hybrids, although attempts were persistently repeated throughout the summer. However, a few seeds were obtained from individuals having respectively *lata, gigas,* and intermediate number of chromosomes and the plants derived from these will form the chief subject of study for the coming year.

To summarize briefly:

The first generation offspring of *O. lata* ♀ × *O. gigas* ♂ fall into three main groups with respect to external characters and number of chromosomes; namely, *lata, gigas*-like and intermediate. Considering external characters only, the latter two should be further divided and subdivided.

Numbers of chromosomes are closely associated with external characters in the first and last, and probably also in the second group.

Pollen grains of two parental forms differ in number of lobes and these are inherited.

ANNE M. LUTZ
STATION FOR EXPERIMENTAL EVOLUTION,
COLD SPRING HARBOR, L. I.,
December 7, 1908

MUCOR CULTURES

IN the study of the Mucoraceae for several years, some interesting facts concerning the development or rather the non-development of zygospores were observed. The experiments were made with the common *Mucor stolonifer* Ehrenberg. The media used were bread, pumpkin, orange, cornmeal, decoction of horse manure with gelatine, Pasteur's solution with gelatine, Hamaker culture medium.[1] The cultures were made with sterilized and unsterilized media. The spores for inoculation were taken from plants grown in the laboratory, from specimens collected for the herbarium, and from specimens sent to us by friends. In one thousand cultures not one zygospore was discovered.

In addition to the cultures, five hundred specimens of this species found growing spontaneously in different places were also examined but not one zygospore was observed.

Besides these experiments, many cultures were made and many specimens examined, a record of the exact number of which, however, was not kept. It is a conservative estimate to say that five hundred observations of this kind were made. This makes a grand total of two thousand observations without a single zygospore.

Experiments were also made to determine the development of this Mucor under anaerobic conditions. The media used for these experiments were orange, bread and Hamaker culture medium. All were sterilized. In giving the results of these experiments below, the word cornmeal will be used for the Hamaker medium. Cornmeal is the principal constituent of the medium. The material for inoculation was kindly furnished by Dr. Niewland, of Notre Dame University.

Small wide-mouthed bottles were used for the cultures. The medium was placed in the bottles and the bottles then closed with cotton and all sterilized. After inoculation, the bottles were placed into Novi jars and the jars filled with gas. The jars with the bottles were then set aside for observation. The following results were obtained.

In Hydrogen.—On orange, mycelium developed but few sporangiophores, no zygospores; on bread, no development; on cornmeal, no development.

In Nitrogen.—On orange, mycelium and few sporangiophores, no zygospores; on bread, about the same result; on cornmeal, about the same result.

In Carbon Dioxide.—On orange, mycelium well developed but few sporangiophores; on bread, mycelium profusely developed, many sporangiophores, no sporangia, no zygospores; on cornmeal, no development.

It seems that the absence of oxygen is not a necessary condition for the growth of zygospores.

DAVID R. SUMSTINE
UNIVERSITY OF PITTSBURG

[1] Hamaker, SCIENCE, XXIII., 710, 1906.

THE BOTANICAL SOCIETY OF AMERICA

A UNION OF THE BOTANICAL SOCIETY OF AMERICA, THE SOCIETY FOR PLANT MORPHOLOGY AND PHYSIOLOGY AND THE AMERICAN MYCOLOGICAL SOCIETY

THE third annual meeting of the federated societies (the fifteenth of the Botanical Society

of America) was held in the Eastern High School, Baltimore, Maryland, December 28, 1908, to January 1, 1909, under the presidency of Professor W. F. Ganong. Over sixty members were in attendance at the meeting, which seemed generally regarded as unusually successful. The arrangements made by the local committee for the American Association concerning rooms, stereopticons, etc., proved entirely adequate and satisfactory.

The officers of the society for 1909 are:

President—Professor Roland Thaxter, Harvard University.

Vice-president—Mr. A. F. Woods, Bureau of Plant Industry.

Treasurer—Dr. Arthur Hollick, New York Botanical Garden.

