trial processes are by no means solely confined to motor coordination, and I must emphasize that the data of this report may not be uncritically applied to industrial situations. More complex processes, such as typewriting, which seem to apply more directly to industrial environment, are being studied, and their various factors analyzed by my colleague, Dr. Walter R. Miles, experimental psychologist of the Nutrition Laboratory. It is only upon the basis of such analysis that justifiable conclusions may be made with regard to the effect of alcohol upon the mental and physical demands of industrial environment.

It may be added that the material already published is being further elaborated, both experimentally and statistically, by Dr. Miles.

FRANCIS G. BENEDICT
NUTRITION LABORATORY OF THE
CARNEGIE INSTITUTION OF WASHINGTON,
BOSTON, MASS.

CINCHONA AS A TROPICAL STATION FOR AMERICAN BOTANISTS

IT is now practically assured that some fourteen American universities, botanical foundations and individual botanists are to cooperate with the Jamaican government in the support of Cinchona as a tropical station. A move to aid in the support of Cinchona, initiated by the Botanical Society of America in 1912, was not consummated, in consequence of the earlier leasing of the station to the British Association for the Advancement of Science. The Jamaican authorities and the British Association seem quite willing, under present conditions, to allow the lease to pass into American hands after October next.

The attention of American investigators should, therefore, be directed to the facilities for botanical research offered by this oldest and best known botanical laboratory in the western tropics.

A brief description of the location of Cinchona and of its botanical environment has recently appeared in *The Popular Science Monthly* (December, 1914, January, 1915). Among the advantages of this station for American botanists there enumerated are the greatly varied flora and series of types of vegetation; the proximity of a library and of two other botanical gardens, beside that surrounding the laboratory. The location of Cinchona is a very fortunate one for American botanists from a practical standpoint. It is in an English-speaking country with good roads, a stable government and adequate quarantine service. It is also within easy reach of our eastern seaports, from several of which the round trip to Jamaica and Cinchona can be made in summer for $75.00 or less for transportation.

In order to give a more adequate idea of the advantages of Cinchona for several different types of research I have asked four investigators who have worked there to suggest the opportunities presented at Cinchona for research in the four or five lines which they have followed. These outlines are appended under the names of their respective authors.

It is altogether probable that any American botanist wishing to work at Cinchona during the coming summer will be granted the privilege by requesting it of the colonial government of Jamaica through Superintendent William Harris, F.L.S., Hope Gardens, Kingston, Jamaica. The writer and the authors of the appended notes on the botanical opportunities of Cinchona will be glad to give any information, within their knowledge, of conditions at and about the laboratory.

DUNCAN S. JOHNSON
JOHNS HOPKINS UNIVERSITY,
BALTIMORE,
May 25, 1916

THE FERN-FLORA OF CINCHONA

THE writer has visited a good many regions rich in ferns, but none equals Jamaica either in number of species or individuals. The extraordinarily varied conditions in Jamaica, due largely to its topography, result in a variety of the fern flora which is really amazing. About five hundred species are reported from this small island, of some four thousand square

miles in extent—a number much exceeding that of the whole of North America north of Mexico.

The high rain forest of the Blue Mountains in the neighborhood of Cinchona, is especially rich in Pteridophytes and Hepaticæ, and offers very exceptional opportunities for collecting material of a great variety of interesting ferns, especially many types which are quite unrepresented in the United States, or at best are represented by a very few extremely rare species.

The very important order, Marattiales, entirely absent from the United States, is represented by species of *Marattia* and *Danœa*, abundant and easily collected. The beautiful filmy ferns, Hymenophyllaceæ, abound and comprise numerous species of *Hymenophyllum* and *Trichomanes*.

Tree ferns of the genera *Hemitelia, Cyathea* and *Alsophila* are very abundant, sometimes 30–40 feet in height, and the Polypodiaceæ are represented by an enormous number of species. The Gleicheniaceæ and Schizæaceæ are better developed at lower elevations, but may be procured without much trouble.

Numerous species of *Lycopodium* and *Selaginella* are common, and at lower elevations in the Blue Mountains one sometimes finds thickets of *Equisetum giganteum*, ten or fifteen feet high.

In the neighborhood of Cinchona—and indeed all over the island—the Hepaticæ are very abundant, and include many rare and interesting forms, which can not be given here in detail.

Douglas Houghton Campbell
Leland Stanford Jr. University

Lichens and Bryophytes at Cinchona

The region around Cinchona is remarkably rich in Bryophytes and Lichens. Even in the immediate vicinity of the station excellent collecting grounds are available, such as the trees behind the laboratories, the trail to and through Morce's Gap, and the trail to Newhaven Gap. More distant points, such as John Crow Peak, Sir John Peak, Mabess River and Doll Wood, yielded additional species in great variety and can be visited without difficulty.

