

SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE.

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FRIDAY, OCTOBER 25, 1901.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF 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.

SECTION F, ZOOLOGY.

THE first meeting of the Section was called to order by Vice-President David Starr Jordan, on Monday, August 26, at 11:30 a.m., when the Section was organized with the following officers:

Vice-President, David Starr Jordan.

Secretary, Henry B. Ward.

Member of Council, C. H. Eigenmann.

Member of General Committee, V. L. Kellogg.

Sectional Committee: C. B. Davenport, Vice-President, 1900; C. H. Eigenmann, Secretary, 1900; D. S. Jordan, Vice-President, 1901; H. B. Ward, Secretary, 1901; E. P. Felt, W. H. Ashmead, T. D. A. Cockerell.

The report from the Committee on Variation was read, and on motion the Section voted to recommend the granting of the funds requested for prosecuting the work. The report is as follows:

The grant of one hundred dollars to this committee was used to help defray the expenses of Mr. C. C. Adams incurred in collecting for study molluscs of the genus *Io*, found in the headwaters of the Tennessee River. A preliminary report has been made by Mr. Adams, and this was printed in the *Proceedings* of the Association for 1900. Mr. Adams submits at this time a second report covering the results of study on the material collected last summer, but prefers to postpone further publication until after his final expedition which he is

making this summer. The main results so far are that he has shown, by the aid of an elaborate series of measurements, that the numerous species of *Io* run into each other in a very complete way, and that the differences between the shells are associated with their position up or down stream. Nevertheless, there is in most streams a more or less marked discontinuity between the smooth, globular, up-stream shells and the spiny, elongated down-stream shells. The meaning of the discontinuity (which justifies, in a way, a division of the shells into two species) is still not perfectly clear. To test certain hypotheses in respect to this discontinuity, Mr. Adams has returned to the field this summer. This piece of work is, we believe, the largest and most thoroughgoing quantitative study of the variation of a species in nature that has yet been reported upon.

The committee request the council to grant it one hundred dollars additional, to aid Mr. Adams in this his final summer's work on this topic.

The committee is glad to report an increasing interest in the quantitative study of variation, and especially the establishment by Professors Pearson and Weldon of a new journal, *Biometrika*, devoted to the results of such study.

Respectfully submitted,

F. BOAS,
CHAS. S. MINOT,
J. MCK. CATTELL,
CHAS. B. DAVENPORT,
C. H. EIGENMANN.

The following resolution was also passed requesting an appropriation for the Concilium Bibliographicum from the funds of the general society:

In view of the very limited sum at the command of the Committee on Grants, and recognizing also the fact that this money has hitherto been devoted only to the encouragement of research, this Section would

recall its request that a grant be made from these funds to the Concilium Bibliographicum.

As an important aid to research, already firmly established, of great assistance to investigators and capable of development so as to serve a wider usefulness, this Section regards the Concilium Bibliographicum as particularly deserving of support and encouragement, and to the end that such financial assistance as is necessary may be given, requests that a special appropriation of \$50 from the general funds of the Association be made for this purpose, and placed at the disposal of an advisory committee of three, consisting of President Minot, together with two other members or fellows appointed by him.

On Monday, at 3 p. m., the Section listened to the address of Vice President Davenport on 'The Zoology of the Twentieth Century,' which, in the absence of Mr. Davenport, was read by the secretary.

On Wednesday morning the Section adjourned to hear the address of Vice-President Jordan before Section G on 'Political and Social Conditions in the Hawaiian Islands.'

At a meeting of the General Committee on Thursday evening, Professor C. C. Nutting, of the University of Iowa, Iowa City, was elected vice-president and chairman of the Section for 1902, and Dr. Charles W. Stiles of the Bureau of Animal Industry, Washington, D. C., was elected secretary for 1902.

The following papers were presented before the Section and, so far as given by the authors, the abstracts for each are appended.

1. 'The Fish-Fauna of Japan, with Observations on the Distribution of Fishes': DAVID STARR JORDAN, President of Stanford University. Published in *SCIENCE* for October 11.

2. 'On the Morphology of the Pineal

Region based upon its Development in Acanthias': CHARLES SEDGWICK MINOT, LL.D.

