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PROCEEDINGS

OF THE

Indiana Academy
of Science

1910

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Indiana Academy of Science

1910

EDITOR L. J. RETTGER

INDIANAPOLIS, IND.
1911

THE UNIVERSITY OF CHICAGO
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THE STATE OF INDIANA,

EXECUTIVE DEPARTMENT,

March 26, 1911.

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

OFFICE OF AUDITOR OF STATE,

INDIANAPOLIS, May 5, 1911.

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.

MAY 5, 1911.

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, May 5, 1911.

L. G. ELLINGHAM,

Secretary of State.

Received the within report and delivered to the printer May 5, 1911.

ED D. DONNELL,

Clerk Printing Board.

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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 Station-

ery: *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 1910-1911.

The appropriation for the publication of the proceedings of the Academy during the years 1910 and 1911 was increased by the legislature in the General Appropriation bill, approved March 9, 1909. That portion of the law fixing the amount of the appropriation for the Academy is herewith given in full:

For the Academy of Science: For the printing of the proceedings of the Indiana Academy of Science, twelve hundred dollars: *Provided*, That any unexpended balance in 1909 shall be available in 1910, and that any unexpended balance in 1910 shall be available in 1911.

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, 1910-1911.

PRESIDENT

CHARLES R. DRYER.

VICE-PRESIDENT

D. W. DENNIS

SECRETARY

A. J. BIGNEY.

ASSISTANT SECRETARY

E. A. WILLIAMSON.

PRESS SECRETARY

MILO H. STUART.

TREASURER

W. J. MOENKHAUS

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MILO H. STUART,	H. W. WILEY,	O. P. HAY,
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P. N. EVANS,	D. W. DENNIS,	J. C. BRANNER,
A. L. FOLEY,	C. H. EIGENMANN,	J. P. D. JOHN,
GLENN CULBERTSON,	C. A. WALDO,	J. M. COULTER,
D. M. MOTTIER,	STANLEY COULTER,	D. S. JORDAN.
ROBERT HESSLER,		

CURATORS

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

COMMITTEES, 1910-1911.

PROGRAM.

W. A. COGSHALL, R. S. HESSLER, D. BODINE.

MEMBERSHIP.

M. B. THOMAS, R. R. RAMSEY, W. W. BLANCHARD.

NOMINATIONS.

A. W. BUTLER, STANLEY COULTER, G. CULBERTSON.

AUDITING.

L. J. RETTGER, F. B. WADE, F. J. BREEZE.

STATE LIBRARY.

G. W. BENTON, W. S. BLATCHLEY, A. W. BUTLER.

RESTRICTION OF WEEDS AND DISEASES.

R. HESSLER, J. N. HURTY, A. W. BUTLER,
S. COULTER, D. M. MOTTIER.

DIRECTORS OF BIOLOGICAL SURVEY.

STANLEY COULTER, J. C. ARTHUR, M. B. THOMAS,
C. H. EIGENMANN, U. O. COX.

RELATIONS OF THE ACADEMY TO THE STATE.

M. B. THOMAS, R. W. MCBRIDE, G. CULBERTSON,
C. C. DEAM.

DISTRIBUTION OF THE PROCEEDINGS.

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

PUBLICATION OF PROCEEDINGS.

L. J. RETTGER, Editor, D. BODINE, D. M. MOTTIER.

OFFICERS OF THE INDIANA ACADEMY OF SCIENCE.

YEARS.	PRESIDENT.	SECRETARY.	ASST. SECRETARY.	PROSS. SECRETARY.	TREASURER.
1885-1886	David S. Jordan.	Amos W. Butler.			O. P. Jenkins.
1886-1887	John M. Coultter.	Amos W. Butler.			O. P. Jenkins.
1887-1888	J. P. D. Jolin.	Amos W. Butler.			O. P. Jenkins.
1888-1889	John C. Brauner.	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 Coultter }		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 Coultter.	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. Schulzize.	Geo. W. Benton.	J. T. Scovell.
1899-1900	M. B. Thomas.	John S. Wright.	E. A. Schulzize.	Geo. W. Benton.	J. T. Scovell.
1900-1901	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. Fyans.	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.

