There is no intended implication of vitalism anywhere, I think, nor of purposeful processes in plants.

Perhaps the most characteristic features of Professor Peirce's volume are its conversationally critical style and mode of presentation as has been indicated, but it will specially attract the reader not only through its personal tone but also through repeated emphasis on the importance of plant physiology in the every-day affairs of human life and through the many examples drawn from the out-of-doors. "It behooves us, therefore, as citizens as well as physiologists, to investigate the processes of food manufacture, and, if we can, throw new light on the problem of world-old hunger" (page 43). Many applications of plant physiological science in agriculture, horticulture and forestry receive much attention, but the point of view of the philosophical scientist is everywhere kept to the fore.

Two chapters (pages 223–296) are devoted to irritability and most of the discussion of growth is there given. Discussion of growth in the abstract is purposely omitted, for the author says he is unable to conceive of growth as a physiological process apart from the influences to which the organism is subject (preface). These influences are classified as mechanical, chemical and radiant, and the discussion of them is full of originality. Although many of what most workers in this field would regard as important features of our knowledge of plant growth and plant response to environmental changes or asymmetry are omitted or receive but cursory mention, and although some philosophical hypotheses with relatively little direct experimental evidence are suggested, yet the examples and illustrations of the various formative and tropistic phenomena are ingeniously and interestingly chosen and discussed. The formative influences of mechanical pressures (such as those occasioned by gravitation) are presented in a novel way, with special reference to such asymmetrical thickenings as occur in tree branches, annual rings, etc. It is pointed out that pressure and contact stimuli may depend not only upon the mass pressures involved and their fluctuations, but also upon molecular pressures due to adhesion (or cohesion) forces operating where two different bodies are in contact. This part of the book should be very valuable and stimulating to somewhat advanced workers on plant responses.

The volume ends with a subject index, but there is no index of authors cited, and such an index would have been useful. Well-chosen and generally adequate citations are given as footnotes throughout the book. There are no drawings, diagrams or figures of any kind.

BURTON E. LIVINGSTON

DESERT LABORATORY,
AUGUST, 1926

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE METHOD OF USING SAFETY RAZOR BLADES FOR MICROTOME SECTIONS

A NUMBER of devices designed to grip safety razor blades in such a manner that they can be used as a substitute for microtome knives are supplied by apparatus dealers. Some workers find them entirely satisfactory for small objects imbedded in paraffin, while others are unable to use them at all. The common defect is a tendency for the wafer-like blades to vibrate, particularly when sectioning large and hard objects. Moreover, they can not be used for sectioning objects imbedded in celloidin or for woody stems, roots, etc., which are commonly sectioned without imbedding by means of a sliding microtome.

The writer finds that safety razor blades can be firmly attached to the flat surface of ordinary microtome knives by means of a film of paraffin. Vibration does not occur even when cutting large blocks of hard tissues and if the blade be attached to a shanked knife, sections of celloidin blocks or of stems can be cut with a sliding microtome. The method described below is that followed when paraffin is used as the adhesive. It is possible that shellac would be more convenient.

Shanked knives of Walb or Lenz manufacture are very satisfactory, as the lower surface is flat or only slightly hollow ground and they may be used with either rotary or sliding microtomes. A thin film of melted paraffin is spread over the area to which the blade is to be attached. Care should be taken to avoid excess. The paraffin should be of a high melt point. As soon as the film has cooled a safety razor blade is laid upon it so that it projects beyond the edge of the knife by the width of its own bevel. It should be held firmly in place with cover glass forceps or suitable spring clips, while the back of the knife is passed in and out of a flame until the paraffin melts. It should then be plunged into cold water and left until completely cool. If the heating be done carefully there is no danger of damaging either knife or blade. The knife should be tilted slightly so that the molten paraffin does not flow along the edge of the blade. When clamped in the microtome, the blade should be on the side of the knife toward the object.