The paper describes the development of the epiphysis, the posterior and superior commissures, the velum transversum and the paraphysis in the embryos of the dog-fish, of from 11.5 to 86.0 mm., studied chiefly by means of median sagittal sections. The velum transversum arises close to the epiphysis, and, unlike other known types, the dog-fish retains this relation permanently. The velum gives rise by its lateral expansion to the choroid plexus of the lateral ventricles. In front of the velum is the paraphysial arch, which is not identical with the paraphysis. This arch exists in all vertebrates, but has not hitherto been recognized as a constant morphological constituent of the brain. The true paraphysis arises as a small evagination from the paraphysial arch, and appears very late in development—in the oldest embryo examined it was not clearly present, so that it is uncertain whether it exists in the dog-fish at all. In amphibia and birds it is easily found, and there develops into a glandular organ, never, so far as known, into a sense-organ, as has been generally assumed hitherto. The single duct opens into the cavity of the brain. We may assume, in default of actual knowledge, that the gland supplies a secretion to the brain, being physiologically comparable to the infundibular gland of the lower vertebrates. In amphibians the velum transversum expands so much that it grows forward and across in front of the paraphysis; the enlarged velum is wholly transformed into the adult choroid plexus, as a part of which the paraphysial gland was long regarded erroneously. In birds and mammals the median portion of the velum is rudimentary or obliterated; the paraphysial arch is well developed and forms a large part of tela choroidea superior; the later portions, on

the contrary, are greatly developed to form the lateral plexus.

3. 'The Essential Mechanism of Hearing in Man': HOWARD AYRES.

4. 'On the Disappearance of the Vast Flocks of Wild Pigeons (*Ectopistes migratoria*) in Eastern North America': EDWARD T. KEIM, Denver, Colo.

In the memory of the middle-aged man many facts can be recalled relating to the annual flight of the myriads of wild pigeons through the Eastern, Middle and Central States of the United States of America. The newspapers of that period (1850 to 1870 and 1880) teemed with accounts of the vast numbers seen, and the superlative adjective was immoderately used to describe the great number and the indiscriminate slaughter. Certain wooded sections in the States of Kentucky, Tennessee, Missouri, Iowa, Illinois, Minnesota and Michigan, when the white settlers first came into these regions, were visited annually by the pigeons for nesting places, but owing to the almost ceaseless attacks by man, beast and bird, these localities were deserted for a year or more. Another fact also observed was that the abundance or scarcity of the 'mast' and the wild fruits and grains, which constituted their main food, determined the location of the annual nesting places. An account of a visit by the writer in company of a party of hunters, to the so-called pigeon roost near Maquoketa, Jackson county, Iowa, will be given, and a map of the United States showing approximate location of known breeding places will be exhibited. An effort will be made to secure mounted specimens of the male and female pigeon.

5. 'The Eleven Elements in the Superior Molar Teeth of Mammals' (illustrated by models): HENRY F. OSBORN.

6. 'The Homologies of the Mouth Parts of Insects with Complete Metamorphosis': VERNON L. KELLOGG.

Despite the continued attention of entomologists through nearly one hundred years to the problem of the homologies of the insect mouth parts, an agreement has not yet been reached as to the interpretation of these homologies in the Diptera and perhaps in other holometabolic groups. The extreme modification of certain parts and the reduction to mere unintelligible vestiges, or, indeed, to total disappearance, in the imaginal condition of the more specialized flies and the fact that even in the generalized flies the fully developed mouth-parts are so modified that a comparison with the typical biting or orthopterous mouth is difficult and hazardous, has determined this long-continued uncertainty in the determination of the mouth-part homologies. For the problem has been heretofore attacked exclusively, or nearly so, by the method of the comparative study of the fully-developed mouth structures. It is certain that no absolute determination of the homologies can be reached by this method alone. I have therefore made an attempt to trace the development of the imaginal mouth parts in the Diptera, Lepidoptera, Coleoptera and Neuroptera, while a student of mine, Mr. A. B. Spaulding, has undertaken similar work on the Hymenoptera. The special difficulty of the work lies of course in the remarkable histolytic and histogenetic conditions attending the post-embryonic development of the holometabolic insects.

