

PROCEEDINGS

OF THE

Indiana Academy of Science

1917

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LEE F. BENNETT, EDITOR

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INDIANAPOLIS :

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

1918



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# CONSTITUTION.

LIBRA  
NEW Y  
BOTAN  
GARDE

## 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 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 members or active members.

SEC. 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. 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, 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.

SEC. 2. The annual meeting of the 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.

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## BY-LAWS.

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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.

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 Pro-

ceedings in excess of fifty (\$50) dollars except by special action of the Executive Committee. (Amendment passed December 8, 1917.)

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 1917-1918.

The appropriation for the publication of the proceedings of the Academy during the years 1916 and 1917 was increased by the Legislature in the General Appropriation bill, approved March 8, 1915. The Act making appropriation for the years 1917-1918 and 1918-1919 was approved March 6, 1917. 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 1916 shall be available for 1917 and that any unexpended balance in 1917 shall be available in 1918.

## PUBLIC OFFENSES—HUNTING WILD BIRDS—PENALTY.

(Approved March 15, 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 Gallinae, 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, 1918.

PRESIDENT,

E. B. WILLIAMSON.

VICE-PRESIDENT,

CHARLES STOLTZ.

SECRETARY,

HOWARD E. ENDERS.

ASSISTANT SECRETARY,

PHILIP A. TETRAULT.

PRESS SECRETARY,

FRANK B. WADE.

TREASURER,

WILLIAM M. BLANCHARD.

EDITOR,

LEE F. BENNETT.

## EXECUTIVE COMMITTEE:

ARTHUR, J. C.,	DRYER, CHAS. R.,	MENDENHALL, T. C.,
BENNETT, L. F.,	EIGENMANN, C. H.,	NAYLOR, JOSEPH P.,
BIGNEY, A. J.,	ENDERS, HOWARD E.,	NOYES, W. A.,
BLANCHARD, W. M.,	EVANS, P. N.,	STOLTZ, CHARLES,
BLATCHLEY, W. S.,	FOLEY, A. L.,	TETRAULT, P. A.,
BRANNER, J. C.,	HAY, O. P.,	WADE, F. B.,
BURRAGE, SEVERANCE,	HESSLER, ROBERT,	WALDO, C. A.,
BUTLER, AMOS W.,	JORDAN, D. S.,	WILEY, H. W.,
COGSHALL, W. A.,	McBETH, W. A.,	WILLIAMSON, E. B.,
COULTER, JOHN M.,	MEES, CARL L.,	WRIGHT, JOHN S.
COULTER, STANLEY,	MOENKHAUS, W. J.,	
CULBERTSON, GLENN,	MOTTIER, DAVID M.,	

## CURATORS:

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

## COMMITTEES ACADEMY OF SCIENCE, 1918.

*Program.*

C. C. DEAM, Bluffton  
 FRANK B. WADE, Shortridge High  
 School, Indianapolis  
 JOHN S. WRIGHT, Indianapolis

*Nominations.*

STANLEY COULTER, Lafayette  
 W. J. MOENKHAUS, Bloomington  
 J. P. NAYLOR, Greencastle

*State Library.*

W. S. BLATCHLEY, 1558 Park Av-  
 enue, Indianapolis  
 A. L. FOLEY, Bloomington  
 AMOS W. BUTLER, State House, In-  
 dianapolis

*Biological Survey.*

HERBERT S. JACKSON, Agr. Experi-  
 ment Station, West Lafayette  
 RICHARD M. HOLMAN, Crawfords-  
 ville  
 M. S. MARKLE, Richmond  
 WILL SCOTT, Indiana University,  
 Bloomington

*Distribution of Proceedings.*

HOWARD E. ENDERS, West Lafay-  
 ette  
 WM. M. BLANCHARD, Greencastle  
 U. O. COX, State Normal, Terre  
 Haute  
 GEORGE OSNER, West Lafayette

*Membership.*

F. M. ANDREWS, Bloomington  
 M. L. FISHER, West Lafayette  
 MASON L. WEEMS, Valparaiso

*Auditing.*

GLENN CULBERTSON, Hanover  
 ROLLO RAMSEY, Bloomington

*Relation of the Academy to the State.*

R. W. MCBRIDE, 1239 State Life  
 Building, Indianapolis  
 GLENN CULBERTSON, Hanover  
 H. E. BARNARD, State House, Indi-  
 anapolis  
 JOHN S. WRIGHT, 3718 Penn. St.,  
 Indianapolis  
 W. W. WOOLLEN, 1628 Penn. St.,  
 Indianapolis

*Publication of Proceedings.*

LEE F. BENNETT, 825 Laporte Av-  
 enue, Valparaiso  
 ROBERT HESSLER, Logansport.  
 GEORGE N. HOFFER, West Lafayette  
 R. R. HYDE, Terre Haute  
 JAMES BROWN, 5372 E. Washington  
 St., Indianapolis

*Advisory Council.*

JOHN S. WRIGHT  
 R. W. MCBRIDE  
 GLENN CULBERTSON  
 STANLEY COULTER  
 WILBUR COGSHALL

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 W. W. Norman }		C. A. Waldo.
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.

OFFICERS—Continued.

YEARS.	PRESIDENT.	SECRETARY.	ASST. SECRETARY.	PRESS SECRETARY.	TREASURER.
1904-1905	John S. Wright.....	Lynn B. McMullen.	J. H. 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. H. 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.....	Howard E. Enders.	F. B. Wade.....	W. A. Cogshall.
1914-1915	Wilbur A. Cogshall...	A. J. Bigney.....	Howard E. Enders.	F. B. Wade.....	Wm. M. Blanchard.
1915-1916	A. J. Bigney.....	Howard E. Enders.	E. B. Williamson...	F. B. Wade.....	Wm. M. Blanchard.
1916-1917	W. J. Moenkhaus.....	Howard E. Enders.	P. A. Tetrault.....	F. B. Wade.....	Wm. M. Blanchard.
1917-1918	E. B. Williamson.....	Howard E. Enders.	P. A. Tetrault.....	F. B. Wade.....	Wm. M. Blanchard.

\*Deceased.

## MEMBERS.\*

## FELLOWS.

- Anderson, H. W., Urbana, Ill.....†1912  
 Department of Botany, University of Illinois.  
 Botany.
- Andrews, F. M., 901 E. 10th Street, Bloomington..... 1911  
 Associate Professor of Botany, Indiana University.  
 Plant Physiology, Botany.
- Arthur, Joseph C., 915 Columbia St., Lafayette..... 1893  
 Professor (Retired) of Vegetable Physiology and Pathology,  
 Purdue University.  
 Botany.
- Badertscher, J. A., Bloomington..... 1917  
 Professor of Anatomy, Indiana University.  
 Anatomy.
- Barnard, H. E., Room 20 State House, Indianapolis..... 1910  
 Chemist to Indiana State Board of Health, State Food Admin-  
 istrator.  
 Chemistry, Sanitary Science, Pure Foods.
- Beede, Joshua W., 404 W. 38th St., Austin, Texas..... 1906  
 Bureau of Economic Geology and Technology, Univ. Texas.  
 Geology.
- Behrens, Charles A., West Lafayette, Ind..... 1917  
 Professor of Bacteriology, Purdue University.  
 Bacteriology.
- Bennett, Lee F., 825 Laporte Ave., Valparaiso..... 1916  
 Professor of Geology and Zoology, Valparaiso University.  
 Geology, Zoology.

