rainic lakes which existed at two or three points along the southern shore of Lake George and the end of Lake Champlain, the drainage of Lake George in both directions after the ice had left its basin, and the elevated gravel and sand terrace near Saratoga.

In a somewhat informal lecture Professor H. L. Fairchild, Rochester, N. Y., described some interesting features in the surface geology of the Genesee region, New York. The lecture was illustrated by numerous lantern slides, some of which were especially instructive as showing in an excellent manner the intimate structure of the gravel and sand beds. These are glacial till as well as stratified lacustrine deposits.

The papers read only by title were:

Terminology proposed for the description of the shell in Pelecypoda: by Professor A. Hyatt, Boston, Mass.

Russia in Europe: by Dr. Gardiner G. Hubbard, Washington, D. C.

Distribution of sharks in the Cretaceous: by C. R. Eastman, Cambridge, Mass.

The equatorial counter currents: by Professor W. M. Davis, Cambridge, Mass.

On Saturday, 31st August, the section joined in the general excursion to Amherst, Northampton and South Hadley. The interest for the section centered in Amherst, of course, and there, under the guidance of Professor B. K. Emerson, the members studied the famous collection of footprints and other impressions from the Connecticut trias made by President E. Hitchcock. These remain in the Appleton Cabinet just as they were left by President Hitchcock. In another building are the fine collections of minerals and rocks which have been gotten together by Professor Emerson since the fire occurred which destroyed the College collections some years ago.

Tuesday nine or ten members of the section availed themselves of the opportunity offered to accompany Professor W. M. Davis to the region of trap and sandstone near Meriden, Conn., which he has studied so thoroughly, from which he has described overflow sheets of trap, beds of tuff with ejected blocks and extensive faults.

Edmund Otis Hovey.

SECTION G. BOTANY.

The botanists were well represented at the recent meeting of the American Association for the Advancement of Science, held at Springfield, Mass. Interesting papers were presented at the meetings of the Botanical Society of America and the Botanical Club. In addition to these Affiliated Societies, Section G (Botany), of the Association proper, also had a full program.

The address of the Vice-President, Dr. J. C. Arthur, was delivered on Thursday afternoon, August 29, the subject being 'The Progress of Vegetable Physiology.' As the address appeared in full in Science, September 20th, it is not necessary to review it here. The papers read before Section G are briefly reviewed below:

1. *A Leaf Rot of Cabbage*, by H. L. Russell, Madison, Wis. In the absence of the author this paper was read by Professor Barnes, of the University of Wisconsin. The disease seems to be associated with bacteria, although the author has not succeeded in isolating the organism. The axils of the lower leaves first show the disease. These points are usually filled with moisture, and the disease gains an entrance through rents caused by rapid growth of the tissue. Once within the tissues, the disease spreads rapidly through the fibro-vascular bundles; as a result, the functions of the plant are disturbed and the leaves wilt. The disease seems to be different from the one described by Garman, and may be checked by cutting off the affected leaves along the main stalk.

2. *Watermelon Wilt and other Wilt Dis-*

eases Due to Fusarium, by ERWIN F. SMITH, Washington, D. C. The author reviewed the work of last year and gave the results of investigations confirming previous statements regarding the nature and cause of watermelon wilt. The discovery of two additional stages of the wilt fungus were noted, and evidence was brought forward to show the great vitality of the fungus. Wilt diseases caused by *Fusarium* have been recently found in a number of other plants, notably sweet potato, cabbage, and cowpeas. On the last-mentioned plant a new *Nectriella* was found, and the evidence shows that the conidia so abundant outside and inside of the plant are but forms of this Ascomycete.

3. *Observations on the Development of Uncinula spiralis* B. & C., by B. T. Galloway, Washington, D. C. The author first called attention to a paper presented before the Association in 1890, in which it was shown by artificial cultures that the forms of *Uncinula spiralis* found on Vitis and Ampelopsis are identical. The development of the fungus was then discussed, especial attention being called to the manner in which the parasite passes the winter. It was shown that the first material change in the fungus after the leaves have fallen is the disappearance of the perithecial appendages. Observations made from time to time brought out the fact that there was no germination of ascospores before January. Through the months of January and February the ascospores were successfully germinated by keeping perithecia, which had been out all winter, for several weeks in moist chambers. The asci were ejected from the perithecia with considerable force, and in most cases collapsed as soon as free. Only a comparatively small number of asci and ascospores remained perfect, and such of the latter as did not break up commenced to germinate within four or five hours after their escape from the ascus. Attempts were made to obtain the fungus on Vitis and Ampelopsis by sowing ascospores, but this work was wholly negative.

4. *The Effect of Sudden Changes of Turgor and of Temperature on Growth*, by RODNEY H. TRUE, Madison, Wis. In the absence of the author, this paper also was read by Prof. Barnes. The author claims that growth and turgor pressure have no direct proportional relation, and in proof of this shows the variation in growth when a radicle is suddenly transferred from water to a one per cent. solution of KNO_3 or *vice versa*, or when it is accommodated to these media by a stay of two or three days before the transfer is made. He attributes retardation to the irritable qualities of the plant, and in substantiation of this discusses the fact that when change of medium produces a very material increase of turgor pressure the rate of growth usual for both media mentioned falls below the normal. He found changes of temperature to affect growth in about the same way as changes of turgor, the retardation period in this case depending upon length of time between extremes and length of time spent at the lower limit when the plant is transferred to a normal range. The author's conclusion is that sudden changes in turgor pressure or surrounding temperature act as a shock to the irritable organisms and cause a pronounced retardation of growth.

