting to 1γ in vertical intensity.

Staff. The post of chief assistant, rendered vacant by the appointment in the previous year of Mr. W. M. H. Greaves to the post of Astronomer Royal for Scotland, has been filled by Dr. H. R. Hulme, fellow of Caius College, Cambridge.

In concluding his report, the Astronomer Royal states the concern he feels regarding the steady deterioration of observing conditions at Greenwich. Long-exposure photography is no longer possible owing to the increasing brightness of the sky at night. As a result of atmospheric pollution by smoke, programmes of work which used to be successfully undertaken at Greenwich are now impracticable. The actual definition of stellar images has also suffered. In addition, there are various forms of fouling, the two most serious being the deposit of grit and the destruction of aluminized surfaces. The pivots and Y's of the new reversible transit, although carefully protected, already show appreciable scoring. There is a permanent risk of damage by grit to the

objectives of all the Greenwich telescopes. "If the Royal Observatory is to continue to make important contributions to astronomy as it has done for the past 264 years, and to provide an efficient time service of high accuracy, it is essential," the report continues, "that it should be removed to a site where astronomical conditions are favourable. The present wasteful efforts to secure observations under increasingly bad conditions, and the restrictions of programmes that are necessitated by such conditions, would thereby be avoided."

Finally, as regards the Abinger magnetic station, the general level of artificial disturbance is now such as to render all observations difficult, and when the disturbances are at their worst the observations lose much of their value. The removal of the magnetic observatory to another site has therefore become a necessity. The choice of a new site for such work in the south of England appears limited to a few regions in Devonshire.

The report concludes with the statement that proposals for the removal of the whole of the astronomical work from Greenwich and of the magnetic work from Abinger to new and more favourable sites are under consideration.

Historical Survey of Mycology*

UNLIKE the treatment of flowering plants, so far as Linnaeus was concerned, the subject of mycology had scarcely begun before his time. It is true that many fungi were mentioned by the classical writers but most of the interest in them was derived solely from their gastronomic effects. Their origin puzzled certain writers who regarded them as the result of the fermentation of the earth; truffles, on the other hand, were supposed to be due to the action of lightning. Herbals were based on classical authority: in 1593 Cesalpino wrote suggesting that fungi were not plants and were spontaneously generated.

Towards the end of the sixteenth century, Porta recognized the spores of such dark-spored forms as *Coprinus* and possibly of the mycetozoa *Fuligo septica*; but he thought they were seeds.

The arrival of the microscope was necessary before any progress in mycology could be made; but even then progress was slow. Hooke, in his "Micrographia", devoted two sections to fungi, and his description of the rose blight, *Phragmidium*, was accompanied by an illustration which is the first known diagram of a microscopic fungus. Hooke's views on fungi were thus expressed: "First, that Moulds and Mushrooms require no seminal property, but the former may be produc'd at any time from any kind of putrifying Animal, or Vegetable Substance, as flesh, etc., kept moist and warm. . . . Next, that as Mushrooms may be generated without seed, so does it not appear that they have any such thing as seed in any part of them; for having considered several kinds of them, I could never find any thing in them that I could with any probability guess to be the seed of it, so that it does not yet appear (that I know of) that Mushrooms may be generated from a seed, but they rather seem to depend merely upon a convenient constitution of

the matter out of which they are made, and a concurrence of either natural or artificial heat." In spite of accumulation of knowledge, similar ideas on the fungi extended over the following century and a half.

Malpighi, writing during 1675-79, described certain fungi in which he interpreted the sporangiophore as an inflorescence and the spores as florets. Thus, Hooke favoured the spontaneous origin of fungi, whereas Malpighi favoured the origin from seed.

Apart from Leeuwenhoek's observations on yeast in 1690, the next step was the recognition of the mycelium or spawn of mushrooms. Tournefort, in 1707, gave the first account of mushroom-growing, and described the mycelium. Still further speculative theories of the origin of fungi appeared, until in 1729 P. A. Micheli published what may be considered as the first real step in our knowledge of the fungi. He made many morphological observations of first importance, but was actually still looking for flowers and seeds in the fungi examined. He also proved that what we now know as spores gave rise to new fungi similar to the plants from which they were taken. But in spite of Micheli's work, most botanists gave up the fungi as hopeless, and even Linnaeus in his "Philosophia Botanica" of 1751 wrote: "The order of Fungi is still Chaos, a scandal to art, no botanist knowing what is a species and what a variety."

Misled by the observations of Baron O. F. Munkhausen, Linnaeus, in the twelfth edition of his "Systema Naturæ" described a genus "Chaos" with six species; the species "*C. Fungorum*" showed the metamorphosis of zoophytes from vegetables into animals and vice versa. "*C. Ustilago*" is the modern *Ustilago* which infects grains of cereals, grasses and certain florets. "*C. infusorium*" contained various Protozoa. The genus was rightly named, and thus did Linnaeus sadly come to grief.

