

PROCEEDINGS

OF THE

Forty-seventh Annual Meeting

Indiana Academy of Science

FOUNDED DECEMBER 29, 1885

VOLUME 41

STANLEY A. CAIN, Editor

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Nominations.

To be announced later.

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 JOHN S. WRIGHT, Indianapolis.

PAST OFFICERS OF THE INDIANA ACADEMY OF SCIENCE

YEAR	PRESIDENT	SECRETARY	PRESS SECRETARY	TREASURER	EDITOR†
1886	*David S. Jordan	Amos W. Butler		O. P. Jenkins	C. A. Waldo
1887	*John M. Coulter	Amos W. Butler		O. P. Jenkins	C. A. Waldo
1888	*J. P. D. John	Amos W. Butler		O. P. Jenkins	C. A. Waldo
1889	*John C. Branner	Amos W. Butler		O. P. Jenkins	G. W. Benton
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1893	J. C. Arthur	Amos W. Butler		W. P. Shannon	W. J. Karshlake
1894	W. A. Noyes	C. A. Waldo		W. P. Shannon	D. Bodine
1895	Amos W. Butler	John S. Wright		W. P. Shannon	E. G. Martin
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1897	*Stanley Gray	John S. Wright		J. T. Seovell	L. B. McMullen
1898	*C. A. Waldo	John S. Wright	Geo. W. Benton	J. T. Seovell	H. L. Bruner
1899	*C. H. Egenmann	John S. Wright	Geo. W. Benton	J. T. Seovell	L. J. Rettger
1900	*D. W. Dennis	John S. Wright	Geo. W. Benton	J. T. Seovell	L. J. Rettger
1901	*M. B. Thomas	John S. Wright	Geo. W. Benton	J. T. Seovell	C. C. Deam
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1903	W. S. Blatchley	John S. Wright	G. A. Abbott	W. A. McBeth	H. E. Barnard
1904	C. L. Mees	John S. Wright	G. A. Abbott	W. A. McBeth	H. E. Barnard
1905	John S. Wright	B. McMullen	G. A. Abbott	W. A. McBeth	H. E. Barnard
1906	Robert Hessler	B. McMullen	Charles R. Clark	W. A. McBeth	H. E. Barnard
1907	D. M. Mottier	B. McMullen	G. A. Abbott	W. A. McBeth	H. E. Barnard
1908	*Glenn Culbertson	J. H. Ransom	G. A. Abbott	W. A. McBeth	H. E. Barnard
1909	A. L. Foley	J. H. Ransom	J. W. Woodhams	W. A. McBeth	H. E. Barnard
1910	*C. N. Evans	Geo. W. Benton	Milo H. Stuart	W. H. Moenkhaus	H. E. Barnard
1911	*P. R. Dwyer	A. J. Bigny	Milo H. Stuart	W. J. Moenkhaus	H. E. Barnard
1912	L. P. Naylor	A. J. Bigny	F. B. Wade	W. J. Moenkhaus	H. E. Barnard
1913	*Donaldson Bodine	A. J. Bigny	F. B. Wade	W. J. Moenkhaus	H. E. Barnard
1914	Severance Burrage	A. J. Bigny	F. B. Wade	W. A. Cogshall	H. E. Barnard
1915	W. A. Cogshall	A. J. Bigny	F. B. Wade	Wm. M. Blanchard	H. E. Barnard
1916	*A. J. Bigny	H. E. Enders	F. B. Wade	Wm. M. Blanchard	H. E. Barnard
1917	W. J. Moenkhaus	H. E. Enders	F. B. Wade	Wm. M. Blanchard	H. E. Barnard
1918	E. B. Williamson	H. E. Enders	F. B. Wade	Wm. M. Blanchard	H. E. Barnard
1919	E. B. Williamson	H. E. Enders	F. B. Wade	Wm. M. Blanchard	H. E. Barnard
1920	H. L. Bruner	H. E. Enders	F. B. Wade	Wm. M. Blanchard	H. E. Barnard
1921	Howard E. Enders	Walter N. Hess	F. B. Wade	Wm. M. Blanchard	H. E. Barnard
1922	F. M. Andrews	Walter N. Hess	F. B. Wade	Wm. M. Blanchard	H. E. Barnard
1923	Charles A. Behrens	Walter N. Hess	H. F. Dietz	Wm. M. Blanchard	H. E. Barnard
1924	C. C. Deam	Flora Anderson	H. F. Dietz	Wm. M. Blanchard	H. E. Barnard
1925	E. R. Cummings	R. C. Friesner	H. F. Dietz	Wm. M. Blanchard	H. E. Barnard
1926	W. M. Blanchard	R. C. Friesner	H. F. Dietz	Wm. M. Blanchard	H. E. Barnard
1927	Frank B. Wade	R. C. Friesner	H. F. Dietz	C. M. Smith	H. E. Barnard
1928	E. G. Mahin	R. C. Friesner	H. F. Dietz	Wm. M. Blanchard	H. E. Barnard
1929	Louis J. Rettger	R. C. Friesner	H. F. Dietz	Wm. M. Blanchard	H. E. Barnard
1930	Rolla R. Ramsey	R. C. Friesner	W. E. Edlington	Wm. M. Blanchard	H. E. Barnard
1931	J. J. Davis	R. C. Friesner	W. E. Edlington	Wm. M. Blanchard	H. E. Barnard
1932	F. Payne	R. C. Friesner	W. E. Edlington	Wm. M. Blanchard	H. E. Barnard

*Deceased. †Officers continued—Annual meeting not held because of influenza epidemic.

†The first meeting of the Academy was held Dec. 29, 1885. D. S. Jordan was President for 1885 also.

CONSTITUTION.¹

ARTICLE I.

SECTION 1. This association shall be called the Indiana Academy of Science.

SECTION 2. The objects of this Academy shall be scientific research and the diffusion of knowledge concerning the various departments of science; to promote intercourse between men engaged in scientific work, especially in Indiana; to assist by investigation and discussion in developing and making known the material, educational and other sources and riches of the State; to arrange and prepare for publication such reports of investigation and discussion as may further the aims and objects of the Academy as set forth in these articles.

WHEREAS, The State has undertaken the publication of such proceedings, the Academy will, upon request of the Governor, or one of the several departments of the State, through the Governor, act through its council as an advisory body in the direction and execution of any investigation within its province as stated. The necessary expenses incurred in the prosecution of such investigation are to be borne by the State; no pecuniary gain is to come to the Academy for its advice or direction of such investigation.

The regular proceedings of the Academy as published by the State shall become a public document.

ARTICLE II.