From the standpoint of the Hepaticæ, to which the writer devoted particular attention during his two visits to Jamaica, the epiphyllous species and the distinctly tropical genera are perhaps the most striking and interesting. Most of the epiphyllous forms belong to the Lejeuneæ and include the genera *Odontolejeunea* and *Leptolejeunea*, together with species of other genera. In addition to the Lejeuneæ the tropical genera *Symphyogyna, Tylimanthus, Syzgiella, Isotachis* and *Dendroceros* are well represented, and many genera known in northern regions by a single species or by a small number of species here attain a remarkable luxuriance. This is strikingly true of *Plagiochila, Lepidozia, Bazzania, Frullania* and *Anthoceros*. Other northern genera, such as *Gymnomitrium, Marsupella, Jungermannia* and *Lophozia*, are either absent altogether or very sparingly represented.

The student of taxonomic problems soon becomes impressed by the imperfection of our knowledge of tropical species and by the difficulties of interpreting the older records regarding them. It will, in fact, be a very long time, unless the number of workers becomes much greater, before our knowledge can even approach completeness. The study of tropical Bryophytes involves careful work in the field followed by careful study in the laboratory and herbarium, and the facilities offered at Cinchona and Hope Gardens are probably unequalled anywhere else in the tropics except at the botanical garden of Buitenzorg.

A. W. Evans
Yale University

Cytological Material at Cinchona

The region about Cinchona offers many advantages to one desiring material for cytological study. The flora is so varied and profuse that the student of almost any group of plants will there find valuable material. This is notably true of lichens, liverworts, ferns and flowering plants. Much light is frequently thrown on perplexing cytological problems by the study of related genera and species; and

thus to one whose investigations have been confined to those species growing in the temperate zones, Cinchona furnishes splendid opportunity for the extension of his work to such allied tropical species.

A tropical rain-forest presents peculiar conditions. The plants do not show the marked periodicity characteristic of colder and dryer regions. Where the temperature and rainfall are so nearly constant at all times of the year as at Cinchona, one is likely to find all of the stages in the life history of a species on almost any single day, and conditions are favorable for collecting the year around. In the plants of a tropical rain-forest, moreover, there is much less cutin, fewer hairs, etc., to interfere with the penetration of fixing solutions, and hence there is the probability of better fixation. That such is not in all cases true is evidenced through the impermeability of the walls of fern sporangia, and the hairiness of the leaves of the Gymnogrammeæ may be as striking here as elsewhere.

To the cytological collector a compound microscope is an absolute necessity; and such a permanent station as that at Cinchona, therefore, seems to be the only solution to the accessibility of such regions. The buildings at Cinchona, including two cottages, a two-room laboratory, the drying house, the dark room, the greenhouses and the garden, were all in good condition when I left there in December last. Through the kind offices of Mr. William Harris at Hope Gardens servants were made available, and one's personal needs adequately supplied. The space is sufficient for a number of investigators at one time, and life there is very pleasant indeed. C. H. FARR

COLUMBIA UNIVERSITY

EXPERIMENTAL WORK AT CINCHONA

THE portions of the Blue Mountains which are accessible from Cinchona, at both higher and lower altitudes, exhibit a diversity of vegetation in correlation with the widely differing temperature and moisture conditions, and also a vertical diversity from floor to canopy within the rain-forest itself. Ample opportunity is thus offered for the investigation of the physical environment in relation to the local and general distribution of plants. A wide range of plant material is available for the study of general physiological behavior as well as for the special types of activity characteristic of rain-forest plants. The fundamental processes of plants, as carried on under extremely humid conditions, and the influence of the character and rate of these processes upon the growth, distribution and periodic phenomena of the hygrophytic vegetation offer a rich field for future work at Cinchona. The gardens, greenhouses and various outbuildings afford opportunity for propagating plants and for placing them under a variety of experimental conditions. The nearness of an extensive tract of virgin forest is also a valuable asset for physiological as well as ecological work. The excellent trails, the easy means of communication and supply, the presence of a guide with a knowledge of the local flora, and the very healthful living conditions combine to make Cinchona an extremely useful station for those who may wish to carry on more or less prolonged investigations in the problems of the semi-torrid and humid tropics.

FORREST SHREVE

THE DESERT LABORATORY

UNIVERSITY AND INDUSTRY[1]

1. THIS Committee was appointed at the April, 1916, meeting to consider the papers presented at the meetings in November and December, 1915, and in April, 1916, and to report at the June, 1916, meeting; this report to embody the findings, conclusions and recommendations of this committee based upon the foregoing material, supplemented by such other as this committee was able to consider.

2. Your committee was divided into three subcommittees to examine the above subject-matter from three different points of view: Firstly, that of the university; secondly, that of the industries, and thirdly, that of the consulting chemists. Each of these subcommittees reached its conclusions separately and these conclusions were then submitted in writing to the full committee. The work of the whole committee is given in the following under

[1] Report of a committee of the New York Section, American Chemical Society.