as an election committee, and will communicate with all members of the association, first, to secure a primary ballot of nominations, and again to secure a ballot of election; votes being taken from a list of candidates receiving the highest number of ballots in the primary. In its modified form this method of election is now before the association as a constitutional amendment.

A resolution was passed to the effect that the association "discourage the use of mental tests for practical psychological diagnosis by individuals psychologically unqualified for this work." By resolution, also, the retiring president was authorized to appoint a committee for the purpose of expressing approval of plans for the establishment of a station for the study of the behavior of primates. The committee, as appointed, consists of Professor J. R. Angell, University of Chicago, chairman; Professor Raymond Dodge, Wesleyan University; President G. Stanley Hall, Clark University; Professor G. M. Stratton, University of California, and Professor E. L. Thorndike, Teachers College, Columbia University.

R. M. Ogden,
Secretary

THE BOTANICAL SOCIETY OF AMERICA. III

Fiber Measurement Studies: A Comparison of Tracheid Dimensions in Longleaf Pine and Douglas Fir, with Data on the Strength and Length, Mean Diameter and Thickness of Wall of the Tracheids: Eloise Gerry.

This paper is a progress report on the fiber dimension studies that are being made as a part of the investigation into the mechanical, physical and chemical properties of Longleaf pine, *Pinus palustris* and Douglas fir, *Pseudotsuga taxifolia* at the U. S. Department of Agriculture, Forest Products Laboratory, which is maintained in cooperation with the University of Wisconsin at Madison, Wisconsin. The microscopic investigations were made at every tenth annual ring on large cross section from old trees. The following data were recorded for each ring: Age, width, per cent. of summer-wood, height above the ground, distance from the pith, and resin content. Fifty measurements were made of the length, mean diameter and thickness of wall to obtain average. The spring and summer-wood were recorded separately. A number of tracheids proportional, respectively, to the per cents. of spring and summer-wood in the ring were measured. This data supplements that previously presented. It includes a summary of over 7,000 measurements on Douglas fir and 5,000 on longleaf pine. The results are as follows: (1) No evidence could be found for a constant fiber length such as was reported by Sanio for the Scots pine. (2) There are many more bordered pits in the spring than in the summer-wood tracheids. The ends of the tracheids may frequently be blunt or forked. They are generally very pointed in the summer-wood. (3) The summer-wood tracheids in any ring are, in general, shorter than the spring-wood tracheids in all the material studied. (4) There is a rapid increase in all dimensions during the first twenty years. (5) The variation in length in a single tree was found in one disk to be .80–7.65 mm. (6) A direct relation appears to exist in the Douglas fir studied between the thickness of the cell walls of the summer-wood and the strength of the material. The thickness of wall and strength of material were both low in young material. (7) No marked relation was found between width of ring and fiber dimensions. A tendency was noted for the young wide-ringed material to have relatively short, narrow tracheids with thin walls. (8) In studying a 455-year-old Douglas fir the possibility was considered of finding indications of old age or decline indicated in the size of the elements. No such effect was discovered. (9) The Douglas fir and pine did not vary widely in the dimensions of their elements. The thickness of wall averaged high in the longleaf pine, but the diameters were somewhat less than those in fir.

Xerofotic Movements in Leaves: Frank C. Gates.

Xerofotic movements are paratonic movements, caused by unequal drying effects in direct sunlight, manifested by an upward bend in the leaflets, or the curling upward of the blade. The upward movement is produced by differential turgidity in certain cells. The greater turgidity of the cells on the lower, less exposed side causes the organ to move upwards. In the *localized* xerofotic response, the differential turgidity is largely confined to a small region, for example, the pulvini of leguminous leaflets. In the *generalized* response, the blade of the leaf curls or rolls upwards. The monocot families, Poaceae, Araceae, Marantaceae and Zingiberaceae furnish examples of the generalized response. The Leguminosae furnish the best examples of the localized response, with which this paper deals. Whether the night position of the leaflets is erect or drooping, the xerofotic response is between 45° and 70° above the horizontal or normal day position.