SECTION 1. Members of this Academy shall be honorary fellows, fellows, non-resident fellows, and active members.

SECTION 2. Any person engaged in any department of scientific work, or in any original research in any department of science, shall be eligible to active membership. Active members may be annual or life members. Annual members may be elected at any meeting of the Academy; they shall sign the constitution, pay an admission fee of two dollars and thereafter an annual fee of one dollar. Any person who shall at one time contribute fifty dollars to the funds of this Academy may be elected a life member of the Academy, free of assessment. Non-resident members may be elected from those who have been active members but who have removed from the State. In any case, a three-fourths vote of the members present shall elect to membership. Applications for membership in any of the foregoing classes shall be referred to a committee on application for membership, who shall consider such application and report to the Academy before the election.

SECTION 3. The members who are actively engaged in scientific work, who have recognized standing as scientific men, and who have been members of the Academy at least one year, may be recommended for nomination for election as fellows by three fellows or members personally acquainted with their work and character. Of members so nominated a number not exceeding five in any one year may, on recommendation of the Executive Committee, be

¹ As printed in Vol. 30, p. 5, 1920-21, with revised paragraphs as indicated in following footnotes.

elected as fellows. At the meeting at which this is adopted, the members of the Executive Committee for 1894 and fifteen others shall be elected as fellows, and those now honorary members shall become honorary fellows. Honorary fellows may be elected on account of special prominence in science, on the written recommendation of two members of the Academy. In any case a three-fourths vote of the members present shall elect.

Nominations for Fellows and Honorary members of the Academy shall be made to the chairman of the Nomination Committee previous to the annual meeting of the Executive Committee. The Nomination Committee shall submit their recommendation to the Executive Committee, which shall then pass the nominees on to the general session of the Academy for final approval.¹

SECTION 4.² The Indiana Academy of Science shall actively promote the organization and operation of local science clubs in connection with secondary schools of the state. Such of these clubs as elect to become members shall constitute the Indiana Junior Academy of Science.

The President shall appoint annually a committee of five members from the Indiana Academy of Science to have full charge, within the Academy, of the Junior Academy of Science. It shall formulate the requirements for membership of local science clubs and election of such clubs must be approved by the Executive Committee of the Academy.

Each applicant club, upon meeting Academy affiliation requirements, payment of an entry fee of \$1.00 and an affiliation fee of \$1.00 and upon recommendation of the committee in charge, shall receive for its files a certification of membership signed by the President, Secretary, and Treasurer of the Academy. Such affiliation shall continue upon payment of annual affiliation fee so long as the club continues to meet requirements of membership. Each affiliated club will receive one copy of the Proceedings of the Indiana Academy of Science.

The Committee in council with the President, Secretary and Treasurer shall formulate a program of work. An annual report of the progress made shall be presented to the Executive Committee of the Indiana Academy of Science by the chairman of the Academy Committee on Junior Academy of Science.

ARTICLE III.

SECTION 1. The officers of the Academy shall be chosen by ballot at the annual meeting, and shall hold office one year. They shall consist of a President, Vice-President, Secretary, Assistant Secretary, Press Secretary, Editor, and Treasurer, who shall perform the duties usually pertaining to their respective offices and in addition, with the ex-Presidents of the Academy, shall constitute an Executive Committee. The President shall, at each annual meeting, appoint two members to be a committee which shall prepare the programs and have charge of the arrangements for all meetings for one year.

SECTION 2. The annual meeting of the Academy shall be held in the city of Indianapolis within the week following Christmas of each year,

¹ Amended to present reading Vol. 37, p. 22, 1927-28.

² Added at the December, 1931, meeting.

unless otherwise ordered by the Executive Committee. There shall also be a summer meeting at such time and place as may be decided upon by the Executive Committee. Other meetings may be called at the discretion of the Executive Committee. The past President, together with the officers and the Executive Committee, shall constitute the Council of the Academy, and represent it in the transaction of any necessary business not especially provided for in this constitution, in the interim between general meetings.

SECTION 3. This constitution may be altered or amended at any annual meeting by a three-fourths majority of the attending members of at least one year's standing. No question of amendment shall be decided on the day of its presentation.

BY-LAWS.

1. On motion, any special department of science shall be assigned to a curator, whose duty it shall be, with the assistance of the other members interested in the same department, to endeavor to advance knowledge in that particular department. Each curator shall report at such time and place as the Academy shall direct. These reports shall include a brief summary of the progress of the department during the year preceding the presentation of the report.

2. The President shall deliver a public address at one of the sessions of the winter meetings of the Academy at the expiration of his term of office.¹

3. The Press Secretary shall attend to the securing of proper newspaper reports of the meetings and assist the Secretary.

4. No special meeting of the Academy shall be held without a notice of the same having been sent to the address of each member at least fifteen days before such meeting.

5. No bill against the Academy shall be paid without an order signed by the President and countersigned by the Secretary.

6. Members who shall allow their dues to remain unpaid for two years, having been annually notified of their arrearages by the Treasurer, shall have their names stricken from the roll.

7. Ten members shall constitute a quorum for the transaction of business.

8. An Editor shall be elected from year to year. His duties shall be to edit the annual Proceedings. No allowance shall be made to the Editor for clerical assistance on account of any one edition of the Proceedings in excess of fifty (\$50.00) dollars, except by special action of the Executive Committee. (Amendment passed December 8, 1917.)

¹ Amended to present reading Vol. 36, p. 24, 1926-27.

MINUTES OF THE SPRING MEETINGS.

OXFORD, OHIO.
MITCHELL, INDIANA.

The Indiana Academy of Science met in joint session with the Ohio and Kentucky Academies at Miami University, Oxford, Ohio, April 2-4, 1931. Approximately 75 members of the Indiana Academy, not resident in Ohio, were present at the Annual Academy Dinner. Approximately 300 persons were present at this dinner.

A brief business session of the Indiana Academy was called for Saturday morning, April 4th. At this meeting the following business was transacted:

Membership Committee reported the names of 12 applicants for membership. These were elected members of the Academy. The matter of exhibits for the winter meetings of the Academy was discussed. It was decided to have exhibits for these meetings which are to be held at Butler University.

The Academy took action favoring a supplementary spring meeting, time and place to be determined by the Program Committee.

F. M. Andrews, Chairman of the Resolutions Committee, presented the following resolutions, which were adopted by the Academy:

The Indiana Academy of Science desires to express its appreciation for the splendid entertainment accorded it by the Ohio Academy of Science during their joint meeting held at Miami University, Oxford, Ohio, on April 2, 3 and 4, 1931; and to thank the Ohio Academy of Science for their invitation and for the excellent meeting that has been arranged and carried out. The Indiana Academy of Science also extends its thanks to Miami University, its officers, faculty and all others who have spared no efforts to make this joint meeting such a great success.