CONSTITUTION.

ARTICLE I.

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

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

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

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

ARTICLE II.

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

SEC. 2. Any person engaged in any department of scientific work, or in original research in any department of science, shall be eligible to active membership. Active members may be annual or life members. Annual members may be elected at any meeting of the Academy; they shall sign the constitution, pay an admission fee of two dollars and thereafter an annual fee of one dollar. Any person who shall at one time contribute

fifty dollars to the funds of this Academy may be elected a life member of the Academy, free of assessment. Non-resident members may be elected from those who have been active members but who have removed from the State. In any case, a three-fourths vote of the members present shall elect to membership. 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.

† A. Abbott	.....	*1908	.....	Fargo, N. D.
R. J. Aley	.....	1898	.....	Orono, Me.
J. C. Arthur	.....	1894	.....	Lafayette.
H. E. Barnard	.....	1910	.....	Indianapolis.
J. W. Beede	.....	1906	.....	Bloomington.
George W. Benton	.....	1896	.....	Indianapolis.
A. J. Bigney	.....	1897	.....	Moore's Hill.
Katherine Golden Bitting	.....	1895	.....	Lafayette.
W. S. Blatchley	.....	1893	.....	Indianapolis.
Donaldson Bodine	.....	1899	.....	Crawfordsville.
F. J. Breeze	.....	1910	.....	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. Davisson	.....	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.
†W. F. M. Goss	.....	1893	.....	Urbana, Ill.
Thomas Gray (Died Dec. 19, 1908)	.....	1893	.....	Terre Haute.

*Date of election.

†Non-resident.

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. Johannott	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.
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.
Rolla R. Ramsey	1906	Bloomington.
J. H. Ransom	1902	Lafayette.
L. J. Rettger	1896	Terre Haute.
David Rothrock	1906	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.
M. B. Thomas	1893	Crawfordsville.
†C. A. Waldo	1893	St. Louis, Mo.
†F. M. Webster	1894	Washington, D. C.
Jacob Westlund	1904	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.

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M. A. Brannon	Grand Forks, N. D.
D. H. Campbell	Stanford University, Cal.
H. W. Clark	Washington, D. C.
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	Tufts College, 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	Fayetteville, Ark.
A. B. Reagan	Orr, Minn.
J. R. Slonaker	Stanford University, Cal.
Alfred Springer	Cincinnati, Ohio.
Robert B. Warder (Deceased)	Washington, D. C.
Ernest Walker	Fayetteville, Ark.
G. W. Wilson	Fayette, Ia.

ACTIVE MEMBERS.

C. E. Agnew	Delphi.
L. E. 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. Bareus.....	Indianapolis.
W. H. Bates.....	West Lafayette.
Guido Bell.....	Indianapolis.
Ray Bellamy.....	Moore's Hill.
Lee F. Bennett.....	Valparaiso.
Thomas Billings.....	West Lafayette.
Harry Eldridge Bishop.....	Indianapolis.
Lester Black.....	Bloomington.
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.
Herman S. Chamberlain (Deceased).....	Indianapolis.
E. J. Chansler.....	Bicknell.
A. G. W. Childs.....	Kokomo.
C. D. Christie.....	Cincinnati, O.
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.
M. E. Crowell.....	Franklin.
Chas. M. Cunningham.....	Indianapolis.
Lorenzo E. Daniels.....	Laporte.
E. H. Davis.....	West Lafayette.
Melvin K. Davis.....	Terre Haute.
Charles C. Deam.....	Indianapolis.

E. M. Deem.....	Frankfort.
Harry F. Dietz.....	Indianapolis.
James P. Dimonds.....	Indianapolis.
Martha Doan.....	Westfield.
J. P. Dolan.....	Syracuse.
David A. Drew.....	Bloomington.
Hans Duden.....	Indianapolis.
Arthur E. Dunn.....	Logansport.
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.
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, O.
Robert G. Gillum.....	Terre Haute.
E. R. Glenn.....	Brookville.
Frederic W. Gottlieb.....	Morristown.
Vernon Gould.....	Rochester.
Frank Cook Greene.....	New Albany.
Earl Grimes.....	Russellville.
Walter L. Hahn (Died May 31, 1911).....	Springfield, S. D.

