SCIENCE

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE SOCIETY FOR PLANT MORPHOLOGY AND PHYSIOLOGY.

THE fifth regular annual meeting of this Society was held at Columbia University, New York City, December 31, 1901, and January 1, 1902, under the presidency of Dr. Erwin F. Smith. There was a good attendance of members, and the meeting was in all ways successful. Friendly greetings were exchanged by telegraph with the botanists in session at Chicago. Some business of general interest was transacted, of which a full account will be found below. This included action upon the report on the *Botanisches Centralblatt* and the Association Internationale des Botanistes, the nomination of American members of the executive committee of the Association Internationale, and the report on the College Entrance Option in Botany. The following new members were elected: Miss Margaret Ferguson, Wellesley; Messrs. Ernst A. Bessey, Washington; T. E. Hazen, St. Johnsbury, Vt.; A. S. Hitchcock, Washington; C. F. Hottes, Urbana, Ill.; E. C. Jeffrey, Toronto; and R. H. True, Washington. The following officers were elected for the ensuing year: President, Professor Volney M. Spalding, University of Michigan; Vice-President, Professor Byron D. Halsted, Rutgers College; Secretary-Treasurer, Professor W. F. Ganong, Smith College. The Society will meet next year with the other societies at Washington.

On the afternoon of January 1 the Society adjourned to the New York Botanical Garden at Bronx Park, where the museums, laboratories and collections of living plants were shown by members of the Garden staff, and Professor MacDougal exhibited some new appliances developed in connection with his physiological work.

Among the enjoyable social features of the meeting were the luncheon given to the Society and its guests at the Teachers College by Professor Lloyd, and the very pleasant informal dinner of the botanists on Wednesday evening. The hospitality of the New York botanists to the members of the Society and their guests was most cordial, and contributed greatly to the pleasure and profit of the meeting. A group photograph of the Society was taken, resulting in an excellent picture, concerning the cost and other particulars of which information will be furnished by the secretary.

The address of the retiring president, Dr. Erwin F. Smith, was delivered at the dinner. It dealt with 'Plant Pathology, a Retroprospect and Prospect.' It will soon appear in full in SCIENCE.

The following papers and reports were presented and discussed. Owing to the crowded condition of the program at the preceding meetings, papers were accepted this year from members and nominees to membership only. The abstracts are prepared by the authors.

Artificial Changes affecting the Vegetation of the Huron River: Professor V. M. SPALDING, University of Michigan.

In the course of a botanical survey of the Huron river and valley it has been found that artificial changes induced by the erection and breaking down of dams have been followed by rapid and extensive readjustment and adaptation. Changes of water level and rapidity of current are responsible for some of the most striking phenomena. Several species, among them *Polygonum emersum* and *Solanum Dulcamara*, exhibit remarkable plasticity, and their structural changes are such as enable them to play the part of aquatics or of land plants as the raising or lowering of the water level may require. Charts are being constructed to show the present distribution of the various plant societies of the river and valley in the vicinity of Ann Arbor.

A Floating Tropical Botanical Laboratory: Dr. JOHN W. HARSHBERGER, University of Pennsylvania. (Illustrated.)

The West Indies, lying in close proximity to the United States, are easily accessible to American botanists. By means of lantern slides, a few of the possible lines of research work, suggested on a visit to the Bahamas, Haiti and Jamaica during the summer of 1901, were illustrated. It was suggested that an investigation of the mature bending of the trunk of the coco-nut palm, of the pollination of the West Indian grown figs (*Ficus*), of the ecologic relationship of the plants of the strand, of the xerophytic and mesophytic forests, might be undertaken with profit. As many of the islands have an irregular coast line, are somewhat inaccessible, and as the inhabitants of Haiti look with suspicion upon strangers, it was thought advisable in investigating the flora of the various islands to visit them by means of a steamer fitted up as a tropical research laboratory. The steamers, Norwegian built (such as the *Belvernon* and *Mt. Vernon* of the Cameron Line), cut away fore and aft, were thought best adapted for the purpose.

The Physiology of Sea Water: Dr. RODNEY H. TRUE, Department of Agriculture.