\* Every effort has been made to obtain the correct address and occupation of each member, and to learn in what line of science he is interested. 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.

- Benton, George W., 100 Washington Square, New York, N. Y. . . . . 1896  
Editor in Chief, American Book Company.
- Bigney, Andrew J., Moores Hill, Ind. . . . . 1897  
Professor of Biology and Geology, Moores Hill College.  
Biology, Geology.
- Bitting, Mrs. Katherine Golden, Washington, D. C. . . . . 1895  
Microscopic Expert, Pure Food, National Canners Laboratory.  
Botany.
- Blanchard, William M., 1008 S. College Ave., Greencastle, Ind. . . . . 1914  
Professor of Chemistry, DePauw University, Greencastle, Ind.  
Organic Chemistry.
- Blatchley, W. S., 1558 Park Ave., Indianapolis. . . . . 1893  
Naturalist.  
Botany, Entomology, and Geology.
- Breeze, Fred J., Hunter Avenue, Bloomington. . . . . 1910  
Graduate School, Indiana University.  
Geography.
- Bruner, Henry Lane, 324 S. Ritter Ave., Indianapolis. . . . . 1899  
Professor of Biology, Butler College.  
Comparative Anatomy, Zoology.
- Bryan, William Lowe, Bloomington. . . . . 1914  
President Indiana University.  
Psychology.
- Butler, Amos W., 52 Downey Ave., Irvington. . . . . 1893  
Secretary, Indiana Board of State Charities.  
Vertebrate Zoology, Anthropology, Sociology.
- Cogshall, Wilbur A., 423 S. Fess Ave., Bloomington. . . . . 1906  
Associate Professor of Astronomy, Indiana University.  
Astronomy.
- Coulter, Stanley, 213 S. Ninth St., Lafayette. . . . . 1893  
Dean School of Science, Purdue University.  
Botany, Forestry.
- Cox, Ulysses O., P. O. Box 81, Terre Haute. . . . . 1908  
Head Department Zoology and Botany, Indiana State Normal.  
Botany, Zoology.

- Culbertson, Glenn, Hanover. . . . . 1899  
 Chair Geology, Physics and Astronomy, Hanover College.  
 Geology.
- Cumings, Edgar Roscoe, 327 E. Second St., Bloomington. . . . . 1906  
 Professor of Geology, Indiana University.  
 Geology, Paleontology.
- Deam, Charles C., Bluffton. . . . . 1910  
 Druggist, Botanist, State Forester.  
 Botany.
- Dryer, Charles R., Oak Knoll, Fort Wayne, or Terre Haute. . . . . 1897  
 Geography.
- Dutcher, J. B., 1212 Atwater St., Bloomington. . . . . 1914  
 Associate Professor of Physics, Indiana University.  
 Physics.
- Eigenmann, Carl H., 630 Atwater St., Bloomington. . . . . 1893  
 Professor of Zoology, Dean of Graduate School, Indiana University.  
 Embryology, Degeneration, Heredity, Evolution and Distribution of American Fish.
- Enders, Howard Edwin, 107 Fowler Ave., Lafayette. . . . . 1912  
 Professor of Zoology, Purdue University.  
 Zoology.
- Evans, Percy Norton, 302 Waldron Street, West Lafayette. . . . . 1901  
 Director of Chemical Laboratory, Purdue University.  
 Chemistry.
- Foley, Arthur L., Bloomington. . . . . 1897  
 Head of Department of Physics, Indiana University.  
 Physics.
- Golden, M. J., West Lafayette. . . . . 1899  
 Formerly Director of Laboratories of Practical Mechanics,  
 Purdue University.  
 Mechanics.
- Hathaway, Arthur S., 2206 N. Tenth St., Terre Haute. . . . . 1895  
 Professor of Mathematics, Rose Polytechnic Institute.  
 Mathematics, Physics.

- Hessler, Robert, Logansport..... 1899  
 Physician.  
 Biology.
- Hoffer, George N., Littleton St., West Lafayette..... 1913  
 Federal Agent, Purdue University Experiment Station.
- Hufford, Mason E., Bloomington..... 1916  
 Physics.
- Hurty, J. N., Indianapolis..... 1910  
 Secretary, Indiana State Board of Health.  
 Sanitary Science, Vital Statistics, Eugenics.
- Hyde, Roscoe Raymond, 636 Chestnut Street, Terre Haute..... 1909  
 Assistant Professor Physiology and Zoology, Indiana State  
 Normal.  
 Zoology, Physiology, Bacteriology.
- Kenyon, Alfred Monroe, 315 University St., West Lafayette..... 1914  
 Professor of Mathematics, Purdue University.  
 Mathematics.
- Kern, Frank D., State College Pa..... 1912  
 Professor of Botany, Pennsylvania State College.  
 Botany.
- Koch, Edward W., Eli Lilly Co., Indianapolis..... 1917  
 Department of Research, Eli Lilly Co.  
 Physiology.
- Logan, Wm. N., 320 S. Fess Ave., Bloomington..... 1917  
 Professor of Economic Geology, Indiana University.  
 Geology.
- McBeth, William A., 1905 N. Eighth St., Terre Haute..... 1904  
 Assistant Professor of Geography, Indiana Normal School.  
 Geography, Geology, Scientific Agriculture.
- McBride, Robert W., 1239 State Life Building, Indianapolis..... 1916  
 Lawyer.
- Middleton, A. R., 629 University St., West Lafayette..... 1908  
 Professor of Chemistry, Purdue University.  
 Chemistry.
- Moenkhaus, William J., 501 Fess Ave., Bloomington..... 1901  
 Professor of Physiology, Indiana University.  
 Physiology.

- Morrison, Edwin, 80 S. W. Seventh St., Richmond..... 1915  
 Professor of Physics, Earlham College.  
 Physics and Chemistry.
- Mottier, David M., 215 Forest Place, Bloomington..... 1893  
 Professor of Botany, Indiana University.  
 Morphology, Cytology.
- Naylor, J. P., Greencastle..... 1903  
 Professor of Physics, DePauw University.  
 Physics, Mathematics.
- Payne, F., 620 S. Fess Ave., Bloomington..... 1916  
 Associate Professor of Zoology, Indiana University.  
 Cytology and Embryology.
- Pohlman, Augustus G., 16 Yale Ave., University City, St. Louis, Mo. 1911  
 Professor of Anatomy.  
 Embryology, Comparative Anatomy.
- Ramsey, Rolla R., 615 E. Third St., Bloomington..... 1906  
 Associate Professor of Physics, Indiana University.  
 Physics.
- Ransom, James H., 323 University St., West Lafayette..... 1902  
 Professor of General Chemistry, Purdue University.  
 General Chemistry, Organic Chemistry, Teaching.
- Rettger, Louis J., 31 Gilbert Ave., Terre Haute..... 1896  
 Professor of Physiology, Indiana State Normal.  
 Animal Physiology.
- Rothrock, David A., Bloomington..... 1906  
 Professor of Mathematics, Indiana University.  
 Mathematics.
- Schockel, Barnard, Terre Haute..... 1917  
 Professor of Physical Geography, State Normal School.
- Scott, Will, 731 Atwater St., Bloomington..... 1911  
 Assistant Professor of Zoology, Indiana University.  
 Zoology, Lake Problems.
- Shannon, Charles W., 518 Lahoma Ave., Norman, Okla..... 1912  
 With Oklahoma State Geological Survey.  
 Soil Survey, Botany.