The meeting was then adjourned.

Supplementary spring meetings of the Indiana Academy of Science were held at Bedford and Spring Mill State Park, May 21-23, 1931. The Executive Committee was called to order by President Davis in the Graystone Hotel, Bedford, at 8:00 p. m. Approximately 50 members of the Academy were present.

Membership Committee recommended ten persons for membership. These were all duly admitted to the Academy.

S. R. Esten, speaking for Chairman H. E. Enders, reported on the activity of the committee in charge of formation of a Junior Academy of Science. It is planned to present the matter to the science teachers of the state at the annual conference of High School Teachers to be held at Indianapolis in October. The matter will then be taken up in a special session during the winter meetings to be held at Butler University in December.

Chairman Pearson of the Program Committee announced the date of the next winter meetings of the Academy, to be December 3-5, 1931, at the Severin Hotel and Butler University, Indianapolis.

C. C. Deam suggested that the next "spring" meeting be held in June or later so that other types of vegetation can be seen. E. R. Cummings called attention to the fact that April is too early and that June is filled with graduations, examinations, etc. President Davis instructed Chairman Pearson to consider the matter, especially with the view of a summer meeting.

President Davis appointed a Resolutions Committee consisting of:

M. W. Lyon, Jr.

L. J. Rettger.

F. M. Andrews.

It was moved by M. W. Lyon, Jr., that telegrams of greetings and sympathy from the Academy be sent to David Starr Jordan, Charles Stoltz, Amos W. Butler and Elwood Montgomery.

Charles C. Deam talked 15 minutes on "Plants of Interest in Monroe, Lawrence and Martin Counties." Will Scott talked 20 minutes on "Animal Life of Donaldson's Cave." E. Y. Guernsey talked 30 minutes of "Historical Lore of Spring Mills."

Lunch was served, Friday, May 22nd, to approximately 125 members and friends, at Spring Mill State Park. The day was spent on trips to Trinity Springs, Purdue Farm, Jug Rock near Shoals, Lost River and through the caves. Dinner was served at the Greystone Hotel, Bedford. This was followed by a social hour.

Saturday was spent on trips through the quarries and stone mills of the Bedford district.

The following resolutions were presented by Chairman Rettger of the Resolutions Committee and adopted by the Academy:

The Indiana Academy of Science is again under great obligations to the Indiana Conservation Commission for being privileged to hold its Spring Meeting in one of the beautiful state parks.

We wish to thank the officers for the innumerable courtesies shown us today which have made our meeting interesting and pleasant.

The members of the Academy desire to say to the officers of the Indiana Conservation Commission that we are not unmindful of the devotion with which they are serving the higher interests of our commonwealth, and that we are watching the gradual unfoldment of their plans for a more beautiful Indiana with pride and satisfaction.

We desire to thank the persons who so ably piloted us today on our trips and whose explanations added much to the enjoyment of the same. We wish also to thank the Program Committee and those associated with them for the local arrangements which have ministered to our comfort during this meeting.

RAY C. FRIESNER, Secretary.

WINTER MEETING.

PROGRAM OF THE FORTY-SEVENTH ANNUAL MEETING OF THE INDIANA ACADEMY OF SCIENCE

HELD AT

BUTLER UNIVERSITY
INDIANAPOLIS, INDIANA

December 3-5, 1931.

THURSDAY, DECEMBER 3, 1931.

- 2:30 p. m. Meetings of the Systematic Botanists, Room 131.
 7:30 p. m. Meeting of the Executive Committee, Severin Hotel.
 8:30 p. m. Motion Pictures of Indiana State Parks. Frank N. Wallace, State Department of Conservation.

FRIDAY, DECEMBER 4, 1931.

- 8:00 a. m. Registration, First floor, middle section, The Arthur Jordan Memorial Hall.
 8:30 a. m. Business Session. Room 131.
 9:00 a. m. General Session. Room 131.
 Address of Welcome—Dr. Walter Scott Athearn, President of Butler University.
 Memorials. Read by title with brief comments by Stanley Coulter.
 Charles W. Stoltz, by Douglas W. Owen.
 Richard B. Moore, by A. R. Middleton.
 William A. Zehring, by Thomas E. Mason.
 †David Starr Jordan, by B. W. Evermann.
 Knute Rockne, by Norman E. Duke.
 †The Days of a Naturalist. W. S. Blatchley.
 †Mono-Vinyl Acetylene and Other Polymers of Acetylene as Intermediates of a New Practical Synthetic Rubber. J. A. Nieuwland.
 10:15 a. m. Demonstrations and Exhibits.
 11:00 a. m. Sectional Meetings.
 12:30 p. m. Luncheon. University Cafeteria.
 2:00 p. m. Sectional Meetings Continued.
 3:30 p. m. Tea Served to Members of the Academy and Their Guests.
 6:30 p. m. Academy Dinner, Roof Garden, Severin Hotel. Music by Students of the Arthur Jordan Conservatory of Music. *Toastmaster*, Richard Lieber.
 8:15 p. m. Address of the Retiring President of the Academy, J. J. Davis, "Entomology and Entomologists of Indiana."

† Not published in this Proceedings.

SATURDAY, DECEMBER 5, 1931.

9:45 a. m. Junior Academy of Science. The Inspiration Which the Junior Academy of Science Has Brought to the High School Science Clubs in the State of Illinois. Louis A. Astell.

MEETINGS OF SECTIONS.

BOTANY (Room 131)