Gillette blades are less satisfactory than heavier blades, such as Auto-Strop, Durham-Duplex, Enders and Keen-Kutter, partly because they are so thin that they may vibrate if used on large blocks and partly because they are seldom perfectly flat, hence do not lie in complete contact with the knife. The greater length of the Durham-Duplex blade makes it more satisfactory for objects imbedded in celloidin, but its wide bevel causes it to be somewhat too flexible for hard objects imbedded in paraffin. There are a number of stropping devices on the market which will prepare any of the blades mentioned above for sectioning. Twin-plex stroppers are very satisfactory and models are available for all types of blades. The Spiro stropper, made by John Watts, Sheffield, England, is very well constructed and convenient to use, although the claim made for it that the stroke is diagonal is not justified. Watts manufactures blades for use in Auto-strop razors which are perforated so that they can be sharpened with the Spiro stropper.

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ESTIMATION OF THE COLLOIDAL MATERIAL IN SOILS

IN conducting investigations to devise methods for determining the content of colloidal material in soils, one of the methods that has been tried and has proved most successful is the hydrometer method. By means of this method, the colloidal content of a soil can be estimated quite accurately in only fifteen minutes. The general procedure consists of dispersing in a mortar by means of a pestle 50 grams of soil, placing it in a high cylinder, adding a total volume of water equal to 1,050 cc, shaking the mixture vigorously for about two minutes and then placing a hydrometer in the mixture and measuring the density or grams per liter. It has been found that the percentage of the material, based on the original sample taken, that stays in suspension at the end of fifteen minutes is equal to the percentage of the colloids as found by the heat of wetting method. This remarkable relationship is almost incredible, but it has been actually found to hold true in all kinds of soils, ranging from sandy loams to very heavy clays and even when different proportions of soil samples are used. The only places where the relationship between the percentage of material staying in suspension at end of fifteen minutes in a liter of water and the percentage of colloids as determined by the heat of wetting method does not hold very close is in abnormal soils which refuse to stay dispersed and in soils whose organic matter is not completely decomposed. Out of thirty-one soils used, however, only three refused to give a very close relationship. In the other soils the relationship is identical in many cases, and in the others it is only about 3 per cent. apart.

From the work thus far done it appears that the hydrometer method can be used confidently to estimate the colloidal content of soils quite close. In some unusual soils the estimated amount may be about 10 per cent. off of the true amount or the amount shown by the heat of wetting method, but when it is considered that by our present methods it takes almost one week to determine the colloidal content of a soil, any method that can give in fifteen minutes the colloidal content of soil should be considered very valuable, even though in some cases the results may be about 10 per cent. off.

The hydrometer method is able not only to estimate the colloidal content of soils, but also to measure the rate of settling, from which a distribution curve of the soil particles of various sizes may be worked out.

The hydrometer employed is of a lactodensimeter type, which has a large volume and weight, both of which make it very sensitive. It was calibrated to read directly in grams of material per liter of water.

A detailed report of these investigations is being published elsewhere.

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PERMANENT CULTURES

VERY frequently instructors are required to keep Protozoan cultures over long periods of time. The following method has been used with great success for such cultures as paramecia, the smaller forms of amoeba and certain forms of flagellates.

A large number of hay infusions are started in ordinary drinking tumblers, using pond water from different localities. They are then placed in various positions about the room and examined from time to time until the proper culture has been found. When a desired culture is found it should be fed five or six scrapings of dried whole wheat bread. These scrapings are made by simply taking a scalpel and scraping a crust of bread, care being taken so as to feed only what the culture will utilize. The glasses are then covered and the process repeated every two weeks or so. Whole wheat bread is far superior to ordinary wheat bread.

Using the above method I have kept ordinary classroom cultures alive for a period of a year.

It is also excellent for maintaining such cultures as rotifers and the small crustaceans.

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SPECIAL ARTICLES

THE FILTERABLE CELL OF THE ROUS CHICKEN SARCOMA AND THE QUESTION OF THE CAUSATIVE AGENT

IN a previous note[1] I reported that desiccated or glycerinated tissues of the Rous chicken sarcoma No. 1 often contain many viable cells. The bearing of this observation on the question of the so-called causative agent which has long been supposed to exist in this

[1] Nakahara, W., SCIENCE, 1926, LXIII, 549.