

PROCEEDINGS

OF THE

Indiana Academy of Science

1911

L. J. RETTGER EDITOR

INDIANAPOLIS, IND.
1912.

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1912

THE STATE OF INDIANA,
EXECUTIVE DEPARTMENT,
March 1, 1912.

Received by the Governor, examined and referred to the Auditor of State for verification of the financial statement.

OFFICE OF AUDITOR OF STATE,
INDIANAPOLIS, March 5, 1912.

The within report, so far as the same relates to moneys drawn from the State Treasury, has been examined and found correct.

W. H. O'BRIEN,
Auditor of State.

March 20, 1912.

Returned by the Auditor of State, with above certificate, and transmitted to Secretary of State for publication, upon the order of the Board of Commissioners of Public Printing and Binding.

MARK THISTLETHWAITE,
Secretary to the Governor.

Filed in the office of the Secretary of State of the State of Indiana, March 28, 1912.

I. G. ELLINGHAM,
Secretary of State.

Received the within report and delivered to the printer April 16, 1912.

ED D. DONNELL,
Clerk Printing Board.

MASON BLANCHARD THOMAS.

On Wednesday evening, March 6, 1912, Mason Blanchard Thomas, Professor of Botany at Wabash College and Dean of the Faculty, died at his home in Crawfordsville of an acute attack of pleurisy.

Mason B. Thomas was born at New Woodstock, N. Y., December 16, 1866. He prepared for college at Cazenovia Academy and entered the College of Arts and Sciences at Cornell University in the fall of 1886. He was graduated with the degree of B. S. in 1890 and was awarded a graduate fellowship in biology at Cornell for the following year. In 1891 he came to Wabash College as Professor of Biology, and after 1895, when the department was divided, he gave his whole time to the study and teaching of Botany.

While at Cornell he was elected to membership in the Sigma Xi Society and at Wabash was elected as an organization member of the Phi Beta Kappa Society. In 1907 an honorary Ph.D. was conferred upon him by the trustees of Wabash.

In June, 1893, he was joined in marriage to Miss Annie Davidson, only daughter of Judge and Mrs. T. F. Davidson, of Crawfordsville, and his wife survives him.

Professor Thomas was a great teacher. He brought to his work a thorough knowledge of his subject, an unbounded energy and enthusiasm, and a personal interest in and love for his students. He was active also in furthering the general interests of the college; was for many years the chairman of the Athletic Committee of the Faculty, and since 1907 has been the Dean of the Faculty. He was a fellow and past president of the Indiana Academy of Science and has always been active in its service. At the time of his death he was secretary of the Indiana Forestry Association and chairman of its Educational Committee, and secretary of the Board of Trustees of the Boys' School at Plainfield. He was also a fellow of the American Association for the Advancement of Science and a member of the American Microscopical Society, the American Forestry Association, the Botanical Society of America, the American Phyto-

pathological Society, the Society of Western Naturalists, and the Corporation of the Marine Biological Laboratory at Woods Hole.

For twenty years Professor Thomas has given his best efforts in the service of Wabash College, of Crawfordsville, and of the State of Indiana, and his influence will long be felt through the work he has done and the inspiration he has given to his students and associates.

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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 1912-1913.

The appropriation for the publication of the proceedings of the Academy during the years 1912 and 1913 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 here-with 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 1911 shall be available in 1912.

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 section.

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.

Indiana Academy of Science.

OFFICERS, 1911-1912

PRESIDENT

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

COMMITTEES, 1911-1912.

PROGRAM.

J. W. BEEDE, R. S. HESSLER, D. BODINE.

MEMBERSHIP.

D. BODINE, J. S. WRIGHT, E. R. CUMMINGS.

NOMINATIONS.

A. L. FOLEY, U. O. COX, R. W. McBRIDE.

AUDITING.

C. H. EIGENMANN, L. J. RETTGER, F. J. BREEZE.

STATE LIBRARY.

H. E. BARNARD, W. S. BLATCHLEY, A. W. BUTLER.

RESTRICTION OF WEEDS AND DISEASES.

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STANLEY COULTER, J. C. ARTHUR, J. M. VAN HOOK,
C. H. EIGENMANN, U. O. COX.

RELATIONS OF THE ACADEMY TO THE STATE.

M. B. THOMAS, R. W. McBRIDE, G. CULBERTSON,
C. C. DEAM, A. W. BUTLER.

DISTRIBUTION OF THE PROCEEDINGS.

J. S. WRIGHT, H. L. BRUNER, G. W. BENTON,
A. J. BIGNEY.

PUBLICATION OF PROCEEDINGS.