- Smith, Albert, University St., West Lafayette..... 1908  
 Professor of Structural Engineering.  
 Physics, Mechanics.
- Smith, Charles Marquis, 152 Sheetz St., West Lafayette..... 1912  
 Professor of Physics, Purdue University.  
 Physics.
- Stone, Winthrop E., Lafayette..... 1893  
 President of Purdue University.  
 Chemistry.
- Van Hook, James M., 939 N. College Ave., Bloomington..... 1911  
 Assistant Professor of Botany, Indiana University.  
 Botany.
- Wade, Frank Bertram, 1039 W. Twenty-seventh St., Indianapolis. . 1914  
 Head of Chemistry Department, Shortridge High School.  
 Chemistry, Physics, Geology, and Mineralogy.
- Waterman, Luther D., 226 Pratt St., Indianapolis..... 1916  
 Physician.
- Williamson, E. B., Bluffton..... 1914  
 Cashier, The Wells County Bank.  
 Dragonflies.
- Woollen, William Watson, Indianapolis..... 1908  
 Lawyer.  
 Birds and Nature Study.
- Wright, John S., care Eli Lilly Co., Indianapolis..... 1894  
 Manager of Advertising Department, Eli Lilly Co.  
 Botany.

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*NON-RESIDENT MEMBERS AND FELLOWS.*

- Abbott, G. A., Grand Forks, N. Dak., Fellow..... 1908  
 Professor of Chemistry, University of North Dakota.  
 Chemistry.
- Aley, Robert J., Orono, Me., Fellow..... 1908  
 President of University of Maine.  
 Mathematics and General Science.

- Branner, John Casper, Stanford University, Calif.  
 President Emeritus of Stanford University.  
 Geology.
- Brannon, Melvin A., President University of Idaho, Moscow, Idaho.  
 Professor of Botany.  
 Plant Breeding.
- Burrage, Severance, Waco, Texas..... 1898  
 United States Public Health Work.
- Campbell, D. H., Stanford University, Calif.  
 Professor of Botany, Stanford University.  
 Botany.
- Clark, Howard Walton, U. S. Biological Station, Fairport, Iowa.  
 Scientific Assistant U. S. Bureau of Fisheries.  
 Botany, Zoology.
- Cook, Mel T., New Brunswick, N. J., Fellow..... 1902  
 Plant Pathologist, New Jersey Experiment Station.  
 Botany, Plant Pathology, Entomology.
- Coulter, John M., University of Chicago, Chicago, Ill., Fellow.... 1893  
 Head Department of Botany, Chicago University.  
 Botany.
- Davis, B. M., Oxford, Ohio.  
 Professor of Agricultural Education.  
 Miami University.
- Duff, A. Wilmer, 43 Harvard St., Worcester, Mass.  
 Professor of Physics, Worcester Polytechnic Institute.  
 Physics.
- Evermann, Barton Warren, Director Museum.  
 California Academy of Science, Golden Gate Park, San Francisco, Cal.  
 Zoology.
- Fiske, W. A., Los Angeles, Cal., Occidental College.
- Gilbert, Charles H., Stanford University, California.  
 Professor of Zoology, Stanford University.  
 Ichthyology.
- Goss, William Freeman M., 61 Broadway, N. Y., Fellow..... 1893  
 President The Railway Car Manufacturers Association.

- Greene, Charles Wilson, 814 Virginia Ave., Columbia, Mo.  
 Professor of Physiology and Pharmacology, University of  
 Missouri.  
 Physiology, Zoology.
- Hargitt, Chas. W., 909 Walnut Ave., Syracuse, N. Y.  
 Professor of Zoology and Director of the Laboratories Syracuse  
 University.  
 Hygiene, Embryology, Eugenics, Animal Behavior.
- Hay, Oliver Perry, U. S. National Museum, Washington, D. C.  
 Research Associate, Carnegie Institute of Washington.  
 Vertebrate Paleontology, especially that of the Pleistocene  
 Epoch.
- Huston, H. A., New York City, Fellow..... 1893  
 Secretary, German Kali Works.
- Jenkins, Oliver P., Stanford University, California.  
 Professor of Physiology, Stanford University.  
 Physiology, Histology.
- Jordan, David Starr, Stanford University, California.  
 Chancellor Emeritus of Stanford University.  
 Fish, Eugenics, Botany, Evolution.
- Kingsley, J. S., University of Illinois, Urbana, Ill.  
 Professor of Zoology.  
 Zoology.
- KleinSmid von, R. B., President Univ. of Arizona, Tucson, Ariz.
- Knipp, Charles T., 915 W. Nevada St., Urbana, Illinois.  
 Professor of Experimental Physics, University of Illinois.  
 Physics, Discharge of Electricity through Gases.
- Marsters, V. F., Kansas City, Missouri, Care of C. N. Gould, Fellow 1893  
 Geologist.
- McDougal, Daniel Trembly, Tucson, Arizona.  
 Director, Department of Botanical Research, Carnegie Insti-  
 tute, Washington, D. C.  
 Botany.
- McMullen, Lynn Banks, State Normal School, Valley City, N. D.  
 Head Science Department and Vice-Pres. State Normal School.  
 Physics, Chemistry.

- Mendenhall, Thomas Corwin, Ravenna, Ohio.  
Retired.  
Physics, "Engineering," Mathematics, Astronomy.
- Miller, John Anthony, Swarthmore, Pa., Fellow..... 1904  
Professor of Mathematics and Astronomy, Swarthmore College.  
Astronomy, Mathematics.
- Moore, George T., St. Louis, Mo.  
Director Missouri Botanical Garden.  
Botany.
- Noyes, William Albert, Urbana, Ill., Fellow..... 1893  
Director of Chemical Laboratory, University of Illinois.  
Chemistry.
- Reagan, A. B.  
Superintendent Deer Creek Indian School, Ibopah, Utah.  
Geology, Paleontology, Ethnology.
- Smith, Alexander, care Columbia University, New York, N. Y.,  
Fellow ..... 1893  
Head of Department of Chemistry, Columbia University.  
Chemistry.
- Springer, Alfred, 312 East 2d St., Cincinnati, Ohio.  
Chemist.  
Chemistry.
- Swain, Joseph, Swarthmore, Pa., Fellow.....1898  
President of Swarthmore College.  
Science of Administration.
- Waldo, Clarence A., 401 West 18th St., New York City..... 1893  
Mathematics, Mechanics, Geology and Mineralogy.
- Wiley, Harvey W., Cosmos Club, Washington, D. C., Fellow..... 1895  
Professor of Agricultural Chemistry, George Washington University.  
Biological and Agricultural Chemistry.
- Zeleny, Chas., 1003 W. Illinois St., Urbana, Ill.  
Professor of Experimental Zoology.  
Zoology.