Secretary—Professor D. S. Johnson, Johns Hopkins University.

Councilors—Professor J. M. Coulter, University of Chicago; Professor Wm. Trelease, Missouri Botanical Garden; Professor F. E. Clements, University of Minnesota.

Five associate members were elected to full membership, and eight botanists were elected to associate membership.

The next annual meeting of the society will be held in conjunction with the American Association for the Advancement of Science.

Important features of the program were the special addresses given on invitation of the council by Professor Roland Baxter, of Harvard University, and Professor J. C. Bose, of Presidency College, Calcutta; the addresses on "Vascular Anatomy," by J. M. Coulter and E. C. Jeffrey; the symposium on "Present Problems in Ecology," with papers by H. C. Cowles, B. E. Livingston, C. H. Shaw, V. M. Spalding and E. N. Transeau; and, finally, the estimates of Darwin's work in botany, given at the Darwin Memorial Session of the society by Wm. Trelease, H. M. Richards and F. E. Clements.

It is planned to publish in full in *The American Naturalist* the addresses on "Vascular Anatomy," on "Plant Ecology," and those given at the Darwin Memorial Session. Reprints of these papers will then be distributed to members of the society.

The scientific session of the society on Thursday morning, December 31, was devoted to the reading of papers which were organized into two programs given simultaneously. Abstracts of these papers follow:

The Structure and Organization of Pediastrum: Professor R. A. HARPER, University of Wisconsin. By title.

Illustrations of Some of the Types of Coralline Algæ: Dr. M. A. HOWE, New York Botanical Garden.

The speaker exhibited a series of lantern-photographs, illustrating the form, structure and habits of growth of the dominant types among the Corallinaceæ. The specimens selected for photographing were collected chiefly on the shores of Newfoundland, Maine, Florida, Bermuda, the Bahamas, Jamaica and Porto Rico. Certain calcareous Chlorophyceæ, often confused with the Corallinaceæ by the earlier naturalists, were also illustrated. The structure of several genera of unsegmented corallines was exhibited by means of photomicrographs. Of special biological interest were photographs showing corallines growing attached to living corals and indicating competitive struggles for existence between calcareous plants and calcareous animals. The speaker alluded to the wide geographic range of the corallines and to the discovery by the late Professor Kjellman of extensive beds of *Lithothamnion glaciale* off the coasts of Spitzbergen and Nova Zembla, more than twelve degrees north of the Arctic circle. Mention was made, also, of recent investigations tending to show that reef-building and land-formation in certain regions have been due to the growth of calcareous plants fully as much as to the corals.

The Male Gametophyte of Dioon edule: Professor C. J. CHAMBERLAIN, University of Chicago.

The staminate cones of *Dioon edule* shed their pollen in September, the male gametophyte at this time consisting of a prothallial cell, a generative cell and a tube cell. The generative cell divides in October, forming a stalk cell and a body cell, and the latter divides in the following spring, giving rise to two sperms. The sperms are formed within two sperm mother cells and swim freely within the mother cells before they escape into the tube cell.

The blepharoplasts are first distinguishable in the body cell and are very probably of nuclear origin. The radiations about the blepharoplasts arise by a transformation of the cytoplasm, but owe much of their subsequent growth to granules of nuclear origin. During the transformation of the blepharoplast into the spiral band, the band is closely connected with the nucleus, both morphologically and physiologically.

The mature sperms not only swim actively by means of cilia, but have an amœboid movement. In escaping from the pollen tube, they may be constricted to less than one fourth their normal

diameter, but readily regain their form. The cilia continue to move even after the sperm has penetrated the egg, but the nucleus soon slips out from the cytoplasmic sheath and moves toward the egg nucleus.

Some details in the transformation of the blepharoplast into the spiral band, as well as details in the origin and development of cilia, are better shown in *Ceratozamia* and will be treated in greater detail in the forthcoming paper on that genus.

Further Studies of Œnotheran Cytology: Dr. R. R. GATES, University of Chicago.