5. *Recording Apparatus for the Study of Transpiration of Plants*, by ALBERT F. WOODS, Washington, D. C. Attention was first called by the author to the fact that the direct method of weighing the plant is the most satisfactory one of determining the amount of water evaporated during a given period. Various automatic devices for accomplishing this object have been described and used. The apparatus in question is a modification of Marvin's recording rain and snow gauge, and is designed to register automatically the loss of water through any given period. It is constructed so as to

register a tenth of a gram. This amount can be reduced to smaller quantities by subdividing the curve recorded.

6. *Pressure, Normal Work, and Surplus Energy in Growing Plants*, by George M. Holferty, Leipzig, Germany. This paper was read by Professor Barnes in the absence of the author. The general questions of pressure, interior and exterior; resistance, natural and artificial; work effects, normal and extra, were discussed. Pfeffer's results showing the amount of pressure were given, and the gypsum method and pressure spring for root pressure were described.

7. *Notes on the Ninth Edition of the London Catalogue of British Plants*, by N. L. Britton, Columbia College, New York City. The author gave a comparison of the treatment and nomenclature of genera in the catalogue common to Great Britain and northeastern North America.

8. *Obolaria virginica L., a Morphological and Anatomical Study*, by Theodore Holm, Washington, D. C. The systematic position of *Obolaria virginica* L. was reviewed, the statements being based upon the morphological characteristics and the anatomy of the various organs of the plant.

9. *Botany of Yakutat Bay, Alaska*, by Frederick V. Coville, Washington, D. C. This paper was a review of a report upon a collection of plants made at Yakutat Bay, Alaska, by Mr. Frederick Funston in 1892. Attention was called to the more important plants collected and a general account was given of the relation of the plant life of the region to environmental conditions and native industries.

The foregoing papers completed the program for Friday. Saturday being devoted to general excursions no regular meetings were held. On Monday Section F (Zoölogy) and Section G (Botany) met in joint session with the following program:

10. *Fungous Gardens in the Nest of an Ant (Atta tardigrada Buckl.) near Washington, D. C.*, by W. T. Swingle, Washington, D. C. The author first briefly reviewed the published statements by Belt made in 1874, that the Central American leaf-cutting ants use the cut-up leaves for carrying into their nests as a medium upon which to grow fungi which serve as food for the ants. The important work of Möller on the fungous gardens of ants in south Brazil, published in 1893, was then reviewed. Möller showed that the ants not only cultivate a fungus on chewed-up fragments of leaves, but that they also make pure cultures of a single species, and furthermore, that they prevent the fungus from producing conidia or other reproductive bodies. The fungus under the action of the ants gives rise to globular inflated hypha ends, which are incapable of germinating and which Möller designated as kohlrabis. In July of this year the author examined some colonies of *Atta tardigrada* in the vicinity of Washington, and found within the nests a fungus closely resembling that described by Möller. Kohlrabis even larger and more perfect than those described by Möller were found, and from this and other evidence the author thinks that it is by no means improbable that the species will prove to be the same as that described by Möller.

11. *Distinction between Animals and Plants*, by J. C. Arthur, La Fayette, Ind. The author called attention to the present and former use of physiological characters to distinguish plants and animals, and to the insufficiency of such characters to explain the differences under consideration. The following was suggested as expressing the difference between animals and plants: "Plants are organisms possessing in their vegetative state a cellulose investment; animals are organisms possessing in their vegetative state a proteid investment, actual or potential."

12. *Variation after Birth*, by L. H. Bailey, Ithaca, New York. The author

reviewed the current discussion of causes of variation and showed that they are concerned chiefly with those forms which are congenital. Argument was then advanced to show that a given set of individuals starting equal may arrive at very unlike destinies. These dissimilarities may be impressed upon the offspring.

13. *Rejuvenation and Heredity*, by CHAS. S. MINOT. The author traced the rôle of the embryonic type of cells in animals and plants as a necessary predisposition of structure for the action of heredity. The rôle of the embryonic type of cells in both animals and plants in reproduction and regeneration was discussed for the purpose of showing that their functions render it impossible to accept Weissman's theory of heredity.

At the close of the last paper the joint session ended. On the afternoon of Monday the final papers before Section G were presented. These are given below:

14. *Poisoning by Broad-leaved Laurel (Kalmia latifolia)*, by FREDERICK V. COVILLE, Washington, D. C. Read by title.

15. *The Number of Spore Mother Cells in the Sporangia of Ferns*, by WILLIS L. JEPSON, Berkeley, Cal. This paper was presented by Prof. Geo. F. Atkinson, and gave the details of investigations to determine the number of spore mother cells in the sporangia of *Pteris crethea*, with comparisons of other species of *Pteridophyta*.