Variations of exposure result in variations of response, even in leaflets of a pair. The xerofotic position decreases the amount of direct radiant energy received per unit area of leaf, reducing the harmful action of too intense sunlight on the chlorophyll, as well as checking the transpiration. Experimental work with screens upon *Gliricidia sepium, Leucaena glauca, Mimosa pudica* and *Ipomoea pes-caprae* limited the causation of the xerofotic response to the action of direct sunlight. The application of chemical drying agents (absolute alcohol and xylol) to the upper side of the large pulvini of *Gliricidia sepium* and to the upper side of the midrib of the clam-shaped leaves of the strand plant, *Ipomoea pes-caprae,* resulted in the assumption of the xerofotic position.

The Osmotic Value of Sea Water and the Osmotic Surplus of Several Marine Algae: R. H. TRUE.

The osmotic value of sea water was determined by the plasmolytic method, *Spirogyra* calibrated by means of NaCl and cane sugar solutions being used as an osmometer. The value so obtained was compared with the values obtained by the freezing-point method and found to agree fairly closely. The osmotic value of several marine algae was also determined and the osmotic surplus was shown to be of the same order of magnitude as that seen in higher land plants.

Measurement of the Surface Forces in Soils: CHARLES A. SHULL.

The internal forces causing absorption of water by dry *Xanthium* seeds have been measured and found to have an initial value of at least nine hundred and sixty-five atmospheres. The internal forces have been determined at various contents covering the range between air-dry and saturation. Dry seeds have been used to measure the surface-holding power of soils for water, with the result that air-dry soils hold water with approximately the same force as an air-dry seed (900–1,000 atms.). As the capillary moisture increases the surface force decreases, until, at the wilting coefficient of the soil, the amount of "back pull" exerted is not more than three or four atmospheres. This relation holds essentially for all types of soil from heavy clay to sand. The soil, therefore, at the critical moisture content for the plant, holds the water with less force than the osmotic pressure of the root hairs of plants, as determined by plasmolytic methods. The wilting of the plant at the wilting coefficient does not result from lack of moisture, or lack of a gradient toward the plant, but probably from the low rate of movement of water as the friction of movement in thin films increases.

The Interrelation of Transpiration, Root Absorption and Water-absorbing Capacity of Tissues in an Opuntia: EDITH B. SHREVE.

Previous workers have found that the transpiring power (*i. e.,* the absolute transpiration rate divided by the evaporative power of the air for the same period) is greater in cacti for the night than for the day. The following is a general summary of the results of an investigation into the causes of this phenomenon. (1) The transpiring power is greatly influenced by light intensity, air temperature, water-content of tissues and available soil water; and these factors very clearly exert their influence indirectly through their action on some other internal process. (2) The day-to-night variations in transpiring power are independent of any day-to-night variations in root absorption. (3) During the daylight hours more water is absorbed by the roots than is lost by transpiration, while at night the reverse is true. (4) Variations in water-intake by the roots are due, on the one hand, to variations in soil retentivity and, on the other, to variations of conditions within the plant itself, and the latter may be subdivided into variations in the absolute transpiration rate and in the water-absorbing power of the tissues. The variations in soil retentivity may be reduced to zero by the use of water cultures and of supersaturated soils. Then on dividing the absolute rate of water-intake at the roots by the absolute transpiration rate for the same period, a quantity is obtained which must represent that part of the root absorption which is independent of variations in transpiration as well as in the retentivity of the soil. This quantity (A/T) has been termed the secondary absorbing power of the roots. Its variations are independent of transpiration, and furthermore, it varies inversely with transpiring power. That is, A/T is greater for the day than for the night and T/E is greater for the night than for the day. (6) Stomata are, in general, shut during the day and open at night, but it is not possible to ascertain whether the closing of the stomata accompanies or follows a decrease in transpiration rate. (7) The water-absorbing capacity of cylinders cut from the internal tissue is less at night than during the day, being least from 4 to 5 A.M. and greatest from 3 to 5 P.M. This is true whether the calculations are based on dry weight or on original wet weight. (8) The theory is advanced that the water-absorbing ca-

