

PROCEEDINGS

OF THE

Indiana Academy of Science

1914

H. E. BARNARD, Editor

INDIANAPOLIS :

WM. E. BURFORD, CONTRACTOR FOR STATE PRINTING AND BINDING

1915

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CONSTITUTION.

ARTICLE I.

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

SEC. 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 resources and riches of the State; to arrange and prepare for publication such reports of investigation and discussions 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 of 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 members or active members.

SEC. 2. Any person engaged in any department of scientific work, or in 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. Application 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.

SEC. 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 one year may, on recommendation of the Executive Committee, be 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 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.

ARTICLE III.

SECTION 1. The officers of this 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 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.

SEC. 2. The annual meeting of this Academy shall be held in the city of Indianapolis within the week following Christmas of each year, 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 Presidents, together with the officers and 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.

SEC. 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 on the morning of one of the days of the meeting at the expiration of his term of office.

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 arrearage by the Treasurer, shall have their names stricken from the roll.

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

AN ACT TO PROVIDE FOR THE PUBLICATION OF THE REPORTS AND PAPERS OF THE INDIANA ACADEMY OF SCIENCE.

[Approved March 11, 1895.]

WHEREAS, The Indiana Academy of Science, a chartered scientific association, has embodied in its constitution a provision that it will, upon the request of the Governor, or of the several departments of the State

government, through the Governor, and through its council as an advisory board, assist in the direction and execution of any investigation within its province, without pecuniary gain to the Academy, provided only that the necessary expenses of such investigation are borne by the State; and,

WHEREAS, The reports of the meetings of said Academy, with the several papers read before it, have very great educational, industrial and economic value, and should be preserved in permanent form; and

WHEREAS, The Constitution of the State makes it the duty of the General Assembly to encourage by all suitable means intellectual, scientific and agricultural improvement; therefore,

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana,* That hereafter the annual reports of the meetings of the Indiana Academy of Science, beginning with the report for the year 1894, including all papers of scientific or economic value, presented at such meetings, after they shall have been edited and prepared for publication as hereinafter provided, shall be published by and under the direction of the Commissioners of Public Printing and Binding.

SEC. 2. Said reports shall be edited and prepared for publication without expense to the State, by a corps of editors to be selected and appointed by the Indiana Academy of Science, who shall not, by reason of such service, have any claim against the State for compensation. The form, style of binding, paper, typography and manner and extent of illustration of such reports shall be determined by the editors, subject to the approval of the Commissioners of Public Printing and Stationery. Not less than 1,500 nor more than 3,000 copies of each of said reports shall be published, the size of the edition within said limits to be determined by the concurrent action of the editors and the Commissioners of Public Printing and Stationery: *Provided,* That not to exceed six hundred dollars (\$600) shall be expended for such publication in any one year, and not to extend beyond 1896: *Provided,* That no sums shall be deemed to be appropriated for the year 1894.

SEC. 3. All except three hundred copies of each volume of said reports shall be placed in the custody of the State Librarian, who shall furnish one copy thereof to each public library in the State, one copy to each university, college or normal school in the State, one copy to each high school in the State having a library, which shall make application therefor, and one copy to such other institutions, societies or persons as may be designated by the

Academy through its editors or its council. The remaining three hundred copies shall be turned over to the Academy to be disposed of as it may determine. In order to provide for the preservation of the same it shall be the duty of the Custodian of the State House to provide and place at the disposal of the Academy one of the unoccupied rooms of the State House, to be designated as the office of the Academy of Science, wherein said copies of said reports belonging to the Academy, together with the original manuscripts, drawings, etc., thereof can be safely kept, and he shall also equip the same with the necessary shelving and furniture.

SEC. 4. An emergency is hereby declared to exist for the immediate taking effect of this act, and it shall therefore take effect and be in force from and after its passage.

APPROPRIATION FOR 1913-1914.

The appropriation for the publication of the proceedings of the Academy during the years 1913 and 1914 was increased by the Legislature in the General Appropriation bill, approved March 9, 1909. That portion of the law fixing the amount of the appropriation for the Academy is herewith given in full:

For the Academy of Science: For the printing of the proceedings of the Indiana Academy of Science twelve hundred dollars: *Provided*, That any unexpended balance in 1913 shall be available in 1914, and that any unexpended balance in 1914 shall be available in 1915.

AN ACT FOR THE PROTECTION OF BIRDS, THEIR NESTS AND EGGS.

SEC. 602. Whoever kills, traps or has in his possession any wild bird, or whoever sells or offers the same for sale, or whoever destroys the nest or eggs of any wild bird, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be fined not less than ten dollars nor more than twenty-five dollars: *Provided*, That the provisions of this section shall not apply to the following named game birds: The Anatidæ, commonly called swans, geese, brant, river and sea duck; the Rallidæ, commonly called rails, coots, mud-hens, gallinules; the Limicolæ, commonly called shore birds, surf birds, plover, snipe, woodcock, sandpipers, tattlers and curlew; the Gallinæ, commonly called wild turkeys, grouse, prairie chickens, quails and pheasants; nor to English or European house sparrows,

crows, hawks or other birds of prey. Nor shall this section apply to persons taking birds, their nests or eggs, for scientific purposes, under permit, as provided in the next session.

SEC. 603. Permits may be granted by the Commissioner of Fisheries and Game to any properly accredited person, permitting the holder thereof to collect birds, their nests or eggs for strictly scientific purposes. In order to obtain such permit the applicant for the same must present to such Commissioner written testimonials from two well-known scientific men certifying to the good character and fitness of such applicant to be entrusted with such privilege, and pay to such Commissioner one dollar therefor and file with him a properly executed bond in the sum of two hundred dollars, payable to the State of Indiana, conditioned that he will obey the terms of such permit, and signed by at least two responsible citizens of the State as sureties. The bond may be forfeited, and the permit revoked upon proof to the satisfaction of such Commissioner that the holder of such permit has killed any bird or taken the nest or eggs of any bird for any other purpose than that named in this section.

PUBLIC OFFENSES—HUNTING WILD BIRDS—PENALTY.

[Approved March 13, 1913.]