L. J. RETTGER, Editor, P. N. EVANS, D. M. MOTTIER.

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.
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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.
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. A. Williamson.....	Milo H. Stuart.....	W. J. Moenkhaus.
1911-1912	J. P. Naylor.....	A. J. Bigney.....	E. A. Williamson.....	Milo H. Stuart.....	W. J. Moenkhaus.

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, specially 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. Applications for membership in any of the foregoing classes shall be referred to a committee on application for membership, who shall consider such application and report to the Academy before the election.

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.

MEMBERS.

FELLOWS.

†G. A. Abbott.....	*1908	Fargo, N. D.
R. J. Aley.....	1898	Orono, Me.
F. M. Andrews.....	1911	Bloomington.
J. C. Arthur.....	1894	Lafayette.
H. E. Barnard.....	1910	Indianapolis.
J. W. Beede.....	1906	Bloomington.
George W. Benton.....	1896	New York City.
A. J. Bigney.....	1897	Moore's Hill.
Katherine Golden Bitting.....	1895	West Lafayette.
W. S. Blatchley.....	1893	Indianapolis.
Donaldson Bodine.....	1899	Crawfordsville.
F. J. Breeze.....	1910	West Lafayette.
H. L. Bruner.....	1899	Indianapolis.
Severance Burrage.....	1898	Lafayette.
A. W. Butler.....	1893	Indianapolis.
W. A. Cogshall.....	1906	Bloomington.
†Mel. T. Cook.....	1902	Newark, Del.
†John M. Coulter.....	1893	Chicago, Ill.
Stanley Coulter.....	1893	Lafayette.
U. O. Cox.....	1908	Terre Haute.
Glenn Culbertson.....	1899	Hanover.
E. R. Cumings.....	1906	Bloomington.
S. C. Davison.....	1908	Bloomington.
C. C. Deam.....	1910	Indianapolis.
D. W. Dennis.....	1895	Richmond.
C. R. Dryer.....	1897	Terre Haute.
C. H. Eigenmann.....	1893	Bloomington.
Percy Norton Evans.....	1901	West Lafayette.
A. L. Foley.....	1897	Bloomington.
M. J. Golden.....	1899	Lafayette.

†Non-resident.

*Date of election.

†W. F. M. Goss.....	1893	Urbana, Ill.
A. S. Hathaway.....	*1895	Terre Haute.
W. K. Hatt.....	1902	Lafayette.
Robert Hessler.....	1899	Logansport.
J. N. Hurty.....	1910	Indianapolis.
†H. A. Huston.....*	1893	Baltimore, Md.
Edwin S. Johnnott.....	1904	Terre Haute.
Robert E. Lyons.....	1896	Bloomington.
W. A. McBeth.....	1904	Terre Haute.
†V. F. Marsters.....	1893	Santiago, Chili.
C. L. Mees.....	1894	Terre Haute.
†J. A. Miller.....	1904	Swarthmore, Pa.
W. J. Moenkhaus.....	1901	Bloomington.
Richard B. Moore.....	1910	Indianapolis.
D. M. Mottier.....	1893	Bloomington.
J. P. Naylor.....	1903	Greencastle.
†W. A. Noyes.....	1893	Urbana, Ill.
A. G. Pohlmann.....	1911	Bloomington.
Rolla R. Ramsey.....	1906	Bloomington.
J. H. Ransom.....	1902	Lafayette.
L. J. Rettger.....	1896	Terre Haute.
David Rothrock.....	1906	Bloomington.
Will Scott.....	1911	Bloomington.
J. T. Scovell.....	1894	Terre Haute.
Albert Smith.....	1908	Lafayette.
†Alex Smith.....	1893	Chicago, Ill.
W. E. Stone.....	1893	Lafayette.
†Joseph Swain.....	1898	Swarthmore, Pa.
J. M. Van Hook.....	1911	Bloomington.
†C. A. Waldo.....	1893	St. Louis, Mo.
†F. M. Webster.....	1894	Washington, D. C.
Jacob Westlund.....	1904	West Lafayette.
†H. W. Wiley.....	1895	Washington, D. C.
W. W. Woollen.....	1908	Indianapolis.
John S. Wright.....	1894	Indianapolis.

*Date of election.

†Non resident.

NON-RESIDENT MEMBERS.

