southern end, we entered the canoe and pushed off from the shingly beach, headed for the northern end of the lake. The surface of the lake was glassy, the air was still, a faint haze overhung the water, the sky was cloudless, and the lake for a considerable distance out was in the shadow of heavily timbered hills. The canoe had barely gotten under way and was not more than twenty meters from the shore when there suddenly arose a musical sound of rare sweetness, rich timbre, and full volume, whose effect was increased by the noiseless surroundings. The sound appeared to come from directly overhead, and both of us at the same moment instinctively glanced upward; each afterward asserted that so great was his astonishment that he was almost prepared to see a pipe organ suspended in midair. The sound, by the most perfect gradation, increased in volume and pitch, reaching its climax a few seconds after the paddling of the canoe was involuntarily suspended; and then, rapidly growing fainter and diminishing in pitch, it seemed to pass away toward the south. The sound lasted ten to fifteen seconds and was subsequently adjudged to range in pitch approximately from a little below center C to a little above tenor C of the pianoforte, the tones blending in the most perfect chromatic scale.

It was at once realized that this was probably a manifestation of the strange phenomena referred to by General Chittenden, whose book had been read in camp, and that an opportunity was presented to investigate and perhaps elucidate the mystery. So favorable was the opportunity that in a short time we were reproducing the sound at will.

Following the dying away of the music and the short period in which we were held spellbound, paddling was resumed and, as the canoe gained sufficient headway, the music recurred in practically the same form as at first, and, as the paddling ceased and the momentum of the canoe fell off, the sound died away. It was then perceived that the sound was coincident with the motion of the canoe: when a certain speed was reached and maintained, the sound was produced and maintained; before that speed was attained there was no sound, and after that speed was lost the sound ceased.

A search for the cause of the sound disclosed the following situation: A jointed bamboo salmon rod with its butt-end touching the side of the canoe was projecting backward about half a meter beyond the gunwale; the waxed silk line was reeled in, but about a meter of line with the lure at the end was wrapped several times around the terminal joint; a lead sinker weighing one hundred grams, that had been attached in order to carry the lure into deep water frequented by the large trout with which the lake had been stocked, was dangling from the end of the rod about five centimeters below the surface of the water. As the canoe moved through the water, the short length of free line, held taut by the sinker, rapidly vibrated in conformity with the speed of the boat; the vibrations were transmitted through the bamboo rod to the canoe, whose thin, curved, rigid sides and bottom acted as a sounding board and gave out an augmented volume of sound that seemed to be concentrated or focused overhead. The combination of essential factors present in this case seems to have been a smooth water surface, a vibrating cord, a resonant body to which the vibrations were transferred, and still air, with perhaps other favorable atmospheric conditions. Later, in other parts of the lake, where the surface was disturbed by ripples or waves and there was slight to moderate movement of the air, attempts to reproduce the sound were futile, although the other factors were as in the original manifestation.

It is not to be inferred that the conditions and explanation herein given are held to account for all the mysterious musical sounds that have been heard in the park. On the contrary, owing to the rarity of the occasions when canoes had been used in park waters, it seems likely that the exact combination of factors noted must have been exceptional. All that is claimed for this manifestation is that it fulfilled the requirements of the mystery as described by the best observers and that its cause was ascertained. An account of the occurrence was promptly given to the superintendent of the park.

That acoustic conditions on Shoshone Lake that morning may have been peculiar is suggested by another observation as the canoe was skirting the eastern shore of the lake and the Shoshone Geyser Basin came within visual range. During several of the eruptions of the principal geyser, the splashing of the geyser water on the hard siliceous platform was distinctly heard. The distance in an air line, according to the official Geological Survey map, was approximately nine kilometers.

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SIR JOHN BURCHMORE HARRISON

WITH the recent announcement in SCIENCE of the death on February 8 of Sir John B. Harrison, director of the department of science and agriculture in British Guiana, it is fitting that some reference should be made to the career of this distinguished chemist, whose work is unfortunately too little known to American scientists.