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana,* That section six (6) of the above entitled act be amended to read as follows: Section 6. That section six hundred two (602) of the above entitled act be amended to read as follows: Section 602. It shall be unlawful for any person to kill, trap or possess any wild bird, or to purchase or offer the same for sale, or to destroy the nest or eggs of any wild bird, except as otherwise provided in this section. But this section shall not apply to the following named game birds: The Anatidae, commonly called swans, geese, brant, river and sea duck; the Rallidae, commonly known as rails, coots, mud-hens and gallinules; the Limicolae, commonly known as shore birds, plovers, surf birds, snipe, woodcock, sandpipers, tattlers and curlews; the Galline, commonly called wild turkeys, grouse, prairie chickens, quails, and pheasants; nor to English or European house sparrows, blackbirds, crows, hawks or other birds of prey. Nor shall this section apply to any person taking birds or their nests or eggs for scientific purposes under permit as provided in the next section. Any person violating the provisions of this section shall, on conviction, be fined not less than ten dollars (\$10.00) nor more than fifty dollars (\$50.00).

Indiana Academy of Science.

OFFICERS, 1914-1915.

PRESIDENT,
WILBUR A. COGSHALL.
VICE-PRESIDENT,
WILLIAM A. MCBETH.
SECRETARY,
ANDREW J. BIGNEY.
ASSISTANT SECRETARY,
H. E. ENDERS.
PRESS SECRETARY,
FRANK B. WADE.
TREASURER,
WILLIAM M. BLANCHARD.
EDITOR,
H. E. BARNARD.

EXECUTIVE COMMITTEE:

ARTHUR, J. C.,	CULBERTSON, GLENN,	MCBETH, W. A.,
BIGNEY, A. J.,	DRYER, CHAS. R.,	MEES, CARL L.,
BLANCHARD, W. M.,	EIGENMANN, C. H.,	MOTTIER, DAVID M.,
BLATCHLEY, W. S.,	EVANS, P. N.,	MENDENHALL, T. C.,
BODINE, DONALDSON,	DENNIS, D. W.,	NAYLOR, JOSEPH P.,
BRANNER, J. C.,	FOLEY, A. L.,	NOYES, W. A.,
BURRAGE, SEVERANCE,	HAY, O. P.,	WADE, F. B.,
BUTLER, AMOS W.,	HESSLER, ROBERT.	WALDO, C. A.,
COGSHALL, W. A.,	JOHN, J. P. D.,	WILEY, H. W.,
COULTER, JOHN M.,	JORDAN, D. S.,	WRIGHT, JOHN S.
COULTER, STANLEY,		

CURATORS:

BOTANY.....	J. C. ARTHUR.
ENTOMOLOGY.....	W. S. BLATCHLEY.
HERPETOLOGY }.....	
MAMMALOGY }.....	A. W. BUTLER.
ORNITHOLOGY }.....	
ICHTHYOLOGY.....	H. C. EIGENMANN.

COMMITTEES ACADEMY OF SCIENCE, 1915.

Program.

WILL SCOTT, Bloomington
 F. B. WADE, Indianapolis
 P. N. EVANS, LaFayette

Nominations.

SEVERANCE BURRAGE, Indianapolis
 W. J. MOENKHAUS, Bloomington
 A. S. HATHAWAY, Terre Haute

State Library.

W. S. BLATCHLEY, Indianapolis
 H. J. BANKER, Coldspring Harbor,
 N. Y.
 A. W. BUTLER, Indianapolis

Biological Survey.

C. C. DEAM, Bluffton
 H. W. ANDERSON, Crawfordsville
 GEO. N. HOFFER, West LaFayette
 A. O. COX, Terre Haute
 J. A. NIEUWLAND, Notre Dame

Distribution of Proceedings.

A. J. BIGNEY, Moores Hill
 JOHN B. DUTCHER, Bloomington
 A. W. BUTLER, Indianapolis
 W. M. BLANCHARD, Greencastle

Membership.

H. E. ENDERS, West LaFayette
 EDWIN MORRISON, Richmond.
 FRED A. MILLER, Indianapolis

Auditing.

E. B. WILLIAMSON, Bluffton
 GLENN CULBERTSON, Hanover

Restriction of Weeds and Diseases.

ROBERT HESSLER, Logansport
 AMOS BUTLER, Indianapolis
 J. N. HURTY, Indianapolis
 STANLEY COULTER, LaFayette
 D. M. MOTTIER, Bloomington

Academy to State.

R. W. MCBRIDE, Indianapolis
 GLENN CULBERTSON, Hanover
 H. E. BARNARD, Indianapolis
 A. W. BUTLER, Indianapolis
 W. W. WOOLLEN, Indianapolis

Publication of Proceedings.

H. E. BARNARD, Indianapolis
 C. R. DRYER, Ft. Wayne
 M. K. HAGGERTY, Bloomington
 R. R. HYDE, Terre Haute
 J. S. WRIGHT, Indianapolis

OFFICERS OF THE INDIANA ACADEMY OF SCIENCE.

