to be referred to the Minister of Housing and Local Government for settlement.

In addition, most river boards employ inspectors who see that purification works are properly maintained and operated, and that in itself has greatly reduced the incidence of pollution arising from neglect and carelessness.

Of course, pollution has by no means ceased. In the Midlands, South Lancashire, the West Riding of Yorkshire, and the Forth and Clyde areas, there are many rivers where conditions are still deplorable, where no fish can live, the water is black, brown, grey or even more strikingly coloured, where the consistency may be that of thin mud and the odour likely to be a public nuisance. For the most part, however, these are a legacy of industrial development in the past century, and if only river boards can for the time being ensure that none of them gets worse and some of them a little better, there are considerable hopes for the future. If the outlook for estuaries were as good, those concerned with fisheries might well be optimistic; but at present nearly all estuaries are outside the jurisdiction of river boards for pollution prevention purposes and the continued deterioration of some of them is causing much apprehension.

River boards and river purification boards have in fact come into being at a fortunate time for them. Public opinion is increasingly opposed to the pollution of rivers, and now in the middle of the twentieth century this æsthetic and sentimental approach has been strongly reinforced by the sudden realization that water is a commodity of great value for domestic and industrial use, and that economically we cannot afford that it should be wasted; a badly polluted water is perhaps more effectively wasted than any other.

Of the land-drainage activities of river boards there is no room to write. They arouse mixed feelings, but the work done is necessary to prevent flooding and to increase agricultural production, and many of the technical problems encountered seem to a layman of very great interest.

THE ROYAL BOTANIC GARDENS, KEW

DURING the past decade an open day has been arranged annually in May for students and members of societies interested in botany at the Herbarium and Library, Royal Botanic Gardens, Kew. This year the invitations from the Director were for May 9 or 10 and between five and six hundred attended. Conducted tours around the Gardens enabled visitors to see something of the living collections under expert guidance. The main objects of the open day are to demonstrate some of the work of Kew that is not known to the general public visiting the Gardens, and to help students in their botanical work by showing them as wide a selection as possible of botanical problems and of specially interesting plants and methods of investigating them. With these aims in mind, an extensive special exhibition was prepared by members of the Kew staff in the three wings of the Herbarium and in the Library. The variety of the exhibits, which were excellently staged, documented and demonstrated, could only illustrate a fraction of what is done and what can be seen at Kew; but they did indicate something of the wide field covered by botany.

Systematic botany is a main concern of Kew, and both floristic and monographic researches are in active progress. A Flora of Cyprus is in preparation for the Colonial Office, and maps, specimens and statistics of families composing the flora were exhibited. Large collections at Kew are from Iraq and much preliminary work has been done on them. Recently a complete flora of this country has been planned, and the Iraqi Government and Kew are co-operating in producing it. The desert vegetation, which occurs in part of that country, was illustrated by selected specimens, and its ecological relationships were explained by a map and meteorological tables. The floras of Africa have for many years been given special attention at Kew. Several expeditions to different parts of tropical Africa have been sent from, or in connexion with, Kew since the Second World War. An exhibit showed the equipment needed for a botanical collecting expedition in the tropics and how good botanical collections are made. Three African Floras are now in course of publication for the Colonial Office, for which the work is being done entirely or largely at Kew. The "Flora of West Tropical Africa", second edition, is receiving a very thorough revision. In connexion with this, a recent expedition to Nigeria and the Cameroons was demonstrated by a series of coloured photographs of different types of vegetation. The "Flora Zambesiaca" covers the Rhodesias, Nyasaland and Bechuanaland. The organization of this Flora in collaboration with the British Museum (Natural History), the black-and-white drawings being made for it, and fine photographs of parts of the country were demonstrated. The "Flora of Tropical East Africa" is being published by families, as these are worked out by specialists, mainly at Kew. A sample of the work involved was an exhibit devoted to the genus *Crotalaria*, of which there are 556 species estimated for tropical Africa. An instructive exhibit of selected examples of variation in tropical African plants showed some of the difficulties met with by the systematist and suggested the immense number of problems requiring detailed investigation by cytogeneticists and ecologists in the tropics. Thus, *Alchemilla johnstonii* shows variation that is apparently phenotypic; *Cassia italica* has at least three rather clear geographical subspecies; *Jasminum fluminense* is separated into five subspecies and several varieties; *Commelina africana* is exceedingly variable, but it is uncertain how far the variation is under genetic control; *Acacia goetzei* varies greatly in indumentum and in the number and size of the leaflets, although the characters of the flowers and pods are constant. The range of kinds of vegetation in central Africa, generally, was shown by series of photographs and living plants. A specially interesting exhibit was of representatives of twenty-five families that are mainly tropical but which have one or a few representatives in the British flora. A somewhat similar series of plants, but at the species-level,

showed links between the floras of Britain and tropical East Africa. All but one of the twenty-four exhibited, and others are known, are presumed to be natives of the two areas. In East Africa many of them are in high mountain habitats. The introduced exception was *Galinsoga parviflora*, a weed of American origin.