George H. Ashley.....	Washington, D. C.
J. C. Branner.....	Stanford University, Cal.
M. A. Brannon.....	Grand Forks, N. D.
D. H. Campbell.....	Stanford University, Cal.
H. W. Clark.....	Fairport, Iowa.
H. B. Dorner.....	Urbana, Ill.
A. Wilmer Duff.....	Worcester, Mass.
B. W. Everman.....	Washington, D. C.
W. A. Fiske.....	Los Angeles, Cal.
C. W. Garrett.....	Pittsburg, Pa.
Charles H. Gilbert.....	Stanford University, Cal.
C. W. Greene.....	Columbia, Mo.
C. W. Hargit.....	Syracuse, N. Y.
O. P. Hay.....	Washington, D. C.
Edward Hughes.....	Stockton, Cal.
O. P. Jenkins.....	Stanford University, Cal.
C. T. Knipp.....	Urbana, Ill.
D. S. Jordan.....	Stanford University, Cal.
J. S. Kingsley.....	Medford, Mass.
D. T. McDougal.....	Tucson, Arizona.
L. B. McMullen.....	Valley City, N. D.
T. C. Mendenhall.....	Worcester, Mass.
J. F. Newsom.....	Stanford University, Cal.
A. H. Purdue.....	Nashville, Tenn.
A. B. Reagan.....	Orr, Minn.
J. R. Slonaker.....	Stanford University, Cal.
Alfred Springer.....	Cincinnati, Ohio.
Ernest Walker.....	Fayetteville, Ark.
G. W. Wilson.....	Raleigh, N. C.

ACTIVE MEMBERS.

C. E. Agnew.....	Delphi.
L. Evelyn Allison.....	West Lafayette.
H. W. Anderson.....	Ladoga.
Paul Anderson.....	Crawfordsville,

H. F. Bain.....	San Francisco, Cal.
Walter D. Baker.....	Indianapolis.
Walter M. Baker.....	Redkey.
Edward Hugh Bangs.....	Indianapolis.
Howard J. Banker.....	Greencastle.
H. H. Barcus.....	Indianapolis.
H. L. Barr.....	Ann Arbor, Mich.
Edward Barrett.....	Indianapolis.
W. H. Bates.....	West Lafayette.
Guido Bell.....	Indianapolis.
Ray Bellamy.....	Moores Hill.
Lee F. Bennett.....	Valparaiso.
Thomas Billings.....	West Lafayette.
Harry Eldridge Bishop.....	Indianapolis.
Lester Black.....	Bloomington.
Harold Blair.....	Indianapolis.
William N. Blanchard.....	Greencastle.
Charles S. Bond.....	Richmond.
A. A. Bourke.....	Edinburg.
Omer C. Boyer.....	Lebanon.
H. C. Brandon.....	Daleville.
Chas. Brossmann.....	Indianapolis.
E. M. Bruce.....	Terre Haute.
Wm. R. Butler.....	Indianapolis.
Edward N. Canis.....	Indianapolis.
E. Kate Carman.....	Indianapolis.
Lewis Clinton Carson.....	Detroit, Mich.
Albert E. Caswell.....	West Lafayette.
E. K. Chapman.....	Crawfordsville.
E. J. Chansler.....	Bicknell.
A. G. W. Childs.....	Kokomo.
C. D. Christie.....	Cincinnati, Ohio.
J. H. Clark.....	Connersville.
Otto O. Clayton.....	Portland.
H. M. Clem.....	Chicago, Ill.
Charles Clickner.....	Silverwood, R. D. No. 1.
Charles A. Coffey.....	Petersburg.
William Clifford Cox.....	Columbus.

J. A. Cragwall.....	Crawfordsville.
C. O. Cramer.....	West Lafayette.
M. E. Crowell.....	Franklin.
Chas. M. Cunningham.....	Indianapolis.
George Cutter.....	South Bend.
Lorenzo E. Daniels.....	Laporte.
E. H. Davis.....	West Lafayette.
Melvin K. Davis.....	Terre Haute.
E. M. Deem.....	Frankfort.
Harry F. Dietz.....	Indianapolis.
C. A. Deppe.....	Franklin.
Martha Doan.....	Westfield.
J. P. Dolan.....	Syracuse.
David A. Drew.....	Bloomington.
Hans Duden.....	Indianapolis.
Herbert A. Dunn.....	Logansport.
M. L. (Durbin) Ellis, Mrs.....	Bloomington.
J. B. Dutcher.....	Bloomington.
Samuel E. Earp.....	Indianapolis.
A. A. Eberly.....	Nowata, Okla.
C. R. Eckler.....	Indianapolis.
Max Mapes Ellis.....	Bloomington.
H. E. Enders.....	West Lafayette.
Samuel G. Evans.....	Evansville.
James E. Ewers.....	Terre Haute.
William P. Felver.....	Logansport.
C. J. Fink.....	Crawfordsville.
M. L. Fisher.....	West Lafayette.
Mary A. Fitch.....	Lafayette.
A. S. Fraley.....	Linden.
George M. Frier.....	West Lafayette.
F. D. Fuller.....	West Lafayette.
Austin Funk.....	Jeffersonville.
John D. Gabel.....	North Madison.
Jesse J. Galloway.....	Bloomington.
Andrew W. Gamble.....	Logansport.
H. O. Garman.....	Indianapolis.
J. B. Garner.....	Crawfordsville.