John Burchmore Harrison was born at Birmingham, England, on May 29, 1856, and received his preliminary education at the Edgbarton Proprietary School, after which he became a student in Christ's College,

Cambridge. In these years of preparation young Harrison came under the influence of such teachers as Gore, Liveing and Dewar, who laid great stress upon the ability of students to devise their own methods and apparatus according to the needs of each special case. The system then in vogue gave a well-rounded training in several sciences and in that power of correlation, which, as seen in such men as Darwin (also of Christ's College), has been the peculiar endowment of so many Cambridge alumni. At the age of twenty-two Harrison received his bachelor's degree, being Natural Science Scholar of his college. Following graduation he did research work in agricultural chemistry at Cambridge and also for a short time at the Rothamsted Experiment Station under Sir John Lawes and Sir Joseph Gilbert.

In 1879, Harrison began his life work in the tropics by accepting an appointment as professor of chemistry and agricultural science in Barbados. During this period, he and his associate, J. R. Bovell, began their famous experiments upon the development of new varieties of seedling sugar canes. The ancient custom of propagating the sugar cane by germination of the buds upon the stalk had led to a general belief, notwithstanding occasional reports to the contrary, that the seed, which is borne on a plume at the end of the cane, was sterile. But all doubts as to the fertility of sugar-cane seed were finally dispelled by the independent, and almost simultaneous, proof of the fact by Soltwedel in Java in 1887 and by Harrison and Bovell in Barbados in 1888.

In 1889 Harrison went from Barbados to British Guiana, where he accepted the appointment of government chemist and professor of chemistry. He was promoted in 1905 to the directorship of the department of science and agriculture, receiving also the appointment of government geologist—positions which he retained until his death. His arrival in British Guiana came at a most opportune time, for the old Bourbon variety of sugar cane, which was the colony's chief source of sugar, was succumbing to the attacks of fungus diseases. By introducing the new hardier seedlings which he had developed in Barbados, Harrison was able to save the sugar industry of British Guiana from extinction. The D–74 and D–95 varieties which he originated were afterwards introduced into Louisiana with most beneficial results. His researches upon the breeding and agriculture of sugar cane were continued until his death.

Harrison's field experiments upon tropical crops were controlled by most careful meteorological observations, such as air and soil temperatures, humidity, degree of sunshine, rate of evaporation and rainfall. He made very extensive investigations upon the composition of the salts removed from the atmosphere by rain and dew—a line of investigation in which he first became interested at Rothamsted.

Another important contribution which Professor Harrison made to the industrial advancement of British Guiana was his discovery of the famous bauxite deposits in the Christianburg-Akyma district of the Demerara River, while he was engaged upon a geological survey of this region in 1897. He devoted much attention to studying the origin of these deposits, which are the most extensive in the world, and attributed their formation to the decomposing action of carbonated waters upon diabase and other siliceous rocks. He conducted many geological expeditions in the West Indian Islands and in the interior of British Guiana, and for his work in this field was awarded the balance of the Wollaston Donation Fund in 1899 by the Geological Society of London. In addition to his study of the bauxite deposits he conducted surveys of the gold- and diamond-bearing areas of British Guiana. Among his numerous contributions to geology and mineralogy there should be mentioned also his recent discovery of a native alloy of palladium and mercury, a mineral hitherto unknown and of which a specimen was deposited by him in the National Museum at Washington.

In agricultural chemistry Professor Harrison is perhaps best known for his exhaustive investigations upon the formation and composition of tropical soils. His studies in this field are closely related to his work as a geologist, this coordination of activities leading to most brilliant results as in the similar case of the late Professor E. W. Hilgard in the United States. Harrison showed that, during the decomposition of the old silicate rocks by meteorological, chemical, physical and biological forces, the potassium, calcium and other elements essential to soil fertility were leached away and contributed to the agricultural richness of the alluvial low lands, while the sand, kaolin, bauxite and other residues, left on the uplands of British Guiana, gave rise to soils of comparatively low agricultural value. These studies of Harrison exploded some false ideas regarding the fertility of certain inland Demerara soils. Harrison's investigation of the rapid complex chemical changes, which take place in tropical soils as a result of oxidation, hydration and nitrification, have also been of great importance. These various researches upon soils required the correlation of many different sciences. Questions of geology, mineralogy, chemistry, physics, meteorology, biology and agriculture were all mutually involved, and the great value of Harrison's diversified scientific interests was shown more conspicuously here than in any other branch of his work. The comparative inaccessibility of certain publications of British Guiana has prevented many of his investigations in

this and other scientific fields from becoming more widely known.

