Royal Botanical Gardens and Empire Botanists

By Sir Arthur Hill, K.C.M.G., F.R.S.

THE leading article in *NATURE* of January 9, on "National Museums of Natural History", discusses the relationship, "beyond the ordinary courtesies of friendship, which exists between these institutions". In the final paragraph, it is said: "We know of no such ties, and we wonder whether the interests of science in our Commonwealth of Nations would not be best served by attempting to develop such links. A free interchange of co-types could do much", and concludes, "But more is wanted, for the taxonomists in all [institutions] must have the same methods and ideas as to species in their work, and this can be secured by the periodical interchange of their staffs".

With regard to the Royal Botanic Gardens, Kew, which were specifically included with the "Museums" in the terms of reference of the Royal Commission on National Museums and Galleries appointed in July 1927, it seems desirable to direct attention to the fact that arrangements have been in operation for many years with other institutions and Governments, which are far more than "the ordinary courtesies of friendship" which, also, are of a very intimate nature with all other kindred institutions.

The Royal Botanic Gardens, Kew, being the headquarters of botanical work for the Empire, has built up in its herbarium and museums a vast collection of type specimens from all parts of the Empire, and the "Floras" of British India, Australia, South and Tropical Africa, etc., have been written at Kew. Kew, therefore, is the Mecca for our botanists from overseas, who must also pursue their studies among the historic specimens, especially from Australia, preserved in the British Museum (Natural History).

Sir Joseph Hooker, so long ago as 1882, realized the importance of establishing a close liaison between botanists working in India and those at the Royal Botanic Gardens, Kew, and on his proposal the Government of India appointed an Assistant for India to work in the Herbarium, and this post, paid by the Government of India, has been maintained since the year 1883. Several of the holders of the assistantship have formerly held Government botanical posts in India.

The Government of the Union of South Africa similarly maintains an Assistant for South Africa at Kew, but in this case a botanist on the staff of the Union Government is sent to work at Kew on the historical South African collections in the Kew Herbarium and returns to his duties in South Africa at the end of two or three years' service in the national herbarium. The salary of the Assistant for South Africa is paid by the Government of the Union of South Africa. This valuable arrangement came about as a result of a meeting of botanists of the Division of Botany held at Pretoria in 1918, in connexion with the establishment of the Botanical Survey of South Africa. At the moment, the South African Government has two officers working at Kew.

An Assistant for West Tropical Africa was appointed to Kew by the Governments of the West African Colonies in connexion with the preparation of "The Flora of West Tropical Africa". The assistant

was appointed in 1909, but the post has now lapsed on the completion of the "Flora".

The proposal for the establishment of liaison officers between the Commonwealth of Australia and the Dominion of New Zealand and the Royal Botanic Gardens, Kew, was put forward by the Director of Kew in his report to the Governments of the Commonwealth and the Dominion after his visits to Australia and New Zealand in 1927-28, and received their approval. Nothing, however, resulted, for various reasons, and when the Third Imperial Botanical Conference was held in London in August 1935 the following resolution was passed:

"Liaison Officers."

"(1) This Conference commends to the Government of the Commonwealth of Australia the importance of maintaining close liaison in botanical matters with the Royal Botanic Gardens, Kew, and urges the Government to consider favourably the appointment of one of the younger Australian Systematic Botanists to work at Kew for a period of at least two years in making a critical examination of the historic Australian type-specimens at Kew and the British Museum and determining current collections made in the Commonwealth and sent over to Kew for critical examination.

"(2) It is further suggested that, at the expiry of his term of service, the officer appointed as Assistant for Australia should be replaced by another of the younger Australian Systematic Botanists."

Similar resolutions, appropriately worded, were passed with regard to New Zealand and Canada.

It is most gratifying to be able to record that the Commonwealth of Australia has now arranged to send over the Botanist from Perth, Western Australia, as its liaison officer to work for two years at Kew, who will be replaced at the end of the period by another botanist from the Commonwealth.

The resolution is also being considered favourably by the Dominion of Canada and by the Dominion of New Zealand. The Government of New Zealand hopes it may be able to send over in the near future a botanist to work at Kew, and it is expected that the Canadian authorities may eventually be able to send over an officer.

An interchange of officers has also been effected at Kew. A few years ago, one of the botanists on the staff of the Herbarium at Brisbane was sent over to Kew by the Queensland Government and a Kew Herbarium assistant was sent to Queensland to take his place, the two institutions paying the salaries of their officers. This exchange proved of the greatest possible value not only to the two institutions but also to the individuals themselves. The Australian botanist was able to study the historic types at Kew and the British Museum, while the Kew botanist had the opportunity of studying the flora of Queensland both in the field and in the Brisbane Herbarium, and also of getting into personal touch with all the botanists in the Commonwealth. Botanists from Kew have also been sent out to South Africa, Rhodesia and Malaya to study the flora, and botanists from all parts of the Empire are constant and welcome visitors at Kew.