pacity of the internal tissue controls the secondary absorbing power of the roots and probably also the transpiring power, since a greater absorbing capacity would mean also a greater resistance capacity to the loss of water. It seems quite possible that in the forenoon the increasing absorbing capacity of the internal tissues may take water from the guard cells, thus causing them to close, and at night the decreasing water-holding capacity may allow the guard cells to take water from the internal tissues, and thus open. The effects exerted by light intensity and air temperature, together with their duration, show that the variations in absorbing capacity are due, at least in part, to chemical changes brought about by the metabolic processes. Many tests showed that the changes in the water-absorbing capacity of the tissues parallel acidity changes in the plants in such a way that when the acidity is highest the absorbing capacity is lowest, and *vice versa*. However, certain exceptions which occur under controlled conditions show that the relation can not be so simple as the influence of mere changes of H-ion concentration. Consequently other factors must be taken into consideration, including the accumulation and disappearance of the salts of organic acids. It is impossible to state yet whether the absorbing capacity of the internal tissue is due to colloidal absorption or to osmotic forces or to both. Although the concentration changes in the total sap which are indicated by the known changes caused by the metabolic changes and by the changes in water-content seem to show that osmotic forces are not of prime importance in controlling the water-absorbing capacity of tissues, still there is no direct proof that it is colloidal absorption which is the sole or the controlling force.

Physiological Temperature Indices for the Study of Plant Growth in Relation to Climate: BURTON E. LIVINGSTON.

The aim of this study is to obtain indices of temperature efficiency for plant growth, by means of which temperatures on the thermometer scale may be weighted in evaluating the temperature term of the environmental complex in physiological, agricultural, forestal and ecological investigation. The system of indices here brought forward is based on the results of Lehenbauer's recent study of the relation of temperature to growth of young maize shoots exposed twelve hours to maintained temperature. Lehenbauer's graph is first smoothed mechanically, and then the ordinates for each degree of temperature are measured. These are all expressed in terms of the ordinate for 40° F. (4.5° C.) taken as unity. The index values increase from zero (2° C.) through unity (4.5° C.) to 122 (32° C.), and then decrease again to zero (48° C.). This is the first system of temperature efficiency indices that takes account of the optimum and maximum in the growth-temperature graph. A chart of the climatic zonation of the United States with respect to temperature efficiency for plant growth during the period of the average frostless season is shown, based on the new indices.

A Single Climatic Index to Represent Both Moisture and Temperature Conditions as Related to Plants: BURTON E. LIVINGSTON.

A method is described by which the indices of precipitation, of atmospheric evaporating power, and of temperature efficiency for plant growth, for any period of time, may be combined into a single index of moisture-temperature efficiency. The new index is the product of the rainfall-evaporation ratio and the summation index of temperature efficiency for the period. The method is only a first approximation and improvements are of course to be expected. By means of these moisture-temperature indices a new climatic chart of the United States is constructed, for the period of the average frostless season. This chart shows that, as far as moisture and temperature conditions are concerned, peninsular Florida possesses the best climate for plant growth, while the least efficient climates of the country are those of the extreme north and of the arid regions. The natural climate of the arid regions is modified by irrigation, and that of the cold regions is modified, on a small scale, by artificially heated greenhouses.

A Living Climatological Instrument: B. E. LIVINGSTON AND F. T. MCLEAN.

While methods for interpreting instrumental records of climatological conditions are being devised, climates may be studied and compared in terms of their actual effectiveness in promoting growth of standard plants. In the first trial of this method the plants were grown in plunged pots, always filled with the same kind of soil, which was renewed after each culture. Ten different stations in Maryland were employed. Soy bean proved very satisfactory as a standard plant. Seeds were soaked in water at a given temperature for a certain time before planting. Various measurements were made on the plants after two weeks and

again after four weeks, when cultures were discontinued. New cultures were started every two weeks. The plant here is regarded as a self-integrating instrument set at zero of its scale at beginning of each four-week exposure period, and the integrations of climatic efficiency for plant growth are read in terms of plant measurements after two and after four weeks, when the instruments are again set at zero. The value of the climate for any two-week or four-week period at any station may be compared with that for any other period, either at the same or at another station.