It is perfectly feasible to trace continuously the development of mouth parts of the dipterous larvæ, from the first budding of the appendages on the successive head segments to fully developed larval condition. But the utter casting aside at pupation of these larval mouth structures and their supplanting by the radically different imaginal parts, which have developed from imaginal histoblasts (derived from the larval hypoderm) make it impossible to trace

a perfect continuity from embryonic anlagen to the definitive imaginal structures.

But we find in the advanced larva that the developing imaginal structures push out into and perfectly correspond with the larval parts, and that an interpretation of the homologies of the adult mouth parts in any of the holometabolic insects can be got at on the basis of this correspondence in position.

The value of this evidence from position is made apparent when the development of the imaginal mouth structures in holometabolic insects with biting mouths, as the Neuroptera and Coleoptera, are studied. There is no question in the minds of entomologists regarding the certainty of the homologies of imaginal mandibles, maxillæ and labium of these insects with the same parts of the imaginal orthopterous mouth. But a study of the development of the imaginal mouth parts in the Neuroptera and Coleoptera has revealed that perfect correspondence in position between the developing imaginal parts and the larval parts, as is apparent in the Diptera, Hymenoptera and Lepidoptera.

I have, therefore, been able to show that the interpretation of the homologies of the imaginal dipterous mouth parts formerly advanced by me (see papers on *Psyche*, 1900) on the basis of a comparative study of the fully-developed imaginal mouth structures, in all the generalized families and several of the specialized families is confirmed by the evidence derived from a study of the post-embryonic development of the imaginal parts. And further, this study shows that the ordinarily accepted interpretation of the homologies of the imaginal mouth parts of the other holometabolic orders of insects is confirmed by the study of their development.

7. 'On Taxonomic Relations between Scolytids and their Host Plants': A. D. HOPKINS, Entomologist, W. Va. Agric. Exp. Sta.

This paper embraces some of the results of the author's studies of the host plants of nearly all the described, and some 100 undescribed, North American Scolytidæ, which in addition to the literature containing references to the plants infested by these beetles in all countries, enables him to bring together for comparison a more comprehensive list of the insects and plants, than has ever before been possible. The species of insects with observed or recorded host plants represent some 500 species, 52 genera, 20 sub-groups, 7 groups, and 3 sub-families. All the host plants are found to belong to the Phanerogamæ. The Gymnospermæ are represented by 1 order, 13 genera and 30 species. The Angiospermæ by 1 order and 1 species in the Monocotyledons, and by 36 orders, 56 genera and 120 species in the Dicotyledons. The paper is illustrated by a chart, showing the relations of the primary and minor divisions in the classification of the insects with those of the plants. The genus of plants infested by the species of any genus or group of insects is shown in horizontal spaces, while the genera of insects, connected with any genera or group of plants, are shown in vertical spaces, crossing the horizontal ones. Thus the relations of genera to genera, and group to group, are presented in a most convenient manner for study and comparison. In the relations observed there seem to be some facts of considerable taxonomic importance which, if properly interpreted, and taken in connection with structural characters of the insects, will aid materially in determining natural affinities. When we came to consider these facts, and apply the evidence they furnish, towards the solving of some taxonomic problems, some rather striking results were obtained, which have guided us to the discovery of some valuable specific, generic and group characters in the insect, heretofore entirely overlooked. Closely

allied species and genera, which had been relegated to far corners in different groups, have been brought together, and order is being restored where there was much confusion. The evidence found in the fossils of Eocene rocks, and in amber, indicates that the Scolytidæ reached a high stage of development at the beginning of the Tertiary, and that it is not at all improbable that a maximum development was attained during the Jurassic or Cretaceous. We find the sequoia, and other survivors of ancient groups of conifers; the tulip, sassafras, oaks, elms, beeches, poplars and other survivors of primitive genera, and groups of other plants, supporting what are believed to be the oldest surviving types of groups and genera of Scolytidæ. This, together with the evidence furnished by the records of the host plants of existing species, furnishes guides and suggestions towards a clear conception of the probable lines of evolution of present forms from primitive generalized groups. They suggest that the progenitors of the Scolytidæ may have found their way into the soft bark and wood of conifer-like trees of the first true forest in the Devonian; or of the thick soft bark of the great tree ferns, *Sigillaria* and *Cicades*, of the Carboniferous, and that from these progenitors of the Gymnosperms, Monocotyledons and Dicotyledons the descendants of the insects have adapted themselves to the physiological changes in the evolution of their hosts, sharing with them the struggle for existence through the changes in surface and climate, from age to age, and from period to period, to the present.