C. F. Harding.....	West Lafayette.
Mary T. Harman.....	Bloomington.
Walter W. Hart.....	Indianapolis.
Victor Hendricks.....	St. Louis, Mo.
L. R. Hessler.....	Crawfordsville.
John P. Hetherington.....	Logansport.
C. E. Hiatt.....	Philadelphia, Pa.
John E. Higdon.....	Indianapolis.
Frank R. Higgins.....	Terre Haute.
S. Bella Hilands.....	Madison.
John J. Hildebrandt.....	Logansport.
Geo. N. Hoffer.....	Lafayette.
G. E. Hoffman.....	Logansport.
Allen D. Hole.....	Richmond.
Lucius M. Hubbard.....	South Bend.
Martha Hunt.....	Indianapolis.
O. F. Hunziker.....	West Lafayette.
Roscoe R. Hyde.....	Terre Haute.
Harry M. Ibison.....	Marion.
J. Isenberger.....	Louisville, Ky.
C. F. Jackson.....	Durham, N. H.
D. E. Jackson.....	St. Louis, Mo.
A. G. Johnson.....	Lafayette.
H. E. Johnson.....	Greenfield.
A. T. Jones.....	West Lafayette.
W. J. Jones, Jr.....	West Lafayette.
O. L. Kelso.....	Terre Haute.
A. M. Kenyon.....	West Lafayette.
Frank D. Kern.....	Lafayette.
L. V. Ludy.....	West Lafayette.
R. W. McBride.....	Indianapolis.
Richard C. McCloskey.....	Chicago, Ill.
T. S. McCulloch.....	Crawfordsville.
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.
Chas. R. Moore.....	West Lafayette.
Geo. T. Moore.....	St. Louis, Mo.
Richard Bishop Moore.....	Indianapolis.
Herbert Morrison.....	Indianapolis.
Frank K. Mowrer.....	Marion.
F. W. Muncie.....	Crawfordsville.
Fred Mutchler.....	Bowling Green, Ky.
Leslie C. Nanney.....	Bedford.
Charles E. Newlin.....	Indianapolis.
J. A. Nieuwland.....	Notre Dame.
Clayton R. Orton.....	West Lafayette.
G. A. Osner.....	Crawfordsville.
D. A. Owen.....	Franklin.
Everett W. Owen.....	Indianapolis.
Fernan L. Pickett.....	Bloomington.
Rollo J. Pierce.....	Richmond.
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.
Will Scott.....	Bloomington.
Charles Wm. Shannon.....	Brazil.
Fred Sillery.....	Indianapolis.
Oscar W. Silvey.....	West Lafayette.
Charles M. Smith.....	Lafayette.
C. Piper Smith.....	Logan, Utah.
Essie Alma Smith Shannon.....	Bloomington.
E. R. Smith.....	Indianapolis.

Geo. Spitzer.....	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.	
A. D. Thorburn.....	Indianapolis.	
Iro C. Trueblood (Miss).....	Greencastle.	
William M. Tucker.....	Osgood.	
W. P. Turner.....	West Lafayette.	
Chas. A. Vallance.....	Indianapolis.	
J. M. Van Hook.....	Bloomington.	
W. B. Van Gorder.....	Lyons.	
H. S. Voorhees.....	Ft. Wayne.	
Frank B. Wade.....	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.....	Bloomington.	
William L. Woodburn.....	Evanston, Ill.	
John W. Woodhams.....	Indianapolis.	
Herbert Milton Woollen.....	Indianapolis.	
J. F. Woolsey.....	Cleveland, O.	
G. A. Young.....	West Lafayette.	
Jacob P. Young.....	Huntington.	
L. E. Young.....	West Lafayette.	
W. J. Young.....	Washington, D. C.	
Lucy Youse.....	Terre Haute.	
W. A. Zehring.....	West Lafayette.	
Charles Zeleny.....	Urbana, Ill.	
Fellows, resident.....		51
Non-resident.....		12
Members, active.....		197
Members, non-resident.....		30
Total.....		290

MINUTES OF THE TWENTY-SIXTH
ANNUAL MEETING

INDIANA ACADEMY OF SCIENCE

CLAYPOOL HOTEL, INDIANAPOLIS, INDIANA.