The Daily March of Transpiring Power as Indicated by the Porometer and by Standardized Hygrometric Paper: SAM F. TRELEASE AND BURTON E. LIVINGSTON.

The transpiring power was determined for the lower surfaces of *Zebrina* leaves at intervals throughout day and night, by method of standardized cobalt chloride paper. At the same intervals porometer readings were made. If porometer rates are proportional to average cross-sectional area of stomatal pores, then stomatal diffusive capacity (Brown and Escombe) should be proportional to square root of porometer rate at any time. Graphs of this diffusive capacity and of transpiring power were made for the same periods. Both graphs agree in showing the same kind of daily march; values of both indices rise to maximum in day and fall to minimum in night. But the range of variation between minimum and maximum values is generally somewhat greater for indices of diffusive capacity. It appears that porometer rates do furnish data for deriving stomatal diffusive capacity in this case, but that this capacity is not quite proportional to transpiring power; transpiring power is here mainly dependent upon degree of stomatal opening, but other conditions are influential. If the index of transpiring power for each determination be divided by the corresponding square root of the porometer rate, a value is obtained that appears to be approximately proportional to the non-stomatal influence upon transpiring power.

The Transpiring Power of Plants as Influenced by Differences of Altitude and Habitat: FORREST SHREVE.

Measurements of the transpiring power of the leaves of some twenty species of plants were made in the Desert and Encinal regions of the Santa Catalina Mountains in southern Arizona in the arid foresummer of 1915. The method of standardized hygrometric paper was used on the plants in their natural habitats. The species investigated belonged to various life-forms. They differed both in the values of their transpiring power and in the character of its daily changes. The same species exhibits a higher transpiring power in the individuals which grow in flood plains than in those which grow on arid slopes. The daily changes in the former individuals are concordant with the daily march of evaporation; while in the latter case the transpiring power falls sharply before the daily maximum of evaporation is reached. A comparison of the transpiring power of the same species at different elevations has shown that the daily check is applied earlier in the day at lower elevations and later at higher ones. The check is manifested, for example, in Emory oak at 5,000 feet, but is in abeyance at 6,000 feet, where the maximum transpiring power and maximum evaporation are simultaneous. In the mesquite the check is applied earlier on the desert at 2,500 feet, later at 4,200 feet and at 5,000 feet, but is not eliminated at the upper limit of the species at the last-named elevation. The values for the transpiring power are in all cases higher at lower elevations, but at the higher elevations the values, although not so high, are sustained through a longer portion of the day.

Cultures of Uredineae in 1915: J. C. ARTHUR.

The report upon rust cultures for the season of 1915 makes the fourteenth covering consecutive work, which was begun in 1899. An interesting observation on the production of the alternate stage of rye rust upon *Anchusa* is given. Aecia of *Puccinia Seymouriana* on *Spartina,* heretofore only known upon *Cephalanthus,* were grown upon hosts representing two additional families. Another species of *Puccinia* on *Spartina* of limited distribution in the northwest is shown to be the correlated form of *Uromyces Spartinae,* and from the southwest a species of *Uromyces* on wild *Hordeum* is conversely found to be the correlated form of the common barley rust, *Puccinia Hordei,* thus adding further proof of the essential identity of the genera *Uromyces* and *Puccinia. Puccinia Eriophori* Thüm., in both its aecial and its telial forms, is established as a widespread American species. Altogether about twenty successful cultures were obtained, supplying various items of information, partly confirmatory and partly new.

The Injurious Effect of Tarvia Fumes on Vegetation: A. H. CHIVERS.