YEARS.	PRESIDENT.	SECRETARY.	ASST. SECRETARY.	PRESS SECRETARY.	TREASURER.
1885-1886	David S. Jordan.....	Amos W. Butler.....	.....	.....	O. P. Jenkins.
1886-1887	John M. Coulter.....	Amos W. Butler.....	.....	.....	O. P. Jenkins.
1887-1888	J. P. D. John.....	Amos W. Butler.....	.....	.....	O. P. Jenkins.
1888-1889	John C. Branner.....	Amos W. Butler.....	.....	.....	O. P. Jenkins.
1889-1890	T. C. Mendenhall.....	Amos W. Butler.....	.....	.....	O. P. Jenkins.
1890-1891	O. P. Hay.....	Amos W. Butler.....	.....	.....	O. P. Jenkins.
1891-1892	J. L. Campbell*.....	Amos W. Butler.....	.....	.....	C. A. Waldo.
1892-1893	J. C. Arthur.....	Amos W. Butler.....	{Stanley Coulter.....}	.....	C. A. Waldo.
			{W. W. Norman.....}	.....
1893-1894	W. A. Noyes.....	C. A. Waldo.....	W. W. Norman.....	.....	W. P. Shannon.
1894-1895	A. W. Butler.....	John S. Wright.....	A. J. Bigney.....	.....	W. P. Shannon.
1895-1896	Stanley Coulter.....	John S. Wright.....	A. J. Bigney.....	.....	W. P. Shannon.
1896-1897	Thomas Gray*.....	John S. Wright.....	A. J. Bigney.....	.....	W. P. Shannon.
1897-1898	C. A. Waldo.....	John S. Wright.....	A. J. Bigney.....	Geo. W. Benton.....	J. T. Scovell.
1898-1899	C. H. Eigenmann.....	John S. Wright.....	E. A. Schultze.....	Geo. W. Benton.....	J. T. Scovell.
1899-1900	D. W. Dennis.....	John S. Wright.....	E. A. Schultze.....	Geo. W. Benton.....	J. T. Scovell.
1900-1901	M. B. Thomas*.....	John S. Wright.....	E. A. Schultze.....	Geo. W. Benton.....	J. T. Scovell.
1901-1902	Harvey W. Wiley.....	John S. Wright.....	Donaldson Bodine..	Geo. W. Benton.....	J. T. Scovell.
1902-1903	W. S. Blatchley.....	John S. Wright.....	Donaldson Bodine..	G. A. Abbott.....	W. A. McBeth.
1903-1904	C. L. Mees.....	John S. Wright.....	J. H. Ransom.....	G. A. Abbott.....	W. A. McBeth.
1904-1905	John S. Wright.....	Lynn B. McMullen..	J. M. Ransom.....	G. A. Abbott.....	W. A. McBeth.
1905-1906	Robert Hessler.....	Lynn B. McMullen..	J. H. Ransom.....	Charles R. Clark....	W. A. McBeth.
1906-1907	D. M. Mottier.....	Lynn B. McMullen..	J. M. Ransom.....	G. A. Abbott.....	W. A. McBeth.
1907-1908	Glenn Culbertson...	J. H. Ransom.....	A. J. Bigney.....	G. A. Abbott.....	W. A. McBeth.
1908-1909	A. L. Foley.....	J. H. Ransom.....	A. J. Bigney.....	G. A. Abbott.....	W. A. McBeth.
1909-1910	P. N. Evans.....	Geo. W. Benton.....	A. J. Bigney.....	John W. Woodhams..	W. J. Moenkhaus.
1910-1911	C. R. Dryer.....	A. J. Bigney.....	E. B. Williamson...	Milo H. Stuart.....	W. J. Moenkhaus.
1911-1912	J. P. Naylor.....	A. J. Bigney.....	E. B. Williamson...	Milo H. Stuart.....	W. J. Moenkhaus.
1912-1913	Donaldson Bodine...	A. J. Bigney.....	C. M. Smith.....	F. B. Wade.....	W. J. Moenkhaus.
1913-1914	Severance Burrage...	A. J. Bigney.....	H. E. Enders.....	F. B. Wade.....	W. A. Cogshall.
1914-1915	Wilbur A. Cogshall..	A. J. Bigney.....	H. E. Enders.....	F. B. Wade.....	W. M. Blanchard.

*Deceased.

MEMBERS.*

FELLOWS.

- ‡‡Abbott, G. A., Grand Forks, N. Dak. †1908
 Professor of Chemistry, University of North Dakota.
 Chemistry.
- Aley, Robert J., Orono, Me. 1898
 President of University of Maine.
 Mathematics and General Science.
- Anderson, H. W., 1 Mills Place, Crawfordsville, Ind. 1912
 Professor of Botany, Wabash College.
 Botany.
- Andrews, F. M., 744 E. Third St., Bloomington, Ind. 1911
 Assistant Professor of Botany, Indiana University.
 Botany.
- Arthur, Joseph C., 915 Columbia St., Lafayette, Ind. 1894
 Professor of Vegetable Physiology and Pathology, Purdue University.
 Botany.
- Barnard, H. E., Room 20 State House, Indianapolis, Ind. 1910
 Chemist to Indiana State Board of Health.
 Chemistry, Sanitary Science, Pure Foods.
- Beede, Joshua W., cor. Wall and Atwater Sts., Bloomington, Ind. 1896
 Associate Professor of Geology, Indiana University.
 Stratigraphic Geology, Physiography.
- Benton, George W., 100 Washington Square, New York, N. Y. 1896
 With the American Book Company.

*Every effort has been made to obtain the correct address and occupation of each member, and to learn what line of science he is interested in. The first line contains the name and address; the second line the occupation; the third line the branch of science in which he is interested. The omission of an address indicates that mail addressed to the last printed address was returned as uncalled for. Information as to the present address of members so indicated is requested by the secretary. The custom of dividing the list of members has been followed.

†Date of election,

‡‡Non-resident,

- Bigney, Andrew J., Moores Hill, Ind. 1897
 Vice-President and Professor of Biology and Geology, Moores Hill
 College.
 Biology and Geology.
- Bitting, Catharine Golden, Washington, D. C. 1895
 Microscopic Expert, Pure Food, National Canners Laboratory.
 Botany.
- Blatchley, W. S., 1558 Park Ave., Indianapolis, Ind. 1893
 Naturalist.
 Botany, Entomology and Geology.
- Bodine, Donaldson, Four Mills Place, Crawfordsville, Ind. 1899
 Professor of Geology and Zoology, Wabash College.
 Entomology and Geology.
- Breeze, Fred J., care American Book Company, New York, N. Y. 1910
 With the American Book Company.
 Geography.
- Bruner, Henry Lane, 324 S. Ritter Ave., Indianapolis, Ind. 1899
 Professor of Biology, Butler College.
 Comparative Anatomy, Zoology.
- Burrage, Severance, care Eli Lilly Co., Indianapolis, Ind. 1898
 Charge of Biological Laboratory, Eli Lilly Co.
 Bacteriology, Sanitary Science.
- Butler, Amos W., 52 Downey Ave., Irvington, Ind. 1893
 Secretary, Indiana Board of State Charities.
 Vertebrate Zoology, Anthropology, Sociology.
- Cogshall, Wilbur A., 423 S. Fess Ave., Bloomington, Ind. 1906
 Associate Professor of Astronomy, Indiana University.
 Astronomy and Physics.
- Cook, Mel T., New Brunswick, N. J. 1902
 Professor of Plant Pathology, Rutgers College.
 Botany, Plant Pathology, Entomology.
- Coulter, John M., care University of Chicago, Chicago, Ill. 1893
 Head Department of Botany, Chicago University.
 Botany.
- Coulter, Stanley, 213 S. Ninth St., Lafayette, Ind. 1893
 Dean School of Science, Purdue University.
 Botany, Forestry.