NOVEMBER 24, 25, 1910.

The Indiana Academy of Science met at the Claypool Hotel, November 24-25, 1910.

The Executive Committee held its regular meeting at 8:00 p. m., November 24. The following members were present: P. N. Evans, President; C. R. Dryer, A. J. Bigney, J. S. Wright, A. W. Butler, W. S. Blatchley, George W. Benton, Robert Hessler, and W. J. Moenkhaus.

On proposal of the treasurer, W. J. Moenkhaus, the following resolution was adopted:

Resolved, That all accounts of the members of the Academy be regarded as paid up to and including the year for which their most recent receipt has been issued.

The State Library Committee, of which A. W. Butler was chairman, reported that the State Librarian was taking special interest in the publications coming to the Academy.

The general interests of the Academy were then discussed at some length.

The regular session of the Academy was held at 9:00 a. m. Friday, November 25, Professor P. N. Evans presiding.

The Program Committee reported their work completed as given in the printed program.

The Committee on Distribution of the Proceedings reported that their work had been performed under the direction of the State Librarian, Dr. Demarchus C. Brown.

The editor, H. L. Bruner, made the following report through the Secretary:

Work performed—

Cost of regular edition	\$1,070 27
Free reprints	183 55
	<hr/>
Total	\$1,253 82

The Treasurer reported as follows:

Balance from 1909.....	\$401 22
Receipts from dues, 1910.....	194 00
	<hr/>
Total	\$595 22
Expenditures during 1909 as per vouchers.....	271 58
	<hr/>
Balance, cash on hand November 25, 1910.....	\$323 64

W. J. MOENKHAUS, Treasurer.

Audited and approved.

L. J. RETTGER,

F. J. BREEZE,

Auditing Committee.

The President then appointed the standing committees.

After the completion of this business, Professor P. N. Evans, as President of the Academy, read his address on "The Place of Research in the Undergraduate Schools." Dr. Demarchus C. Brown was called upon to speak concerning the books that come to the Academy through his office. He called attention to three points:

1. That two consignments of books had been bound, one of 118 volumes and one of 119 volumes.
2. That he now had 300 volumes ready for the bindery.
3. That the list of domestic exchanges was very incomplete, and that there were now 114 foreign exchanges on the list. This list was also incomplete.

He asked that a special committee in Indianapolis be appointed to quickly decide all questions relative to the publications. This work was referred to the Committee on State Library.

The reading of the regular papers in general session was then taken up.

After Dr. Hessler's paper on "Plants and Man," he presented the following resolution, which was adopted:

Resolved, That the Indiana Academy of Science hereby endorses the establishment of a National Department of Public Health, such as is advocated by the Owens bill.

Papers were read until noon.

At 2:00 p. m. the Academy went into business session. M. B. Thomas, as chairman of the Membership Committee, reported the following persons for membership:

Kenneth P. Williams.

William M. Tucker.

Jesse J. Galloway.

Herbert Morrison.

Ray Bellamy.

Charles M. Smith.

George M. Frier.

F. D. Fuller.

Mary A. Fitch.

Clayton R. Orton.

H. H. Barcus.

M. S. Markle.

J. A. Price.

Harry M. Ibison.

David A. Drew.

They were elected.

The following persons were elected fellows:

F. J. Breeze.

C. C. Deam.

J. N. Hurty.

N. E. Barnard.

R. B. Moore.

The Auditing Committee reported the books of the Treasurer correct.

The Academy was then divided into the following sections for completing the reading of the papers:

A. Zoölogy, Geology and Geography.

B. Botany.

C. Mathematics, Physics, Chemistry.

At 8:00 p. m. the Committee on Nomination of Officers, A. W. Butler chairman, reported as follows:

President—Charles R. Dryer.

Vice-President—David W. Dennis.

Secretary—Andrew J. Bigney.

