tinue normal research until the purely legalistic aspect of the matter could be examined. Though no fault had been found with the apparatus or the emitted wave, this concession was refused, and we therefore suspended all research in this field.

On November 12, 1934, after much correspondence, the whole matter was referred to a member of the legal staff of the commission, *who stated emphatically that our interpretation of the Radio Act was completely correct in every respect.*

On the basis of this opinion, the engineers of the commission requested me to prepare suggestions for a new clause in the regulations designed to recognize the special requirements of ionosphere observatories. In view of the long interruption which had already occurred, the engineers agreed to proceed as rapidly as possible and estimated that we could resume normal operation within three weeks. Our suggestions were prepared immediately.

On February 9, 1935, the proposed amendment was still "under consideration."

On April 27, we discovered for the first time that Counsel Spearman and Commissioner Stewart had overruled the previous legal opinion. Their opposition was frankly largely based upon apprehension lest the use of semi-automatic apparatus in research involve the commission in disputes over the use of unattended equipment in commercial communication. Mr. Stewart therefore requested specific suggestions which would enable the commission to discriminate between the two cases. We immediately prepared a detailed statement pointing out that we are not engaged in any form of communication, and that our transmission is completely determined at all times by our licensed operators. On the other hand, the commercial stations are clearly engaged in some form of point-to-point or broadcast communication. Uninterrupted supervision by licensed operators could logically be demanded in order to prevent the use of profane and obscene language, even if the commercial stations could match the highly specialized protective equipment necessitated by our research problems. We have received an acknowledgement of our letter, but no reply to our detailed suggestions as yet.

In any case, this aspect of the matter clearly involves a question of administrative expediency and not fundamental law. We must therefore conclude that the present attitude of the commission is based on an instinctive desire to preserve the *status quo* at any cost and that this desire hampers scientific research unreasonably.

HARRY ROWE MIMNO

CRUFT LABORATORY,
HARVARD UNIVERSITY

COFFEE AND CACAO IN SOUTHERN FLORIDA

RECENT experiments have shown that conditions for normal growth and fruiting of coffee and cacao can be provided in southern Florida, not in open field plantings but sheltered by larger trees, as in gardens, courts or dooryards. Even with no indication of commercial production being feasible, many residents and winter visitors in Florida are attracted to the more tropical crops, not grown elsewhere in the United States, and often have time and money to use in local experiments. The amateur plantsmen are recruited from many lines of experience in other regions as farmers, horticulturists and botanists, teachers, merchants, manufacturers, chemists, technologists and inventors, so that attention may be given not only to the culture and breeding of coffee and cacao, but also to processes of fermentation and curing, which may largely determine flavors and commercial values. Miami is becoming an educational center with special facilities for tropical plant research and training of tropical experts.

Coffee is a handsome spreading shrub or small tree, with shining laurel-like leaves, fragrant white flowers and clusters of crimson berries, while the "chocolate-tree" is remarkable for its habit of cauliflory, bearing its small star-like flowers and large gourd-like fruits along the naked trunk and larger limbs, not on the new growth with the leaves. Both trees are outstanding examples of dimorphic branching, but are specialized on different lines that serve well for comparative study as an introduction to this strangely neglected field of botanical science. The vegetative adaptations of plants eventually may be recognized as not less significant than the floral adaptations that have had so much attention.

Shade-trees and cover-crops are used with coffee and cacao in most of the tropical countries, and are especially needed in Florida. Thin soils and strong trade-winds rapidly intensify drought conditions, so that emergency watering is necessary, though less is required in protected cultures. As a soil cover, the Sarawak bean, *Phaseolus hosei,* a small-leaved creeping plant from the Malay region, was recommended by the late Edward Simmonds, and has proved entirely satisfactory. The conditions of wind and soil protection that were found necessary for raising Hevea rubber trees at the Plant Introduction Garden a few miles below Coconut Grove, Florida, as stated in SCIENCE of May 3, 1935, also have produced the most normal and fruitful young trees of coffee and cacao, some of them flowering and fruiting in the second season.

Winds are more moderate away from the coast, but exposure to drought and frost may be greater, since much of the interior country is denuded and fire-swept. Efforts to drain the Everglades undoubtedly have increased the fires and the local frost hazards in recent years, though the danger of further denudation is being recognized, and facilities of irrigation and fire control may be established to protect and develop the tropical region.