8. 'Some Recent Observations on Culi-
cidæ': L. O. HOWARD, chief entomologist,
U. S. Department of Agriculture, Wash-
ington.

An account of some new work on the biology of *Aedes*, *Psorophora*, *Megarhinus* and *Stegomyia*.

9. 'The Larva of *Pyrrharcia isabella* as an Anatomical Subject': E. P. FELT, N. Y. State entomologist, Albany, N. Y.

The availability and desirability of this larva is shown and a few general statements made in regard to its internal anatomy. Attention is also called to an internal parasite and its relations to its host. Two small drawings illustrate the paper.

10. 'On the Development and Evolution of the Scolytid Gallery': A. D. HOPKINS.

This paper embraces some of the results of the author's special study of the galleries of the large number of described and many undescribed North American Scolytidæ, together with those figured from all countries, so far as available; representing in all some 400 species, 37 genera, 13 sub-groups, 7 groups and 3 subfamilies. Brief reference is made to the structural character, and characteristics of habit, which distinguish this family of beetles. In the galleries three fundamental forms, or types, are recognized: (1) The longitudinal, (2) the transverse, (3) the broad, irregular chambers which, modified or combined, form the specific types of all galleries, and these seem to fall naturally into eight primary groups and thirty-two divisions. The primary groups are designated as follows: (1) The primitive forms; (2) broad, irregular, branching forms; (3) the ambrosia galleries; (4) the intermediate or transverse branching forms; (5) the longitudinal, branching forms; (6) the double, transverse; (7) the double longitudinal; (8) the single longitudinal, or higher forms. The paper is illustrated by numerous lantern slides from photographs, and by drawings of typical forms of galleries; also by a chart which shows the relations of the various genera, sub-groups, groups and sub-families, to the groups of galleries, in horizontal and vertical spaces. The various forms of the galleries throughout the

family, so far as observed, range from the simplest longitudinal burrow (excavated in decaying bark or wood), as the primitive type, to the complex or composite form (with its many radiating branches from a central chamber), as the intermediate, and to the short, straight, longitudinal egg gallery (with its symmetrical radiating brood burrows in living bark), as representing the highest type. It is seen from a study of this diagram, that a group of allied forms of galleries does not necessarily represent any single group of species, but that the several groups of galleries represent parallel or periodic stages and relations in the evolutionary development of all the groups.

Thus if the characters, as expressed by the gallery, are properly interpreted as indicating a stage or period in the evolution, and are studied in connection with structural characters of the insects, it will indicate the natural position of a species, in its relation to other species in its group, and to similar stages and periods in other groups. The results of this line of study and thought, incompletely expressed as they are in this paper, may serve at least to suggest the course of evolution of the scolytid gallery within the maximum and minimum limit of an instinctive idea or tendency common to all individuals of the family, but expressed in varying degree as the different, low, intermediate and higher species and individuals are capable of expressing it. This suggests a parallel with the social development of the human species, in the evolution of the idea common to all, of constructing a habitation in which to rear and protect a family of offspring, as has been expressed in varying degree from the simplest to the highest perfection. It may suggest the importance of considering the law of parallel development of characters and characteristics, in species of remote, as well as near, affinity, and thus enable us to

eliminate some of the errors in our systems of classification, where a character, due to parallel development, has been mistaken for one of near affinity. And finally the results of this study of the gallery, together with the results of a study of the parallel relation of structural characters, indicate a law of parallel or periodical relation of groups of organisms somewhat similar to that of the chemical elements.

11. 'The Eye of the Blind Lizard *Rhineura floridana*': C. H. EIGENMANN, Bloomington, Ind.

The eye has been withdrawn from the surface; the tear glands are enormous as compared with the eyeball, which is very small, the optic fiber layer forming a central strand. The optic nerve does not extend to the eye. The layers of the retina have retained a high degree of specialization.