Assistant Secretary—E. A. Williamson.

Press Secretary—Milo H. Stuart.

Treasurer—W. J. Moenkhaus.

They were elected as read.

On motion of Stanley Coulter, it was decided that it is the sense of this Academy that hereafter the nomination for vice-presidents shall not carry with it the promotion to the office of president.

President P. N. Evans then asked Professor Stanley Coulter to introduce the speaker of the evening, Dr. D. T. MacDougal, of the Desert Laboratory, Tucson, Arizona.

Dr. MacDougal's subject was "Desert Days and Desert Ways." It was fully illustrated with numerous lantern slides. This lecture was one of great worth to every person present, and it was greatly enjoyed and appreciated.

SPRING MEETING.

NASHVILLE, BROWN COUNTY, MAY 20-21, 1910.

The spring meeting of the Academy was held in Brown County on the above date. The program, as planned, was carried out successfully and members who were able to attend reported a pleasant time. The Indianapolis Southern Railroad gave us a special car from Indianapolis at 7:20 Friday morning, May 20th. We arrived at Helmsburg at 8:35, where we were joined by members of the Academy who came from Bloomington. The party was met by Joshua Bond, liveryman, with two hacks, and without delay, some riding and some walking, set out for Waltman's and Freeman's orchards and the Bear Wallow. A lunch of ham sandwiches and buttermilk was served here, and after a rest the route was followed down the ridge into the valley and along the road which follows Grease Creek, into Nashville, where we arrived at 2:45, tired but happy. We left Helmsburg in mud and mist, but the day gradually brightened until by the time we left Bear Wallow the sun was shining brightly.

The rest of the afternoon was spent in viewing historic and interesting sights in and about Nashville. Dinner at 5:30 at Pittman's Inn was followed by two hours of social chat upon the broad piazzas of this sanatorium. At 7:45 three additional members arrived, including Mr. Blatchley, who was unable to be present during the day and who was booked for the principal address of the evening.

The public meeting was held in the court house at Nashville. In the absence of President P. N. Evans and of Vice-President C. R. Dryer, past President D. W. Dennis, of Earlham, was asked to preside. Professor Dennis spoke of the work of the members of the Academy for the State and of the interest which the people should take in the Academy. He introduced Dr. Eigenmann, who spoke briefly on his South American fishing experiences. Following Dr. Eigenmann, Mr. Blatchley was introduced and gave his lecture on the "Indiana of Nature," illustrated by many charts showing the geological growth of the State. This address was enjoyed by the audience, which comfortably filled the court room.

Saturday morning the party separated into groups. Some of them returned on the early trains, others returned at noon, and still others stayed until the following day, visiting Weed Patch hill and other points of interest. The day started out rather threatening, but it gradually cleared. Altogether, considering the time of year, the weather was quite favorable and the roads unusually good. The following members of the Academy were present :

W. S. Blatchley,	G. M. Frier,
Donaldson Bodine.	W. C. Goble,
G. W. Benton,	Roscoe R. Hyde.
E. R. Cumings,	William A. McBeth.
G. W. Childs.	Robert W. McBride.
Charles C. Deam.	R. R. Ramsey,
David W. Dennis,	Charles Stoltz.
C. H. Eigenmann.	J. M. Van Hook.
Arthur L. Foley.	W. F. VanGorder.
E. S. Ferry.	J. S. Wright.

GEORGE W. BENTON, Secretary.

PROGRAM OF THE
 TWENTY-SIXTH ANNUAL MEETING
 INDIANA ACADEMY OF SCIENCE

CLAYPOOL HOTEL, INDIANAPOLIS, INDIANA,

November 25, 1910.

P. N. EVANS, President.	CHARLES R. DRYER, Vice-President.
GEORGE W. BENTON, Secretary.	A. J. BIGNEY, Assistant Secretary.
W. J. MOENKHAUS, Treasurer.	H. L. BRUNER, Editor.

PROGRAM.

FRIDAY, NOVEMBER 25.

9:00 A. M., General Meeting.

Business.

President's Address.

Plants and Man—Weeds and Disease, 20 minutes.....Robert Hessler

An Outline Review of Indiana Municipal Water Supplies.