An account is given of the destruction of a gar-

den at Hanover, New Hampshire, by fumes of a tar compound known as tarvia which was melted at a time when atmospheric conditions were such as to cause the fumes to hug the ground and blow over the near-by garden, with the result that at least twenty species were killed or severely injured. The rapid and characteristic action of the fumes seemed to favor certain conclusions. A brief review of literature regarding smoke and fumes is given, together with a brief description of a series of experiments which indicate that the following is true regarding the nature of the injury. (1) The injury was due to the constituents of the volatile substances which condensed in the form of an oily coating on the surfaces of the plants. (2) The injury did not involve, to any extent at least, the passage of gases through stomata. (3) The injury was due to the action of the fumes on aerial parts. (4) The injury varied with the distance from the escaping fumes, the temperature of the melting tar, and the age of the plant structures.

A Canker of Apple Caused by Plenodomus fuscomaculans: G. H. Coons.

A serious canker of apple has been found in some orchards in northern Michigan. This canker is characterized by the elongated lesions which are commonly accompanied by checking of the bark into small squares or rectangles. Lesions are found extending along the limb, commonly on the under side. These are the result of the killing of the bark in strips. In the older cankers the killed bark drops off, leaving the bare wood. One limb may show all stages of the trouble, from freshly killed bark to the decorticated wood. In the bark and especially on the bare wood pycnidia are found in abundance. The wooly aphid by its attack makes the canker very unsightly and greatly interferes with the natural healing of the wound. The causal relation of an associated organism, *Aposphaeria fuscomaculans* Sacc. has been shown by the ordinary rules of proof. Recent work on the genera of the Sphaeropsidales has given cause for rearrangement in the old genera. From a study of the morphology of the organism associated with this canker, it has seemed advisable to transfer the fungus to the genus *Plenodomus*. The physiological relations of the causal organism has been studied at considerable length, but an account of these is being published separately in the *Journal of Agricultural Research*. The results may be summarized by stating that this organism shows relations to environmental factors, quite as sharp as those reported by Klebs for *Saprolegnia* and other fungi. In particular light was found essential for pycnidium formations. Successful inoculations were obtained on the limbs of Wealthy, Duchess, Jonathan and Ben Davis apple as well as upon the Hyslop crab. Other standard varieties seem more resistant, especially the Northern Spy. The fungus has been successfully inoculated into pear, small cankers being formed. No successful inoculations could be obtained on apple leaves. Apple fruits of various kinds are only very slightly invaded by the fungus, no conspicuous rotting or spotting being caused. The fungus shows marked attenuation after being grown in culture. The disease has been successfully controlled by methods commonly advised for apple canker.

Recent Contributions to our Knowledge of the Genus Gymnosporangium: Frank D. Kern.

A little more than four years ago the writer published an account of the genus *Gymnosporangium*, "A Biologic and Taxonomic Study of the genus *Gymnosporangium*," which purported, as the title indicated, to cover all of the information available at that time relative to the biology and taxonomy of these plants. Since that time there have appeared more than a dozen papers which have contributed additional facts to our knowledge of this interesting genus. These contributions have been of varied interest, some concerning life-histories, others relating to anatomy, physiology, taxonomy, distribution or pathologic importance. The scattered condition of the additional information, as well as the accumulation in the writer's hands of unpublished data, has suggested the idea of bringing together in one account the more important facts. The appended bibliography, in connection with the one formerly given, will serve to direct any one to the original sources provided exceptions may be taken to any interpretations here given. With the exception of a broad general statement it seems most satisfactory to make an arrangement of notes under specific headings since, for the most part, references deal with individual species rather than the genus as a whole. Among the more notable points brought out in the various special papers may be mentioned the report of another aecial host outside the Rosales, the finding of teliospores in the species possessing uredinia, studies upon the effects produced by the hosts upon the morphology of the fungi, and active investigations of the species causing diseases of economic importance.

The Relation of the Seed Stock to the Control of Bean Anthracnose and Bean Blight: J. H. MUNCIE.