- Cox, Ulysses O., P. O. Box 81, Terre Haute, Ind..... 1908
 Head Department Zoology and Botany, Indiana State Normal.
 Botany, Zoology.
- Culbertson, Glenn, Hanover, Ind..... 1899
 Chair Geology, Physics and Astronomy, Hanover College.
 Geology.
- Cummings, Edgar Roscoe, 327 E. Second St., Bloomington, Ind..... 1906
 Professor of Geology, Indiana University.
 Geology, Paleontology.
- Davisson, Schuyler Colfax, Bloomington, Ind..... 1908
 Professor of Mathematics, Indiana University.
 Mathematics.
- Deam, Charles C., Bluffton, Ind..... 1910
 Druggist.
 Botany.
- Dennis, David Worth, Richmond, Ind..... 1895
 Professor of Biology, Earlham College.
 Biology.
- Dryer, Charles R., Oak Knoll, Fort Wayne, Ind..... 1897
 Geographer.
- Eigenmann, Carl H., 630 Atwater St., Bloomington, Ind..... 1893
 Professor Zoology, Dean of Graduate School, Indiana University.
 Embryology, Degeneration, Heredity, Evolution and Distribution
 of American Fish.
- Enders, Howard Edwin, 105 Quincy St., Lafayette, Ind..... 1912
 Associate Professor of Zoology, Purdue University.
 Zoology.
- Evans, Percy Norton, Lafayette, Ind..... 1901
 Director of Chemical Laboratory, Purdue University.
 Chemistry.
- Foley, Arthur L., Bloomington, Ind..... 1897
 Head of Department of Physics, Indiana University.
 Physics.
- Golden, M. J., Lafayette, Ind..... 1899
 Director of Laboratories of Practical Mechanics, Purdue Uni-
 versity.
 Mechanics.

- ††Goss, William Freeman M., Urbana, Ill..... 1893
Dean of College of Engineering, University of Illinois.
- Haggerty, M. E., Bloomington, Ind..... 1913
- Hathaway, Arthur S., 2206 N. Tenth St., Terre Haute, Ind..... 1895
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Mathematics, Physics.
- Hessler, Robert, Logansport, Ind..... 1899
Physician.
Biology.
- Hilliard, C. M., Simmons College, Boston, Mass..... 1913
- Hoffer, Geo. N., West Lafayette, Ind..... 1913
- Hurty, J. N., Indianapolis, Ind..... 1910
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Sanitary Science, Vital Statistics, Eugenics.
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Botany.
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Organic and Biological Chemistry.
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Geography, Geology, Scientific Agriculture.
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Physiology.
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Chemistry, Radio-activity.

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 Morphology, Cytology.
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 Physics, Mathematics.
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 Chemistry.
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 Embryology, Comparative Anatomy.
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 Mathematics.
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 Zoology, Lake Problems.
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 Soil Survey, Botany.
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 Botany.
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 Mathematics.
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- Woollen, William Watson, Indianapolis, Ind..... 1908
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 Birds and Nature Study.
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 Botany.

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 Geology.
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 Botany, Soil Survey.
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 Mathematics, Physics, Chemistry.
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 Zoology.
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 Medicine, Surgery, X-Ray, Electro-Therapeutics.
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- Wood, Harry W., 84 North Ritter Ave., Indianapolis.
Teacher, Manual Training High School.
- Woodburn, Wm. L., 902 Asbury Ave., Evanston, Ill.
Instructor in Botany, Northwestern University.
Botany and Bacteriology.
- Woodhams, John H., care Houghton Mifflin Co., Chicago, Ill.
Traveling Salesman.
Mathematics.

Wootery, Ruth, Bloomington, Ind.

Yocum, H. B., Crawfordsville.

Young, Gilbert A., 725 Highland Ave., Lafayette.

Head of Department of Mechanical Engineering, Purdue University.

Zehring, William Arthur, 303 Russell St., West Lafayette.

Assistant Professor of Mathematics, Purdue University.

Mathematics.

Zeleny, Charles, University of Illinois, Urbana, Ill.

Associate Professor of Zoology.

Zoology.

Zufall, C. J., Indianapolis, Ind.

Fellows	70
Members, Active	260
Members, Non-resident	29
	<hr/>
Total	359

MINUTES OF THE SPRING MEETING
 OF THE
 INDIANA ACADEMY OF SCIENCE.

SOUTH BEND, INDIANA, THURSDAY, MAY 28, 1914.

Public meeting of the Academy in the auditorium of the South Bend High School. The meeting was addressed by Dr. John M. Coulter, of the University of Chicago, upon the subject "Plant Breeding and How it Will Help Solve the Problem of Our Food Supply." Attendance: About 250.

The speaker was introduced by Severance Burrage, of the Eli Lilly Drug Company of Indianapolis, President of the Academy.

BUSINESS SESSION MAY 28, 1914.

At the close of the public meeting addressed by Dr. John M. Coulter the Academy was called into business session by President Burrage.

The following committees reported:

Resolutions:

Upon motion of John S. Wright, seconded by W. S. Blatchley, and passed, "That the Secretary be instructed to wire Dr. C. H. Eigenmann our regrets at his inability to attend this meeting."

In accordance with the motion the following telegram was sent:

"Dr. Eigenmann—The members of the Indiana Academy of Science in session at the spring meeting, South Bend, May 28th, wish to express their regrets that the condition of your health prevented your attendance, and join in wishing you speedy and complete recovery."

"HOWARD E. ENDERS, Secy."

Membership:

The Membership Committee, F. M. Andrews, chairman, read the names of forty-four applicants for membership. Upon motion duly seconded and passed, the secretary cast the ballots for membership of the persons whose names were proposed.

Letters were read in acknowledgment of sympathy from Chas. W. Fairbanks; and of regrets from Dr. Harvey W. Wiley.

With the consent of the Academy, Mr. J. S. Wright was authorized to extend a special invitation to Dr. Wiley to attend the next fall and spring meetings of the Academy.

The choice of a time for the fall meeting was requested.

It was moved (Blatchley) and seconded (Cogshall) that the meeting be set for the Thanksgiving period, as heretofore for several years. The motion was amended, and passed, "to leave the time for the meeting in the hands of the Program Committee, with power to act."

(In the discussion prior to the passage of the amendment, the sentiment was against the Thanksgiving period.)

Announcements:

President Burrage announced that Professor Edward Lee Green, botanist, of the Smithsonian Institution, will be present tomorrow and will accompany the party on its excursion.

Mr. Charles Stoltz, M. D., chairman of the local committee, announced the program for tomorrow (Friday, May 29, 1914). Automobiles for the whole party leave 7:00 a. m. from the front of the Hotel Oliver; return to the same place at 4:00 o'clock in the afternoon. Banquet, 6:30 p. m., at the Hotel Oliver.

Attention was called to the fact that J. B. Garner of Crawfordsville had not received the publications and literature of the Academy. He desires his name on the mailing list.

BUSINESS SESSION MAY 29, 1914.

After the noon luncheon on the field trip—at the Adventist College, north of Berrien Springs, Michigan—the meeting was called to order by the President, Severance Burrage, for the purpose of hearing the report of the Membership Committee.

F. M. Andrews, chairman, presented the names of six persons for membership.

Upon motion, duly seconded and passed, the secretary cast the ballot for their election to membership.