Florence A. Gates.....	Toledo, Ohio.
Robert G. Gillum.....	Terre Haute.
E. R. Glenn.....	Bloomington.
Frederic W. Gottlieb.....	Morristown.
Vernon Gould.....	Rochester.
Melvin K. Haggerty.....	Bloomington.
Guy E. Grantham.....	West Lafayette.
Frank Cook Greene.....	New Albany.
Earl Grimes.....	Russellville.
C. F. Harding.....	West Lafayette.
Mary T. Harman.....	Bloomington.
Walter W. Hart.....	Indianapolis.
Victor Hendricks.....	Springfield, Mo.
John P. Hetherington.....	Logansport.
C. E. Hiatt.....	Philadelphia, Pa.
John E. Higdon.....	Indianapolis.
Frank R. Higgins..	Terre Haute.
S. Bella Hilands.....	Madison, Ind.
John J. Hildebrandt.....	Logansport.
Geo. N. Hoffer.....	Lafayette.
Geo. L. Hoffman.....	West Lafayette.
G. E. Hoffman.....	Logansport.
Allen D. Hole.....	Richmond.
Lucius M. Hubbard.....	South Bend.
Martha Hunt.....	Indianapolis.
O. F. Hunziker.....	West Lafayette.
Joseph G. Hutton.....	Brookings, S. D.
Roseoe R. Hyde.....	Terre Haute.
Harry M. Ibison.....	Marion.
J. Isenberger.....	Louisville, Ky.
C. F. Jackson.....	Durham, N. H.
D. E. Jackson.....	St. Louis, Mo.
P. D. Jenks.....	Indianapolis.
A. G. Johnson.....	Lafayette.
W. J. Jones, Jr.....	West Lafayette.
A. M. Kenyon.....	West Lafayette.
Frank D. Kern.....	West Lafayette.
Clinton A. Ludwig.....	West Lafayette.

L. V. Ludy.....	Madison, Wis.
R. W. McBride.....	Indianapolis.
Richard C. McCloskey.....	Chicago, Ill.
T. S. McCulloch.....	Charlestown, Ind.
N. E. McIndoo.....	
Edward G. Mahin.....	West Lafayette.
James E. Manchester.....	Minneapolis, Minn.
Wilfred H. Manwaring.....	New York City.
M. S. Markle.....	Richmond.
William Edgar Mason.....	Borden.
Clark Mick.....	Indianapolis.
A. R. Middleton.....	West Lafayette.
G. Rudolph Miller.....	Indianapolis.
F. A. Miller.....	Indianapolis.
H. T. Montgomery.....	South Bend.
Chas. R. Moore.....	West Lafayette.
Geo. T. Moore.....	St. Louis, Mo.
Richard Bishop Moore.....	Indianapolis.
Herbert Morrison.....	Indianapolis.
Edwin Morrison.....	Richmond.
Frank K. Mowrer.....	Redkey.
F. W. Muncie.....	Crawfordsville.
Fred Mutehler.....	Bowling Green, Ky.
B. D. Myers.....	Bloomington.
Leslie C. Namey.....	Bedford.
Charles E. Newlin.....	Indianapolis.
J. A. Nieuwland.....	Notre Dame.
Milton S. Nugent.....	Elnora.
Clayton R. Orton.....	West Lafayette.
G. A. Osner.....	Ithaca, N. Y.
D. A. Owen.....	Franklin.
Everett W. Owen.....	Indianapolis.
C. E. Owens.....	Bloomington.
E. J. Petry.....	West Lafayette.
Ferman L. Pickett.....	Bloomington.
Rollo J. Pierce.....	Richmond.
F. J. Pipal.....	West Lafayette.
Ralph B. Polk.....	Greenwood.