John Ellis, who had a long correspondence with

* From the Presidential Address delivered to the Linnean Society of London, by Dr. J. Ramsbottom, O.B.E., on May 24.

Linnaeus on the subject, carried out a series of observations and finally convinced himself that the spores of fungi, like seeds of flowering plants, were unrelated to the animalculæ which appeared when they were placed in water. But others, including Sir John Hill, persisted with Munckhausen's theory.

Necker, in 1783, published a treatise expounding the view that fungi were like plants in their method of nutrition, development and growth, but that they differed in origin. He therefore regarded them as a new kingdom between minerals and animals and proposed for it the name *Regnum mesymale*—the intermediate kingdom. Villemin also proposed a new class for them, namely, pseudo-zoo-lithophytes.

Discussion on the origin of fungi which had been rife ended in 1783, and the conception of spontaneous generation was finally exploded by Pasteur, whose forerunners in this field of thought were Redi and Spallanzani.

In 1784, Hedwig published his classic work on

cryptogams, in which he proposed the use of the name 'spore' for the reproductive structures of these plants. In 1837, Léveillé announced that spores are essentially different from seeds since they do not contain embryos. Hedwig's work was incorporated in the general mycological structure by Persoon, to whom was due perhaps more than to anyone else the foundation of systematic mycology. During 1815-74, the recognized authority on the classification of the fungi was Elias Fries.

The highly complex pleomorphy of the rust fungi took a long time to unravel, although heterocœism was much to the fore because of the damage caused by the rust of wheat. Heterocœism was proved conclusively in wheat by de Bary in 1865, while Oersted, in the same year, independently proved heterocœism in *Gymnosporangium* on junipers and pears.

The important part played by fungi in causing diseases of plants was obvious so soon as it was realized that mildews, etc., were fungi.

Training of Teachers

A DETERMINATION that teachers, as a body, should not be inferior to other professions in respect of their education and training led the National Union of Teachers to undertake two years ago an investigation of the whole question of the training of teachers and the grants available for the purpose. The investigating committee, composed of six members of the Union's executive and six representatives of university training departments, of training colleges and of secondary schools, completed its work last February, and the report* has been published in the form of a book of 360 pages including a summary of the principal conclusions formulated in 95 articles. These range over a wide field, including recruitment and placing as well as training. Although a number of the recommendations concern the content of training courses, the committee regarded such things as internal matters for the training institutions. In a preliminary chapter a strong case is made out for requiring some actual experience of teaching practice *before* admission to a training institution, this being desirable less for its intrinsic value than as a test of aptitude for the career of a teacher, for it is notorious that many recipients of grants for training have no such aptitude nor even any serious desire to take up teaching as a profession. It is proposed to make an officer of the local education authority report on the teaching potentialities, personality and general suitability for the teaching profession of every applicant for a place in a university training department or training college.

The vital importance of teaching practice as part of the college or university course is also emphasized and it is mainly to provide adequate opportunities for this that the report recommends the lengthening of the course to three years as a minimum. The report is equally emphatic as to the influence of residential conditions during the years of training, and proposes that residence in a college or hostel should be compulsory for all and that funds should be provided for ensuring that hostels are run on the

right lines as recommended by the University Grants Committee in its last quinquennial review.

Above all, the committee was concerned to press on towards the ideal of "a unified profession to serve a unified system of education", implying for the teacher trained in a training college a status equivalent to that of the university graduate. To this end it is proposed to develop the connexion between training colleges and universities so that the former may eventually become integral parts of the latter. On the crucial question of the staffing of training colleges the report observes that salaries are inadequate and prospects of promotion relatively small but leaves it at that, the additional grants it proposes for training colleges being intended to enable them to reduce the fees payable by students, not to make possible a higher standard of qualification and status for the staffs. It quotes with approval a suggestion that the staffs might be strengthened by the addition of two or three experienced practising teachers seconded for a definite period of years.

The report concludes with a paragraph on the need for immediate investigation by the Board of Education. Should such an investigation be made, it is to be hoped that the fundamental importance in this connexion of the progress of science will be recognized. The progress of science and its application has brought about changes which should affect the training of teachers both in respect of science teaching and as calling for a change in the attitude of all teachers towards science. Progress is so rapid that science teaching in schools is bound to lag hopelessly behind and be correspondingly ineffective unless it is kept constantly under review by competent observers, and modified and readjusted whenever necessary, and unless examining bodies are compelled to take cognizance of such changes. On the other hand, the social and economic transformations resulting from it are so sweeping that it is of the first importance that science should form an integral part of the curriculum of the primary as well as the post-primary school and that all teachers should grasp the relations of science teaching to the teaching of other subjects. The question is discussed in Prof. Bernal's recent book on "The Social Function of Science".

* The Training of Teachers and Grants to Intending Teachers. Being a Report of a Committee of Investigation appointed by the Executive of the National Union of Teachers and adopted by the Executive on 3rd March 1939. Pp. xxxi+328. (London: National Union of Teachers, 1939.)