16. *The Southern Tomato Blight*, by ERWIN F. SMITH, Washington, D. C. The author reviewed his previous work on this subject, and from the evidence obtained concludes that the tomato wilt and cucumber wilt are not identical; that the tomato and potato wilt are identical; that various other solanaceous plants, including eggplant, are susceptible to the disease; that the cause of the disease, as determined by inoculations, is a bacillus, the biology of which has not been fully worked out; that the stinking wet rot is due apparently to one or more organisms which follow in the path of the true parasite; and finally, that primary infection of the plants as a rule takes place through the parts above ground.

17. *Constancy of the Bacterial Flora of Fore Milk*, by H. L. BOLLEY, Fargo, N. Dak. This paper was a report of investigations on the constancy of species and physiological types of bacteria in normal fore milk. The experiment was conducted with ten animals during three winter months and three animals during the month of July. The conclusion drawn by the author is that species may be quite constant in the udder of an individual animal, but that there is little evidence of constancy among different animals, even under similar conditions.

18. *A New California Liverwort*, by DOUGLAS H. CAMPBELL, Palo Alto, Cal. The author gave a brief account of a new liverwort allied to *Sphærocarpus*, collected near San Diego, Cal.

19. *Personal Nomenclature in the Myxomycetes*, by O. F. COOK, Huntington, N. Y. The author claims that only the personal system of nomenclature is used in the Myxomycetes, naming Massee's Myxogastres and Lister's Mycetozoa in substantiation of the claim. The paper discusses the author's view of the changes which will be necessary should the priority system of nomenclature be adopted.

20. *Root Fungus of Maize: Enantiomorphism in Plants*, by GEO. MACLOSKIE, Princeton, N. J. The root cap of the roots of maize is described. The author believes that the nature of the cap makes it a medium for the luxuriant growth of a certain microscopic fungus, and that this fungus may possibly account for the ability of Gramineæ to extract nitrogenous food without impoverishing the soil. The author claims to have discovered two kinds of maize produced from the same ear, and states that this diversity depends on place of origin of

the ovules. This habit the author calls antidromy, and claims that all flowering plants are antidromous. The manner in which this habit manifests itself in different plants is described and a list of the plants examined is given. The author thinks this law will explain many of the mysteries of plant growth.

21. *Exoascus upon Alnus Leaves*, by Mrs. Flora W. Patterson, Cambridge, Mass. An account is given of the first recorded appearance of Exoascus on Alnus leaves in America. The difference between this Exoascus and various other species is shown. The species will not be named until additional knowledge in regard to it is obtained.

22. *Experiments in Pollinating and Hybridizing Citrus Fruits*, by H. J. Webber, Eustis, Fla. The author gives an account of his experiments to determine the cause of the sterility of the Navel orange. It was found that this variety produces no pollen. The form, growth, etc., of the Navel and common oranges are minutely described. Experiments were also conducted by the author to determine if Navel oranges develop without pollination and the effect on this variety of foreign pollen. Other experiments in hybridizing were also described.

23. *Summary of a Revision of the Genus Dicranum*, by Chas. R. Barnes and Rodney H. True, Madison, Wis. Read by title.

24. *The Physiology of Isopyrum viternatum L., and the Transmission of Stimuli Effects in Mimosa pudica L.*, by D. T. MacDougal, University of Minnesota. The papers by Professor MacDougal were read during the absence of the Secretary, and as the abstracts were not at hand a review cannot be given.

On Saturday, August 30, a number of the botanists visited Harvard College, where they were entertained by Dr. Farlow, and shown the many things of botanical interest in the vicinity of Cambridge.

B. T. Galloway, *Secretary*.

SECTION I. ECONOMICS.

The most important feature of the meeting was the change in name of the section, looking toward an extension of scope. The old name 'Economic Science and Statistics' was justly regarded as bungling and inadequate. The question of terminology is, however, a serious one. No name wholly adequate to express and limit the field which this section seeks to cover could be found. It is properly a branch or offshot of anthropology, as Mr. Fernow showed in his Vice-Presidential address, and is concerned with all that advances the physical well-being of man; while, equally with anthropology, it discusses his social and moral welfare, all being indissolubly knit together. 'Sociology' was at first the name selected by the section, after considering 'Social and Economic Science.' The general session, however, preferred the latter, and the constitution was accordingly so amended.

The Section of 'Social and Economic Science' is fortunate in having had as its President this year an economist so well and favorably known as B. E. Fernow, Chief of the Division of Forestry; and equally fortunate in the election for next year of Wm. R. Lazenby, so long a professor at the Agricultural College at Columbus, O., and this year doubly honored by election to the office of President of the Society for the Promotion of Agricultural Science.

Popular interest in this section is always great, and even when there is not a flood of papers there are always some to arrest attention. Not that everything said in the section is sound. Some wild monetary theories have been broached; some revolutionary socialistic schemes advocated, but the sound common sense of the majority of members gives them a speedy quietus, and the result is better than if they were exploited somewhere else where their fallacy might be less promptly refuted. On the other hand, some interesting and valuable