Announcements concerning the further movements of the party were made by local chairman, Dr. Stoltz.

BANQUET AND BUSINESS SESSION.

HOTEL OLIVER, May 29, 1914.

An ample banquet was spread in one of the private dining-rooms of the Hotel Oliver for forty-eight persons. President Severance Burrage, as master of ceremonies, expressed pleasure with the entertainment provided by the local committee. He made a strong plea for a large attendance and an increased membership for the fall meeting.

President Burrage then called upon the following persons for toasts and for expression of their sentiments.

Rev. John Cavanagh, of Notre Dame University, extended the greetings of the city and of Notre Dame to the members of the Academy.

Professor Dennis, of Earlham College: "How the Other Man Looks at It."

Professor Edward Lee Green, of the Smithsonian Institution, Washington, D. C., "The Unchangeableness of Nature, or the Stability of Science and the future of the Academy of Science."

Amos Butler, chairman of the State Board of Charities: "The Problem of Dealing with Mental Defectives."

Judge Hubbard, of South Bend: "Geology of the Regions About South Bend."

Dr. W. S. Blatchley, former State Geologist: "Geological Rambles."

Father Nieuwland, of Notre Dame University: Invitation to members of the Academy to visit him in his laboratories.

Professor Mottier of Indiana University: "Conservation of Our Young Members."

Professor Bodine, Wabash College: "A Personal Appreciation of the Day."

Dr. J. C. Arthur. "The Influence of the Academy of Science."

Eugene Manning, City Comptroller of South Bend, in the absence of the Mayor, extended the good-will of the city.

Dr. Montgomery of South Bend, "Welcome to our Homes, and to our Town."

Dr. Stoltz, South Bend, expressed his appreciation in the name of the local committee.

The *Business Session* was called to order by President Burrage.

The Membership Committee, F. M. Andrews, chairman, reported the

names of five applicants for membership. Upon motion, duly seconded, and passed, the Secretary cast the ballot for their election to membership.

Attention was called by the President to the fact that nearly sixty members were added to the Academy during the spring meeting.

Amos Butler read several letters relative to the passage of the congressional bills on the protection of migratory birds. Attention was also called to the treaty with Canada, aimed to protect migratory birds.

The following motion was passed: "That the President of the Academy of Science be appointed a committee of one to express to Senators Shively and Kern the earnest desire that they support all efforts to make the migratory bird law effective, and support the international treaty with Canada for bird protection in every way possible."

In accordance with this motion the following telegram was sent:

"MAY 29, 1914.

Hon. Benj. F. Shively, U. S. Senate, Washington, D. C.:

"The Indiana Academy of Science in session here heartily endorses your support of the appropriation to make the bird law effective, and relies upon you to support legislation for the protection of the birds, including the treaty with Canada. We regard these as important to all the people.

"SEVERANCE BURRAGE, President."

Mr. Butler requested all the members of the Academy to write Senators Kern and Shively relative to the bird legislation. Many members pledged to do so.

A resolution, introduced by Professor Bodine, was passed: "That a rising vote of thanks be extended to Dr. Stoltz, Dr. Montgomery, and the other members of the local committee for the fine entertainment today."

Adjournment.

HOWARD E. ENDEES,

Assistant Secretary.

The following were elected to membership May 29, 1914:

Ethel Montgomery, South Bend, Ind. Physics.

Helen A. Southgate, Michigan City, Ind. Physiography and Botany.

Jose Angel Caparo, Notre Dame, Ind. Physics and Mathematics.

Dr. D. A. Rhinehart, 301 N. Walnut Street, Bloomington, Ind. Anatomy.

Thurman Brooks Rice, Winona Lake, Ind. Botany.

- Charles M. Schnell, South Bend, Ind. Earth Science.
- Roy H. Schierling, P. O. Box 172, Bloomington, Ind.
- Philip Armand Tetrault, West Lafayette, Ind. Biology.
- James Troop, Lafayette, Ind. Entomology.
- Charles Stech, Bloomington, Ind. Geology.
- Leonard L. Steimley, Bloomington, Ind., Indiana Club. Mathematics.
- Forest Glenn Tucker, 430 E. Fourth Street, Bloomington, Ind. Geology.
- W. A. Wissler, 415 S. Grant Street, Bloomington, Ind. Chemistry.
- Glenn Blaine Ramsey, University of Maine, Orono, Maine. Botany.
- H. C. Oberholzer, U. S. Department of Agriculture, Washington, D. C. Biology.
- Thomas J. Murray, West Lafayette, Ind. Bacteriology.
- Fred A. Molby, 525 S. Park Avenue, Bloomington, Ind. Physics.
- Preston Walter Mason, Purdue University, Lafayette, Ind. Entomology.
- E. C. Marshall, 409 E. Fourth Street, Bloomington, Ind. Chemistry.
- Clyde A. Malott, 209 S. Dunn Street, Bloomington, Ind. Geology.
- Joseph McGuire, Notre Dame, Ind. Chemistry.
- Fred J. McCartney, Bloomington, Ind. Philosophy.
- Edward Koch, 314 N. Washington Street, Bloomington, Ind. Physiology.
- Charles Bernard Jordan, West Lafayette, Ind. Director of School of Pharmacy, Purdue University.
- Regedius M. Kaezmarek, Notre Dame, Ind. Biology.
- Glenn James, West Lafayette, Ind. Mathematics.
- Thomas F. Jackson, 325 S. Grant Street, Bloomington, Ind. Geology.
- Thos. P. Irving, Notre Dame, Ind. Physics.
- Herbert Imel, South Bend, Ind., care Studebaker School. Zoölogy.
- George Hyslop, Bloomington, Ind., Kappa Sigma House. Philosophy.
- Chas. P. Hutchins, Buffalo, New York. Athletics.
- W. F. Hostetler, South Bend, Ind. Geography and Indian History.
- Paul M. Harman, 111 W. Dunn Street, Bloomington, Ind. Geology.
- Louis M. Hammerschmidt, South Bend, Ind. Science of Law.
- William Happ, South Bend, Ind. Botany.
- Elbert Howard Clark, West Lafayette, Ind. Mathematics.
- John B. Berteling, South Bend, Ind. Medicine.
- Homer Glenn Fisher, 727 Atwater Street, Bloomington, Ind. Zoölogy.
- David Christie Duncan, West Lafayette, Ind. Instructor in Physics Purdue University.

Albert H. Dewey, West Lafayette, Ind. Dept. of Pharmacy, Purdue University.