## ACTIVE MEMBERS.

- Aldrich, John Merton, 316 S. Grant St., West Lafayette.  
Federal Entomological Station.  
Zoology, Entomology.
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Zoology, Indiana University.
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- Baker, William Franklin, Indianapolis, care Eli Lilly Co.  
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Mathematics.
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Mathematics.

- Bliss, G. S., Fort Wayne.  
Medicine, State School for Feeble Minded.
- Blose, Joseph, Spiceland.  
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Biology, Bacteriology, Physical Diagnosis and Photomicrography.
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Chemistry.
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Water Supply, Sewage Disposal, Sanitary Engineering.
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Chemistry.
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Botany, Agriculture, Purdue University.
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Physics and Mathematics.
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Geology, University of Texas.
- Canis, Edward N., R. F. D. No. 17, Clermont.  
Officeman with William B. Burford.  
Botany, Psychology.

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Physics.
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Ornithology and Mammals.
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Chemistry, Experiment Station.
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Physics and Chemistry.
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Psychology.
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Chemistry and Physics.

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Conchology.
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Physiography, Geography, Climatology.
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Astronomy.
- Demaree, Juan B., State House, Indianapolis.  
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Botany.
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Graduate Student in Zoology, Indiana University.
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Franklin College.
- Dietz, Harry F., Federal Horticultural Hall, Washington, D. C.  
Entomology, Eugenics, Parasitology, Plant Pathology.
- Doan, Martha, Richmond.  
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- Dolan, Jos. P., Syracuse.
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Laboratory of Physics, University of Pennsylvania.
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Fruit Culture.
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Physiology.
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Dean Indiana University Medical College.  
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Assistant in Dairy Chemistry, Experiment Station, Purdue  
University.
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Chemistry, Purdue University.
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Genetics, with State Board of Charities.
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Merchant.  
Botany, Ornithology.
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Railroad Clerk.  
Geology, Chemistry.
- Fisher, Homer Glenn, Johns Hopkins Medical School, Baltimore, Md.  
Student in Medicine.
- Fisher, L. W., 16 Salisbury St., West Lafayette.  
Student, Zoology, Purdue University.
- Fisher, Martin L., Lafayette.  
Professor of Crop Production, Purdue University.  
Agriculture, Soils, Crops, Birds, Botany.
- Foresman, George Kedzie, 110 S. 9th Street, Lafayette.  
Instructor in Chemistry, Purdue University.
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High School Instructor.
- Fulk, Murl E., 1793 E. 24th St., Cleveland, Ohio.  
Anatomy.
- Fuller, Frederic D., 4220 West 28th St., Bryan, Texas, Experiment  
Station.  
Chemistry, Nutrition.

- Funk, Austin, 404 Spring St., Jeffersonville.  
 Physician.  
 Diseases of Eye, Ear, Nose and Throat.
- Galloway, Jesse James, Geology Department, Columbia University.  
 New York City.  
 Geology, Paleontology.
- Gatch, Willis D., Indianapolis, Indiana University Medical School.  
 Professor of Surgery.  
 Anatomy.
- Gates, Florence A., 3435 Detroit Ave., Toledo, Ohio.  
 Teacher of Botany.  
 Botany and Zoology.
- Gidley, William, 123 Russell St., West Lafayette.  
 Professor of Pharmacy, Purdue University.
- Gillum, Robert G., Terre Haute.  
 State Normal School.
- Glenn, Earl R., New York City.  
 The Lincoln School of Teachers College, Columbia University.  
 Physics.
- Goldsmith, William Morton, Gunnison, Colo.  
 Colorado State Normal School.  
 Biology.
- Gottlieb, Frederic W., Morristown.  
 Care Museum of Natural History, Assistant Curator, Moores Hill  
 College.  
 Archaeology, Ethnology.
- Greene, Frank C., 30 N. Yorktown St., Tulsa, Okla.  
 Geology.
- Hadley, Murray N., 51 Willoughby Bldg., Indianapolis.  
 Physician.
- Hammerschmidt, Louis M., Studebaker Building, South Bend.  
 Science of Law.
- Hanna, U. S., Bloomington.  
 Professor of Mathematics.
- Hansford, Hazel Irene, 110 S. Fess St., Bloomington.  
 Graduate Student in Botany, Indiana University.

Happ, William, South Bend.

Botany.

Harding, C. Francis, 503 University St., West Lafayette.

Head of Electrical Engineering, Purdue University.

Harman, Paul M., 111 N. Dunn St., Bloomington.

Physiology.

Heimbürger, Harry V., St. Paul, Minn.

Instructor in Biology in Hamline University.

Heimlich, Louis Frederick, Littleton St., West Lafayette.

Instructor in Botany, Purdue University.

Hemmer, John Edwin, Bloomington.

Graduate Student in Botany, Indiana University.

Hendricks, Victor K., 615 Frisco Building, St. Louis, Mo.

Assistant Chief Engineer, St. L. & S. F. R. R.

Civil Engineering and Wood Preservation.

Hess, Walter E., Greencastle.

Professor of Biology, DePauw University.

Hetherington, John P., 417 Fourth St., Logansport.

Physician.

Medicine, Surgery, X-Ray, Electro-Therapeutics.

Hinman, Jack J., Jr., State University, Iowa City, Ia.

Senior Water Bacteriologist and Chemist, Laboratories for State  
Board of Health.

Chemistry and Biology.

Hoffman, George L., 321 Fourth St., Logansport.

Bacteriology.

Hoge, Mildred Kirkwood (Mrs. Aute Richards, Crawfordsville, Ind.)

Recently Instructor in Zoology, Indiana University.

Hole, Allen D., 615 National Road, Richmond.

Professor Earlham College.

Geology.

Holman, Richard M., Crawfordsville.

Professor of Botany, Wabash College.

Houseman, H. B., 901 Wabash Ave., Crawfordsville.

Instructor in Chemistry, Wabash College.

Huber, Leonard L., Hanover.

Zoology.

- Hurd, Cloyd C., Crawfordsville.  
Zoology.
- Huchinson, Emory, Norman Station, Ind.  
Zoology.
- Hutton, Joseph Gladden, Brookings, South Dakota.  
Associate Professor of Agronomy, State College.  
Agronomy, Geology.
- Hyslop, George, 65 Nagle St., New York City.  
Cornell Medical School.
- Iddings, Arthur, Hanover.  
Geology.
- Imel, Herbert, South Bend.  
Zoology.
- Irving, Thos. P., Notre Dame.  
Physics.
- Jackson, Herbert Spencer, 940 7th St., West Lafayette.  
Botany, Agricultural Experiment Station.
- Jackson, Thos. F., Carter Oil Co., Tulsa, Okla.  
Geology.
- Jacobson, Moses A., West Lafayette.  
Instructor in Bacteriology, Purdue University.
- James, Glenn, West Lafayette.  
Mathematics, Purdue University.
- Jordan, Charles Bernard, West Lafayette.  
Director School of Pharmacy, Purdue University.
- Kaezmarek, Regedius M., Notre Dame.  
Professor of Zoology.
- Knotts, Armenis F., 800 Jackson St., Gary.  
Nature Study.
- Kohl, Edwin J., 105 Fowler Ave., West Lafayette.
- Lee, C. O., Russell St., West Lafayette.
- Leigh, Howard, 307 N. 7th St., Richmond.  
Student in Zoology, Earlham College.
- Liston, Jesse G., R. F. D., No. 2, Lewis.  
High School Teacher.  
Geology.