The studies reported were made at

Wood's Holl, Mass., during portions of the last three summers. The plant most used was *Cladophora gracilis*. This alga was able to survive temporarily in a cane-sugar solution containing 1.2 gram molecules per liter of solution without apparent injury, and carried on its functions with seeming regularity. A greater or less proportion of the cells lived in concentrations between 0.3 grm. mol. and 1.6 grm. mol., but at the extremes unbalanced osmotic forces wrought injury to the younger cells. The plants were fatally affected within an hour by solutions of sodium chlorid in all concentrations, and in a solution isotonic with sea water were unable to respond to plasmolytic tests after about one-half hour. A progressive synthesis of artificial sea water, containing those substances present in a quantity equal to five thousandths of one per cent., was made. Death in a solution containing the proper amount of sodium chlorid took place in about a half-hour. When to this magnesium salts were added, no marked change in the period of survival was seen. The addition of the trace of calcium sulfate required extended the time of survival to about two hours. On the further addition of the potassium compounds, the plants lived for about twenty-four hours. Although isotonic with natural sea water, this artificial mixture was less saline to the taste than the former. On adding further sodium chlorid (about three-fourths per cent.) until equal salinity to the taste was obtained, the artificial solution was found to be capable of supporting an apparently normal existence in the alga for eight days. Evidence that cannot be summarized here was presented in support of the view that not only the actual amount of substances dissolved is concerned in the physiological behavior of sea water, but that the form in which these things there exist is important. Further work is in progress.

On the Teaching of Plant Physiology to Large Elementary Classes: Professor W. F. GANONG, Smith College.

The author called attention to the fact that the advance of science depends not only upon the acquisition of new knowledge and its correct interpretation, but also upon its utilization, of which one phase is its application in education. Plant physiology is rapidly rising in educational favor, but a chief obstacle to its more rapid advance is the difficulty of teaching it to large classes by proper laboratory methods. It was pointed out that many of the practical difficulties are disappearing with the improvement in methods and appliances, and ultimately the subject will be taught through individual experimentation. This is not yet practicable in large elementary classes, and at present students must be taught *en masse*. After trial of various plans the author had attained fair success by selecting the ten or twelve most fundamental experiments and setting them up, with full explanations, before the class, requiring the students individually to make records and finally to present reports upon them. The details of the management of the plan on which its success largely depends can not be repeated here, but the paper is soon to be published in *School Science*.

Discussion on the Most Profitable Relation of the American Botanical Societies to one another.

The opinions brought out by this discussion agreed very closely with those expressed by the speakers before the American Society of Naturalists at Chicago on January 1, as reported in this journal for February 14. One speaker urged a closer union of the various societies with the American Association, while another advocated the merits of a double system, in which regional societies, meeting regularly

in the principal centers within natural geographical districts, would combine with the American Association whenever the latter meets within their territory, the American Association thus forming a bond between the various regional societies.

Report of the Committee on the Botanisches Centralblatt, presented by the Chairman, Professor W. G. Farlow, Harvard University.

Printed copies of the report were distributed to those present. It showed a completely successful result of the committee's work. A full account of this report and its bearings will be given elsewhere in this journal, so that for the present it is enough to say that it describes the continuance of the correspondence with the proprietors of the *Botanisches Centralblatt* authorized by the Society last year, the purchase of the *Centralblatt* by the Association Internationale des Botanistes, and the selection of the seven American editors of the journal. The committee having completed its work was discharged with the thanks of the Society. Professor Farlow explained further the present status of the *Centralblatt* as the organ of the Association Internationale, and the business features of the arrangement. Membership in the Association is open to any one interested in botany, on payment of the annual subscription of 25 shillings, and all members will receive the *Centralblatt* free. To meet the purchase price of the *Centralblatt* one hundred bonds have been issued of the value of 250 florins each ($100.68), subscription to one or more of which makes one a foundation member of the Association. These bonds bear interest at the rate of 2½ per cent. and are to be redeemed from the profits of the *Centralblatt.* Very few have yet been taken in this country, and it is desirable, in order that this country may do its share in this important matter, that more should be taken here. The *Centralblatt* promises to be a strong journal of reviews, indispensable to every botanist, and it now has the support of the leading botanists of the world. In the discussion which followed, it was pointed out that American members of the Association Internationale would soon be called upon to vote for two American members of the general executive committee of the Association. There appears to be no body of botanists with authority to make nominations of such members, although in the absence of nominations the votes are likely to be very scattering or even not cast at all. It was then suggested that, in view of the fact that this Society had managed the correspondence with the proprietors of the *Centralblatt* and had aided the Association Internationale to choose American editors, etc., it might not be inappropriate for the Society also to suggest nominations of American members of the executive committee. Accordingly the Society voted to thus suggest the nomination of Professors W. G. Farlow and C. E. Bessey. Professor Farlow stated that he would be unable to serve on the committee, and accordingly Professor W. F. Ganong was nominated instead. It was announced that any further information about the subject, copies of the report of the committee, or of the blank forms of application for membership in the Association or for subscription to bonds, could be obtained from Professor Trelease, Missouri Botanical Garden, St. Louis, Mo., chairman of the American Board, or from the secretary of the Society.