On account of the enormous losses caused by them, the diseases, anthracnose and blight, have become a serious menace to the bean-growing industry of the United States. For the season of 1915 it is estimated that the loss, to the Michigan bean crop alone, is at least a million bushels and the money loss about two and one half million dollars. The control measures, recommended by various authors, incorporated with our own, have been tried out in our experimental plats. These measures consist of the application of fungicides to the growing plants and treatment of the seed with chemical solutions and hot water. In no case did these measures prove satisfactory in controlling the diseases. Likewise the planting of native seed from some of the western states proved unsatisfactory. It has been found possible to grow Michigan seed beans in western states where the climate is favorable and where these diseases are of no economic importance, and to secure, in this way, seed apparently free from disease. The behavior of the plants from western-grown Michigan seed will be further tested in our experimental plats. Since spraying and seed treatments have failed to control these diseases, we have sought for a palliative, to be employed until some satisfactory control measure can be worked out. We have found that by planting a variety of beans of high productivity, the losses due to these diseases can be so decreased that, in ordinary years, they will not be burdensome to the industry. This variety of pea beans is known commercially in Michigan as the Early Wonder. According to Mr. W. W. Tracy, of the U. S. Department of Agriculture, this variety was heard of in western New York, in 1890, as the Little Early Scofield. Seed from a single plant was first grown in Michigan in about 1908. Later, when seed from this variety was put on the market the varietal name was changed to Early Wonder. Early Wonder beans have been observed under field conditions in six of the principal bean-growing counties of this state, during the past three seasons. At least two thousand acres of beans of this variety were under observation this season. This variety of beans is well adapted to Michigan conditions, matures early and produces well. On account of this early ripening, the pods harden before the diseases have made serious inroads into the tissue, thus preventing to a great extent the spotting of the seed. Data collected for the past three seasons bring out the following points: (1) Early Wonder beans ripen from ten days to two weeks earlier than ordinary home-grown varieties. (2) The average yield per acre is twenty bushels. (3) The average pick per bushel is two pounds. (4) The seed is uniform in size, shape and color. (5) The pods ripen evenly and hang high above the ground. (6) Early Wonder beans produce well, even under severe disease and weather conditions. We are recommending that true Early Wonder beans be planted in Michigan as a palliative measure until some more successful control measure for the anthracnose and blight can be found.

New Methods and Apparatus for Determining, Qualitatively and Quantitatively, the Effects of Sulphur Dioxide on Plants: P. J. O'GARA.

A résumé of the work done by European and American workers is given. It is shown that the methods of sulphur dioxide analyses have been in error, this error often reaching up to one thousand per cent. or more. Furthermore, the type of apparatus used in subjecting plants to an atmosphere containing sulphur dioxide gas was faulty. In addition it may be stated that the effects of the various environmental factors, such as temperature, humidity and light, were not sufficiently taken into consideration as affecting plants subjected to an atmosphere containing sulphur dioxide. The methods employed in the experimental work which has been carried on by the writer and his assistants have been such as to take into account every factor which would influence the effects of sulphur dioxide on plants. For the first time it has been possible to measure accurately extremely minute quantities of sulphur dioxide. It has been possible to subject plants to known concentrations of sulphur dioxide and to check these concentrations during the progress of the experiments. During the seasons of 1914 and 1915 twenty-six agricultural crops were investigated, the purpose being to determine qualitatively and quantitatively the effects of sulphur dioxide when employed at various concentrations and at the various periods of growth of the various crops. During the two years during which the experimental work has been carried on fully two thousand experimental plots have been used. The new methods and appliances will be shown by the use of a large number of lantern slides.

Concerning Certain Peculiar Tissue-strands in a Protomyces Gall on Ambrosia Trifida: ALBAN STEWART.