James A. Price.....	Ft. Wayne.
W. H. Rankin.....	Ithaca, N. Y.
C. A. Reddick.....	Crawfordsville.
C. J. Reilly.....	Syracuse.
Allen J. Reynolds.....	
George L. Roberts.....	Lafayette.
J. Schramm.....	St. Louis, Mo.
E. A. Schultze.....	Laurel.
Charles Wm. Shannon.....	Brazil.
Fred Sillery.....	Indianapolis.
Oscar W. Silvey.....	West Lafayette.
James P. Simonds.....	Indianapolis.
Charles M. Smith.....	Lafayette.
C. Piper Smith.....	Logan, Utah.
Essie Alma Smith Shannon.....	Bloomington.
E. R. Smith.....	Indianapolis.
Geo. Spitzer.....	West Lafayette.
Brenton L. Steele.....	Pullman, Wash.
Chas. Stoltz.....	South Bend.
J. M. Stoddard.....	
Milo H. Stuart.....	Indianapolis.
Julius W. Sturmer.....	Lafayette.
J. C. Taylor.....	Logansport.
Albert W. Thompson.....	Owensville.
Clem O. Thompson.....	Terre Haute.
A. D. Thorburn.....	Indianapolis.
Iro C. Trueblood (Miss).....	Greencastle.
William M. Tucker.....	Osgood.
W. P. Turner.....	West Lafayette.
Chas. A. Vallance.....	Indianapolis.
W. B. Van Gorder.....	Lyons.
H. S. Voorhees.....	Ft. Wayne.
Frank B. Wade.....	Indianapolis.
Luther D. Waterman.....	Indianapolis.
Luther C. Weeks.....	West Lafayette.
Mason L. Weems.....	Valparaiso.
Daniel T. Weir.....	Indianapolis.
James E. Weyant.....	Indianapolis.

Virges Wheeler.....	Montmorenci.
A. E. White.....	Connersville.
Alfred T. Wiancko.....	Lafayette.
Kenneth P. Williams.....	Urbana, Ohio.
E. B. Williamson.....	Bluffton.
William L. Woodburn.....	Evanston, Ill.
John W. Woodhams.....	Indianapolis.
Herbert Milton Woollen.....	Indianapolis.
J. F. Woolsey.....	Cleveland, Ohio.
G. A. Young.....	West Lafayette.
Jacob P. Young.....	Huntington.
W. J. Young.....	Washington, D. C.
Lucy Youse.....	Terre Haute.
W. A. Zehring.....	West Lafayette.
Charles Zeleny.....	Urbana, Ill.

Fellows.....	66
Members, active.....	210
Members, non-resident.....	29
	—
Total.....	305

MINUTES OF SPRING MEETING.

TERRE HAUTE, INDIANA.

MAY 11, 12 AND 13, 1911.

Members of the Academy were called to order by President Dryer in the library of the State Normal at 8 p. m. Thursday, May 11th.

The plans of the meeting as arranged by the Local Committee were outlined by the President.

The regular program for the evening was as follows:

Illustrated lecture—"The Mussel Industry of the Wabash River," by Prof. U. O. Cox, Indiana State Normal.

Illustrated lecture, "The Autochrome Process in Color Photography," by Prof. J. B. Peddle, Rose Polytechnic Institute.

About seventy-five members and visitors were present.

On Friday, at 9:30 a. m., a boat excursion was taken up the Wabash River. The party was landed some distance above Fort Harrison for an hour's tramp ashore. The party then returned to the Fort Harrison grounds for luncheon, which had been provided by the Local Committee. After luncheon an inspection of the historic grounds was made. Dr. Scovell gave a brief history of the Fort, supplemented by some interesting remarks by Mr. Emil Ehrman, present proprietor of the grounds. Mr. Ehrman distributed souvenirs in the form of small pieces of wood from a log from the original fort. The following new members were elected to the Academy during a brief business meeting:

Milton B. Nugent, Elnora, Ind.

Geo. Cutter, South Bend, Ind.

Edward Barrett, Indianapolis.

Resolution of thanks were voted Mr. Emil Ehrman for his splendid hospitalities. Similar resolutions were voted the Local Committee for the splendid program they were providing the members of the Academy. The excursionists landed at Terre Haute at 5:00 p. m.

At 8:00 p. m. a public address was given by Professor Wm. H. Hobbs, University of Michigan, under the auspices of the Academy.

May 13, Saturday, was spent by some of the visiting members in a drive along Sugar Creek.

The following were members of the excursion party :

D. M. Mottler.	W. A. McBeth.
Robert Hessler.	Charles R. Stoltz.
T. H. Grosjean.	Dr. Charles Stoltz.
L. B. Webster.	L. J. Rettger.
J. J. Galloway.	O. L. Kelso.
John B. Peddle.	B. V. Caffee.
W. S. Blatchley.	J. W. Beede.
A. H. Caffee.	J. P. Young.
Donaldson Bodine.	W. A. Cogshall.
R. G. Gillum.	H. J. Banker.
W. H. Kessel.	C. H. Bean.
E. M. Bruce.	E. S. Johonnott.
U. O. Cox.	F. R. Higgins.
James H. Baxter.	C. W. Shannon.
W. C. Ball.	R. R. Hyde.
O. J. James.	J. E. Ewers.
George Cutter.	C. R. Dryer.
Fred Donaghy.	William H. Hobbs.
M. K. Davis.	E. Barrett.
George W. Benton.	Mrs. George Cutter.
Mrs. George W. Benton.	J. T. Scovell.