On the Teaching of Vegetable Pathology: Dr. Hermann von Schrenk, Shaw School of Botany.

The speaker discussed the scope of vegetable pathology and urged the necessity of recognizing the plant as a living organism. For a course of vegetable pathology, a

thorough knowledge of physiology, general chemistry (preferably also organic chemistry), physics, general morphology of higher plants, French and German ought to be required. He outlined a course in pathology beginning with the study of the influence of environmental conditions on the plant cell, followed by actual experimental work with bacterial and fungous diseases. Emphasis was laid upon the fact that the plant should be considered first and foremost, and that the student should work with this himself.

The Destruction of Cell Walls by Bacteria: Dr. ERWIN F. SMITH, Department of Agriculture.

Lantern slides were exhibited showing all stages in the destruction of the inner tissues of the turnip due to the parasitism of *Pseudomonas campestris*. All were made from one plant which was inoculated on the blades of the leaves by means of needle pricks, using a pure culture of this bacterium. The disease appeared on the leaves only after a number of days. There was a progressive downward movement of the disease. The plant was removed from the soil on the fifty-second day after inoculation, at which time most of the leaves were shriveled, but the root was white and entirely sound externally. Sections of the root showed the bacteria to be very abundant in the inner parts. A careful microscopic examination made at the time did not reveal the presence of any fungi or animal parasites in the tissue. Cultures made from the interior of this root yielded only *Pseudomonas campestris*. Portions of the root were fixed in strong alcohol and subsequently infiltrated with paraffin, cut on the microtome with a very sharp knife, and fastened to slides with water containing one-half per cent. gelatin, freshly prepared. The paraffin was subsequently dissolved out with turpentine, the sections stained in carbol-fuchsin, washed in water containing 50 per cent. alcohol, passed through graded alcohols, dehydrated in absolute alcohol, passed into xylol and finally mounted in Canada balsam. A study of serial sections with the best microscopic appliances has failed to reveal the presence of any fungi in the sections. The parts which are attacked are only the inner parts of the root (vessels and parenchyma). Many of the bundles are filled with the short bacterium, and cavities in the parenchyma are found around some of these bundles. The fixing and subsequent treatment of the sections allow the study of the organism *in situ*. The bacterial masses are not torn or displaced by the knife, and an examination of these slides shows all stages in the solution of the cell walls, from single cells or vessels occupied by the bacteria, to cavities occupying the place formerly occupied by hundreds of cells and filled with the bacteria and the remnants of the cell walls. The cells are crowded apart by the growth of the bacteria, and the middle lamella first disappears, but the cell walls proper also become vague in outline and finally disappear.

Observations on the Bacterial Rot of the Calla Lily: Dr. C. O. TOWNSEND, Department of Agriculture.

This is a soft brown rot, with offensive odor, that usually attacks the bulbs but may appear on the roots or leaves. It has been observed to destroy the calla plants in entire houses in the vicinity of Washington. As a rule, the bulb shows the disease most frequently near the top, but it often happens that the attack is made below the surface of the ground, in which case the bulb is commonly almost entirely destroyed before the leaves indicate that the plant is diseased. If proper conditions prevail, the disease progresses rapidly and the diseased tissue is broken down. Agar

plate cultures, made with care from the advancing margin of the diseased area, give only bacteria and generally pure cultures of a rod-shaped motile Schizomycete. Neither fungi nor burrowing insects are present. The colonies appear in the agar plates in from twenty-four to thirty-six hours. The surface colonies grow rapidly, are nearly round, slightly convex, having a milky color, shining surface and entire margin. The imbedded colonies remain much smaller, are mostly spindle-shaped and have a brownish tinge. The organism grows rapidly on nutrient, slant agar, and on steamed potato, carrot, parsnip, salsify, beet and onion. It does not discolor the medium upon which it grows; it develops slowly in alkaline gelatin; the stab cultures are beaded in form, and the gelatin is not liquified. Milk is coagulated rather rapidly; blue litmus milk is changed to red and eventually faded to white. Nitrates are reduced to nitrites. The organism grows in the closed end of fermentation tubes containing peptonized beef bouillon with 5 per cent. grape sugar, but without formation of gas. Diseased plants have been treated with lime, sulfur and dilute formaline, with some success in controlling the disease, but the best treatment found thus far consists in changing the soil in the calla bed or in growing the plants in pots, and in the proper management of the greenhouses.