T. G. YUNCKER, DEPAUW UNIVERSITY, Chairman.

Read

1. A Simpler Celloidin Process.† Edwin J. Kohl, Purdue University. (Lantern; 10 min.)
2. An Ecological Study of the Bald Cypress in Indiana. Winona H. Welch, DePauw University. (10 min.)
3. Plants New or Rare to Indiana. XVII. Charles C. Deam, Bluffton. (5 min.)
4. Seed Germination and the Survival of Seedlings of *Berberis vulgaris* in Monroe County, Indiana. David M. Mottier, Indiana University. (10 min.)
5. Some Observations on *Pinus virginiana* in Monroe County, Indiana: An ecological Indiana. J. E. Potzger, Indiana University. (10 min.)
6. A Measure of Growth. F. M. Andrews, Indiana University. (8 min.)
7. Plasmolysis. Richard King, University of Maryland. (5 min.)
8. Mixed Cultures of Bacteria and Fungi. C. L. Porter, Purdue University. (Lantern; 10 min.)
9. Why Plant Giants?† R. H. Carr, Purdue University. (Lantern; 10 min.)
10. Survival Studies on Hemlock Seedlings Under Forest Conditions.† Ray C. Friesner, Butler University, and J. E. Potzger, Indiana University. (Lantern, 5 min.) (To be published in Butler University Botanical Studies, 1932.)
11. Anatomical Studies within the Genus *Hydrangea*. George W. Burkett, DePauw University. (10 min.)
12. Studies on Virgin Hardwood Forests. I. Density and Frequency of the Woody Plants of Donaldson's Woods. Stanley A. Cain, Indiana University. (Lantern; 10 min.)
13. Frost Flowers.† W. N. Clute, Butler University. (Lantern; 5 min.) (To be published in Amer. Botanist, 1932.)
14. Response of Plants to Sawdust. Delzie Demaree, Little Rock, Arkansas. (8 min.)
15. Local and General Distribution of Indiana Trees.† Alva J. Lindsey, Butler University. (Lantern; 10 min.) (To be published in Butler University Botanical Studies. 1932.)

† Not published in this Proceedings.

16. Method Used in a Statistical Study of a Beech-Maple Association at Turkey Run State Park.† Mabel Marie Esten, Butler University. (Opaque projector; 10 min.) (To be published in Butler University Botanical Studies. 1932.)

17. Chromosome numbers in the Genus *Helianthus*.† Florence Geisler, Butler University. (10 min.) (Butler University Botanical Studies 2:53-62, 1931.)

18. Chromosome numbers in *Quercus* and *Fagus*.† Hellen Aufderheide, Butler University. (10 min.) (Butler University Botanical Studies, 2:45-52. 1931.)

19. An Inexpensive Recording Transpirometer. Raymond E. Girton, Purdue University. (Lantern; 10 min.)

20. Plankton Algae of White River near Indianapolis, Indiana.† C. Mervin Palmer, Butler University. (Lantern; 10 min.) (To be published in Butler University Botanical Studies. 1932.)

21. Succession of Forests as Indicated by Fossil Pollen in Peat Samples from a Northern Michigan Bog.† J. E. Potzger, Indiana University. (6 min.) (Science, 1932.)

22. Preservation of Dry Plant Material. F. M. Andrews, Indiana University. (5 min.)

23. Indiana Taxonomic Notes, 1931.† Ray C. Friesner, Butler University. (5 min.) (To be published in Butler University Botanical Studies. 1932.)

24. The Genus *Solidago* in Indiana.† Ray C. Friesner, Butler University. (10 min.) (To be published in Butler University Botanical Studies. 1932.)

25. Merrillville Bog: A Statistical Study of the Only Pure Stand of *Pinus strobus* in Indiana.† Alva J. Lindsey, Butler University. (Lantern; 10 min.) (To be published in Butler University Botanical Studies. 1932.)

26. The Algae of Indiana. B. H. Smith, State Teachers College. (5 min.)

27. A Note on *Passiflora lutea* L. Robert Hessler, Indianapolis.

Read by Title.

28. Flowering Plants Previously Unreported for Monroe County, Indiana. J. E. Potzger, Indiana University.

29. Plants of Spring Mill State Park: I, Ferns; II, Trees, Shrubs and Woody Vines. Stanley A. Cain, Indiana University.

By Demonstration (Room 240).

30. Growth Irregularities in Hybrid Freesias Induced by X-rays. W. P. Morgan, Indiana Central College.

31. Visualizing Materia Medica. C. J. Zufall, Purdue.

32. Indiana Aerial Soil Survey. T. M. Bushnell, Purdue.

Exhibits (Room 240).

The following papers have exhibits: 1, 8, 13, 16, 19, 24, 26, 31, 32.

† Not published in this Proceedings.

CHEMISTRY AND BACTERIOLOGY (Room 127).

E. G. MAHIN, Chairman.

Read.

1. Comparative Studies on Merthiolate with Reference to Laboratory Evaluation and Human Tissue Antiseptics. H. M. Powell and W. A. Jamieson, Indianapolis.
2. Purification of the Virus of Smallpox.† C. A. Behrens and L. B. Morgan, Purdue University. (Lantern.)
3. The Antigenic Proteins of *Salmonella aertrycke*. Frank J. O'Hara, St. Edward's University, and Mary E. Taylor, Texas University.
4. Automatic Alarm Devices for Use in Gas Absorption. Thomas H. Vaughn, University of Notre Dame. (Lantern.)
5. The Double Decomposition Reaction. E. A. Wildman, Earlham College.

Read by Title.

6. Organic Compounds of Selenium—Cycle Diselenides. IV. W. E. Bradt and J. F. Green, State College of Washington.
7. Organic Compounds of Selenium—Cyclic Selenols. V. W. E. Bradt and J. H. Crowell, State College of Washington.
8. Separation of Iron from Indium with Cupperson. F. C. Mathers and C. E. Pritchard.

Exhibits (Room 240).

The following papers have exhibits: 2, 9.

9. Monovinylacetylene and the Synthesis of Practical Rubber.† J. A. Nieuwland, University of Notre Dame. Jour. Amer. Chem. Soc. 53: 4197-4225.

GEOLOGY AND GEOGRAPHY (Room 339).

W. N. LOGAN, Chairman.

Read.

1. Stratigraphic Problems Involved in Determining the Geologic Structure in the Lower Mississippian Outcrop Area of Southern Indiana. Paris B. Stockdale, Ohio State University.
2. The Stratigraphy and Structure of a Devonian Limestone Area in Clark County, Indiana. George I. Whitlatch and John W. Huddle, Indiana University.
3. An Ordovician Fauna from Northwestern University.† R. R. Shrock and H. L. Lloyd, University of Wisconsin.
4. Some Drainage Problems in Southern Indiana.† Gerard Fowke, Madison.
5. Climate and Corn Yield in Indiana, 1887-1930. John K. Rose, Indiana University. (Opaque projector.)
6. Lost River at Wesley Chapel Gulf, Orange County, Indiana. Clyde A. Malott, Indiana University.

† Not published in this Proceedings.

7. The Underground Features of Sinking Creek, Washington County, Indiana. Robert E. Bates, Indiana University.

8. The Completed Ohio River Project. J. E. Switzer, Indiana University.

9. Experiments in Model-Map Making. A. H. Meyer, Valparaiso University.

10. Notes on the Glacial Boundary in Indiana. W. D. Thornbury, Indiana University.

11. A Fault Along Bryant's Creek, Northern Monroe County. Richard Freed and Ronald Rogers, Indiana University.

12. Mud Stalagmites.† Clyde A. Malott, Indiana University, and Robert R. Shrock, University of Wisconsin.

13. The Principal Beds of Underclay in the Coal Fields of Indiana. George I. Whitlatch, Indiana University.

14. Structural Studies in the Siosi Field. William N. Logan, Indiana University.

Read by Title.

