

clearly that he who runs may read their substantial identity. The actual gap in the spectrum of the known radiations between light and X-rays is also rapidly disappearing. The longest stride into the region beyond the ultra-violet was made by Lyman with the vacuum grating spectroscopy which he developed. For a time Prof. Bazzoni and I held the record in this direction with our determination of the short wave limit of the helium spectrum, which is in the neighbourhood of 450 Ångstrom units. More recently this has been passed by Millikan, who has mapped a number of lines extending to about 200 Ångstrom units—that is to say, more than four octaves above the violet limit of the visible spectrum. I am not sure what is the longest X-ray which has been measured, but I find a record of a Zinc L-ray by Friman (*Phil. Mag.*, vol. 32, p. 494, 1916) of a wave-length of 12.346 Ångstrom units. There is thus at most a matter of about four octaves still to be explored. In approaching this unknown region from the violet end the most characteristic property of the radiations appears to be their intense absorption by practically every kind of matter. This result

is not very surprising from the quantum point of view. The quantum of these radiations is in excess of that which corresponds to the ionising potential of every known molecule, but it is of the same order of magnitude. Furthermore, it is large enough to reach not only the most superficial, but also a number of the deeper-seated electrons of the atoms. There is evidence, both theoretical and experimental, that the photo-electric absorption of radiation is most intense when its quantum exceeds the minimum quantum necessary to eject the absorbing electron but does not exceed it too much. In the simplest theoretical case the absorption is zero for radiations the frequencies of which lie below the minimum quantum, rises to a maximum for a frequency comparable with the minimum, and falls off to zero again at infinite frequency. This case has not been realised in practice, but, broadly judged, the experimental data are in harmony with it. On these general grounds we should expect intense absorption by all kinds of matter for the radiation between the ultra-violet and the X-ray region.

### The Botanic Gardens, Victoria, Cameroons Province, Nigeria.

HIS Excellency the Governor of Nigeria, Sir Hugh Clifford, G.C.M.G., in a remarkable address to the Nigerian Council,<sup>1</sup> which is deserving of careful study by those interested in our West African colonies, directed attention to the neglected condition of the Victoria Botanic Gardens in the recently acquired Cameroon Province, and stated that at his request the Assistant Director of the Royal Botanic Gardens, Kew, was about to visit Nigeria for the purpose of advising the Government "as to the action that should be taken for their restoration and future maintenance." We learn from the *Kew Bulletin*, No. 6, issued in September last, that Captain A. W. Hill has returned from his mission, and fully endorses the remarks made by the Governor as to the beauty and value of these gardens.

To quote from His Excellency's address:—

The Botanical Gardens at Victoria compare in everything save size with their prototypes at Buitenzorg in Java and Peradeniya in Ceylon. They contain a fine and varied collection of trees and plants and shrubs which have been brought together from every part of the tropics; and, in spite of their close proximity to the sea, the soil in them appears to be abundantly fertile. A special feature of these gardens is a stream of water, crystal clear, that patters noisily over a bed of pebbles. . . .

It would be a lasting discredit to this Government, I consider, if it were to neglect to repair the damage which the war has already unhappily inflicted upon these lovely and valuable gardens.

The gardens, we learn, cover an area of some 200 acres, and are provided with a good labora-

tory, a herbarium, and museum building, as well as a building which served the purpose of an agricultural school. All these are in a very fair state of repair, and are only awaiting the time when they can be restored to their proper functions. The site is admirably adapted to garden purposes, since the soil is a highly fertile decomposed volcanic rock. There are some steep hills, commanding fine views either across the bay or to the lofty Cameroon Mountain, but there is also a considerable tract of more or less level ground, so that it is possible to cultivate useful economic plants under varied tropical conditions. Connected with these gardens were the experimental plots of tea and cinchona at Buea, situated at an altitude of 3300–3600 ft., on the slope of the Cameroon Mountain. Photographs of these plantations are given in the *Bulletin*, and though now in a very neglected condition, they show that the cultivation of these products is a practical proposition in the Cameroon Province. High-level stations are thus a necessary adjunct to the gardens.

The importance of the Victoria Botanic Gardens and substations, with the laboratory and other buildings, where mycological, chemical and entomological research can be carried out, can best be realised when it is pointed out that the lower slopes of the Cameroon Mountain are covered by extensive plantations of such economic plants as cocoa, coffee, Hevea and Funtumia rubber, kola, bananas, oil palms, etc. The Cameroon Province thus differs essentially from Nigeria proper, where large plantations are rare and widely separated. In Nigeria fungus and insect diseases are not able to spread far, since

<sup>1</sup> Nigerian Council, Address by the Governor, Sir Hugh Clifford, December 29, 1920. See especially pp. 184–86 and 208–11.

there are dense tracts of forest or bush which act as a barrier; the native plantations also are usually small. In the Cameroon Province the plantations are more or less continuous, so that the risk of the spread of disease is ever present,

gardens should be, rather than to an agricultural department, the function of which is purely technical and is concerned in the main with investigation and instruction.