A Disease of the American Ash: Dr. Hermann von Schrenk, Shaw School of Botany.

A disease of *Fraxinus Americana* caused by *Polyporus fraxineus* was described. Attention was called to the large per cent. of living trees affected with this disease in localities where the ash is present in large numbers.

Vegetative Reproduction in Leptolejeunea: Professor A. W. Evans, Yale University.

Certain species of the epiphyllous genus *Leptolejeunea* reproduce themselves largely by means of leafy propagula, which represent modified branches. This type of vegetative reproduction, although known in several mosses, has not before been recorded for the hepatics. The first leaves and under leaves of the propagula show curious modifications, and the most remarkable of these are found in the underleaves, which develop disc-shaped suckers instead of the usual clusters of rhizoids. By means of these suckers, the propagula are able to attach themselves quickly to the smooth leaf-surface upon which they grow.

Observations on Pterygophora: Professor Conway MacMillan, University of Minnesota. This paper will be published in full in *Minnesota Botanical Studies.*

Pterygophora grows much larger in the Straits of Fuca than reported in systematic works upon the kelps. It has been found with stipe three meters in length and a decimeter in thickness. Secondary thickening, in *Lessonia* apparently limited to the stipe, takes place in *Pterygophora* in both hapteres and stipe, producing rings of growth in each of these organs. Secondary thickening in the haptere differs from that in the stipe. In the former the ringed appearance is principally due to succession of cell layers differing in contents; in the latter the ringed appearance is due to succession of cell layers in which the elements are of different size and shape. A cross section through the growth-ring in the stipe of *Pterygophora* recalls similar sections through the stem of Gymnosperms. The substance which by its varying abundance in successive cell layers gives rise to the ringed appearance in cross sections of old hapteres is related to that which has been called fucosan and appears to be polysaccharid in character. Pits, in the strengthening tissue and tissue of growth-rings of the stipe, are abundant upon the

concentric faces of the tracheid-like elements, but are generally absent from the radial faces. Mucilage canals announced for this plant by Ruprecht are wanting. An abundant formation of polysaccharids goes on in old pinnæ and hapteres. *Pterygophora* differs strongly in its anatomical structure from *Lessonia*. The secondary thickening differs anatomically from that of other kelps studied. A series of young plants, from 2 cm. in length, shows that the midrib is basally developed in the principal lamina and that it is not present in the younger stages. In this respect *Pterygophora* strongly differs from *Alaria*. The classification of *Pterygophora* in the vicinity of *Alaria* is of somewhat doubtful value. It appears rather to be a genus of Laminarieæ and may be related with such a form as *Laminaria radicosa* Kjellman.

Germination of Basidiomycetous Spores: Dr. MARGARET E. FERGUSON, Wellesley College.

This investigation was undertaken to determine, more definitely than is known at present, the conditions of germination in the Basidiomycetes, particularly in *Agaricus campestris*. Twelve species out of the twenty-six studied in preliminary tests yielded high percentages of germination in various media, and four species gave fifty per cent. germination or less. The spores of eleven species germinated in distilled water, but the percentages of germination were invariably lower than when an external food supply was present. The effect, on the germination of the spores of *Agaricus campestris*, of extremes of temperature, alkalies, acids, and organic substances was tested. The spores were also subjected to the action of an artificial digestive fluid. The percentages of germination obtained in these experiments with *Agaricus campestris* varied from 0 to 25. Almost perfect germination of the spores of this species was, however, obtained in a large number of cultures and in various media; but a high percentage of germination never occurred except in cultures containing the growing mycelium of *Agaricus campestris*. The germinated spores were frequently transferred to test-tubes containing bean stems and other solid substrata, and in many instances abundant mycelium was produced. A full report of these studies, which were undertaken at the suggestion of Professor B. M. Duggar, is now in the hands of the publishers and will appear shortly.

Behavior of Mutilated Seedlings: Professor BYRON D. HALSTED, Rutgers College. (By title.)