Ernest A. Davis, Notre Dame, Ind. Chemistry.

Noble H. Coryell, 330 S. Henderson Street, Bloomington, Ind. Chemistry.

Jacob Roland Collins, W. Lafayette, Ind. Instructor in Physics, Purdue University.

Flora Charlotte Anderson, Wellesley College, Wellesley, Mass. Botany.

Paul J. Carlyle, 315 N. Washington Street, Bloomington, Ind. Chemistry.

William Franklin Baker, Indianapolis, Ind., care Eli Lilly & Co. Medicine.

George A. Baker, South Bend, Ind. Archaeology.

J. A. Badertscher, 509 N. Washington Street, Bloomington, Ind. Anatomy.

William Gidley, W. Lafayette, Ind. Dept. of Pharmacy, Purdue University.

Willis D. Gatch, Indianapolis, Ind., Indiana University Medical School. Anatomy.

George Kedzie Foresman, 110 S. Ninth Street, Lafayette, Ind. Chemistry. Purdue University.

Carl Clayton Hyde, Bloomington, Ind., Kappa Sigma House. Geology.

Arthur Wilbur Henn, 821 Atwater Avenue, Bloomington, Ind. Zoölogy.

Ralph Benjamin Wiley, 1012 Seventh Street, West Lafayette, Ind., Purdue University. Hydraulic Engineering.

MINUTES OF THE THIRTIETH ANNUAL MEETING.
INDIANA ACADEMY OF SCIENCE.

CLAYPOOL HOTEL, INDIANAPOLIS, IND., DEC. 4, 1914.

The Executive Committee of the Indiana Academy of Science met in the Assembly Room, and was called to order by the President, Severance Burrage of Indianapolis, Ind.

The following members were present: Severance Burrage, Andrew J. Bigney, Howard E. Enders, W. A. Cogshall, Donaldson Bodine, J. P. Naylor, Glenn Culbertson, John S. Wright, Stanley Coulter, A. W. Butler, and Robert Hessler.

The minutes of the Executive Committee of 1913 were read and approved.

The reports of the standing committees were then taken up.

The Program Committee, John S. Wright, chairman, reported the work completed as indicated by the printed program, with three additional papers.

Amos W. Butler, member of the State Library Committee, reported that progress is being made in the way of housing books of the Indiana Academy of Science. Lack of available funds hampers the State Librarian in binding of exchanges. The State Librarian requests a ruling upon the matter of sending out proceedings to individuals upon request.

On motion, duly passed, the matter of distribution of proceedings is left to the discretion of the Committee on Distribution of Proceedings and the State Librarian.

On motion, duly passed, John S. Wright is authorized to prepare a revised membership blank and have it in order for use next year.

REPORT OF MEMBERSHIP COMMITTEE, F. M. ANDREWS, CHAIRMAN.

The following named persons are proposed for membership in the Academy:

Harry C. Travelbee, 304 Oak Street, West Lafayette, Ind. Botany.

- William J. Cotton, 5363 University Avenue, Indianapolis, Ind. Physics and Chemistry.
- Charles H. Arndt, Lafayette, Ind. Biology.
- William W. Smith, West Lafayette, Ind. Genetics.
- Oliver P. Ferry, West Lafayette, Ind. Physiology.
- Louis Frederick Heimlich, 703 North Street, Lafayette, Ind. Biology.
- Harry Creighton Pepper, West Lafayette, Ind. Chemical Engineering.
- Paul E. Bowers, Michigan City, Ind. Medicine.
- Charles P. Emerson, Hume-Mansur Building, Indianapolis, Ind. Dean Indiana University Medical College. Medicine.
- Ralph Emory Nelson, 419 Vine Street, West Lafayette, Ind. Chemistry.
- Ralph Bushnell Stone, West Lafayette, Ind., Purdue. Mathematics.
- W. H. Hanna, 828 Atwater Avenue, Bloomington, Ind. Mathematics.
- Fred Earl Robbins, 215 Waldron Street, West Lafayette, Ind. Agriculture.
- Ralph B. Stone, 307 Russell Street, West Lafayette, Ind. Mathematics.
- Frank Scott Corey Wicks, Indianapolis, Ind. Sociology.
- F. C. Atkinson, Indianapolis, Ind., American Hominy Co. Chemistry.
- Arthur Iddings, Hanover, Ind. Geology.
- Harry Binford, Earlham, Ind. Zoölogy.
- Samuel Hugh Hamill, 110 E. Fourth Street, Bloomington, Ind. Chemistry.
- Ralph Howard Carr, Lafayette, Ind. Chemistry.
- George Lindenbug Clark, Greencastle, Ind., DePauw University. Chemistry.
- Dr. D. W. Davis, Greencastle, Ind., DePauw University. Biology.
- Ondess L. Inman, Bloomfield, Ind. Botany.
- Richard Sigler, Terre Haute, Ind. Physiology.
- Adam L. Bowles, Terre Haute, Ind. Zoölogy.
- John Ralph Keubler, 110 E. Fourth Street, Bloomington, Ind. Chemistry.
- Dr. Daniel T. Miller, Indiana University, Bloomington, Ind. Anatomy.
- Fred Donaghy, Ossian, Ind. Botany.
- Horace Powell, West Terre Haute, Ind. Zoölogy.
- William Marion Goldsmith, Oakland City, Ind. Zoölogy.
- Muri E. Fulk, Decatur, Ind. Anatomy.
- Michael James Blew, R. R. 1, Wabash, Ind. Chemistry and Botany.
- Harvey Elmer Stork, Huntingburg, Ind. Botany.
- Harold Orahood, Kingman, Ind. Geology.
- Dr. VanDoran, Earlham College, Richmond, Ind. Prof. of Chemistry.

- Carlton Edwards, Earlham College, Earlham, Ind.
 W. C. Van Nys, Newcastle, Ind. Medicine.
 Barclay D. Morris, Spiceland, Ind., Spiceland Academy. Science.
 Paul H. Brown, Richmond, Ind. Physics and Manual Training.
 Bernard F. Dostal, Bloomington, Ind. Physics.
 O. C. Berry, Waldron Street, West Lafayette, Ind. Engineering.
 James M. Breckenridge, 514 S. Walnut Street, Crawfordsville, Ind. Chemistry.
 Dr. V. H. Moon, Indianapolis, Ind. Pathology.
 H. C. Balcom, 1023 Park Avenue, Indianapolis, Ind. Botany.
 Elton R. Clark, Indianapolis, Ind. Zoölogy.
 A. E. Stickels, 768 Massachusetts Avenue, Indianapolis, Ind. Chemistry.
 John C. Dean, Indianapolis, Ind. Astronomy.
 Dr. G. S. Bliss, Fort Wayne, Ind., State School for Feeble-Minded. Medicine.