- Loomis, Nathaniel E., 127 Waldron St., West Lafayette.  
 Assistant Professor of Chemistry, Purdue University.  
 Physical Chemistry.
- Ludwig, C. A., R. R. 1, Brookville.  
 Botany.
- Ludy, L. V., 600 Russell St., West Lafayette.  
 Professor Experimental Engineering, Purdue University.  
 Experimental Engineering in Steam and Gas.
- Mahin, Edward G., 27 Russell St., West Lafayette.  
 Associate Professor of Chemistry, Purdue University.
- Mains, E. B., 212 S. Grant St., West Lafayette.  
 U. S. Agricultural Experiment Station.  
 Plant Pathology and Mycology.
- Malott, Burton J., 2206 Calhoun St., Fort Wayne.  
 Teacher in High School.  
 Physical Geography and Geology.
- Malott, Clyde A., 316 East 2nd St., Bloomington.  
 Geology.
- Markle, M. S., Richmond.  
 Professor of Botany, Earlham College.
- Martin, Dr. H. H., LaPorte, Ind.  
 Surgery and Urology.
- Mason, Preston Walter, 128 Andrew Place, West Lafayette.  
 Entomology, Purdue University and Experiment Station.
- Mason, T. E., 130 Andrew Place, West Lafayette.  
 Instructor Mathematics, Purdue University.  
 Mathematics.
- McCarthy, Morris E., 224 Fowler Ave., West Lafayette.  
 Student in Zoology, Purdue University.
- McIndoo, N. E., 7225 Blair Road, Takoma Park, Washington, D. C.  
 U. S. Department of Agriculture, Bureau of Entomology.  
 Insect Physiology.
- McKinley, Lester, Bloomington.  
 Graduate Student in Botany, Indiana University.
- Miller, Fred A., Greenfield.  
 Botanist for Eli Lilly Co.  
 Botany, Plant Breeding.

- Molby, Fred A., 525 S. Park Ave., Bloomington.  
Physics.
- Montgomery, Charles E., 360 Augusta Avenue, DeKalb, Ill.  
Assistant Professor of Biology, Normal School.
- Montgomery, Ethel, South Bend.  
Physics.
- Montgomery, Dr. H. T., 244 Jefferson Bldg., South Bend.  
Geology.
- Moore, Bruce V., 710 S. Fess Ave., Bloomington.  
Graduate Student and Assistant in Psychology.
- Morrison, Harold, Federal Horticultural Board, Washington, D. C.  
Entomology.
- Morrison, Louis, 80 S. West St., Richmond (France).
- Munro, G. W., 202 Waldron St., West Lafayette.  
Mechanical Engineering.
- Murray, Thos. J., Blacksburg, Va.  
Bacteriology, Virginia Polytechnic Institute.
- Myers, B. D., 321 N. Washington St., Bloomington.  
Professor of Anatomy, Indiana University.
- Nelson, Ralph Emory, 125 Russell St., West Lafayette.  
Chemistry, Purdue University.
- Nothnagel, Mildred, Gainesville, Fla.  
Assistant Plant Physiology, Experiment Station, Univ. of Fla.
- Noyes, Harry A., 705 Russell St., West Lafayette.  
Chemistry and Bacteriology, Agricultural Experiment Station.
- Oberholzer, H. C., National Museum, Washington, D. C.  
Biology.
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Associate Professor of Botany, Wesleyan University.  
Botany.
- Orahood, Harold, Kingman.  
Geology.
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Plant Pathology.

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Botany, Plant Breeding, Plant Pathology, Bio-Chemistry.
- Pickett, Fermen L., Pullman College Station, Washington.  
Botany.
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Zoology.
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Botany, Agricultural Experiment Station.
- Powell, Horace, Hazleton.  
Zoology.
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Principal High School.
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Principal High School.  
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- Tucker, Forest Glen, Columbus, Ohio.  
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- Turner, William P., 222 Lutz Avenue, Lafayette.  
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- Van Doren, Dr. Lloyd, Earlham College, Richmond.  
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 Chemistry, Botany.
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 Mathematics, Astronomy.
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 Botany and Zoology.

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Physician, Lt. Col., M. C., N. A.

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

Assistant Professor of Mathematics, Purdue University.

Mathematics.

Fellows .....	65
Members, Active .....	231
Members and Fellows, Non-resident.....	38
<hr/>	
Total .....	334

MINUTES OF THE SPRING MEETING,  
INDIANA ACADEMY OF SCIENCE,

MAY 17 AND 18, 1917.

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The spring meeting of the Indiana Academy of Science was held Thursday and Friday, May 17 and 18, 1917, at Purdue University, in connection with the dedication of the new biology building, Stanley Coulter Hall of Biology.

THURSDAY AFTERNOON—2:00 O'CLOCK, MAY 17TH.

Reception of the building for the University and address by President W. E. Stone.

Brief Addresses by—

President W. J. Moenkhaus, representing the Indiana Academy of Science;

John S. Wright, Esq., representing the Alumni;

Dr. H. C. Cowles, Chicago University, on Botany;

Dr. C. H. Eigenmann, Indiana University, on Zoology.

A complimentary supper was served to members of the Academy and invited guests, at 6:00 o'clock, in Stanley Coulter Hall of Biology.

THURSDAY EVENING—8:00 O'CLOCK.

Address—

"The Modern Biological Laboratory and Public Health," Professor W. T. Sedgwick, Massachusetts Institute of Technology.

FRIDAY, MAY 18TH, FIELD TRIP.

The members of the Academy and guests assembled at Stanley Coulter Hall of Biology at 8:00 o'clock a. m. The loaded automobiles started out at half-minute intervals for the trip. It was planned especially to view Pine Creek valley and vicinity. The automobiles proceeded along the lowland of the Wabash River to Granville Bridge, thence to Greenhill and across the upland to Rainsville, thence along Pine Creek to the "Narrows" of Mud Creek, one of its tributaries, where luncheon

was served. From the "Narrows" the party proceeded to Mudlavia, thence to Attica, and then to Lafayette, following the Wabash River.

The trip afforded an opportunity to visit the Native White Pine regions of northwestern Indiana. At the high bridge east of the Warren County Farm detached rocks and high cliffs were of extreme interest to geologists and students of physiography. This is the northern extension of the geologic features which occur at Turkey Run.

Many of the party walked from the Warren County Farm to the "Narrows."

#### BUSINESS SESSION.

The meeting was called to order, after luncheon, on a hill-side near Mud Creek west of Attica, by President W. J. Moenkhaus. Sixty members attended the meeting, and about thirty additional persons participated in the field trip and luncheon, as guests of the Academy.