A series of British plants of special interest was subdivided as follows: species that have become extinct in Britain within living memory (such as *Schoenus ferrugineus*, *Spiranthes aestivalis* and *Orobanche ramosa*); species that have been recorded in Britain, but of which the records have not been confirmed (as *Rubus arcticus*, *Silene rupestris* and *Limodorum abortivum*); British plants formerly abundant but now on the verge of extinction (*Cypripedium calceolus*, *Potentilla rupestris* and *Orchis militaris*); plants formerly of a reasonably wide range but now extinct in Britain (*Senecio paludosus*, *Senecio paluster*); introduced or native plants formerly common or locally common but now very rare (such as *Caucalis lappula*, *Roemeria hybrida* and *Stachys germanica*); species, mostly more or less recent introductions, now increasing in the British flora (a large number shown, including *Sisymbrium orientale*, *Juncus tenuis*, *Veronica filiformis*, *Quercus cerris* and *Senecio squalidus*). The main British groups of *Salicornia* were illustrated by specimens and photographs, including living seedlings from seeds sown on April 18 which germinated ten days later.

Monographic revisions were demonstrated for *Camellia*, for which genus a monograph is in the press, for *Hypericum*, with diagrams, specimens and maps arranged to show trends in the evolution of the genus, for the grass genus *Eleusine*, and for the genus *Dianthus*.

The cryptogams were exemplified by specimens and photographs showing the characters of the venation in species of *Polypodium*, by a considerable number of living plants of tropical African ferns indicating their wide range in size and vegetative morphology, by specimens selected to show the growth forms found in tropical fungi, and by photographs, drawings and specimens of the bog mosses (*Sphagnum*).

Botanical researches have often to be illustrated by paintings, drawings, photographs or diagrams, and these are continually being prepared at Kew. Original paintings for the *Botanical Magazine*, a journal commenced in 1787 and edited at Kew from 1841 to the present day (since 1922 for the Royal Horticultural Society), black-and-white originals for "Drawings of British Plants" by Miss Ross-Craig, paintings of lilies by Miss L. Snelling, and a large series of sketches, etc., by working botanists, often not for publication, demonstrated the range of botanical illustrations. The essence of the last-mentioned illustrations is that they shall convey information concisely and without the possibility of misconception, and they need not be 'works of art', though some are.

The varied work carried out at Kew in connexion with economic plant products was illustrated by the varieties of guinea corn or great millet (*Sorghum*) from tropical Africa, by an interesting exhibit of vegetable waxes and plants yielding them, and by a demonstration of plant introduction. The cultivation of cinchona (for quinine) and of rubber in the Asiatic tropics was largely due to Kew. At the present time, disease-resistant varieties of bananas, cocoa and other tropical crops are being grown and partly tested under quarantine conditions at Kew before being introduced into new areas.

Several exhibits were of a miscellaneous nature. One that attracted considerable attention was of early dissecting and compound microscopes contrasted with some of the latest models. A fine series of living specimens of nearly all the existing genera of conifers occupied one end of the newest wing of the Herbarium. From the Jodrell Laboratory, specimens and microscopic preparations demonstrated the methods of dealing with archæological material of plant origin for determination. Photographs and diagrams illustrated work in progress on certain tropical plants by irradiation by mercury-vapour lamps. Germination and flowering were affected and there was increased growth shown and most plants improved in general health and vigour. In *Aristida*, a widespread grass genus in subtropical and tropical countries, with about 400 species, especially in the drier parts of Africa, Australia and America, the awn aids in dispersal. A series of specially prepared specimens showed the gradual increase in size of the awn and various developments in its structure. Living specimens of *Arundinaria fastuosa* grown at Kew illustrated the periodic flowering of bamboos.

For students from schools and colleges there were a number of well-devised exhibits. These included: the various methods of dispersal shown in the Gramineæ, with water, wind or animals acting as agents; living and dried specimens and drawings and pictures of the evolution of leaves; a comprehensive collection of living succulent plants of such diverse families as Cactaceae, Euphorbiaceae, Asclepiadaceae, Liliaceae, Apocynaceae, Compositae, Portulacaceae, Crassulaceae and Vitaceae; a large number of 'plants of special interest to students', including living examples of phyllodes, phylloclades, cauliflory, phylloflory, hybrids, unusual organs of attraction, kinds of armature, and vegetative multiplication; the switch habit in Australian plants, as correlated with relatively low rainfall and a sunny climate, and shown in twenty-four different families; and phenomena of plants in the tropical American rain forest, including epiphytes, parasites, saprophytes, epiphyllous liverworts, lianes, climbers, myrmecophytes, drip-tips, and so on.

One of the important works prepared at Kew is the "Index Kewensis", and the method of compilation was demonstrated. The "Index Kewensis" was initiated by Charles Darwin and the original volumes contained names of seed-bearing plants published from 1753 until 1885. Supplement 12 (1951–55) is now in the press. Darwin had close connexions with Kew, especially through personal friendship with Sir Joseph Hooker. An exhibit of historical interest included some of his letters, specimens collected by him, and some of his books.

The Library was open to visitors, and there were arranged special exhibits of books from the library of Dr. Bromfield which formed the nucleus of the Kew Library (now having more than 55,000 volumes); old woodcut herbals; British county floras; botanical works and periodicals prepared at Kew; botanical bibliographies; botanical publications illustrated in colour; Colonial floras; a selection of books presented by the Bentham-Moxon trustees; manuscripts and original letters from the Hooker correspondence (of which seventy-six volumes are at Kew), from Boott, D. Don, R. Spruce, and other well-known botanists, and samples of Bentham's diary which he kept for more than seventy years.

W. B. Turrill