15. Tertiary-Pleistocene of the Navajo Country in Arizona, with a Description of Some of Its Included Fossils.† Albert B. Reagan, Ouray, Utah.

16. A Check List of Caloosahatchie Species. H. I. Tucker and D. Wilson, Greencastle.

17. A list of the Tertiary Species from Acline, Florida. H. I. Tucker and D. Wilson, Greencastle.

Exhibits (Room 236).

The following papers have exhibits or charts: 1, 6, 7, 8, 9, 10, 11, 12.

PHYSICS, MATHEMATICS AND ASTRONOMY (Room 327).

R. B. ABBOTT, Chairman.

Read.

1. An Experiment in Optics, with a New Theory of the Milky Way and of Halos.† Oliver E. Glenn, Vevay.

2. The Genetics of Ideas. R. B. Abbott, Purdue University.

3. The Owen Bridge in Impedence Measurements. J. B. Hersham, Indiana University. (Lantern, charts.)

4. Resonance.† Arthur L. Foley, Indiana University.

5. Some Observations on the Formation of Striae in a Kundt's Tube, and Allied Phenomena. Rolla V. Cook, Indiana University.

6. A Visual Concept of Atomic Structure.† Harvey A. Zinszer, Kansas State College.

7. Derivation of Filter Equations. R. R. Ramsey, Indiana University.

8. Types of Automatism in Nature.† Oliver E. Glenn, Vevay.

9. Further Results of Ionization of Gases by Positive Ions.† Mason E. Hufford, Indiana University. (Lantern.)

† Not published in this Proceedings.

10. Some Latitude Determinations.† W. A. Cogshall, Indiana University. (Lantern.)

Read by Title.

11. Effects of the Circulation of Insulating Oils Upon Their Dielectric Properties. Jesse C. Hendricks, Clemson College, South Carolina.
 12. Radiation and Its Principal Constituents in the Dynamic Universe.† E. A. Smith and F. M. Smith, Secaucus, New Jersey.
 13. Cosmosolar Rays.† E. A. Smith and F. M. Smith, Secaucus, New Jersey.
 14. An Infinity Pendulum. E. G. Plasterer, Huntington.

By Demonstration (Room 327).

15. Electrodeless Discharge. Charles T. Knipp, University of Illinois.
 16. A Demonstration in Diffraction. J. B. Dutcher, Indiana University.

ZOOLOGY (Room 227).

W. P. MORGAN, Chairman.

Read.

1. Insects of Indiana for 1931.† J. J. Davis, Purdue University.
 2. The Aid of Places.† Robert Hessler, Indianapolis.
 3. Progressive Paralysis of the Nervous System of House Flies. William A. Hiestand, Purdue University.
 4. Distribution of Franklin's Ground Squirrel in Indiana.† M. W. Lyon, Jr., South Bend. Amer. Mid. Nat. Jan. 1932.
 5. Comparative Erythrocyte Counts of Representative Vertebrates. E. G. Stanley Baker and Loretta E. Kline, DePauw University. (Lantern.)
 6. Physiological Assay of Glucosides, Toxins and Poisons on Goldfish. Vincent A. Lapenta, Indianapolis.
 7. A Probable Second Record of the Extinct Deer, *Odocoileus dolichopsis* (Cope).† William L. Engels, University of Notre Dame. (Lantern.) Amer. Mid. Nat. 13:12-15. 1932.
 8. Periodicity in Spawning in *Cumingia tellinoides*.† B. H. Grave, DePauw University.
 9. Prehistoric Mastodons of Indiana.† John H. Furbay, Taylor University.
 10. The Occurrence of the Fresh-Water Medusa Near Richmond, Indiana. M. R. Garner and M. S. Markle, Earlham College. (Moving pictures.)
 11. Revision of and Additions to the List of Spiders of Indiana. F. R. Elliott, Valparaiso University.
 12. Winter Birds of Indiana.† Sidney R. Esten, Department of Conservation.
 13. Notes on Beaks of Birds.† Frederick H. Test, Purdue University. (Lantern.)

† Not published in this Proceedings.

14. Birds of Tippecanoe County. II. Louis A. Test and Frederick H. Test, Purdue University.
15. The Amphibia of Montgomery and Putnam Counties.† B. H. Grave, DePauw University.
16. Visible vaso-motor effects in the pulmonary circulation of the frog. W. A. Hiestand.
17. A comparison of the metabolic rates of various insects as determined by carbon dioxide output. W. A. Hiestand, Purdue.
18. The Physiography of the Tippecanoe. Herman P. Wright (Posthumous), Indiana University.
19. Some Modifications of Leg Structures in Hydrophilidae. Russell G. Weber, Butler University.
20. Additional Records of Indiana Butterflies.† Robert W. Montgomery, Stewartsville High School.
21. Records of Indiana Dragonflies. VI, 1931. B. Elwood Montgomery, Purdue University.

By Demonstration (Room 236).

22. Corresponding Stages in the Spermatogenesis of Four Species of Pseudoscorpionida (*Chelanops corticis*, *C. oblongus*, *Chelifer muricatus*, *Chernes scorpioides*).† Henry G. Nester, Butler University.
23. Ichthyophthiriasis Among the Fishes of a Pond in Indianapolis. N. E. Pearson, Butler University.

Exhibits (Room 236).

The following papers have exhibits: 8, 15.

24. The Important Economic Insects Described by Thomas Say.† J. J. Davis, Purdue University.
25. Metacercaria Belonging to the Genus Neascus, Species Probably Vanleavei, which Produced an Epidemic Among the Fishes of Leonard Springs Pond West of Bloomington.† N. E. Pearson, Butler University.

MINUTES OF THE EXECUTIVE COMMITTEE.

The Executive Committee was called to order at 7:30 p. m., December 3, 1931. The following members were present: F. M. Andrews, W. M. Blanchard, W. S. Blatchley, H. L. Bruner, A. W. Butler, C. C. Deam, H. E. Enders, W. E. Edington, A. L. Foley, R. C. Friesner, Robert Hessler, M. W. Lyon, Jr., E. G. Mahin, R. R. Ramsey, F. B. Wade, J. S. Wright, J. J. Davis, T. G. Yunckers, S. A. Cain, E. M. Bruce, N. E. Pearson, W. A. Cogshall, W. J. Moenkhaus, D. M. Mottier.