W. J. MOENKHAUS,
Secretary Pro Tem.

MINUTES OF THE TWENTY-SEVENTH
ANNUAL MEETING

INDIANA ACADEMY OF SCIENCE

CLAYPOOL HOTEL, INDIANAPOLIS, INDIANA.

NOVEMBER 30, 1911.

The Executive Committee of the Indiana Academy of Science held its regular annual meeting at 8:00 p. m. The following members were present: Chas. R. Dryer, President; A. J. Bigney, W. J. Moenkhaus, D. M. Mottier, W. S. Blatchley, Judge R. W. McBride, W. A. Cogshall, J. S. Wright, D. Bodine, R. Hessler, C. H. Eigenmann. The minutes of the Executive Committee of last year were read and approved. The Treasurer made the following report:

TREASURER'S REPORT, 1911.

Balance cash on hand November 25, 1910.....	\$323 64
Dues collected, 1911.....	163 00
Total	\$486 64
Expenditures during years as per vouchers.....	222 94
Balance cash on hand November 30, 1911.....	\$263 70

W. J. MOENKHAUS,
Treasurer.

Audited and approved.

C. H. EIGENMANN,
L. J. RETTGER.

The Program Committee reported that its work had been performed as represented on the printed program.

The State Library Committee reported that the State Librarian had been taking care of all the exchanges in the most careful way, that he had bound 237 volumes and had 300 more ready for binding, and that he

had published a list of the exchanges, which can be secured on application. The committee on the relations of the Academy to the State were instructed to keep in close touch with the plans for erecting a memorial building, so that if there were rooms available they might be secured for the Indiana Academy of Science. Mr. A. W. Butler was added to this committee. The committee on the distribution of the proceedings for 1910 reported that their work had been performed. Nine hundred volumes had been printed, 300 of which were retained in the State library for distribution to libraries and learned societies, the remainder distributed to members as exchanges.

The following persons were recommended as Fellows in the Academy: Will Scott, Augustus G. Pohlman, J. M. Van Hook, F. M. Andrews.

The following standing committees were appointed by the President: Program.—J. W. Beede, R. Hessler, D. Bodine.

Membership.—D. Bodine, J. S. Wright, E. R. Cumings.

Nominations.—A. L. Foley, U. O. Cox, R. W. McBride.

Auditing.—C. H. Eigenmann, L. J. Rettger, F. J. Breeze.

State Library.—H. E. Barnard, W. S. Blatchley, A. W. Butler.

Restriction of Weeds and Diseases.—R. Hessler, J. N. Hurty, A. W. Butler, Stanley Coulter, D. M. Mottier.

Directors of Biological Survey.—Stanley Coulter, J. M. Van Hook, C. H. Eigenmann, J. C. Arthur, U. O. Cox.

Relations of the Academy to the State.—M. B. Thomas, R. W. McBride, G. Culbertson, C. C. Deam, A. W. Butler.

Distribution of Proceedings.—J. S. Wright, H. L. Bruner, G. W. Benton, A. J. Bigney.

Publication of Proceedings.—L. J. Rettger, Editor; P. N. Evans, D. M. Mottier.

After discussing the general interest of the Academy the committee adjourned.

MINUTES OF THE TWENTY-SEVENTH
ANNUAL MEETING

INDIANA ACADEMY OF SCIENCE

THE GERMAN HOUSE, DECEMBER 1, 1911.

The Indiana Academy of Science met in general session at 9:30 a. m. with President Chas. R. Dryer in the chair. The minutes of the Executive Committee were approved.

The Editor of the Proceedings, L. J. Rettger, reported that many difficulties confronted him in his work as editor, and he urged those making contributions that great care should be taken in presenting their papers in the best possible form and that no changes should be made in the proof if they possibly could be avoided. On motion of Dr. Rettger, it was decided that the other members of the committee should meet with the editor at least twice, and that their expenses should be paid by the Academy.

The Program Committee introduced the following resolutions: (1) That the Program Committee shall have the greatest possible liberty in choosing what papers sent in shall be read in the Academy and what shall be read by title only, and they shall choose the place of meeting. (2) That the Academy vote on the question whether or not they desire the program to continue through Saturday morning. The first part was adopted. In the second part, it was voted to have no Saturday session.

The following persons were elected to membership: F. J. Pipal, West Lafayette; James E. Ewers, Terre Haute; E. K. Chapman, Crawfordsville; E. J. Petry, West Lafayette; C. O. Cromer, West Lafayette; C. A. Deppe, Franklin; Melvin K. Haggerty, Bloomington; Harold Blair, Indianapolis; Clinton A. Ludwig, West Lafayette; Geo. L. Hoffman, West Lafayette; F. M. Andrews, Bloomington; E. B. Williamson, Bluffton; B. D. Myers, Bloomington; P. D. Jenks, Indianapolis; Clem O. Thompson, Terre Haute; C. E. Owens, Bloomington; H. J. Barr, Ann Arbor, Michigan.