Those who have had the good fortune to visit Sir John, either at his beautiful home in the Georgetown Botanical Gardens, or at his spacious, well-equipped laboratory, will recall with pleasure his cordial manner and delightful personality. The museum of "Mares' Nests," which he kept in his office, will never be forgotten by any one who has seen that famous collection of disappointed hopes. His rugged independence of opinion, his caustic comments upon false pretenses and his outspoken contempt for every kind of sham, although mistaken by some as indicative of pessimism, were only the evidences of his deep sincerity and love for truth. In later years he was blamed for an apparent unwillingness to share the growing responsibilities and burdens of his many-sided position with others, but his attitude in the matter was natural. Unassisted he had built up and coordinated the varied scientific activities of the colony into a single unit, and the relinquishment of any part of this work was to him almost like the disowning of a child. Owing to physical debilities Sir John was nevertheless upon the point of withdrawing from active work in order to spend the remaining years with his daughter in England, when his life was cut short only a few weeks before the date of retirement.

In addition to his duties as director of the department of science and agriculture and government geologist, Professor Harrison, at the time of his death, was chairman of the board of agriculture, chairman of the Sugar Planters Experiment Stations Committee, and a member of the Executive Council of the Colony. He maintained an active interest in American science, having visited the United States on various occasions and being a member of the American Association for the Advancement of Science, of the American Chemical Society and of the American Geological Society. He was the recipient of many honors, having received the order of C. M. G. in 1901 and the knighthood in 1921.

For variety, scope and economic value the thirty-seven years of Sir John Harrison's scientific work in British Guiana are without a parallel. There is no one man who can fill his position. Versatile, all-round investigators of his type are now no longer produced. The world of science is much poorer with his passing.

BUREAU OF CHEMISTRY C. A. BROWNE

SCIENTIFIC EVENTS

COOPERATION BETWEEN THE UNITED STATES AND GREAT BRITAIN IN MINE SAFETY RESEARCH

UNDER the program of cooperative research between the United States Bureau of Mines and the British Safety in Mines Research Board, Dr. H. F. Coward, an English investigator, well known for his researches on the ignition of gases and the propagation of gaseous explosions, is working at the Pittsburgh, Pa., mining experiment station of the Bureau of Mines, on a number of scientific problems connected with ignition and explosion of gases. G. W. Jones, E. J. Meiter, M. D. Hersey and H. P. Greenwald, of the Bureau of Mines Technical staff, have been assigned to work with Dr. Coward on the following problems:

The limits of inflammability of methane in air to which certain diluent gases have been added;
The ignition of gases by minimum flames;
The measurement of the pressure developed by gaseous explosions;
The propagation of flame in mixtures of gas and air.

Good progress has been made with each research, and the results will be embodied in joint publications of the Bureau of Mines and the Safety in Mines Research Board, according to the annual report recently made by Dr. R. V. Wheeler, in charge of the British mine safety research work and George S. Rice, chief mining engineer of the Bureau of Mines.

In exchange for Dr. Coward's services, Dr. R. Thiessen, of the Pittsburgh experiment station, has been in Sheffield, England, for some time assisting the Safety in Mines Research Board in its researches on the spontaneous combustion of coal and the inflammability of coal dust. Dr. Theissen was selected for this assignment because of his wide knowledge of the constitution of coal, to the study of which he has devoted many years while associated with the Bureau of Mines.

Arrangements have also been made, under the cooperative agreement, for the exchange of information on two particular groups of researches in which the experimental difficulties are great and the necessity for obtaining accurate information is pressing. These researches deal with the inflammability of coal dust and with the measurement of the degree of fineness of dust particles. The corresponding members of the two staffs are F. M. Bouton and A. Allison, of the U. S. Bureau of Mines, and E. F. Greig and A. L. Godbert, of the British Board.

As a result of a series of conferences held at the Pittsburgh experiment station, the following-named problems are being studied by the British and American organizations, simultaneously or by one or the other of the organizations separately, with a full exchange of information between the investigators concerned:

The composition of coal as affecting its inflammability.
The effect of the fineness of coal dust on its inflammability.