

PROCEEDINGS

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OF THE

INDIANA ACADEMY

OF SCIENCE

1908

PROCEEDINGS

OF THE

Indiana Academy of Science

1908

EDITOR H. L. BRUNER

INDIANAPOLIS, IND.
1909

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INDIANAPOLIS

W. M. B. BURFORD, PRINTER
1909

THE STATE OF INDIANA,
EXECUTIVE DEPARTMENT, }
April 19, 1909. }

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

OFFICE OF AUDITOR OF STATE,
INDIANAPOLIS, April 28, 1909. }

The within report (no financial statement) has been examined and found correct.

JOHN C. BILLHEIMER,
Auditor of State.

APRIL 28, 1909.

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, April 29, 1909.

FRED A. SIMS,
Secretary of State.

Received the within report and delivered to the printer April 29, 1909.
A. E. BUTLER,
Clerk Printing Board.

TABLE OF CONTENTS.

	PAGE.
An act to provide for the publication of the reports and papers of the Indiana Academy of Science.....	6
An act for the protection of birds, their nests and eggs.....	8
Officers, 1908-1909.....	9
Committees, 1908-1909.....	10
Principal officers since organization.....	11
Constitution.....	12
By-Laws.....	14
Members and Fellows.....	15
Members, non-resident.....	16
Members, active.....	17
Program of the Twenty-fourth Annual Meeting.....	22
Report of the Twenty-fourth Annual Meeting.....	26
Papers presented at the Twenty-fourth Annual Meeting:	
President's Address: Deforestation and Its Effects Among the Hills of Southern Indiana, by Glen Culbertson.....	27
Work of the Pathological Laboratory of the Central Indiana Hospital for Insane, Indianapolis, by George F. Edenharter.....	39
An Addition to the Birds of Indiana, by Amos Butler.....	49
Biography and the Influence of Environment, by Robert Hessler....	51
Felkner Island, Wabec Lake, Kosciusko County, Indiana, by J. P. Dolan.....	67
A Strange Nurse, by A. J. Bigney.....	69
The Shake Dance of the Quilente Indians, with Drawing by an Indian Pupil in the Indian School, by Albert B. Reagan.....	71
Photographic Observations of Morehouse's Comet, by W. A. Cogshall.....	75
Field Observations on Rusts for the General Botanist, by J. C. Arthur.....	83
The Rust of Timothy, by F. D. Kern.....	85
Notes on the Heteroecious Plant Rusts of Indiana, by Aaron G. Johnson.....	87
Some Anomalies in the Female Gametophyte of Pinus, by D. M. Mottier.....	95

	PAGE.
Notes on the Seedless Persimmon, by Wm. L. Woodburn	99
Testing Seed Corn by Specific Gravity, by Herbert A. Dunn	103
Notes on the Flora of Cass County, Indiana, by Robert Hessler	107
A New Anthracnose Attacking Certain Cereals and Grasses, by A. D. Selby and Thomas F. Manns	111
Dissemination of Disease by Means of the Seed of the Host Plant, by M. F. Barrus	113
The Histological Difference between <i>Pinus taeda</i> and <i>P. palustris</i> , by Katherine Golden Bitting	127
Report of Work in Corn Pollination, by M. L. Fisher	133
The Killing of Mustard and Other Noxious Weeds in the Grain Fields of Dakota, by E. W. Olive	135
The Meyer Molecular Weight Calculation, by Percy N. Evans	139
The Relation of Fats to Moisture Content of Butter, by O. F. Hunziker	141
The Use of the Polariscope in Testing High Tension Insulators, by C. Francis Harding	147
Some Contributions to the Chemistry of Mucoïd, by C. E. May	151
The Estimation of Lead by Titration of Lead Chromate, by W. C. Brooks	157
An Evolution Method for the Determination of Sulfur in Sulfides and Sulfates, by F. C. Mathers	159
The Destruction of Platinum Crucibles through Ignition of Magnesium Ammonium Phosphate, by R. E. Lyons	161
Probable Origin of the Depressions in the Mesa South of the Tijeras Canyon, New Mexico, by Albert B. Reagan	165
Headwaters of the Tippecanoe River, by J. T. Scovell	167
Caves and Cave Formations of the Mitchell Limestone, by F. C. Greene	175
Life Zones of Indiana as Illustrated by the Distribution of Orthoptera and Coleoptera Within the State, by W. S. Blatchley	185
Animals of the Olympic Peninsula, Washington, by Albert B. Reagan	193
The Circulation of Mixed Blood in the Embryo Mammal and Bird and in the Adult Reptile, Amphibian and Fish, by A. G. Pohlman	201
The Indiana Academy of Science, by J. T. Scovell	209
Index	211

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 body, 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,

Preamble.

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.