The particular form of mutilation of seedlings here considered is that of the removing of the plumule. In radish seedlings the first change noticed was the deeper green of the cotyledons, followed by a remarkable elongation of the petioles. The cotyledons became thicker than in those of the normal plants, due to increase in size of cells, and filled with starch, while the roots grew to considerable size. In the morning glory a similar behavior of the cotyledons was observed, while the hypocotyls became enlarged and served as a repository for the large accumulation of starch. In the Hubbard squash the cotyledons of the deplumuled plants remained close to the earth and grew to four or more inches in length, and held green for over four months. The egg-plant as a type of a slow-growing seedling produced rigid upright cotyledons that became quite fleshy and remained alive for many months. The sunflower illustrates a type in which the hypocotyl elongates greatly until it is sometimes over nine inches in length, with the primitive structure retained. In other words, the ring of wood is not developed as in the normal plants. These experiments illustrate how

an organ normally designed to store food for the developing seedling may persist in an emergency and take on a greatly increased size for that purpose. The petiole may assume a direction in connection with its enlargement that will aid the blade in its work of photosynthesis. Along with these changes in the seed leaves there may be others in surrounding parts, particularly the hypocotyl which becomes thickened remarkably and green in the morning glory and greatly elongated but slender in the sunflower. In the radish a place for any surplus growth still remains, for the root is naturally destined to be fleshy and the hypocotyl is not modified.

Notes on New Species of Lichens collected by the Harriman Expedition: Professor Clara E. Cummings, Wellesley College.

The list, soon to be published, contains an enumeration not merely of the species collected by the members of the Harriman expedition, but also of various other collections, notably that made by Professor Setchell in Alaska the same year. The total number of species and varieties listed is 219. Of these 97 species are new to Alaska, three of which are new to America and three others new to science. The three new species were referred provisionally to the genera *Verrucaria, Endocarpon* and *Pertusaria.* The Verrucaria was said to be characterized by an unusual development of the thallus. Three points of difference from the typical *Endocarpon* were noted, namely the distribution of the gonidia throughout the tissue of the thallus, the numerous perforations in the mature prothallus and the projection of the apothecia beyond both surfaces of the thallus. In further discussion the possibility was suggested that new genera might perhaps be established for the so-called *Verrucaria* and *Endocarpon.*

What is the Archesporium? Professor F. E. Lloyd, Columbia University.

It is proposed to limit the use of the term 'archesporium' to the mass of cells which, by tetrad divisions, gives rise to spores. The cells heretofore so designated have diverse origins and no peculiar morphological features, and are distinguishable only by their denser cytoplasmic contents. They are vegetative cells which are set aside when an extensive archesporium is necessary. It is only when the constituent cells enter the heterotypic mitoses that their peculiar character is without doubt evident. In parthenogenetically reproduced plants where true tetrad division in this sense lapses, the archesporium is determined on comparative grounds.

The Continuity of Protoplasm: Dr. Henry Kraemer, Philadelphia College of Pharmacy. (By title.)

The earlier studies of the author upon the structure of starch grains showed under certain conditions the presence of radiating feather-like clefts, which he concluded represented channels through which liquids are distributed throughout the grain. Studies with similar reagents upon cell walls seem to imply a similar nature for many markings which have commonly been explained as passages for permitting the continuity of protoplasm from cell to cell. He calls attention to references to the use of sulphuric acid in the study of continuity of protoplasm, and the objections to its employment for this purpose. The studies are being continued.

The Embryology and Germination of the Genus Peperomia: Professor Duncan S. Johnson, Johns Hopkins University.

The ripe seed of this genus is about .5 mm. long; the globular, fifteen-celled embryo only .04 mm. and the surrounding endosperm .1 mm. in diameter. In germination the endosperm bursts out of the

seedcoat at the tip but continues, as a jacket two cells in thickness, to enclose the embryo till the latter, after reaching a size of .15 mm. as a globular, undifferentiated mass of cells, at length develops two cotyledons and a root, and the latter bursts through the endosperm and bends down to anchor in the soil. From the beginning of its development to the time when it drops, with the exhausted seed, from the tips of the highly elevated cotyledons the endosperm seems never to serve for the storage of food material, but always as a digesting and absorbing organ for dissolving and passing on to the embryo the starch with which the abundant perisperm is filled. This seems to be the sole function of the endosperm also in many other genera, especially those with abundant perisperm, *e. g., Saururus, Heckeria, Dianthus* and *Cerastium.*

Report of the Committee on the Standard College Entrance Option in Botany: Presented by the Chairman, Professor W. F. GANONG, Smith College.