In a recent paper[1] I described the method of chromosome reduction in *Œnothera*, using *O. rubrinervis* and several of the other mutants as types. I have since examined the various stages of reduction in the wild *O. biennis* and in *O. lævifolia*, and the observations confirm in practically every detail the results recorded in that paper. In both of these forms the chromosome number is fourteen, the reduced number being seven.

The essential points in the method of reduction may be briefly stated as follows:

After synapsis a single thick spirem is finally formed, which breaks into a chain of fourteen chromosomes lying mostly attached end to end. These do not always pair with each other, but frequently lie unpaired on the spindle. In the heterotypic mitosis half of them pass to each pole. Each divides during the later stages of this mitosis, and the halves are separated by the homotypic mitosis. The first mitosis thus separates whole chromosomes and the second mitosis the (probably) longitudinal halves of these. The chromosomes become so nearly globular that the direction of this split is not easily determined.

On account of the weakness of the attraction between homologous chromosomes at the time of pairing, many of them lie unpaired on the heterotypic spindle; and this allows of occasional irregularities in their distribution. Such irregularities provide a possible basis for the origin of mutants having the same number of chromosomes but lacking certain groups of characters, provided, of course, that the chromosomes are qualitatively different.

The Type of the Genus Cactus: Dr. J. N. ROSE, U. S. National Museum.

Edaphic Conditions in Local Peat Bogs: Dr. G. P. BURNS, University of Michigan.

Beginning with the open water, the plant societies usually found in the peat bogs near Ann Arbor are the aquatic, bog-sedge, bog-shrub, tamarack, maple-poplar and willow or marginal societies. A study was made of the distribution of these societies at different lakes and records were made of the variations in the edaphic factors influencing the different societies.

The data obtained indicate quite clearly that the position of the peat deposit is dependent upon the depth of the water and shape of the shore of the original lake and not upon the direction of the prevailing winds, as has been supposed.

Of the edaphic factors, the position of the water-table in the various areas is the most important. This is subject to wide variations. In the summer of 1905, April 24 to August 5, the variation under the different societies was as follows: bog-sedge, 0 cm.; bog-shrub, 17 cm.; tamarack, 31 cm.; willow or marginal society, 95 cm. In these outer areas fungi and bacteria can work to greater depths, changing the nature of the soil and rendering it capable of holding more and more available water, or in other words less xerophytic.

Continuous temperature records also show that the marginal areas are less xerophytic than those nearer the open water.

Stomata and Transpiration in Tradescantia zebrina: Dr. B. E. LIVINGSTON, Desert Botanical Laboratory.

The purpose of this study is to determine as well as possible to what extent the stomata are influential in causing the transpiration rate to be relatively greater by day than by night. By measuring the stomatal pores and calculating the relative diffusion capacities for night and day, it is found that this capacity in the daytime is about 2.6 times as great as in the night. The influence of the evaporating power of the air in this connection varies, of course, with weather conditions. The greatest difference observed shows an evaporating power for the day of 6 times that of the night. The smallest difference shows a ratio of 1.92. An attempt is made to calculate the transpiration ratio (day to night) by multiplying the evaporation ratio by the ratio of diffusion capacity. The result of this apparently shows that with direct sunlight the calculated transpiration rate for the day is too low, while with diffuse light it is too high. An average of nine tests with diffuse light shows the actual transpiration ratio to be 0.76 of the calculated, but individual tests showed a close approximation.

The conclusion is that, with diffuse light, the

[1] "A Study of Reduction in *Œnothera rubrinervis*," *Bot. Gaz.*, 46, 1–34, 1908.

variation in the size of the stomatal pores in *Tradescantia zebrina* (with the resulting variation in diffusion capacity) is amply great enough to explain that portion of the daily rise in transpiration rate which is not dependent upon the variation in the evaporating power of the air. With direct sunlight it appears that the stomatal variation is not large enough to explain this.

The Vegetation of Northern Zacatecas, Mexico: Professor F. E. Lloyd, Alabama Polytechnic Institute.