The Victoria Gardens could be made the main centre for research in West Africa, and would be able to furnish results of immense value to the various agricultural departments; but we would urge that it should be established rather in connection with the Agricultural Department of Nigeria than under its direct control.

Reference has been made to the building which served as an agricultural school, and we would lay stress on the importance of such a school for the training of native agriculturists in a province like the Cameroons, with its large plantations. The value of such schools has been demonstrated in the West Indies and elsewhere, and with plantations demanding a large amount of skilled native labour a school attached to a scientific institute can scarcely fail to produce results of very great benefit.

The perusal of the narrative under review strengthens the conviction which we formed on reading His Excellency's address, that "it would be a lasting discredit" were we "to neglect to repair the damage" which the gardens have

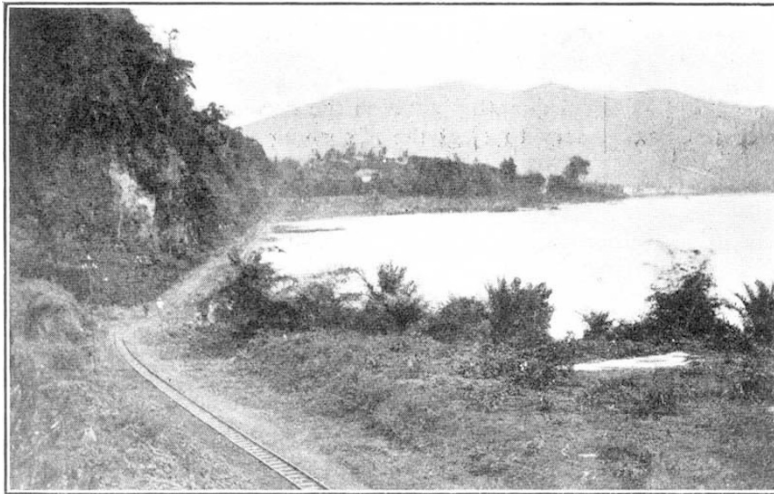


FIG. 1.—Ambas Bay, showing the seaward face of the Victoria Botanic Gardens which cover the promontory on which Government House can be seen crowning the summit. View looking to the south.—The trolley line from Victoria to Bota (the starting-point of the Buea Railway) is seen running at the foot of the cliff, which is the highest point of the gardens at the Bota end. The Limbe river, which traverses the gardens, enters the sea near the end of the promontory.

and the prosperity of the plantations depends very largely on the maintenance of an adequate scientific staff.

It is no doubt unfortunate for many reasons that the Cameroon Province, with the noble Cameroon Mountain, explored as long ago as December, 1861, by Sir Richard Burton and Mr. G. Mann, lies at one end of Nigeria, while Lagos and the headquarters of the Nigerian Agricultural Department at Ibadan lie far away near the Western border. Except by sea, communication between Ibadan and Victoria is at present well-nigh impossible, so that the proper development of the Victoria Gardens as a centre for research in connection with or under the control of the Agricultural Department of Nigeria, if this should be deemed essential, affords problems of considerable administrative difficulty.

While desiring to urge very strongly that the Victoria Gardens should be restored and maintained as a botanic garden fully equipped for tropical research in problems of soil chemistry, mycology, entomology, and plant-breeding, we would point out that research of this character belongs to a scientific institution, such as the

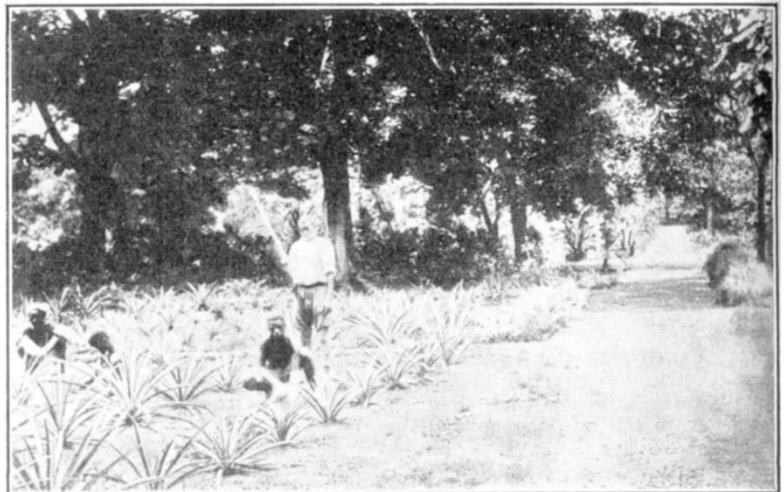


FIG. 2.—Pineapple plantation in the Victoria Botanic Gardens on the east side of the Limbe river.

suffered and, we may add, were we to neglect the magnificent opportunity afforded us, with our great West African responsibilities, of maintaining them as a centre of scientific research in the tropics.