On motion they were recommended.

The Treasurer, W. A. Cogshall, reported as follows:

Balance from 1913	\$254 78
Collected to December 1st	133 00
	<hr/>
Total	\$387 78
Expenses December 1st	174 79
	<hr/>
	\$212 99

Upon motion, duly passed, the report was received and turned over to the Auditing Committee.

On publication of Proceedings, H. E. Barnard, editor, reported the publication and distribution of Proceedings for 1913.

On motion the following members were recommended as Fellows:

Fellows, Wm. L. Bryan, Indiana University, Psychology; E. B. Williamson, Bluffton, Biology; A. W. Kenyon, Purdue, Mathematics; J. A. Nieuwland, Botany; Wm. M. Blanchard, DePauw University, Chemistry.

The matter of avoiding duplication of reports was discussed. It is deemed desirable to have committees report at the executive session and that only the Secretary's summarized report be read at the general meetings.

The Secretary reported the binding of the minutes of previous sessions of the Academy, and the purchase of a new Secretary's book. The Secretary reported that the State Librarian has consented to deposit the bound copies of the minutes in the safe of the State Library.

President Burrage reported that he had appointed the following persons as delegates to the State Tax Association: Judge R. W. McBride, William Lowe Bryan. Alternates, E. B. Williamson, Dr. Cecil C. North. Adjournment.

GENERAL SESSION. ASSEMBLY ROOM, 2:00 P. M.

The meeting was called to order by President Severance Burrage.

The minutes of the Executive Committee were read and approved.

On motion, duly passed, the persons who were recommended for membership were elected members of the Indiana Academy of Science.

On motion, duly passed, the five persons who were recommended by the Executive Committee were elected fellows in the Academy of Science.

The regular program was then taken up. The papers numbered 1-11 were read in general session; after which the Academy separated into two sections as follows: Section A—Bacteriology, Botany and Zoology, presided over by President Burrage and H. E. Enders being Secretary. Section B—Chemistry, Physics, Engineering, Geography, Geology, Mathematics, and Meteorology; W. A. Cogshall presiding and A. J. Bigney being Secretary.

EVENING SESSION, 8:00 O'CLOCK.

Business:

The report of the Nominating Committee was as follows: President—W. A. Gogshall, Bloomington; Vice-President—W. A. McBeth, Terre Haute; Secretary—A. J. Bigney, Moores Hill; Assistant Secretary—Howard E. Enders, Lafayette; Press Secretary—Frank B. Wade, Indianapolis; Treasurer—William M. Blanchard, Greencastle; Editor—H. E. Barnard, Indianapolis.

On motion the report was accepted, and the persons named were elected for the ensuing year.

SATURDAY, DECEMBER 5TH, 9:00 A. M.

Business:

The following resolutions were presented by the chairman of the Resolution Committee, Stanley Coulter of Purdue University:

Resolution No. 1.

Resolved, That the Indiana Academy of Science, recognizing the importance to the State and Society of the Preservation of the Public Health, hereby endorses the proposal for a thoroughly trained county health commissioner, who will give his entire time to this service, and urges the Legislature to pass a law to that end.

Resolution No. 2.

Resolved, That we extend a vote of thanks to Mr. Lawrence, manager of the Claypool Hotel, for the use of rooms for the meetings of the Academy, and for his continued kindness in aiding us in every way possible.

Resolution No. 3.

(On suggestion of R. R. Ramsey.)

Be it Resolved, That as certain periodicals, such as Science Abstracts A and B, *Baiblaita zu der Annalen der Physik* (in Physics), and in all probability other magazines in other lines are not on the list of exchanges, that such exchanges be sought and obtained if possible. If not successful, periodicals whose nature is primarily abstracting, should be put on the mailing list.

On suggestion of Will Scott that our journals should be open to foreign scientists, Stanley Coulter moved, and it was passed, that a committee be appointed to take up the matter with the Smithsonian Institution regarding the opening of our scientific journals to foreign scientists for publication of their papers.

On motion the Academy endorsed the plan of the State Geologist to cooperate with the United States Geological Survey, with a view to the prevention of floods in Indiana (see resolution of last year), and ordered that a copy of that resolution be sent to the Governor, Lieutenant-Governor, and Speaker of the House.

Adjourned to sections.

AFTERNOON SESSION, 1:00 O'CLOCK.

Section B met to complete the reading of its papers.

Adjournment.

A. J. BIGNEY, Secretary.

SEVERANCE BURRAGE, President.

PROGRAM
OF THE THIRTIETH ANNUAL MEETING OF THE
INDIANA ACADEMY OF SCIENCE,
CLAYPOOL HOTEL, INDIANAPOLIS,
FRIDAY AND SATURDAY, DECEMBER 4 AND 5, 1914.

GENERAL PROGRAM.

FRIDAY, DECEMBER 4.

Meeting of Executive Committee	10:30 a. m.
General Session	2:00 p. m.
Section Meetings	4:00 p. m.
Informal Dinner, Tickets \$1.00. For reservation, apply to W. M. Blanchard, DePauw University, Greencastle.	
	6:00 p. m.
Business Session	7:45 p. m.
General Session	8:00 p. m.
Address by the Retiring President, Severance Burrage.	
Symposium on Feeble-mindedness.	

SATURDAY, DECEMBER 5.

General Session	9:00 a. m.
Section Meetings	9:45 a. m.
General Session, followed by Section Meetings (provided the time is required to complete the program)	2:00 p. m.

LIST OF PAPERS TO BE READ.

Address by the Retiring President, Mr. Severance Burrage.

GENERAL SESSION AT EIGHT O'CLOCK, FRIDAY EVENING.

Subject: "Science in Its Relation to Conservation of Human Life."

Symposium: Some Scientific and Practical Aspects of the Problem of
Feeble-mindedness.

1. The Feeble-minded Family Amos W. Butler, Indianapolis
 2. The Problem of Feeble-mindedness Dr. G. S. Bliss, Ft. Wayne
 3. The Feeble-minded and Delinquent Boy . Dr. F. E. Paschal, Jeffersonville
 4. The Feeble-minded and Delinquent Girl . Dr. E. E. Jones, Evanston, Ill.
 5. Feeble-mindedness in the Public School . Miss Katrina Myers, Indianapolis
- Discussion opened by Mr. F. S. C. Wicks.

GENERAL—TWO O'CLOCK FRIDAY.