5 minutesCharles Brossman

A New Building for the Department of Practical Mechan-

ics at Purdue University, 10 minutes.....M. J. Golden

Features of Subterranean Drainage in the Bloomington

Quadrangle. 30 minutes.....J. W. Beede

The Shi-Shi Cig. 3 minutes.....Albert B. Reagan

Notes on the Shaker Church of the Indians. 5 minutes....Albert B. Reagan

The Wreck of the "Suthern." 5 minutes.....Albert B. Reagan

The Bois Fort Indian Reservation in Minnesota, 8 minutes

Albert B. Reagan

Conservation Problems in Indiana, 12 minutes.....Frederick J. Breeze

2:00 P. M., Sectional Meetings.

ZOOLOGY, GEOLOGY AND GEOGRAPHY.

Geology of Croy's Creek, Clay Co., Ind., 10 minutes.....C. W. Shannon

The Properties and Reactions of Thrombin. 10 minutes.....L. J. Rettger

- Some Conglomerate Beds of Post Glacial Origin, 5 minutes Glenn Culbertson
- The Nature and Origin of the Fish Fauna of the Plateau of British Guiana, 15 minutes.....C. H. Eigenmann
- A Physiographic Survey of the Terre Haute Area—Reports of Progress, 10 minutes.....Charles R. Dyer
- The Work Done by Normal Brook in Thirteen Years, 20 minutesCharles R. Dyer and Melvin K. Davis
- Paleolithic, Neolithic, Copper and Iron Ages of Shelby Co., Ind., 10 minutesF. W. Gottlieb
- The Effects of Ice in Lakes Upon the Shore Lines of the Same, 3 minutesAlbert B. Reagan
- A New Bed of Trilobites, 5 minutes.....A. J. Bigney
- The Fauna of the Brazil Limestone.....F. C. Greene

MATHEMATICS, PHYSICS AND CHEMISTRY.

- The Preparation of Ether, 5 minutesP. N. Evans
- The Temperature Coefficient of the Surface Tension of Water, 15 minutes.....Arthur L. Foley
- LaPlace's Theory of Capillarity, 10 minutes.....Arthur L. Foley
- A Derivation of Poisson's Equation, 10 minutes.....Kenneth P. Williams
- The Value at Low Temperatures of the Specific Heats of a GasC. M. Smith
- Gaseous Fermentation in Sweetened Condensed Milk, 40 minutesO. F. Hunziker
- Investigations Concerning the Reichert-Meissl No. and the Relations of Butter Fat Constants in Butter Analysis..George Spitzer
- A Convenient Laboratory Device, 5 minutes.....J. P. Naylor

BOTANY.

- Some Anomalies in the Gametophyte of *Dryopteris stipularis*, 5 minutesCaroline A. Black
- The Flora of Eastern Nova Scotia, 10 minutes.....Stanley Coulter
- The Weed Problem in Indiana, 10 minutes.....Stanley Coulter
- The Heteroecious Rusts with *Aecia* on *Euphorbia*.....Mary A. Fitch
- An Example of Persistent Life, 2 minutes.....D. A. Owen
- Indiana Fungi, 5 minutesJ. M. Van Hook
- Steccherinum septentrionale* (Fr.) Banker in Indiana, 10 minutesHoward J. Banker

- The Water Balance of Desert Plants, 15 minutes.....D. F. MacDougal
 Disease Resistance in Varieties of Potatoes.....C. R. Orton
 The Laboratory Method of Determining the Fungicidal
 Value of Spraying Mixtures, 10 minutes.....L. R. Hessler
 The Black Knot of Plum, 10 minutes.....H. L. Rees
 Additions to the Indiana Flora, 3 minutes.....Charles C. Deam
 An Ecological Survey of the Lower Whitewater Gorge. 15
 minutesM. S. Markle and L. C. Petry
 Report of Work on Corn Pollination II, 3 minutes.....M. L. Fisher
 8:00 p. m., Address, illustrated by stereopticon, by Dr. D. T. MacDougal,
 of the Desert Laboratory, Tucson, Arizona.