A general comparison between the vegetation of the region indicated in the caption with that of other desert regions, more especially with that of the vicinity of Tucson, Ariz., in which the greater general density of the vegetation of the Zacatecas desert is pointed out, and an attempt is made to explain the difference upon the grounds of diversity in meteorological conditions as bearing on soil-moisture and evaporation.

The extended account embraces a year's observations of the meteorology, the topography and soils of an area of 2,000,000 acres, a somewhat detailed account of the plants and their distribution as related to the topography, together with observations upon the seasonal changes, and the adaptational characters in the vegetation which appear to be correlated with them.

The Presence and Absence Hypothesis: Dr. G. H. Shull, Station for Experimental Evolution.

In explaining the behavior of what are now called Mendelian hybrids, Mendel assumed that pairs of antagonistic characters are represented by pairs of internal units, one member of each such pair of units coming from the one parent, the other from the other parent, and both existing side by side in the heterozygotes. De Vries laid great stress upon this conception in distinguishing between "varieties" and "species." This idea is perhaps yet the most commonly held, though it has recently become common to describe a Mendelian "pair" of characters in the terms of the presence and absence of a *single* character. There is no evidence of the existence of a pair of internal units or "allelomorphs" and the phenomena of incomplete dominance, reversal of dominance, etc., can be simply explained by the assumption that there is no paired condition of internal units. The dominance of the absence of a character over its presence is readily explained by analogy with many common chemical reactions, and while it may be assumed, as has been done by Bateson and Davenport, that what appears to be *absence* of a character may really be the *presence* of an inhibiting factor, this is not a necessary assumption. It can be shown that absence of an internal unit may be expected occasionally to dominate its presence.

Cultures of Uredineæ in 1908: Professor J. C. Arthur, Purdue University.

For the tenth consecutive season cultures of various species of rusts have been made from both resting or winter spores and active or summer spores. There were 204 collections with resting spores available, of which, however, only 105 collections were brought into germinating condition. Of those which could be made to germinate 248 sowings were made, representing about 44 different species. Of collections with active spores 73 sowings were made, representing about 16 species. The proportion of successful cultures equaled, or possibly exceeded, that of previous seasons. Some of the results of most general interest may be mentioned. For the first time in America the early or brown rust on rye was grown on *Anchusa*, being sown in July, and the similar rust on wheat failed to germinate so soon after maturity, seemingly settling the much-discussed identity of the so-called *Puccinia dispersa* of Europe and of America. Many trials with the rust on timothy, *P. phleipratensis*, failed to infect barberry plants, this agreeing with European studies. Telial connections were established for *Æcidium macrosporum* on *Smilax*, and the æcia on *Ranunculus*, *Cymbalaria* and *Aquilegia* sp. An unusually large addition to current information was secured regarding species of *Gymnosporangium*. The life-cycle was demonstrated for the first time for one species from the southern states, one species from the northern states and one species from the western states beyond the Rocky Mountains.

Dichotocladium, a New Genus of the Mucorineæ: Professor A. F. Blakeslee, Connecticut Agricultural College.

The species (*D. stoloniferum*) which forms the type of this genus was found five years ago in Venezuela growing saprophytically on dung. It has the habit of growth of a *Chætocladium*, to which it is undoubtedly most nearly related. It differs from *Chætocladium* primarily in that the fertile branches are dichotomous, not in whorls, and the sterile ends are not bristle pointed.

The genus may be briefly characterized as follows: Vegetative hyphæ stout, distinct, continuous. Fertile hyphæ erect or creeping, stoloniferous, bearing one to several lateral bushy crowns of repeatedly forked hyphæ. Ultimate branches of crown, slender, projecting beyond its surface, or short, terminated by persistent swollen heads upon

which are borne solitary spores. Sexual condition heterothallic.

The Interpretation of pre-Persoonian Names, and their Bearing on the Selection of a Starting Point for Mycological Nomenclature: Dr. E. J. DURAND, Cornell University.