12. 'The Ontogenic Development and Degeneration of the Eye of the Blind Fish *Amblyopsis*': C. H. EIGENMANN, Bloomington, Ind.

The history of the eye of *Amblyopsis* may be divided into four periods: (1) The period of palingenic development ending when the fish is about 4.4 mm. long. (2) The period of direct development, during which the eye develops directly from a palingenic stage to the highest development the eye reaches—at the end of 10 mm. in length. (3) The period of progressive modification, during which the eye undergoes many changes without reaching a more perfect condition as an organ of vision. This ends when the fish has reached full maturity. (4) The period of degeneration ending with death; during this period the eye is gradually wiped out.

13. 'The Finding of the *Leptocephalus* of the American Eel': C. H. EIGENMANN, Bloomington, Ind.

Among many *Leptocephali* in the United States National Museum were found two which on account of their great resemblance

to the *Leptocephalus* of the European eel and on account of their differences from that of the European eel, which were just the differences between the adults, were considered the *Leptocephali* of the American eel. They were taken off New York.

14. 'A Gigantic Campanularian, with Observations concerning its Systematic Relations': C. C. NUTTING, Iowa City, Iowa.

15. 'The Harvard Embryological Collection': CHARLES S. MINOT, LL.D.

The collection was founded in connection with the Embryological Laboratory of the Harvard Medical School. It is intended to be used primarily for research work in the comparative embryology of vertebrata. It is proposed to have carefully graded stages of eighteen or more species, chosen as types of vertebrate classes, and to have of each stage three sets of serial sections in three planes—transverse, frontal and sagittal. The collection is to be thoroughly catalogued, every section being numbered. The paper describes the precise method used, the growth of the collection and other details.

16. 'On a New Type of Secretion by the Formation of Spherules': by CHARLES S. MINOT, LL.D.

The process here recorded was first observed in the glands of the cervix of the human uterus. The end of the epithelial cell, next the lumen of the gland, assumes a clearer appearance, becomes distended and then breaks off as a spherule, which lies in the gland cavity. The spherule breaks down, and its substance forms the secretion of the gland. Certain observations indicate that the same type of spherular secretion recurs in the [mesonephros (Wolfian body of the pig, embryo, kidney of the frog). Mingazzini has described a somewhat similar spherule formation occurring on the basal ends of the epithelial cells of the intestine, during the resorption of food.

17. 'Laws of Adaptive Radiation': HENRY F. OSBORN.

18. 'Potential, Latent or Parallel Homology as distinguished from Phyletic or Derivative Homology (illustrated by Models)': HENRY F. OSBORN.

19. 'The Phylogenetic Relations of the Simple Vertebrates': HOWARD AYRES.

21. 'A Study of the Variations in *Sympetrum rubicundula* Say and *S. obtrusa* Hagen': MORTON J. ELROD, University of Montana.

These two species of Odonata are separated from each other on the relative sizes of the divisions of the bifid hamule, those having a little more than the apical third bifid being classed as *rubicundula*, those having the genital hamule with a fourth bifid being classed as *obtrusa*. The observations are based on the study of 394 specimens, from Maine to Montana, 223 being males. The aim of the author is to determine if the relative portions of the bifid hamule are a constant factor, and to determine if there are other factors that may be used for separation of the species.

Sixteen tables of figures are given, showing the variations observed in the fore and hind wings of both males and females, the length of males and females, the number of ante-cubitals, postcubitals and cross nervures of the fore and hind wings of the right and left sides of both males and females, the length of hamule of males, the relative widths of the bifid portions of the males, and the vulvar lamina of the females. The results of the measurements are as follows: The antecubitals and postcubitals are very irregular in number. There is a high percentage of both males and females of both species with five antecubitals on the hind wings. The antecubitals are much more constant than the postcubitals. The females show greater variation than the males. The left side shows greater variation than the right. The antecubitals on fore wings vary from six to nine, on hind wings from

four to seven. Postcubitals on fore wings vary from five to ten, and on hind wings from five to eleven. The males have more cross nervures than the females. Three-fourths of all the specimens have a less number of cross nervules on one wing than on the other. There is great variation in the length of the hamules. The comparison of the bifid portions of the hamules does not justify the separation into two species. There is no appreciable difference in the wings or length of body of the two species. No differences of consequence could be observed in the vulvar laminae of the females. The two species should be reduced to one, *S. rubicundula* Say, and a new description of the species written, which description is given in the paper. The variety *assimilata* is retained.