6. The Alcohol Problem in the Light of Coniosis,
20 minutes.....Robert Hessler
7. Cold Storage, Practical Conservation, 20 minutes.....H. E. Barnard
8. Changing Conditions among the Cumberland Plateau Mountain
People, lantern, 20 minutes.....Bernard H. Schockel
9. The Conservation of Energy, 30 minutes.....Arthur L. Foley
10. Agriculture in Southern Indiana, 15 minutes.....C. G. Phillips
11. The Chief Reason for the Migration of Our Birds, 15 minutes.....D. W. Dennis

BACTERIOLOGY.

12. An Aeration Apparatus for Culture Solutions, with charts,
10 minutes.....Paul Weatherwax
13. Autagonism of *B. fluorescens* and *B. typhosus* in Culture,
10 minutes.....P. A. Tetrault

BOTANY.

14. Notes on the Distribution of the Forest Trees of Indiana,
15 minutes.....Stanley Coulter
15. A New Enemy of the Black Locust, 5 minutes.....Glenn Culbertson
16. The Parasitic Fungi Attacking Forest Trees in Indiana,
10 minutes.....Geo. N. Hoffer
17. A New Disease of *Viola cucullata*, lantern, 5 minutes....H. W. Andersons
18. Oatsmut in Indiana, 15 minutes.....F. J. Pipal
- 18a. Weed Seeds in soil, 10 minutes.....F. J. Pipal
19. Additions to Indiana Flora, 3 minutes.....Chas. C. Deam
20. Some Peculiarities in *Spirogyra dubia*, 5 minutes.....Paul Weatherwax
21. Stomata of *Trillium nivale*, 10 minutes.....F. M. Andrews
22. Final Report on Cross Pollination of Corn, 3 minutes.....M. L. Fisher
23. The Primrose-Leaved Violet in White County, charts
and specimens, 10 minutes.....Louis F. Heimlich
24. Continuous Rust Propagation without Sexual Reproduction,
10 minutes.....C. A. Ludwig
25. Correlation of Certain Long-cycled and Short-cycled Rusts,
10 minutes.....H. C. Travelbee
26. Some Species of *Nummularia* Common in Indiana, 10 minutes
.....C. E. O'Neal.
27. The Genus *Roscellinia* in Indiana, 2 minutes.....Glenn B. Ramsey

28. Cultivating and Breeding Medicinal Plants, lantern,
20 minutes..... Fred A. Miller
29. Some Large Botanical Problems, 10 minutes..... J. C. Arthur

ZOOLOGY.

30. The Alba Gehre Collection of Birds' Eggs in the Museum
of Purdue University, 10 minutes.....Howard E. Enders
31. A Study of the Maturation Period in the Mole-Cricket, blackboard,
10 minutes.....F. Payne
32. Note on a Peculiar Nesting Site of Chimney Swift,
3 minutes.....Glenn Culbertson
33. Mosaics in *Drosophila Ampelophila*, chart, 5 minutes..Horace M. Powell
34. New Mutations in the Genus *Drosophila* and their Behavior
in Heredity, chart, 10 minutes.....Roscoe R. Hyde
35. Notes on Indiana Earthworms, 10 minutes.....H. V. Heimburger
36. Insects of the Between-Tides Zone, 30 minutes.....Chas. H. Arndt
37. Regeneration in *Sagartia*, 5 minutes..... D. W. Davis
38. The Relation of Birds to Aquatic Life as Exemplified by
Observation and Studies made at Lake Maxinkuckee,
15 minutes..... Barton W. Evermann
39. The Reptiles and Batrachians of the Lake Maxinkuckee
Region, 20 minutes.....Barton W. Evermann.
40. A Physical and Biological Survey of Lake Maxinkuckee,
20 minutes..... Barton W. Evermann

CHEMISTRY.

41. The Quantitative Determination of Copper, 5 minutes..W. M. Blanchard
42. The Alundum Crucible as a Substitute for the Gooch
Crucible, 5 minutes.....George L. Clark
43. Some Recent Work in Dairy Chemistry, 20 minutes.....George Spitzer
44. Analysis of Zirconium Minerals, 10 minutes.....James Brown
45. Correlation of High School and College Chemistry,
20 minutes..... James Brown
46. Chemical Composition of Virgin and Cropped Indiana Soils,
10 minutes.....S. D. Conner

ENGINEERING.

47. Sewage Disposal, lantern, 15 minutes.....Charles Brossmann
48. Extension of Empirical Curve by the Addition of Estimated Values
to a Series of Observations, charts, 20 minutes.....Albert Smith

49. Tar-Forming Temperatures of American Coals, charts, 20 minutes
 O. C. Berry.

GEOGRAPHY.

50. Shawnee Mound, Tippecanoe County, A Glacial Alluvial Cone,
 charts and photographs, 10 minutes..... William A. McBeth

GEOLOGY.

51. Stratigraphic Correlation of the Outcrop at Spades, Indiana,
 15 minutes..... H. N. Coryell
52. Pennsylvania Fossil Plants of the Bloomington Quadrangle,
 5 minutes..... J. F. Jackson
53. Preliminary Geological History of Dearborn County, 10 minutes
 A. J. Bigney
54. Notes on the Cause of Asterism in "Starolite" (Asteriated Quartz),
 charts and specimens, 10 minutes..... Frank B. Wade
55. The Mississippian Section of Monroe County, charts, 15 minutes
 J. W. Beede
56. The Flatwoods Region of Owen and Monroe Counties, Indiana,
 25 minutes..... Clyde A. Malott

MATHEMATICS.

57. Mechanical Device for Testing Mersenne Numbers for Primes,
 5 minutes..... Thomas E. Mason
58. Some Properties of Binominal Coefficients, 20 minutes... A. M. Kenyon

METEOROLOGY.

59. The Watertown, S. D., Tornado of June 23, 1914, 10 minutes
 J. Gladden Hutton

PHYSICS.

60. A New Lantern and Projector, lantern, 10 minutes..... Arthur L. Foley
61. Some Text Book Inconsistencies, 5 minutes..... Arthur L. Foley
62. The Mechanism of Light and Heat Radiations, 10 minutes
 James E. Weyant
63. A Simple Form for the Carey Foster Bridge, lantern, 5 minutes
 J. P. Naylor
64. The Change of the Radio Activity of Certain Springs, lantern,
 10 minutes..... R. R. Ramsey
65. Radio Activity of Spring Water, lantern, 10 minutes..... R. R. Ramsey
66. A Radio-Active Electroscop, lantern, 5 minutes..... Edwin Morrison