Publication of
the Reports of
the Indiana
Academy of
Science.

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 services, 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

Editing
Reports.

Number of
printed
Reports.

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.

Proviso.

**Disposition
of Reports.**

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 Indiana 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.

Emergency.

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

SECTION 602. It shall be unlawful for any person to kill, trap or possess any wild bird, or to purchase or offer Birds. the same for sale, or to destroy the nests or the 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 Anatidæ, commonly called swans, geese, brant, river and sea duck; the Rallidæ, commonly known as rails, coots, mudhens, and gallinules; the Limicolæ, commonly known as shore birds, plovers, surf birds, snipe, woodcock, sandpipers, tattlers and curlews; nor to English or European house sparrows, 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, upon conviction, be fined not less than ten dollars nor more than fifty dollars.

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 said Commissioner written testimonials from two well-known scientific men certifying to the good character and fitness of said applicant to be entrusted with such privilege, and pay to said Board 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 nests or eggs of any bird for any other purpose than that named in this section.

Indiana Academy of Science.

OFFICERS, 1908-1909.

PRESIDENT

A. L. FOLEY.

VICE-PRESIDENT

P. N. EVANS.

SECRETARY

JAMES H. RANSOM.

ASSISTANT SECRETARY

A. J. BIGNEY.

PRESS SECRETARY

GEORGE A. ABBOTT.

TREASURER

WILLIAM A. MCBETH.

EXECUTIVE COMMITTEE

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P. N. EVANS,	W. S. BLATCHLEY,	W. A. NOYES,
J. H. RANSOM,	H. W. WILEY,	J. C. ARTHUR,
A. J. BIGNEY,	M. B. THOMAS,	O. P. HAY,
G. A. ABBOTT,	D. W. DENNIS,	T. C. MENDENHALL,
W. A. MCBETH,	C. H. EIGENMANN,	J. C. BRANNER,
GLENN CULBERTSON,	C. A. WALDO,	J. P. D. JOHN,
D. M. MOTTIER,	THOMAS GRAY,	J. M. COULTER,
ROBERT HESSLER,	STANLEY COULTER,	D. S. JORDAN,
JOHN S. WRIGHT,		

CURATORS

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

COMMITTEES, 1908-1909.

PROGRAM,	W. J. MOENKHAUS,	H. L. BRUNER,	J. P. NAYLOR.
MEMBERSHIP,	R. HESSLER,	D. ROTHROCK,	P. N. EVANS.
NOMINATIONS,	J. S. WRIGHT,	S. BURRAGE,	D. M. MOTTIER.
AUDITING,	W. J. MOENKHAUS,	W. A. COGSHALL,	E. G. MAHIN.
STATE LIBRARY,	J. S. WRIGHT,	W. S. BLATCHLEY, G. W. BENTON.	A. W. BUTLER,
RESTRICTION OF WEEDS AND DISEASES,	R. HESSLER, S. COULTER,	J. N. HURTY,	A. W. BUTLER D. M. MOTTIER.
DIRECTORS OF BIOLOGICAL SURVEY,	STANLEY COULTER, C. H. EIGENMANN,	C. R. DRYER,	M. B. THOMAS, J. C. ARTHUR.
RELATIONS OF THE ACADEMY TO THE STATE,	R. W. McBRIDE,	M. B. THOMAS, W. S. BLATCHLEY.	G. CULBERTSON,
DISTRIBUTION OF THE PROCEEDINGS,	J. S. WRIGHT, R. E. LYONS,	H. L. BRUNER,	G. W. BENTON, J. H. RANSOM.
PUBLICATION OF PROCEEDINGS,	H. L. BRUNER, Editor,	D. BODINE,	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.
1888-1889	John C. Branner....	Amos W. Butler....			O. P. Jenkins.
1889-1890	T. C. Mendenhall...	Amos W. Butler....			O. P. Jenkins.
1890-1891	O. P. Hay.....	Amos W. Butler....			O. P. Jenkins.
1891-1892	J. L. Campbell....	Amos W. Butler....			C. A. Waldo.
1892-1893	J. C. Arthur.....	Amos W. Butler....	{ Stanley Coulter... }		C. A. Waldo.
			{ W. W. Norman... }		
1893-1894	W. A. Noyes.....	C. A. Waldo.....	W. W. Norman....		W. P. Shannon.
1894-1895	A. W. Butler.....	John S. Wright....	A. J. Bigney....		W. P. Shannon.
1895-1896	Stanley Coulter....	John S. Wright....	A. J. Bigney....		W. P. Shannon.
1896-1897	Thomas Gray.....	John S. Wright....	A. J. Bigney....		W. P. Shannon.
1897-1898	C. A. Waldo.....	John S. Wright....	A. J. Bigney....	Geo. W. Benton....	J. T. Scovell.
1898-1899	C. H. Eigenmann...	John S. Wright....	E. A. Schultze...	Geo. W. Benton....	J. T. Scovell.
1899-1900	D. W. Dennis.....	John S. Wright....	E. A. Schultze...	Geo. W. Benton....	J. T. Scovell.
1900-1901	M. B. Thomas....	John S. Wright....	E. A. Schultze...	Geo. W. Benton....	J. T. Scovell.
1901-1902	Harvey W. Wiley...	John S. Wright....	Donaldson Bodine..	Geo. W. Benton....	J. T. Scovell.
1902-1903	W. S. Blatchley...	John S. Wright....	Donaldson Bodine..	G. A. Abbott.....	W. A. McBeth.
1903-1904	C. L. Mees.....	John S. Wright....	J. H. Ransom.....	G. A. Abbott.....	W. A. McBeth.
1904-1905	John S. Wright....	Lynn B. McMullen..	J. 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.