The report stated that the option had been formulated by the committee, had been printed and distributed to members in April and had been widely circulated among prominent teachers. Notes calling attention to it had been inserted in SCIENCE and in *School Science* and had caused a demand which exhausted the edition of 200 copies. Taking into consideration the criticisms and suggestions received, the Committee (reduced to the chairman and Professor Lloyd by the withdrawal of Professor Atkinson) prepared a revised edition which was printed in June and distributed in October. As a whole, the replies to the request of the Committee for suggestions, etc., indicated a surprisingly wide approval of the features of the option recommended by the Committee. The adverse criticisms were practically only three. First, it was thought by some too difficult for a year of high school study. In answer to this it was stated that it was the intention to make it fully as hard as a year of any other subject whatsoever taught in the high schools. The time is past when botany should be content to occupy a humble corner in the high school curriculum. It may be offered or not offered, but if offered at all it must be upon a plane equal to that of any other subject whatever. Second, it was objected, though not widely, that it laid too much stress upon ecology, which was thought not to be a proper high school study. The general consensus of opinion, however, seems to favor some ecology in the high school course, though it should be only of the most concrete and definite sort, and it is this kind of ecology the Committee has endeavored to emphasize. Third, it has been held that the part dealing with the types of plants and groups should not proceed primarily, as the Committee recommends, from the point of view of natural history but from that of morphology. In answer to this the Committee points out that the one does not exclude the other, and that in order that the course may be equally available for the education of those who go no farther and for those who continue into higher courses, it seems best to approach the subject from that point of view which will have the most meaning for the average high school student, and which will yield him the knowledge of most pleasure and profit to him in after life. In the opinion of the Committee such a point of view is rather that of natural history than of comparative morphology, and the special comparative morphology of the groups can best be taken up in second courses by those who go on. It was reported that the option had been formally adopted by the College Entrance Examination Board, and would shortly be pub-

lished in one of their documents. This, together with the widely favorable criticism it has received, indicates that it will probably be widely adopted. The Committee recommended that a standing committee of two be appointed to take the further interests of the option in charge, to keep it in touch with educational progress, and readjust it to changing conditions; and that a new edition be prepared for distribution. The report was adopted, and as the committee, the former committee, Professors Ganong and Lloyd, was reappointed.

W. F. Ganong,
Secretary.

THIRD ANNUAL MEETING OF THE CORDILLERAN SECTION OF THE GEOLOGICAL SOCIETY OF AMERICA.

The Cordilleran Section of the Geological Society of America held its third annual meeting in the Academy of Sciences, San Francisco, on December 30 and 31, 1901. In the absence of the chairman, Professor W. C. Knight, of Wyoming, Mr. H. W. Turner was elected temporary chairman. The secretary reported the following rules as having been adopted by the Council of the Society at Denver, August 26, 1901:

1. *Officers.*—The officers of the Cordilleran Section shall be a Chairman and a Secretary. The latter shall also perform the duties of an accounting officer with reference to the expenses of meetings.

The officers of the Section shall be resident within the geographical limits of the Section. A President or Vice-President of the Society shall be, *ex officio,* Chairman of the Section whenever present at a meeting.

2. *Geographical Limits.*—For purposes of scientific fellowship and discussion the limits of the Section shall correspond with the limits of the general Society, and the meetings of the Section shall be open to all Fellows of the Society for presentation of papers, either in person or by proxy. For purposes of administration the membership of the Section shall be limited to those Fellows residing west of the 104th meridian.

3. *Membership.*—No person not a member of the Society may become a member of the Section. Members may invite contributions to the discussions at their meetings under the same rules as those applied to meetings of the Society.

4. *Date of Meetings.*—The meetings of the Section may be held at any time, subject to approval by the Council of the Society (Article 4 of Constitution). All notices and programs of meetings shall be sent to all Fellows of the Society.

5. *Expenses.*—The expenses of the Section, so far as they shall be paid from the general fund of the Society, shall be limited to the ordinary economical expenses of the meetings.

6. *Publications.*—All papers presented to the Section shall be available for publication in the *Bulletin* of the Geological Society of America under the rules governing publication by the Society.

The officers elected for the ensuing year were: H. W. Turner, of San Francisco, Chairman, and Andrew C. Lawson, of Berkeley, Secretary. An executive committee consisting of the chairman, secretary and Professor J. C. Merriam was appointed.

Resolutions were adopted expressive of the sense of loss sustained by the Section in the deaths of Professors Joseph Le Conte and E. W. Claypole.

The following papers were read and discussed partly in the Academy of Sciences and partly at the University of California, where the Section met after the opening session, for the purpose of viewing illustrative specimens and lantern slides: