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SCIENCE IN BRITAIN[1]

By Sir RICHARD GREGORY, Bt., F.R.S.

THE British Association for the Advancement of Science was founded in the year 1831. In the same year the world-renowned naturalist, Charles Darwin, left England in H.M.S. *Beagle* as a member of the famous expedition to the Pacific. Between 1831 and 1836 the expedition surveyed the South American coasts and adjacent islands, including the Galapagos Islands, and also the coasts of Australia and New Zealand. Darwin recorded that the voyage was the most important event in his life and it determined his whole career. The geological and other natural history notes made by him during the voyage, especially along South America, were the basis of most of his later works.

Exactly a century ago, Darwin prepared a short account of the facts observed by him which indicated relationships between different living things and suggested a common line of descent. Also, in the year 1842, was published his great work on "The Structure and Distribution of Coral Reefs," which gave the results of his own observations of coral atolls in the Pacific and Indian Oceans, and threw new light upon their structure. He suggested that cores should be obtained by borings of such reefs in order to discover how deep the coral rock extended below the limit of about thirty fathoms in which the coral organisms can live. The British Association was the first body to set

[1] From the report of the British Association for the Advancement of Science. This is the English text of a broadcast recently prepared by the president of the association for a series of talks on British science given in South American programs of the British Broadcasting Corporation in Spanish and Portuguese. It outlines the peacetime activities of the association, some of which are necessarily in abeyance now; it will therefore interest especially those who have come into contact with the association only during the war period.

such a project on foot, with the result that cores obtained at depths of more than a thousand feet were found to be built up of the remains of coral organisms living near the surface of the ocean.

One of the chief characteristics of the British Association is that of taking the initiative in promoting or undertaking scientific investigations of this kind. This applies also to other movements of national interest to which the association gives its authority and appeals for support. The acquisition and preservation of the house in the village of Downe, Kent, where Darwin lived for forty years and wrote his great work on "The Origin of Species," was the result of such an appeal made at an annual meeting of the association by the president, Sir Arthur Keith. Darwin took up his residence in the house exactly a century ago and died there in 1882. Through the generosity of a distinguished surgeon, Sir Buckston Browne, the house and grounds were purchased in 1927 and transferred to the possession of the British Association, with an endowment towards the maintenance as a national memorial. The chief rooms have in them furniture and objects used by Darwin himself and are decorated to reproduce the surroundings in which he worked. Charles Darwin's home at Downe has thus now become a place of pilgrimage similar in character and contents to the home of George Washington at Mount Vernon, Virginia, and similarly brings thousands of visitors to the shrine.

The British Association differs from other scientific societies in the fact that no professional rank or other technical qualification is required on the part of an applicant for admission to its membership. It is therefore, open not only to scientific students and investigators, but also to any member of the community interested in science. The association does not invade the field marked out by other scientific organizations, but provides common ground on which representatives of them all can meet to discuss methods and results of scientific research and foster public interest in them.

The objects for which the association was constituted are: to give a stronger impulse and a more systematic direction to scientific inquiry; to promote the intercourse of those who cultivate science in different parts of the British Empire with one another and with foreign philosophers; to obtain a more general attention for the objects of science and the removal of any disadvantages of a public kind which impede its progress.

The legislative body of this parliament of science is a general committee of about seven hundred members who have qualified to serve upon it by the publication of contributions to the advancement of science. This committee has similar functions to those of the British Parliament, and it similarly elects the council and officers to act as a cabinet governing the association's affairs.

The association meets annually as a corporate body, and the place of the meeting is decided by the general committee not less than two years in advance. Invitations to meet at particular places are sent to the association by municipal and other authorities; and there are usually several of these awaiting acceptance every year. The average number of membership tickets issued at an annual meeting is above two thousand, but at some meetings the number has been more than twice as great. At every annual meeting many local residents and others not professionally engaged on scientific work become members, and the expenses of the meeting are borne by the local authorities and their supporters. Since the foundation of the association in 1831 meetings have been held in most of the chief cities and towns of Great Britain, as well as in Ireland, Canada, South Africa, Australia and India.

There are now thirteen sections of the association, each with its own president and secretaries, and together they cover all branches of scientific knowledge. The sections meet separately for the consideration of their own special subjects, but two or more sections often meet jointly for the discussion of contributions of common interest. Communications to the various sections relate usually to the position of researches in which the authors are engaged and to problems arising out of them.

Results of new investigations are often announced at the annual meetings and are sometimes of great scientific interest. For example, it was at the annual meeting at Oxford in 1894 that Lord Rayleigh and Sir William Ramsay announced the discovery of a new gas, to which the name argon was given, in the earth's atmosphere. This gas is now widely used to increase the life and efficiency of electric bulb lamps. Another similar gas, neon, afterwards isolated from the air, is used in electric discharge tubes for advertisement and other purposes. The discovery of the existence of the electron, upon which the transmission and reception of electric waves used in all forms of radio communication depend, was announced by Sir Joseph Thomson at the annual meeting of the association in 1897. Five years earlier, Sir Oliver Lodge had given, at the annual meeting, the first demonstration that electric waves could be used for signalling in the Morse code, over a distance of sixty yards, through two internal and one external wall.

At every annual meeting, research committees are appointed to report upon particular subjects and problems of scientific importance. These reports, presented at following meetings, constitute the most influential part of the association's activities. The work of these committees is entirely voluntary, but small financial grants are made to cover essential expenses. Fully one half of the total receipts for membership tickets

for annual meetings have been devoted to scientific investigations by means of such grants, the total amount being about £1,000 a year. The association received no assistance from public funds, and possesses, therefore, the freedom of service highly cherished by most British scientists.

Through its research committees, the association has initiated many new scientific movements which have afterwards been maintained from public and other funds. The Kew Observatory, now under the British Meteorological Office, and one of the most renowned institutions in the world, was placed at the disposal of the association by Queen Victoria just a century ago. The government at that time had decided no longer to maintain the building as an observatory and museum, for which purposes it had been built by King George III. In spite of its slender financial resources, the responsibility for maintaining the observatory as a center of work in meteorology, terrestrial magnetism and electricity, and related subjects, was undertaken by a committee of the association, and the results of this decision have influenced the progress of geophysical knowledge everywhere. Between 1843 and 1872 the association made grants to the Kew Observatory amounting to £12,300, by far the largest total to any of its committees at any time in its history, and the whole of this amount was derived from the membership subscriptions at annual meetings.

Another example of work of international value is that carried out by British Association committees on electrical standards. Eighty years ago there were no generally recognized units or standards for the measurement of electrical resistance, current, electromotive force, quantity, capacity and similar values. The association undertook investigations of this subject over a long period of years, and the standards specified and constructed by its committees have become international, thus assisting trade and manufacture everywhere. In all the principal countries of the world the same electrical units and standards are adopted. The British Association was responsible for the institution of this uniform system.

Reports of this kind, with the inaugural address given annually by the president of the association, and the addresses delivered to the separate sections by their respective presidents, are now published in a quarterly review with the title, "The Advancement of Science," instead of a bulky annual volume. The current issue of this review includes all the papers read at the Conference on Science and World Order held in London in September of last year. The conference was arranged by the association's Divisions for the Social and International Relations of Science, and was attended by distinguished men of science and other citizens of more than twenty nationalities. This was the first occasion upon which representatives of science, administration and government met together to consider problems of the adjustment of progressive scientific knowledge to social action.

The division was established in 1938 to further the objective study of contacts of science with social conditions, and to promote the welfare of human communities by international understanding of them. It is empowered to hold meetings or conferences at any time with the view of attaining these objects; and it represents the response of the association for cooperation in the shaping of a social structure worthy of the powers which science has given to civilized communities. When General Smuts was president of the association at the Centenary Meeting in 1931, he pointed out in his presidential address on "The Scientific World-Picture of To-day" that "One of the greatest tasks before the human race will be to link up science with ethical values, and thus to remove dangers threatening our future." Every president since then has referred in his inaugural address to the social implications of science and the need for effective recognition of them. By the establishment of its new division the association has adapted itself to the needs of the times, and provided a new cooperative federation of thought and action on contacts of science with social and international affairs.

Every association for the advancement of science, constituted like the British Association and including not only scientific workers but also members of the community engaged in other pursuits, can take part in this development of its fields of activity. Freedom from any sort of political influence or domination is a characteristic of British scientific societies and is essential for the impartial study of social and international problems. Since the British Association was founded, similar bodies have come into existence in the United States, Australia, New Zealand, South Africa and other countries, and all of them possess the spirit of cooperation for the increase of knowledge and the service of mankind.

Meetings of the association outside Great Britain have always stimulated interest in science and its relationships to the community. There is nothing in the constitution of the association to prevent such meetings being held outside the British Commonwealth, or for delegates to be sent to a conference in any country. The expanded outlook represented in the new Division for the Social and International Relations of Science can give high public significance, as well as scientific authority, to such a meeting anywhere in the world.