Many of the tropical crop plants have the ecological status of hylophytes, that is, they are specially adapted to forest undergrowth conditions where the sun and wind do not reach the soil surface, which explains why so many tropical seeds, like coffee and cacao, are viable only in the fresh state and do not withstand drying. Also the hylophytes may be considered as shade-tolerant plants, contrasting with *agrophytes* as plants of open country, requiring full exposure to the sunlight. For the forest undergrowth vegetation the protected cultures undoubtedly provide more normal conditions than the open cultures that are customary in temperate climates, as well as affording more shelter from frost.

Cacao is more delicate than coffee and more likely to suffer from local frosts, though in some respects easier to grow, the seeds germinating in a few days while coffee takes several weeks. Plantings in different districts are desirable, so that local supplies of seed may be at hand to facilitate tests and replacements. Cacao, like the Hevea rubber tree, tolerates wet lands and periods of flooding. Farmers who begin by raising a few trees and find pleasure in preparing their own product and supplying their own households have the best prospects of utilizing new crops. New methods and systems of tropical farming may be worked out in Florida, very different from the contract-labor plantations of the East Indies and with greater promise of human satisfactions.

Coffee competes with rubber as our most valuable agricultural import, though having only a beverage use, while chocolate is a rich food. Extensive cultures of coffee and cacao in several tropical countries have been destroyed by pests and diseases, and continued absence of these in Florida may stimulate interest in local experiments. A fungous disorder of cacao in Ecuador, Venezuela and Guiana is responsible for the recent shifting of the centers of production to Brazil and West Africa, thus repeating the history of previous transfers, first from southern Mexico and Guatemala to Nicaragua, Costa Rica and the West Indies, and later to the South American countries.

O. F. COOK

BUREAU OF PLANT INDUSTRY
SEPTEMBER 17, 1935

THE SIMILARITY BETWEEN THE MECHANISM OF THE RENNIN AND PECTASE (PECTIN-METHOXYLASE) REACTIONS

ATTENTION has been called recently in these pages[1] to the fact established by Hammersten[2] in 1875 that the coagulation of milk by rennin occurs in two distinct reactions, *viz.*, enzyme action and the subsequent formation of the coagulum. It is our purpose to note the striking similarity between the mechanism of this reaction and the gel formation from pectin by pectase. In both cases the enzyme causes a slight degradation of the molecule, which also is the first step in the enzymic decomposition of the substrates. In the absence of calcium (Sr, Ba, etc.) no visual evidence of the enzyme action occurs. In the presence of or upon the addition of calcium, however, the paracasein in milk and pectic acid produced from pectin both form insoluble salts; and a coagulum or gel appears.

One of us recently made a detailed separate study[3] of the two reactions involved in the gel formation by pectase, *i.e.*, the enzymic de-methoxylation and the formation of the gel. The two reactions have different pH optima, that of the gel formation depending greatly on the experimental conditions.

The changes in the relative velocity of the two reactions cause the appearance of the pH optimum for the diphasic visible change at a varying pH value. It will be of great interest to see whether similar conditions exist in the case of the rennin reaction.

A. C. DAHLBERG
Z. I. KERTESZ

NEW YORK STATE AGRICULTURAL EXPERIMENT STATION, GENEVA

IODINE IN GOITER TREATMENT

DR. MCCAY, in his interesting article[1] on the work of Boussingault, closes with the proposition, "One can only speculate concerning the human suffering that might have been evaded if some eminent physician had noted this contribution of the French chemist at an early date."

The following quotation from a treatise a century old serves to quiet any speculation on this question.

It may not be amiss to observe here that the author of the present volume first employed the hydriodate of potash, as a remedy for goitre, in the year 1816, after having previously ascertained, by experiments upon himself, that it was not poisonous in small doses as had been represented. Some time before the period stated, this

[1] A. G. Smith and H. C. Bradley, SCIENCE, 82: 467, 1935.
[2] See a review of this problem in "Fundamentals of Dairy Science," A. C. S., Monograph series, 1935.
[3] Z. I. Kertesz, in "Ergebnisse der Enzymforschung," Vol. 5, in press.
[1] SCIENCE, 82: 350, 1935.