The stems of the great rag-weed, *Ambrosia trifida,* are sometimes infected by *Protomyces*

andinus Lagh. causing the formation of large galls. These usually occur just above the ground, but it is often the case that they may also occur higher up on the stem, as much as two feet above the galls, which are located near the roots. Both kinds of galls have essentially the same histological structure. In the deeper portions of the galls, near the pith where infection evidently starts, peculiar tissue-strands are formed which are similar in some respects to the tumor strands which have been found in the stems of certain plants infected with the crown-gall organism, *Pseudomonas tumefaciens*. The strands consist of whorl-like arrangements of thin-walled cambiform cells which usually enclose groups of sporanges of the fungus. Short tracheids sometimes accompany the strands. The strands may occur singly or in groups, and usually run in a vertical direction. They have been found both in the galls located near the ground and in those higher up on the stem, but there is no indication of them in the normal part of the stem between two such galls. They are purely local and have no relation one gall with another. The fact that abnormalities in the tissues of the host plant are to be found in or nearly to the pith in the infected parts, indicates that the stems become infected while they are still quite young, probably before secondary thickening starts. This offers a possible explanation as to how the upper galls on the stems come about. In the young seedling plant there are a number of short internodes formed near the ground which lengthen out by subsequent growth. If the lower internodes should become infected at this time the infected parts would probably be carried up later by the lengthening of the stem.

Anthracnose (Colletotrichum lagenarium (Pass.) E. and H.) a Serious Disease of Cucurbits (preliminary report): J. J. Taubenhaus.

Watermelons, cantaloups and cucumbers are important crops in the trucking districts of Delaware. Of late growers are experiencing great difficulty in raising these cucurbits, especially watermelons. Conditions are similar in neighboring states of New Jersey, Maryland and Virginia. Investigations on cucurbit diseases undertaken at Delaware have shown that the difficulties mentioned are occasioned by several diseases. One of the chief causes of failure of watermelons in Delaware and vicinity is the anthracnose disease. The latter causes a deep spotting on the rind of the fruit impairing its shipping quality. The disease, too, is the cause of a serious leaf spot, and a blight and canker of the vines. The attacks are severest on the watermelon crop in its second successive year. For this reason growers are forced to practise a rotation of six years or longer. *Colletotrichum lagenarium* also causes a serious leaf and fruit disease of cucumbers and citrons, the latter of which are usually considered the most immune of all cucurbit plants. It also attacks the fruits of cantaloups and the ornamental gourd. Pumpkins and squashes seem to be free from the attacks of the fungus. Cultures of *Colletotrichum lagenarium* from all the cucurbitaceous hosts mentioned are very easy to obtain. Cross inoculations with pure cultures have shown that the anthracnose from watermelons, cantaloups, cucumbers, citrons and ornamental gourd are all one and the same; the disease may be readily transferred from one to the other. Investigations are now under way to determine the life history of *Colletotrichum lagenarium*, its relationship to the various hosts and to other species of Colletotrichums, especially *C. lindemuthianum*, and methods of control. Besides anthracnose there are two other apparently new diseases of the watermelon which are being investigated.

Fungi producing the Heart-rot of the Apple: B. O. Dodge.

Polyporus admirabilis Peck was found on many living apple trees at Litchfield, Conn., during the month of August. The fruit bodies were growing singly or in clusters. Individual sporophores vary in size from ten to forty centimeters in diameter. The heart-wood is first attacked and the fungus gradually encroaches on the sap-wood until the limbs and trunk are weakened to such an extent that they are broken down during wind-storms. Apple trees of the east are more commonly attacked by another type of polypore. These are the white bracket forms frequently found on the inside of hollow trees near knotholes. When growing on the outside of a tree the mycelium penetrates the sap-wood up and down for some distance so that the base of the trunk may bear a large number of imbricated sporophores. This type of fungus belongs to the *Spongipellis* group. *Polyporus galactinus*, or *Polyporus spumeus* var. *malicola* is the species found in the old apple orchards of the New England states. The form attacking the apple tree in Virginia, identified as *Polyporus fissilis*, is very near to *P. galactinus*, but it has larger pores and thicker flesh.

H. H. Bartlett,
Secretary