In the absence of members of the Membership Committee the Secretary submitted the names of persons proposed for membership. On motion, duly passed, they were elected to membership in the Academy. The new members are:

- Michael James Blew, 215 Indiana Avenue, Bloomington.
- Hobart Cromwell, Terre Haute.
- Richard G. Dukes, West 7th Street, West Lafayette.
- Loyal W. Fisher, 16 Salisbury Street, West Lafayette.
- Armenis F. Knotts, 800 Jackson Street, Gary.
- Edwin J. Kohl, 105 Fowler Avenue, West Lafayette.
- H. H. Martin, M. D., Laporte.
- C. O. Lee, Russell Street, West Lafayette.
- Morris E. McCarty, 224 Fowler Avenue, West Lafayette.
- Louis A. Morrison, 80 S. West 7th Street, West Lafayette.
- George W. Munro, 202 Waldron Street, West Lafayette.
- Robert E. Snodgrass, 1819 N. New Jersey Street, Indianapolis.
- Carl G. Watson, 120 Thornell Street, West Lafayette.
- Charles G. Woodbury, 615 University Street, West Lafayette.

Amos W. Butler reported the continuance of the annual appropriation of \$1,200 by the State Legislature for the purpose of printing the Proceedings.

R. W. McBride discussed the matter of urging the Printing Board to speed up its work on the 1916 Proceedings.

On motion, duly passed, a committee consisting of the President, Secretary, and Judge McBride, is authorized to visit the Governor in an effort to hasten the work of publication of the Proceedings.

On motion, Editor Lee F. Bennett is empowered to use his discretion in making up the 1916 Proceedings, by elimination of some of the papers, or to reduce their length if they would otherwise add too much to the size and cost of the volume.

It is further urged that an effort be made to embody in the 1916 Proceedings a paper by Professor Hadley of Monrovia, on "David Worth Dennis—An Appreciation."

On motion, the Committee on Distribution of Proceedings is to fix prices at which back numbers of the publication may be procured, and to report at the Fall Meeting.

The following resolutions by Frank B. Wynn, on the State Parks, and by Amos W. Butler, on Appreciations, were received, and passed by the Academy:

Resolved, That the Indiana Academy of Science most heartily approves the attitude of the Governor of the State in promoting the movements for State Parks; first, because it will insure the preservation of native forests, and beautiful natural places which are now rapidly being destroyed and can not be replaced.

Secondly, We urge their preservation as health and recreation preserves for all the people for all time to come.

In the midst of this, the largest Spring Meeting of the Indiana Academy of Science, we express our appreciation of the fine hospitality of Purdue University, which has made this occasion a remarkably successful one. To President Stone, Dean Coulter and all of his associates, to the ladies for the welcome luncheon, and to the ladies of the Household Economics Department, for the splendid supper, our grateful acknowledgments are made, and to all who have contributed to this meeting our sincere thanks are given.

We also wish to make formal recognition of the notable advance made by Purdue University in the erection of the new biology building, so well planned for its purpose and so well built, to express our appre-

ciation of the wisdom shown in naming it for the Head of the Department of Biology, Dr. Stanley Coulter, a distinguished and beloved member of this body.

Professor McBeth of the State Normal School, was then called upon to speak briefly of the geological formation of the region covered in the field trip, after which the meeting adjourned.

W. J. MOENKHAUS, President.

HOWARD E. ENDERS, Secretary.

EVENING—FRIDAY, MAY 18TH.

Reception to members of the Academy in Stanley Coulter Hall of Biology, by the University Club.

SATURDAY—MAY 19, 1917.

A number of the members of the Academy joined in a visit to the Tippecanoe Battlefield and the State Soldiers' Home.

MINUTES OF THE FALL MEETING,  
INDIANA ACADEMY OF SCIENCE,  
INDIANA UNIVERSITY, BLOOMINGTON, INDIANA,  
DECEMBER 6, 1917.

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The Executive Committee of the Indiana Academy of Science met in the Faculty Room of Maxwell Hall, and was called to order by the President, W. J. Moenkhaus, of Bloomington. The following members were present: F. M. Andrews, Lee F. Bennett, Wm. M. Blanchard, H. L. Bruner, W. A. Cogshall, C. C. Deam, Howard E. Enders, Edwin Morrison, D. M. Mottier, Will Scott, Charles Stoltz, and John S. Wright.

The minutes of the Executive Committee of 1916 were read and approved.

The reports of the standing committees were then taken up.

*Program Committee*—F. M. Andrews, Chairman, reported the work completed as indicated by the printed program of fifty-one titles. On motion, the following title, which arrived too late for entry, was added to the program: "Disposition and Intelligence of the Chimpanzee", by W. Henry Sheak, of Philadelphia, Pa.

*Committee on Distribution of Proceedings*—Howard E. Enders, chairman, reported that the 1915 Proceedings had been sent out since the last meeting, through the co-operation of the State Librarian, and that the 1916 issue, now in page-proof, will be mailed as early as possible.

*Committee on Restriction of Weeds and Diseases*—D. M. Mottier, member, reported informally upon the possible value of the work of such committee, but that in view of the fact that the State Board of Health and other agencies in the State are engaged in such work, it would seem to be unnecessary to continue this committee.

On motion, duly passed, the committee is discharged, and this committee hereafter is to be discontinued.

*Committee on Relations of the Academy to the State*—John S. Wright reported for the committee that the customary twelve hundred (\$1,200) dollar appropriation has been made available for the printing of the Proceedings.

*Committee on Publication of Proceedings*—Lee F. Bennett, chairman and Editor, reported on the incidents in delay of Proceedings. Half of the page-proofs are now in hand, and others will be received soon.

On motion, the Editor of Proceedings is to be allowed the sum of fifty (\$50) dollars for expense of clerical hire for the 1916 issue. It is the sense of the Executive Committee that this sum be continued from year to year.

*Advisory Council*—John S. Wright and W. A. Cogshall reported for the committee that they had conferred with the Governor of the State relative to the matter of placing properly qualified men in the scientific offices of the State, and that he had given assurance of such co-operation.

*Committee on Academy Foundation*—The report of this special committee, appointed a year ago, was read by the chairman, H. L. Bruner.

On motion, the report is hereby received and is to be submitted to the members of the Academy for consideration at the business session tomorrow.

Wm. M. Blanchard, Treasurer, reported as follows:

Balance in Treasury December 2, 1916.....	\$378 49
Dues collected during the year.....	344 00
Total .....	\$722 49
Expenditures .....	197 91
Balance in treasury, December 1, 1917.....	\$524 58

The report was received and, in the absence of P. N. Evans, was referred to W. A. Cogshall for audit.

There were no reports from the committees on State Library and Biological Survey.

H. E. Enders reported relative to the matter of setting a price for back numbers of the Proceedings, as directed at the Lafayette Spring Meeting. The committee advises that, inasmuch as the State pays for the publication of the Proceedings, we have no authority to offer for sale or receive money for copies of the Proceedings. It is advised that the practice be followed of sending copies to interested workers upon application, and prepayment of the carriage charges.