After these business items the Academy took up the program as printed.

In the afternoon session the following items of business were considered:

The Auditing Committee reported account of the Treasurer correct.

The Committee on Nominations reported as follows: For President, Joseph P. Naylor, Greencastle; Vice-President, Donaldson Bodine, Crawfordsville; Secretary, Andrew J. Bigney; Assistant-Secretary, E. A. Williamson, Bluffton; Press Secretary, Milo H. Stuart, Indianapolis; Treasurer, W. J. Moenkhaus; Editor, L. J. Rettger, Terre Haute.

The printed program was carried out.

Adjournment.

PROGRAM OF THE
 TWENTY-SEVENTH ANNUAL MEETING

INDIANA ACADEMY OF SCIENCE

GERMAN HOUSE, INDIANAPOLIS, INDIANA.

NOVEMBER 30, DECEMBER 1, 2, 1911.

CHARLES REDWAY DRYER, President. D. W. DENNIS, Vice-President.
 A. J. BIGNEY, Secretary. W. J. MOENKHAUS, Treasurer

THURSDAY, NOVEMBER 30, 7:30 P. M.

Meeting of the Executive Committee, Claypool Hotel.

FRIDAY, DECEMBER 1, 9:30 A. M.

Business

Respiration of Necturus, 10 m. H. L. Bruner
 Chemical Notes on Ventilation, 10 m. P. N. Evans
 Scientific Results of the Indiana University Expedition
 to British Guiana, 15 m. C. H. Eigenmann
 The String Galvanometer in Physiological Research, 10 m. . . . L. J. Rettger
 An Indiana Shell Mound, 10 m. W. S. Blatchley
 Maternal Impression, 20 m. A. G. Pohlman
 Through the Yukon and Alaska Gold Fields, 20 m. (Lantern) . . R. E. Lyons
 Mountain Climbing in the Far Northwest Pres. W. E. Stone

FRIDAY, DECEMBER 1, 1:30 P. M.

Business

President's Address—The North America of Today and
 Tomorrow, and Indiana's Place in It Charles R. Dryer
 Purposes, Methods and Progress of the Indiana Soil
 Survey, 20 m. State Geologist Edw. Barrett
 The Water Powers of Indiana, 15 m. William M. Tucker
 Economic and Social Expressions of Physical Geography
 in Indiana, 15 m. Harry M. Clem

3:30 p. m. Sectional Meetings

GEOLOGY AND GEOGRAPHY SECTION.

- Terraces along the Whitewater River, near Richmond, 20 m. Allen D. Hole
 Conservation of the Soil in Dearborn County, 10 m. A. J. Bigney
 Remarks on the Nature and Origin of the Stream
 Terraces of Southern Indiana, 20 m. J. W. Beede
 The Geological Conditions of Municipal Water Supply
 in Driftless Areas of Southern Indiana, 30 m. E. R. Cumings
 Some Physiographic Features in the Great Fault, near
 the Mouth of the Illinois River (by title) J. G. Hutton
 Some Neglected Principles of Physiography (by title) A. H. Purdue
 The Function of Hydrostatic Pressure in Glacial
 Movement and Erosion, 15 m. J. E. Ewers
 Sand Dunes in Indiana (lantern), 10 m. C. W. Shannon
 Some Results of the Work of Glaciers in Indiana, 10
 m. (lantern) C. W. Shannon
 Physiography of the Guadalupe Mountains, 20 m. J. W. Beede
 The Geographic Contrasts of Brown and Johnson
 Counties, 10 m. Frederick J. Breeze
 Islands in the Border Drift, 10 m. M. K. Davis
 A Note on the Bastostomas of the Richmond Series of
 Indiana, 15 m. E. R. Cumings, J. J. Galloway
 A Note on the Occurrence of Hand Specimens of
 Jointed Structure in the New Albany Black
 Shale, 3 m. Glenn Culbertson
 Observations Having for Their Object the Determination of the Time Required for the Erosion of Clifty and Butler Valleys in Jefferson County, Ind., Report of Progress, 6 m. Glenn Culbertson

BOTANY SECTION.