President Davis made the following introductory remarks: The usual committees were appointed. Dr. M. G. Mellon was appointed to represent the Academy at the dedication of the New Chemistry Building at Indiana University. The President accepted the invitation of the Ohio Academy of Science and gave an illustrated talk on Points of Historic and Scientific Interest in Indiana, at the joint meeting of the Ohio,

† Not published in this Proceedings.

Kentucky and Indiana Academies at Miami University, Oxford, Ohio, April 2-4. The President also represented the Academy at the Birthday Dinner to Dean Stanley Coulter, given by the Hamilton County Nature Study Club, at Noblesville, and talked on "Coulter the Scientist."

Reports of officers followed:

Academy Foundation.—Chairman Butler presented the following report:

December 1, 1930, balance on hand.....	\$84.85
Total receipts, including interest and other additions.....	1,329.94
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Total	\$1,414.79
Investments made, including cost of same.....	\$1,379.08
Balance on hand December 1, 1931.....	35.71

ASSETS.

Railroad Bldg. and Saving Assoc.—23 shares.....	\$2,300.00
U. S. 4th L. L. Bond E06142095.....	50.00
Muncie Masonic Temple Preferred.....	200.00
Standard Oil Company of Indiana, E150525.....	328.00
U. S. Treasury Notes 1944-54, (H00016648, J00009389, K00028470, A00028471, C00011163)	500.00
Indiana National Bank Savings Account Book 16639.....	78.32
U. S. Treasury Bonds (A00010851, 23858).....	200.00
Same K00029970	500.00
Balance as shown above.....	35.71
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Total assets	\$4,192.03

Archaeological Survey.—No report.

Auditing Committee.—Chairman Edington reported that the books of the Treasurer have been examined and found correct on November 30, 1931, by Mr. Frank W. Horan. The audit of the books of the Editor has been postponed on account of the late delivery of the Proceedings and the Reprints. This audit will be made later and reported on at the Spring Meeting. The books of the Trustees of the Academy Foundation have been audited and found correct. The bonds, stocks and certificates have been inspected and found correctly listed.

Biological Survey.—Chairman Lyon reported that work was well under way toward the completion of a bibliography of Indiana fauna and flora. The report carried a recommendation that a sum not to exceed \$200.00 be allowed for clerical aid in final compilation of this bibliography. During preparation of material it was stipulated that each title should follow the form of citation used in Biological Abstracts and that it may be followed by such annotations as may seem desirable to the compiler. Professor Paul Weatherwax has charge of the botanical titles, Mr. Sidney Esten has charge of titles dealing with vertebrates and invertebrates other than arthropods and Mr. B. E. Montgomery has charge of titles concerning arthropods. The Committee recommended that the

bibliography be published in a taxonomic sequence so that each compiler shall receive due authorship credit.

The committee reiterated its recommendations of a year ago that the policy of the State Conservation Department in securing for future generations important ecological habitats still available within the State, be continued.

The Committee recommended the perpetuation of a majority of its members.

The Committee finally recommends that whereas;

A survey of state educational institutions shows much biological research material inadequately housed, and much valuable material has already been lost to the State by removal of collections to institutions in other states,

Therefore, this Academy recommends that the state universities be urged to provide adequate facilities for the organization and the permanent preservation of specimens of the Indiana fauna and flora.

The report was accepted together with all of its recommendations.

Editor.—Report of the Editor was postponed to the spring meeting of the Academy. Publication of papers read by members of the Indiana Academy at the joint meeting of the Ohio, Indiana, and Kentucky Academies of Science was authorized.

Volume 40 of the Proceedings was off the press in October. This volume contained 402 pages, an increase of 64 pages over Volume 39. In addition to the 100 separates of papers subscribed for by the authors 1,500 bound copies were printed at a cost of \$1,806.32 plus \$51.58 editorial expenses. The financial report of the editor was delayed until the spring meeting, due to the slowness with which reprint bills were being paid. This delay, with \$76.95 still due on Volume 40, is attributed to the general financial conditions.

STATE FUNDS.

Annual appropriation for 1930 Proceedings (1931) vol. 40.....	\$1,500.00
Part cost of vol. 40 to Fort Wayne Printing Co.....	\$1,291.17
Part cost of vol. 40 to Stafford Engraving Co.....	206.67
	————— 1,497.84
Reverted to State at close of fiscal year.....	2.16

REPRINT FUNDS.

Savings account balance from vol. 39.....	\$150.00
Checking account balance from vol. 39.....	101.90
(Irvington State Bank, Indianapolis)	
Arrears from authors vol. 39 (since last report).....	9.00
	————— \$260.90
Due on reprints from vol. 39.....	11.20
	————— \$272.10
Carried over from vol. 39.....	258.95
Receivable from authors for reprints, vol. 40.....	182.00
Received from authors for reprints, vol. 40, to March 17, 1932, balance	————— 182.00
Balance due, vol. 40.....	\$76.95

COST OF VOLUME 40.

State funds, as cited above.....				\$1,497.84
Reprint funds, to complete costs:				
Stafford Engraving Co.			22.49	
Fort Wayne Printing Co.....			285.99	
Editorial expenses:				
By check from Treasurer M. W. Lyon, Jr.....			51.58	
				<hr/>
Total cost of vol. 40.....				\$1,857.90
Cost. vol. 40.....	\$1,857.90	State funds.....		\$1,497.84
Due vol. 39.....	11.20	Vol. 39 rept.....		272.10
Due vol. 40.....	76.95	Vol. 40 rept.....		258.95
Checks 13-20 on vol. 41... ..	12.65	Academy treas.		51.58
Bank balancing service		Interest		4.78*
charges	2.00			<hr/>
				\$2,085.25
				<hr/>
	\$1,960.70	Bal. Irv. State bank,		
Cash on hand.....	1.50	Indpls., 3-16-32		123.05*
				<hr/>
	\$1,962.20			\$1,962.20

May 1, 1932 (Signed) STANLEY A. CAIN, Editor.
 May 18, 1932 (Signed) W. P. MORGAN, Auditor.

Considering that volume 39 accounts closed with total assets of \$272.10 and volume 40 with total assets of \$200.00 (to wit: balance, March 16, 1932, of \$123.05; due on vol. 40, \$76.95;) it is apparent that expenses exceeded the income from the state and the reprint funds by \$72.10. This can be considered the extent to which the reprint funds failed to carry the costs of the additional 64 pages over volume 39.

Membership Committee.—Chairman Bruce read the names of 45 applicants for membership in this Academy. These were all accepted.