22. 'Further Studies in the Geographical Variation of *Io*': CHAS. C. ADAMS, Zoological Department University of Chicago, Chicago.

23. 'A Preliminary Statement of the Alkalinity of the Blood in Infections and the Infusion of Salts derived from Horses' Blood as a Therapeutic Measure': A. EMIL SCHMITT, New York City.

Based on the premises that the degree of alkalinity in the blood of certain species of lower animals, as horse, dog and cat, is greater than that in man, and that it is a causative factor in their immunity, and also that the alkalinity of the blood in man is reduced in the infections, and that by the infusion of alkaline solutions this can be increased and the infection thus overcome, the writer suggests the use of the salts derived from the horses' blood-ash and reports cases of puerperal septicæmia and cerebro-spinal meningitis thus treated. The views on the question of alkalinity are sustained by a number of authors, and the advantage accruing from the use of the salts derived from horses' blood-ash are set forth and compared with the prepared solutions of

salts composed according to analyses of blood-ash. The relationship of degree of alkalinity of blood and the incubation period of infections, as well as the immunity enjoyed by the black races, as also instances among the white race, and especially with lower animals compared with man, are hinted at.

No definite results as a therapeutic measure are claimed, but the author wishes to suggest a new trend of thought which will attack disease at its very foundations, altering the composition of the blood and body juices to make them uninhabitable for germ propagation. Introduction by means of infusion into the veins at the elbow instead of subcutaneously is resorted to on account of the pain and possible change of composition in the latter method. 500-1,000 cc. of the 1-per-cent. salt solution are infused at one time, controlled by the condition of arteries and heart. With this strength neither a dissolution nor a crenation of the corpuscles takes place, as demonstrated under the microscope, the isotonic coefficient of human blood compared with various strengths of this solution varying from .44-.58 per cent. No harmful effects have been noticed and venesection, to rid the body of some of its toxins in serious cases, is considered a valuable adjunct to the new form of treatment.

24. 'Cold as a Causal Factor in the Blood Changes due to High Altitude': JOHN WEINZIRL, Albuquerque, New Mexico.

Up to the present time no satisfactory explanation of the blood changes due to high altitude has been offered. The more commonly accepted hypothesis that the increased blood counts are due to diminished atmospheric pressure, or that more red corpuscles are required to furnish sufficient oxygen to the tissues when the oxygen supply is diminished, has serious objections to it. In the first place, the oxygen absorption by the hemoglobin of the red

cells is a chemical phenomenon independent of the partial pressure of oxygen. Secondly, it is not at all plain why an increased number of red cells should be required to carry a given amount of oxygen, for, as Paul Bert has shown, the amount of oxygen actually used by an animal is constant even when the supply is diminished by one-half, or when pure oxygen is respired. Nor are the various other hypotheses that have been offered more satisfactory than the above. An experiment with common white rabbits, planned to test some of these hypotheses, accidentally revealed the fact that extreme temperature changes or a change from a warm to a cold temperature, produced all the phenomena of high altitude; and that when the animals were subsequently taken to a higher altitude the usual phenomena did not ensue.

That the blood counts made in winter are higher in red cells than those made in summer has been previously observed, and comparative tests by the writer confirm this fact. An important factor in altitude changes is a change in temperature, and since cold is capable of producing phenomena of the blood identical with those produced by high altitude, it would appear that cold is an important factor in accounting for the blood changes due to high altitude. That cold is the only factor the writer does not maintain.

HENRY B. WARD,
Secretary.

THE GLASGOW MEETING OF THE BRITISH
ASSOCIATION FOR THE ADVANCE-
MENT OF SCIENCE.

THE enterprise of the city of Glasgow in holding this year a large and successful industrial exposition attracted to that great commercial center a large number of congresses, and among others the British Association for the Advancement of Science, which held its sessions under the presi-