- Improvement of Medicinal Plants, 15 m. Fred A. Miller
 Notes on Some New and Notable Members of the
 Indiana Flora, 10 m. E. J. Grimes
 The Blooming of *Ceris Canadensis* in October, 2 m. D. M. Mottier
 Some Variations in Plants, 5 m. F. M. Andrews
 The Conjugation of Two Different Species of *Spirogyra*, 5 m. F. M. Andrews

Indiana Fungi, II, 5 m.....	J. M. Van Hook
A Monograph of the Common Indiana Species of Hypoxylon, 5 m.....	C. E. Owens
The Black Rot, <i>Sphaeropsis Malorum</i> Pk., 10 m.....	L. R. Hesler
The Root Rot of Ginseng, 10 m.....	G. A. Osher
Distribution of Trees among Spermatophytes, 10 m.....	F. J. Pipal
Prevalence and Prevention of Stinking Smut in Indiana, 10 m..	C. R. Orton
The Unattached Aecial Forms of Plant Rusts in North America, 10 m.....	A. G. Johnson
On Plants New or Little Known in Indiana, 3 m.....	A. J. Bigney
Report of Work on Corn Pollination, III, 5 m.....	M. L. Fisher
Inheritance of Color in Corn Silk, 10 m.....	C. O. Cromer
Rate of Tree Growth in Southern Indiana, 10 m.....	Stanley Coulter
Orchard Rust in Indiana, 10 m.....	F. D. Kern
Some Abnormal Plants, 5 m.....	Raymond Bellamy
Experimental Work of the Indiana State Board of Forestry, 10 m.....	Stanley Coulter

CHEMISTRY, PHYSICS, MATHEMATIC SECTION.

Effects of Certain Dissolved Salts upon the Cohesion of Water, 10 m.....	Edwin Morrison
Summary of a Series of Thermal Value and Ash Tests of an Indiana Slack and Nut Coal, 3 m..	F. C. Mathers and I. E. Lee
Effect of Storage on the Composition of Carburetted Water Gas, 3 m.....	F. C. Mathers and I. E. Lee
A Scheme for the Qualitative Separation and Detec- tion of Potassium and Sodium, 3 m....	F. C. Mathers and I. E. Lee
The Effect of Ammonium Chloride in the Precipitation of Barium Sulphate, 5 m.....	R. E. Lyons
A Modified Method for Determining Lead Peroxide in Red Lead, 5 m.....	A. R. Nees and O. W. Brown
Electrolytic Recovery of Silver from Silver Chloride Residues, 2 m.....	F. C. Mathers
Analyses and Fertilizer Value of Certain Weeds Growing in Indiana, 3 m.....	F. C. Mathers and Gail M. Stapp
A New Gas Generator, 10 m.....	Raymond Bellamy
The Nascent State (abstract), 10 m.....	J. H. Ransom and R. A. Stevens
The Use of Hydrogen Peroxide in Hyperchlorhydria, 10 m.....	O. P. Terry

- Nutrients in Green Shoots of Trees, 10 m.....E. J. Petry
 Concerning Spheric Geometry, 10 m.....D. A. Rothrock
 On the Solution of Differential Equations by Cauchy's
 Parameter Method, 10 m.....T. E. Mason
 On the Representation of a Number as the Sum of
 Consecutive Integers, 10 m.....T. E. Mason
 On Multiply Perfect Numbers, with a Table of 170
 New Ones together with the 47 previously
 published, 10 m.....R. D. Carmichael and T. E. Mason
 Theorem on Addition Formulage, 10 m.....Leslie McDill
 A Simple Method of Measuring Surface Tension, 5 m.....Arthur L. Foley
 Electromagnetic Induction in German Silver and
 Bismuth, 10 m.....Arthur L. Foley
 A New Method of Photographing Sound Waves,
 10 m.....Arthur L. Foley and Wilmer H. Souder
 Recalescence in Magnetic Alloys, 10 m.....John B. Dutcher
 Diffraction Photographs, 5 m.....Mason E. Hufford
 Effect of Pressure on a Cadmium Cell, 10 m.....Rolla R. Ramsey
 The Cause of Polarization in a Cadmium Cell, 10 m.....Rolla R. Ramsey

FRIDAY, 8:15 P. M.

- The Story of Niagara.....Frank Bursley Taylor

SATURDAY, 9:00 A. M.

- The Regenerated Scale of *Fundulus heteroclitus* with
 preliminary note on its formation, 5 m.....Will Scott
 Coniosis, 20 m.....Robert Hessler
 The Effects of Deforestation on the Water Level of
 Montgomery County, 10 m.....H. L. Barr
 Methods of Studying Animal Vision, 30 m. (lantern).....M. E. Haggerty
 The Climate of Indiana, 10 m.....W. A. McBeth
 The Lessening of Forest Waste, 20 m.....S. J. Record
 Our Diminishing Wood Industries, 10 m.....Stanley Coulter
 Some Archeological Specimens, 5 m.....A. J. Bigney
 The Archeology of Indiana and Ohio, 10 m (lantern).....F. W. Gottlieb
 Ethnological Researches in the North Land, 15 m.
 (lantern)F. W. Gottlieb