Press Secretary.—Secretary Edington reported that very few abstracts for publicity purposes reached him. It was suggested that members offering papers on the program submit a carbon copy of their paper to the Press Secretary.

Program Committee.—Chairman Pearson presented the printed program. He explained that the Saturday trip would be made to the Eli Lilly Pharmaceutical Laboratories, Biological Laboratories as stated in Program being a clerical error.

Relation of Academy to State.—Chairman Logan reported that the annual appropriation for publication of Proceedings was expended before the close of the fiscal year.

Research Committee.—Chairman Foley reported progress of the work of the Research Committee.

* It was necessary to transfer the savings account to the checking account to enable the payment of bills 3-7-32.

REPORT OF TREASURER, INDIANA ACADEMY OF SCIENCE
FOR 1931.

RECEIPTS.

Balance on hand January 9, 1931.....	\$639.71	
Collected from members as dues and initiation fees...	945.00	
American Association for Advancement of Science....	113.50	
	\$1,698.21	

DISBURSEMENTS.

Secretary		
Clerical expenses	\$16.00	
Stationery and printing (includes stationery for all offices and committees and cost of wrapping Proceedings)	61.30	
Postage (includes postage for mailing Proceedings)	97.18	
Miscellaneous Expenses (includes new addressograph machine)	49.90	
	\$223.38	
Treasurer		
Clerical expenses	28.35	
Stationery and printing.....	22.30	
Postage	27.60	
Miscellaneous expenses	9.51	
	87.76	
Editor		
Miscellaneous expenses	55.58	
	55.58	
Program Committee		
Stationery and printing.....	111.10	
Postage	99.66	
Miscellaneous expenses	31.57	
	242.33	
Biological Survey Committee		
Multigraphine questionnaire ...	16.00	
	16.00	
Academy Foundation		
American Association for Advancement of Science funds..	113.50	
Additional funds	434.67	
Safe deposit box.....	5.00	
	553.17	
	\$1,178.22	
Balance in bank Dec. 31, 1931.....	519.99	
	\$1,698.21	

Respectfully submitted,

M. W. LYON, JR., Treasurer.

Examined and found correct, January 30, 1932.

FRANK W. HORAN, Member Auditing Comm.

REPORTS OF SPECIAL COMMITTEES.

Anniversary Publicity.—Chairman Edington reported that the Chairman of the Committee has done considerable preliminary work with the expectation of assigning specific investigations to the members of the committee. These assignments will be made during the coming year. Accordingly, it is requested that the present committee be continued.

A.A.A.S.—H. E. Enders, Academy Representative of the Council of A.A.A.S. reported progress of work toward bringing the winter meetings of A.A.A.S. to Indianapolis in 1935 or '36.

Brown County Marker.—Chairman Logan reported as follows: "The Committee requests an extension of time for the completion of its report because the route of the Indianapolis-Nashville state highway has not been decided to the Committee's knowledge and further recommendations cannot be made until that location has been determined." The personnel of this committee is W. N. Logan, Chairman, C. A. Malott, B. W. Douglas, E. R. Smith and T. M. Bushnell.

Junior Academy of Science.—Chairman Enders reported concerning plans for the formation of a Junior Academy of Science through the affiliation of High School Science Clubs with the Academy. He recommended the following amendment to the Constitution, to become Section 4 of Article II:

The Indiana Academy of Science shall actively promote the organization and operation of local science clubs in connection with secondary schools of the state. Such of these clubs as elect to become members shall constitute the Indiana Junior Academy of Science.

The President shall appoint annually a committee of five members from the Indiana Academy of Science to have full charge, within the Academy, of the Indiana Junior Academy of Science. It shall formulate the requirements for membership of local science clubs and election of such clubs must be approved by Executive Committee of the Academy.

Each applicant club, upon meeting Academy affiliation requirements, payment of an entry fee of \$1.00 and an affiliation fee of \$1.00 and upon recommendation of the committee in charge, shall receive for its files a certification of membership signed by the President, Secretary, and Treasurer of the Academy. Such affiliation shall continue upon payment of annual affiliation fee so long as the club continues to meet requirements of membership. Each affiliated club will receive one copy of the Proceedings of the Indiana Academy of Science.

The Committee in council with the President, Secretary and Treasurer shall formulate a program of work. An annual report of the progress made shall be presented to the Executive Committee of the Indiana Academy of Science by the chairman of the Academy Committee on Junior Academy of Science.

The proposed amendment was referred to the General Session for final action.

New Business.—Dr. A. W. Butler presented his resignation as Chairman of Academy Foundation and Trustee of Academy Endowment Funds.

Resignation was accepted with regrets and a rising vote of thanks given Dr. Butler for his 12 years of service on this committee.

Dr. Lyon moved that a committee of three members be appointed to consider the matter of bonding Academy Trustees. This committee to report at next annual meeting in December, 1932. Motion was properly seconded and carried. The following members were appointed: H. L. Bruner, Chairman, W. A. Cogshall, John S. Wright.

The Committee on Publications was requested to present to the next annual meeting a recommendation regarding sale of Proceedings in order to meet requirements regarding publication of new taxonomic descriptions.

President Davis was instructed to appoint a committee toⁿ consider the matter of lowering the cost of Life Membership in the Academy, the committee to make recommendations to the Executive Committee at its annual meetings in December, 1932. The following committee was appointed: W. M. Blanchard, Chairman, M. W. Lyon, R. C. Friesner.

The Treasurer was instructed to send out as part of the annual dues notices, a request for statement of special field of scientific interest of each member, such information to be included in the membership list published annually in the Proceedings.

R. R. Ramsey, W. P. Morgan and E. M. Bruce were appointed on a committee to receive invitations for the next winter meetings of the Academy.

MINUTES OF THE GENERAL SESSION.

The minutes of the Executive Committee were read, corrected and approved.

The amendment to the Constitution which was proposed during the meeting of the Executive Committee was again read and unanimously adopted.

The Editor was instructed to publish the Constitution together with all Amendments in Volume 41 of the Proceedings.

The following Resolutions Committee was appointed: F. M. Andrews, Chairman, F. Donaghy and C. E. Behrens.

President Walter S. Athearn of Butler University gave an Address of Welcome after which the regular program of papers followed.

At a brief business session following the annual Academy dinner the following business was transacted:

The Committee on Invitations recommended that the next winter meetings be held at the University of Notre Dame. The recommendation was adopted by the Academy.

Chairman Enders spoke briefly of the Junior Academy of Science and urged as many as possible to assist in the work of organizing the Junior Academy at the meetings to be held on Saturday at Butler University.