The paper discusses with quotations and examples the difficulties attending the interpretation of the species of pre-Persoonian authors because (1) the species were based entirely on external characters; (2) specific limits are now much more closely drawn than formerly; (3) microscopic characters, then ignored, are now regarded as the most important bases for generic and specific distinction, and (4) they as a rule preserved no specimens by which their names can be definitely determined. It is proposed, therefore, that the date 1753 be abandoned as the beginning of mycological nomenclature and a later one selected, so that these old names may be excluded. The considerations which should have weight in the selection of such a date are then taken up, and a brief history of systematic mycology given, with the discussion of several possible starting points. The conclusion is finally reached that Persoon's "Synopsis Methodica Fungorum," of 1801, be selected for the following reasons:

1. The genera and species described before the time of Persoon should be excluded from consideration because the majority of them can never be definitely and accurately identified.

2. Any publication in the modern period is too recent, the bulk of the systematic work having been done before it began.

3. Its date of publication is early enough to include a great majority of the published names of fungi, and nearly all of those which can be certainly fixed at the present time.

4. Its publication marks the beginning of the second important epoch in mycological history.

5. Its author was the originator of systematic mycology.

6. It can be used as well as any other work as the common point of departure for all groups of fungi.

7. It is a comprehensive work covering all groups of fungi, and summarizes what had been done before its time, so that it bears about the same relation to the classification of fungi that the "Species Plantarum" of Linnæus does to that of vascular plants.

8. Persoon's herbarium is in existence and is available for study, so that most of his names can be fixed with a degree of definiteness impossible for those before his time.

Adaptations in a Desert Lichen Flora: Professor BRUCE FINK, Miami University. By title.

Successful Inoculations with Peridermium: GEORGE GRANT HEDGCOCK, Bureau of Plant Industry.

Studies of the Potato Fungus, Phytophthora infestans: Professor L. R. JONES and Mr. N. J. GIDDINGS, University of Vermont.

Phytophthora infestans has been carried continuously in pure culture in the laboratories of the University of Vermont for four years. Starting with sterile blocks of raw potato, other culture media have been used with varying success, including raw and cooked potato and pumpkin; potato extract media, including juice from raw potato variously handled, potato broth, and broth with agar or gelatin; pumpkin agar; and several synthetic media solidified with agar.

Longevity.—Sealed gelatin cultures seven months old remained alive, but were slow in starting.

Noteworthy Morphological Characters Observed.—Haustoria-like branches in potato tissue as described by Delacroix. Abundant septation in old cultures. Apparent differentiation in some cases into two strains, the one exceeding the other in vegetative vigor. Oogonia-like bodies sparingly produced on certain media, frequent on others.

Concerning Infection and Disease Resistance.—Sporulation may occur in diseased tubers before digging and in storage. Infection occurs usually through eyes, but occasionally through wounds or lenticels. Wide differences occur between varieties (*e. g.*, Early Rose, vs. Irene) as to ease of leaf infection and subsequent rate of spread; leading to conclusion that disease resistance of leaves may reside in mesophyll as well as possibly in epidermal tissues.

Similar differences occur in the rate of development upon sterile blocks cut from the interior of potato tubers, *e. g.*, Ionia seedling *vs.* Irene. This difference is not due to the acid reaction of cell sap.

Artificial Cultures of Phytophthora with Special Reference to Oospores: Dr. G. P. CLINTON, Connecticut Agricultural Experiment Station.

In the 1905 Connecticut Agricultural Experiment Station Report the writer gave results of experiments with artificial cultures of *Phytophthora infestans.* The oospores, which are as yet unknown, did not develop in these. However, the oospores of *Phytophthora phaseoli,* described for the first time, readily developed in the cultures. The past fall specimens of the recently described

Phytophthora thalictri were found, but cultures were not attempted, since the host had no perennial parts from which infected tissue could be taken. However, the oospores, not reported before, were found in the leaves. To account for their absence in the potato mildew, especially in artificial cultures, the writer suggested that these fungi may have distinct sexual mycelia. This is indicated by observations that the antheridia and oogonia of the other two species seem to be borne on separate mycelial threads. Recently the writer again obtained pure growths of the lima bean mildew, from which several hundred cultures have been made in an attempt to solve this problem. Cultures from mycelial growths, possibly mixed, have so far always produced oospores. Petrie dish separation cultures are now being made to get cultures from single spores. If the theory is correct, these should produce no oospores.

Origin and Function of the Peridium of the Rusts: Professor E. W. Olive, South Dakota State College. By title.

Observations on the Relation of Wound Parasites to the Heartwood of the Affected Tree: Dr. P. Spaulding, Bureau of Plant Industry.

While studying various wood-rotting fungi for the past few years there has been noted a very apparent relation of the so-called "wound parasites" to the heartwood of the diseased trees. A very striking instance of this was that of *Fomes ribis* occurring upon sassafras trees. In every case examined this fungus was found attacking the tree only in wounds where the heartwood was exposed by some injury, such as the breaking of a large branch, or the splitting of a branch from the main trunk. *Fomes igniarius*, as studied for the past four years, upon beech, has been found occurring in a similar manner. Hundreds of blazed beech trees have been examined, and in not a single instance was this fungus found growing upon these blazes in the sapwood. On the other hand, it was constantly found at wounds which extended into the heartwood. *Polystictus versicolor*, when attacking the heartwood of catalpa, occurs, growing into the stubs of dead branches. Such observations as have been thus far made upon *Fomes fraxinophilus* when attacking white ash show the same thing to be true, the attack practically always being made through dead stubs. Von Schrenk has also said that *Fomes rimosus* attacks the heartwood of black locust, either by entering through the dead stubs or through insect burrows. The sapwood of black locust is comparatively thin, and it is safe to accept his implied statement that heartwood must be exposed before this fungus attacks its host.

Further Studies of the Anthracnoses: Dr. C. L. Shear and Miss Anna K. Wood, Bureau of Plant Industry.

Twenty-three forms of so-called *Colletotrichum* and *Glœosporium* from the following hosts have been studied since the writers' previous paper was published: 1, *Camellia japonica;* 2, *Caryota rumphii;* 3, *Cinnamomum zeylanicum;* 4, *Citrullus vulgaris;* 5, *Citrus limonum;* 6, *Citrus decumana;* 7, *Citrus aurantium;* 8, *Coffea arabica;* 9, *Costus speciosa;* 10, *Cucurbita maxima;* 11, *Curculigo* sp.; 12, *Eriobotrya japonica;* 13, *Ficus longifolia;* 14, *Kentia* sp.; 15, *Lathyrus odoratus;* 16, *Ligustrum vulgare;* 17, *Maranta lineata;* 18, *Musa sapientum;* 19, *Persea gratissima;* 20, *Phormium tenax;* 21, *Piper macrophylla;* 22, *Pitcairnia corallina;* 23, *Psidium guajava;* 24, *Rubus occidentalis;* 25, *Thea bohea.*

Pure cultures made from conidia from hosts 6, 16, 19, 24 and 25 produced both conidia and ascospores and both these forms of fructification have been found on the host plants also. Cultures from conidia from hosts 3, 20 and 21 have produced both conidia and asci, but no ascogenous fructifications have been found on the host plants themselves. On hosts 1, 2, 5, 7, 8, 9, 11, 12, 13, 17, 22 and 23, both conidia and ascospores have been found. On hosts 4, 10, 14, 15 and 18 only conidia have been found and the cultures from the same hosts have produced only conidia.

Cultures from a single conidium taken from *Persea gratissima* carried through twenty-three generations have shown considerable variation in character of growth and development in different generations. Cultures from a single ascospore from the same source carried through seven generations have been quite uniform. The cultures from conidia usually produced an abundance of acervuli followed by perithecia. The cultures from ascospores produced no acervuli except a few very small ones in the first generation, but scattered conidia and an abundance of perithecia occurred in all. The ascospore cultures still produce conidia and the conidia cultures still produce asci.

No morphological characters either in cultures or under natural conditions have been found to be sufficiently constant to justify the segregation of species except perhaps in the case of the cotton anthracnose. The ripe rot fungus of the grape, *Glœosporium* (*Glomerella*) *rufomaculans*, represents fairly well the essential characters of all.