On motion, a committee of three was appointed to prepare amend-

ments to the Constitution and By-Laws to define the duties of Editor of Proceedings, and to recognize the position as an officer of the Executive Committee.

John S. Wright, Lee F. Bennett and W. A. Cogshall were appointed to serve as members of this committee.

On motion it is recommended that the 1918 Program Committee determine the feasibility of inviting the members of the Illinois Academy of Science to hold their Spring Meeting as a joint meeting with the Indiana Academy of Science, at some time and place to be determined by the committees of these Academies.

Adjourned.

W. J. MOENKHAUS, President.

HOWARD E. ENDERS, Secretary.

### GENERAL SESSION.

SCIENCE HALL, 10:15 A. M., DEC. 7, 1917.

The meeting called to order by President W. J. Moenkhaus.

In accordance with the arrangements of the Program Committee the Academy proceeded at once with the reading of the general papers numbered 1 to 5, after which the body went into business session.

#### *Business:*

The minutes of the Executive Committee were read and approved.

The report of the committee appointed to investigate the advisability of establishing a research endowment fund to be known as the Academy Foundation, was received and was considered at some length, after which the following resolution was passed:

Resolved, That the Academy expresses sympathy in the movement and refers the matter back to the Committee on Academy Foundation for further amplification, and for private publication and circulation among members of the Academy during the ensuing year, with a view to its consideration in 1918.

Auditor W. A. Cogshall reported upon the correctness of the report of the Treasurer.

Report of progress in the Biological Survey was made by chairman, C. C. Deam.

The following named persons were proposed for membership, and were elected:

Harold R. Brown, Earlham College, Richmond, Indiana.

Anna Mary Collins, Irvington, Indianapolis, Indiana.

Martha L. Denny, Bloomington.

Charles S. Driver, Bloomington.

Walter N. Hess, Greencastle.

Richard M. Holman, Crawfordsville.

Moses A. Jacobson, West Lafayette.

Jacob Papish, Bloomington.

Louis Roark, Bloomington.

Lewis A. Taylor, Earlham College, Richmond.

Eben Henry Toole, West Lafayette.

The following named members were elected Fellows:

J. A. Badertscher, Professor of Anatomy, Indiana University.

Charles A. Behrens, Professor of Bacteriology, Purdue University.

Edward W. Koch, Department of Research, Eli Lilly Co., Indianapolis.

William M. Logan, Associate Professor of Geology, Indiana University.

Barnard Schockel, Professor of Geography, State Normal School.

The report of the Nominating Committee was as follows:

President—E. B. Williamson, Bluffton.

Vice-President—Dr. Charles Stoltz, South Bend.

Secretary—Howard E. Enders, West Lafayette.

Assistant Secretary—P. A. Tetrault, West Lafayette.

Treasurer—Wm. M. Blanchard, Greencastle.

Editor—Lee F. Bennett, Valparaiso.

Press Secretary—Frank B. Wade, Indianapolis.

The Committee on Amendments moved the following amendments to the Constitution and By-Laws, for final action to-morrow:

*Amendment to Constitution, Article III, Section 1, second sentence, by insertion of the word "Editor" after the words "Press Secretary."*

The article and section so amended will read:

“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, Editor, and Treasurer, who shall perform the duties usually pertaining to their respective offices and in addition, with 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.”

*Amendment to the By-Laws:*

“BY-LAW 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) dollars except by special action of the Executive Committee.”

AFTERNOON SESSION—1:30 P. M.

Papers numbered 6, 7, and 8 were read in general session after which the Academy adjourned to sectional meetings. President Moenkhaus served as chairman of the section on Bacteriology, Botany and Zoology; and Edwin Morrison presided over the section on Astronomy, Chemistry, Geology and Physics.

EVENING SESSIONS.

The address of the retiring President, Professor W. J. Moenkhaus, was delivered at the informal dinner, at the Cafeteria, at 7:00 p. m.

At 8:30 Professor Charles T. Knipp, of the University of Illinois, addressed the members of the Academy and guests on the subject: “Electric Discharge in Vacuum Tubes—The Electron.” The extensive equipment and the facilities of the Department of Physics made it possible to illustrate the whole of the lecture in a striking manner.

A smoker and informal entertainment was given by the Sigma Xi Scientific Fraternity at the Faculty Club rooms immediately after Professor Knipp’s address.

SATURDAY, DECEMBER 8, 1917.

*Business:*

The meeting was called to order at 8:45 by President Moenkhaus.

The amendments to the Constitution and By-Laws were called for second reading, and were passed on motion.

The following named Fellows were elected Non-Resident Fellows:

Charles Zeleny, Professor of Experimental Zoology, University of Illinois, Urbana, Illinois.

Severance Burrage, Resident of Massachusetts, now with a medical commission in Serbia.

The matter of the Spring Meeting was discussed. In view of the fact that members of the Illinois Academy of Science have suggested that a joint meeting be held with their Academy it is advised that the 1918 Program Committee take up the matter and determine whether this is feasible; if so to complete the plans, otherwise to determine a place and time for an independent meeting.

The Academy adopted the following resolution presented by Wm. M. Blanchard:

Resolved: That we extend to Indiana University, and particularly to the members of the Academy who are connected with the University, as well as to our special visitor, Professor Charles T. Knipp, a vote of thanks for the entertainment and courtesy manifested at this December meeting of the Academy.

The Academy then went into general session for the reading such papers as remain from the several sections.

Adjourned.

W. J. MOENKHAUS, President.

HOWARD E. ENDERS, Secretary.



Subject: Electric Discharge in Vacuum Tubes—"The Electron," Science Hall, Room 38.

A smoker will be given by the Sigma Xi Scientific Fraternity at the Faculty Club Rooms immediately after Professor Knipp's address.

SATURDAY.

Business Session ..... 8:00 a.m.

GENERAL SESSION.

FRIDAY, 10:00 A.M.

1. Transplantation of Testes into Ovariectomized Female Guinea Pigs, 5 min.....By Mathew Winters  
Presented by Dr. B. D. Myers, Indiana University.
2. The Physiography of Indianapolis, 15 min. (by title) .Chas. R. Dryer
3. The Pygidiidae, 30 min.....C. H. Eigenmann, Indiana University
4. Some criteria of Skeletal Homologies, 15 min.....  
.....J. S. Kingsley, University of Illinois
5. A Fish Epidemic in Huffman's Lake, 10 min.....  
.....Will Scott, Indiana University
6. Germinal Changes Affecting Facet Number in the Bar-eyed Race of *Drosophila*, 10 min.....  
.....Charles Zeleny, University of Illinois
7. The Dwarfing Effect of Attacks of Mites of the Genus *Eriophyidae* upon Norway Maples, 10 min.....  
.....Howard E. Enders, Purdue University
8. Where the Feeble-minded are Self-supporting, 12 min.....  
.....Hazel I. Hansford, Indiana University

SECTIONAL MEETINGS.

FRIDAY 1:30 P.M. AND SATURDAY 8:30 A.M.