It may be of interest to record that on the Gardens side the principle of exchange has for some time been in active operation, as we now exchange student gardeners with Germany, France, Italy, Sweden, Switzerland, Belgium, Canada, the United States of America and New Zealand, and other parts of the Empire when opportunity offers. The Kew student

is sent out in exchange for one or two years, his place being taken by a student gardener from the botanic garden or other centre to which he has been sent. At the present time, twelve exchanges are in operation, much to the advantage of the men concerned and certainly to the advantage of Kew.

Wetting and Detergent Action

THE symposium on the "Scientific and Technical Aspects of Wetting and Detergency", held at the Imperial College of Science on February 19-20 under the auspices of the British Section of the International Society of Leather Trades Chemists, brought together a large company of scientific and technical workers for the discussion of nearly twenty interesting papers, which dealt with many of the known important points in these two problems, and suggested new points of view likely to prove important in future research.

The fundamental quantities determining whether a solid is, or is not, completely wetted by a liquid, are the surface tensions of the solid, and the liquid, and the amount of adhesion between the solid and the liquid. The impossibility, at present, of measuring the surface tension of solids is not such a serious difficulty in the scientific study of wetting as might be supposed, since the contact angle, which can be measured, is simply related to the surface tension of the liquid and the adhesion between solid and liquid, and is itself the immediately relevant quantity in most problems of wetting; and probably also in detergency.

C. G. Sumner described modifications in the 'plate' method for determining contact angles; N. K. Adam showed how contact angles can be determined on single textile fibres or thin wires visible under low powers of the microscope; and J. O. Cutter and C. W. Price reported a careful study of the method (originally due to Bartell and Osterhof) of measuring the adhesion tension and contact angles of liquids against solid powders, by determination of the pressure required to prevent the liquid penetrating into solid plugs of the powder, kept compact under high compression. This method, the only one available for the quantitative study of the wetting of fine powders, is not easy; it depends on careful attention to details of the apparatus and on the maintenance of a high pressure on the powder.

Probably the most important single industry dependent on the wetting properties of solid surfaces is that of mineral flotation; H. Freundlich dealt, in a short paper with a valuable bibliography, with the principal features of this process, including a discussion of the importance of contact angle, and of the surface films formed by the selective adsorption of the 'collectors' on the surface of the valuable minerals, which decrease their ease of wetting by the water and consequently cause them to stick to the air bubbles rising in the froth, and thus become collected at the surface. H. Martin described the very important applications of wetting agents in assisting the spread of insecticide solutions over the surface of leaves and fruit. He has taken particular account of the difference between the advancing and the receding contact angles, directing attention to

which of the two is relevant for each practical problem; and he deserves gratitude for his timely protest against the pernicious and short-sighted practice of some manufacturers, in placing on the market, and expecting intelligent and chemically minded customers to use, or advisory officers to recommend, mixtures of unspecified and possibly inconstant composition bearing names suggestive of 'nostrums' rather than of scientifically manufactured and reliable products.

A paper by E. J. Daniels and D. J. Macnaughtan directed attention to some effects of surface impurities and inclusions in metals, on their ease of wetting by solders or by tin; this is a very important subject to which but little quantitative study appears to have been given. A. de Waele discussed the importance of wetting in the deflocculation and the plasticity of solid suspensions; and W. E. Wornum and G. A. Campbell dealt with the wetting problems of the paint industry, including the fundamental problem of the wetting of pigments by the liquid medium, and that of the surfaces to be painted by the finished paint or varnish. Wetting, it must be remembered, is not identical with deflocculation or dispersion; it is but one of the two main factors concerned. The other is the adhesion of the solid particles for each other, which must be overcome by the wetting liquid for the dispersion to be effective.

Detergency, which formed the subject of the second day's discussion, is a more complicated and perhaps more interesting problem. C. Robinson, in his introductory paper, discussed a theory due to N. K. Adam which places the emphasis in detergent action on the displacement of the grease from the solid surface, as comparatively large globules; the contact angle formed by the surface of separation between grease and aqueous detergent solutions, and the solid being cleaned, being the important measurable quantity determining the efficiency of detergent action. If this is correct, detergent action is essentially a preferential wetting of the solid surface by the detergent, instead of by the grease, and not, as has been occasionally held in the past, simply a wetting of the grease by the detergent, with consequent emulsification of the grease or other dirt. Surface and interfacial tensions, of course, enter into the problem, but neither alone is necessarily of predominating importance. Robinson considered also the problem of the removal of detached globules of grease from entanglement with the cloth; and described his measurements of the interfacial tension between oils and detergent solutions, which show some very remarkable effects of traces of polyvalent salts. G. S. Hartley discussed the power that solutions of soaps and paraffin chain colloidal electrolytes ('soap-like' substances) possess, of actually dissolving organic compounds which are