Cross inoculations from forms on fruits seem to indicate that the fungus may soon adapt itself to a different host and after a few generations develop about as readily on one fruit as another. All are perhaps only slightly specialized physiological forms of one omnivorous species.

A Bacterial Gall of the Daisy and its Relation to Gall Formations on Other Plants: Dr. C. O. TOWNSEND, Bureau of Plant Industry.

In 1904 some Paris daisy plants affected with galls of different sizes were received from a commercial grower of this plant in New Jersey. Work upon the cause of these gall formations and their relation to similar abnormal growths upon other plants was undertaken by the writer in cooperation with Dr. Erwin F. Smith, in charge of the Laboratory of Plant Pathology. Much of the technical work in connection with the problems investigated has been performed by Miss Nellie A. Brown, scientific assistant in the Laboratory of Sugar Beet Investigations.

After repeated efforts an organism was isolated from the galls, which had the ability to induce the formation of new galls upon healthy plants when inoculated into the stems and branches or even into the leaves of healthy daisy plants. From these galls formed by inoculation, the organism has been isolated and the process of inoculation repeated until no doubt remains regarding the cause of the gall formations.

The organism which produces these growths is a short rod, motile, possessing from one to three polar flagella, non-gas forming, and does not cloud bouillon heavily. On agar plate cultures the colonies come up slowly, usually in from three to five days, at a temperature of 25° C. The surface colonies are translucent white, round, with entire margins, smooth and dense. The growth is viscid on agar streak cultures after three days. The organism blues litmus milk, does not liquefy gelatin and does not grow at blood temperature in either agar or bouillon cultures. It will grow slightly at a temperature below 0° C.

The daisy organism will produce galls upon a large number of other plants, including tomato, potato, tobacco, sugar beet, hop, carnation, grape, raspberry, peach and apple. This work has led to the isolation of pathogenic Schizomycetes from the galls of peach, hard gall of apple, hairy root of apple, hop, rose and chestnut. The organisms obtained from the galls of these different plants are cross inoculable and are very similar, if not identical in size, shape, structure and habits of growth on media with the organism from the daisy gall. Pure cultures of these organisms are now under investigation. The abnormal growths produced by inoculation with the organisms obtained from the galls of the plants mentioned are similar in many cases to those produced by the daisy organism upon those plants.

These investigations have left no doubt regarding the cause of the crown gall of the peach and at least some of the gall formations upon the apple and other economic plants.

Variation of Fungi Due to Environment: Professor F. L. STEVENS and Mr. J. G. HALL, North Carolina College of Agriculture and Mechanic Arts.

The effect of different densities of colonies on a plate is reported for five species of fungi, some of which show an entire elimination of pycnidial formation and the production of spores without covering when plates are thickly sown.

The effects of different densities of mycelium upon zone formation are illustrated from *Ascochyta* and *Sclerotinia*.

The effects of chemicals as influencing the color, growth and character of several species of fungi are reported. The changes produced are often sufficient to shift the fungus from one order to another.

The effect of light upon growth, spore formation and zonation of colonies, of several species of fungi is reported.

Under the heading of "unknown factors" several changes of character which could not be attributed to environment are mentioned.

DUNCAN S. JOHNSON,
Secretary
JOHNS HOPKINS UNIVERSITY

THE ASSOCIATION OF AMERICAN GEOGRAPHERS

THE fifth annual meeting was held in Baltimore, December 31, 1908, to January 2, 1909, under the presidency of Mr. G. K. Gilbert. Professor Albrecht Penck gave a lecture before the association at its opening session on Thursday evening, on "Man, Soil and Climate." Other features of the meeting were: the president's address by Mr. Gilbert, on the subject "Earthquake Forecasts," and a round table conference on "Geography for Secondary Schools," conducted by Professor R. E. Dodge. The conference was held informally in connection with a smoker at the Johns Hopkins Club on Friday evening. About thirty papers were read by members, representing meteorology and various phases of physiographic, biological, human and educational geography.