*Astronomy.*

1. A New Form of Telescope Mounting, 10 min.....  
.....W. A. Cogshall, Indiana University

*Bacteriology.*

2. Bacterial Action on Proteins in presence of Carbohydrates, 10 min.H. M. Weeter, Purdue Univ.; George Spitzer, Purdue Univ.

3. Hydrolysis of Proteins and Methods of Separating the Cleavage Products, 10 min.....Geo. Spitzer, Purdue University

*Botany.*

4. Plastids, 10 min. (by title).....D. M. Mottier, Indiana University
5. Species of Martyniaceae, 5 min..Flora Anderson, Indiana University
6. Variation and Varieties of Zea Mays, 10 min.....  
.....Paul Weatherwax, Indiana University
7. Improved Technique for the Control of Pollination in Corn, 10 min.....Paul Weatherwax, Indiana University
8. Dormant Period of Timothy Seed after Harvesting, 10 min.....  
.....M. L. Fisher, Purdue University
9. The Plant Succession on Niagara and Hudson River Limestone, near Richmond, Ind., 5 min. (by title).....  
.....M. S. Markle, Earlham College
10. Notes on Microscopic Technique, 5 min. (by title).....  
.....M. S. Markle, Earlham College
11. The Ustilaginales of Indiana, 10 min.....  
.....H. S. Jackson, Purdue University
12. The Uredinales of Indiana, 10 min.....H. S. Jackson
13. A Suspected Case of Live-Stock Poisoning by Wild Onion (*Allium Canadense*), 10 min. (by title).....  
.....F. J. Pipal, Purdue University
14. Additions to the list of Plant Diseases of Economic Importance in Indiana, 10 min. (by title).....  
.....Geo. A. Osner, Purdue University
15. Reaction of Culture Media, 10 min. (by title).....  
.....H. A. Noyes, Purdue University
16. Studies on Pollen, 5 min.....F. M. Andrews, Indiana University
17. Stoppage of a Sewer Pipe by Roots of *Acer Saccharum*, 5 min...  
.....F. M. Andrews, Indiana University
18. Anthocyanin of *Beta Vulgaris*, 5 min.....  
.....F. M. Andrews, Indiana University
19. Improved Forms of Maximow's Automatic Pipette, 5 min.....  
.....F. M. Andrews, Indiana University
20. The Effect of Centrifugal Force on Plants, 5 min.....  
.....F. M. Andrews, Indiana University

21. The Effect of Aeration on the Roots of Zea Mays, 5 min. . . . .  
 . . . . . Colonzo C. Beals, Indiana University
22. Resistance of Mucor Zygotes, 20 min. . . . .  
 . . . . . Mildred Nothnagel, Indiana University

*Chemistry.*

23. The Absorption of Iron by Platinum Crucibles in Clay Fusions,  
 5 min. . . . . W. M. Blanchard,  
 DePauw University; Roscoe Theibert, DePauw University
24. The Injurious Effect of Borax in Corn Fertilizers, 10 min. (by  
 title) . . . . . S. D. Conner, Purdue University
25. Chemical Estimations of Fertility in Fulton County (Ind.) Soils,  
 15 min. . . . . R. H. Carr and G. A. Gast, Purdue University
26. By-products of the Preparation of Ether, 10 min. (by title) . . .  
 . . . . . P. N. Evans and G. K. Foresman, Purdue University
27. Quantitative Precipitation of Manganese as the Sulphide, 15  
 min. . . . . James Brown, Butler College
28. The Influence of Methyl Iodide Vapor and Tobacco Smoke on the  
 Growth of Certain Bacteria and Fungi (by title) . . C. A. Ludwig

*Geology.*

29. Brief Notes on the New Castle Tornado, 10 min. . . . .  
 . . . . . Colonzo C. Beals, Indiana University
30. "The Mt. Carmel Fault," 5 min. . . . W. N. Logan, Indiana University
31. "Some Criteria of Dip," 5 min. . . . W. N. Logan, Indiana University
32. "Possible Utilization of Indiana Kaolin," 5 min. . . . .  
 . . . . . W. N. Logan, Indiana University
33. "The Physiographic Divisions of the United States as made by  
 the Fenneman Committee," 5 min. . . . .  
 . . . . . F. J. Breeze, Indiana University
34. "Glacial Boulders in Brown and Monroe Counties, South of  
 the Limit of Glaciation, 15 min. . . . .  
 . . . . . F. J. Breeze, Indiana University
35. "Field Methods in the Mid-Continental Oil Field," 15 min. . . . .  
 . . . . . Louis Roark, Indiana University

*Physics.*

36. Energy Loss in Commercial Hammers, 15 min.....  
 .....Edwin Morrison and Robert L. Pelry, Earlham College
37. Some Experiments on Resonance of Tubes and Horns, 5 min. . .  
 .....Arthur L. Foley, Indiana University
38. Two New Photographic Methods of Measuring the Speed of  
 Sound Waves, 10 min. . . . . Arthur L. Foley, Indiana University
39. Conditions Affecting the Speed of Sound Waves, 10 min. . . . .  
 .....Arthur L. Foley, Indiana University
40. The Conduction of Heat and Electricity Thru Selenium, 10 min.  
 .....Arthur L. Foley, Indiana University
41. Some Observations on Fluorescence, 5 min. . . . .  
 .....Arthur L. Foley, Indiana University
42. Further Notes on the Identity of X-Rays and Light, 10 min. . . .  
 .....Mason E. Hufford, Indiana University
43. An improved Form of High Vacuum High Speed Mercury Vapor  
 Air Pump, 10 min. . . . . Charles T. Knipp, University of Illinois
- 43a. A Possible Standard of Sound. Chas. T. Knipp, University of Illinois
44. Visible Color Effects in a Positive Ray Tube Containing Helium,  
 10 min. . . . . Chas. T. Knipp, University of Illinois

*Zoology.*

45. The Effect of Artificial Selection upon Bristle Number in the  
 Fruit Fly and the Interpretation of the Results, 15 min. . . .  
 .....F. Payne, Indiana University
46. The Unionidæ of Lake Maxinkuckee, 20 min. (by title) . . . . .  
 . . . . Barton Warren Evermann, California Academy of Science;  
 Howard Walton Clark, U. S. Biological Station, Fairport, Iowa
47. A Day with the Birds of a Hoosier Swamp, 10 min. (by title) . . .  
 . . . . Barton Warren Evermann, California Academy of Science
48. Further Experiments with the New Mutant, Scarlet in the Dro-  
 sophila Repleta, 10 min. . . . . H. W. Cromwell
49. A Seasonal Study of the Stickleback Kidney, Cayuga Jordan, 15  
 min. . . . . Walter N. Hess, DePauw University
50. On the Locus of the Gene for the Mutant, Curved (by title) . . .  
 .....Roscoe R. Hyde, Indiana State Normal

51. The Erdmann New Culture Medium for Protozoa, 20 min. . . . .  
.....By C. A. Behrens, Purdue University; H. C. Travelbee, Purdue University
52. Disposition and Intelligence of the Chimpanzee.....  
.....W. Henry Sheak, Philadelphia, Pa.
53. The Uredinales of Delaware.....H. S. Jackson, Purdue University
54. The Trees of White County, Indiana.....  
.....Louis L. Heimlich, Purdue University