Chairman Andrews offered the following resolution which was unanimously adopted:

The Indiana Academy of Science assembled for its Forty-Seventh Annual Meeting at Butler University desires to express its appreciation and thanks to the University, its officers and faculty for the excellent

arrangements and plans for our meeting, and those who have provided perfectly for our entertainment. The thanks of the Academy are especially extended to President Athearn for his address of welcome. To all who have contributed so liberally in every way of their time and efforts we again extend our thanks for our very pleasant and successful meeting.

Chairman Rettger of the Committee on Nominations made the following report which was unanimously adopted:

Honorary Fellow, H. C. Oberholzer, Washington, D. C.

Fellows—Nathan E. Pearson, Butler University.

L. A. Test, Purdue University.

Allen D. Hole, Earlham College.

C. E. Deppe, Franklin College.

B. A. Howlett, Rose Polytechnic Institute.

President, Fernandus Payne, Indiana University.

Vice-President, Richard Lieber, Department of Conservation.

Secretary, Ray C. Friesner, Butler University.

Assistant Secretary, W. P. Morgan, Indiana Central College.

Treasurer, M. W. Lyon, Jr., South Bend.

Editor, S. A. Cain, Indiana University.

Press Secretary, W. E. Edington, DePauw University.

MINUTES OF JUNIOR ACADEMY OF SCIENCE.

Meeting was called to order at Butler University by Chairman Enders at 10 o'clock December 5, 1931.

The meeting was opened with an address upon the nature, functioning and value of the Junior Academy of Science by Mr. Louis Astell. Considerable discussion followed. Mr. Wade discussed the plan followed in promoting science clubs at Shortridge High School. He pointed out that active clubs must always be sponsored by enthusiastic teachers.

Miss Edna Banta discussed the work of the science club in the North Madison High School. She reported upon their scheme of achievement points as an aid in maintenance of enthusiasm.

Mr. Hargraves spoke of the plan used at Arsenal Technical High School. He likewise reported that awards are made for achievement, points being given for such activities as attendance, taking part in program, attendance at field trips, first proven report of a species of bird or flower for the season.

Mr. C. O. Pauley discussed the plan used in the Valparaiso High School. He reported a number of clubs covering all phases of school activities.

Mr. M. M. Williams spoke regarding the work in the Bloomington Junior High School. He reported that club membership is limited to 25 members. Members are encouraged to undertake investigations within the range of high school abilities.

Mr. Ross Stacy spoke of the work at Washington (Indianapolis) High School and Miss Clemie Ransom spoke of the work at Crispus Attucks (Indianapolis) High School.

Two reports were given by high school pupils as illustrations of pupil work in these clubs:

Miss Genevieve O'Hair of Greencastle High School spoke of Nature in the North Woods and Mr. Richard Strain of Bloomington Junior High School gave a talk on habits and behavior of various species of fishes.

The following regulations were adopted for affiliation of high school science clubs with the Indiana Academy of Science:

1. A first class teacher, a member of the Indiana Academy of Science must act as sponsor, and provide inspiration and suggestions to the member club.
2. The club must prepare a constitution modeled after that of the Indiana Academy of Science. A copy of which is to be deposited with the Chairman of the Junior Academy Committee.
3. Apply to Indiana Academy of Science for affiliation—Howard E. Enders, Chairman of Committee on Junior Academies of Science, Purdue University, W. Lafayette, Indiana.
4. Application be accompanied by a copy of the constitution of the applicant club.
5. Entry fee of \$1.00 and annual affiliation fee of \$1.00 must accompany application for affiliation.
6. Each club must send at least one delegate other than the sponsor to the annual meetings of the Indiana Junior Academy of Science.
7. One or more clubs may become affiliated from each high school.
8. All clubs affiliated before March 1, 1932, will be considered charter members of the Indiana Junior Academy of Science.
9. As many clubs as possible are urged to send exhibitions of their activities for presentation to both the Indiana Academy of Science and the Indiana Junior Academy of Science.
10. The Proceedings of the Indiana Academy of Science will be sent annually to each affiliated club.

Mr. Sidney Esten, member of the Committee on Junior Academy of Science, was appointed as "field" and "contact" man for the Junior Academy of Science.

EXHIBITS.

The following exhibits were offered as illustrations of the activities of these clubs:

The Crawfordsville High School was represented by a collection of mounted Lepidoptera, the work of Mr. William Leavenworth, and by a collection of mounted birds, bird pictures and 47 cases including 150 species and over 300 individuals of mounted Lepidoptera, the latter collections being the work of Mr. Fred Hall.

The Valparaiso High School exhibited a number of ingenious pieces of apparatus constructed by Mr. Joe Urschel, member of the club. Five types of pin-hole cameras were exhibited with examples of pictures taken with each. The first was cylindrical about the size of a large hickory nut taking a picture 11 mm. in diameter with an exposure of one second. The second was an ordinary pin-hole camera taking a four by five inch plate. The third was of a like nature but with a focal length of 5 cm. and with

the pin-hole situated high in order that tall buildings might be photographed at very close range. The fourth was a freak-taking camera with the plate set at an angle to the usual position. The fifth takes fifteen small rectangular pictures with one loading of the film on the outside of a cylinder, which is turned after each exposure. This exhibit also included a steam boiler modeled after that invented by Hero, in 120 B. C. and a hygroscopic motor, both constructed by Mr. Urschel.

The North Madison Nature Club exhibited mounted collections of moths, beetles, butterflies and dragonflies together with pictures and notebooks supplementing the collection. The club was represented by Mr. Frazier Hitz.

The Greencastle Nature Club exhibited a collection of photographs illustrating natural history studies in the North Woods. These were the work of Miss Genevieve O'Hair, member of this club.

At the joint meeting of the Chemistry-Physics-Biology sections, at the State Teachers' Association, Professor Enders of Purdue University, spoke in behalf of the proposed Junior Academy of Science. He asked for exhibits, from the science clubs already in existence, these exhibits to be made expressly for the Academy of Science meeting.

This suggestion was presented to the Shortridge Chemistry Club, by the sponsor. A committee was appointed to plan an exhibit. The subject "Salt" was chosen, because it was possible for the club members to make a number of the products exhibited.

Crude salt is shown with four major uses. (1) Refined as table salt; (2) The starting material in the production of hydrochloric acid; (3) As a source of chlorine and sodium hydroxide, by electrolysis of brine; (4) In the preparation of sodium carbonate and sodium bicarbonate by the Solvay process.

The exhibit was prepared by the club as a whole at a regular meeting.

RAY C. FRIESNER, Secretary.