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.

G. A. Abbott.....	*1908.....	Indianapolis.
R. J. Aley.....	1898.....	Bloomington.
J. C. Arthur.....	1894.....	Lafayette.
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.
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.
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.....	1893.....	Terre Haute.
A. S. Hathaway.....	1895.....	Terre Haute.
W. K. Hatt.....	1902.....	Lafayette.
Robert Hessler.....	1899.....	Logansport.

*Date of election.

†Non-resident.

†H. A. Huston.....	*1893.....	Chicago, Ill.
Edwin S. Johannatt.....	1904.....	Terre Haute.
Robert E. Lyons.....	1896.....	Bloomington.
W. A. McBeth.....	1904.....	Terre Haute.
V. F. Marsters.....	1893.....	Bloomington.
C. L. Mees.....	1894.....	Terre Haute.
†J. A. Miller.....	1904.....	Swarthmore, Pa.
W. J. Moenkhaus.....	1901.....	Bloomington.
D. M. Mottier.....	1893.....	Bloomington.
J. P. Naylor.....	1903.....	Greencastle.
†W. A. Noyes.....	1893.....	Champaign, 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.....	Charleston, S. C.
J. C. Branner.....	Stanford University, Cal.
M. A. Brannon.....	Grand Forks, N. D.
D. H. Campbell.....	Stanford University, Cal.
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. Green	Columbia, Mo.
C. W. Hargitt	Syracuse, N. Y.
O. P. Hay	New York City.
Edward Hughes	Stockton, Cal.
O. P. Jenkins	Stanford University, Cal.
D. S. Jordan	Stanford University, Cal.
J. S. Kingsley	Tufts College, Mass.
D. T. MacDougal	Tucson, Arizona.
L. B. McMullen	Valley City, N. D.
T. C. Mendenhall	Worcester, Mass.
A. H. Purdue	Fayetteville, Ark.
A. B. Reagan	Mora, Wash.
Alfred Springer	Cincinnati, Ohio.
Robert B. Warder	Washington, D. C.
Ernest Walker	Clemson College, S. C.
G. W. Wilson	Fayette, Ia.

ACTIVE MEMBERS.

C. E. Agnew	Delphi.
L. E. Allison	West Lafayette.
H. W. Anderson	Ladoga.
H. F. Bain	San Francisco, Cal.
Walter D. Baker	Indianapolis.
Edward Hugh Bangs	Indianapolis.
W. H. Bates	West Lafayette.
Lee. F. Bennett	Valparaiso.
Harry Eldridge Bishop	Indianapolis.
Lester Black	
William N. Blanchard	Greencastle.
Charles S. Bond	Richmond.
H. C. Brandon	Bloomington.
Fred J. Breeze	Remington.
E. M. Bruce	Terre Haute.
Lewis Clinton Carson	Detroit, Mich.

Herman S. Chamberlain	Indianapolis.
E. J. Chansler	Bicknell.
A. G. W. Childs	Kokomo.
C. D. Christie	West Lafayette.
Howard W. Clark	Chicago, Ill.
Otto O. Clayton	Geneva.
H. M. Clem	Monroeville.
Charles Clickener	Silverwood, R. D. No. 1.
Charles A. Coffey	Petersburg.
William Clifford Cox	Columbus.
J. A. Cragwall	Crawfordsville.
M. E. Crowell	Franklin.
Lorenzo E. Daniels	Laporte.
E. H. Davis	West Lafayette.
Charles C. Deam	Bluffton.
Martha Doan	Westfield.
J. P. Dolan	Syracuse.
Herman B. Dorner	Urbana, Ill.
Hans Duden	Indianapolis.
Arthur E. Dunn	Logansport.
Herbert A. Dunn	Logansport.
M. L. Durbin	Anderson.
J. B. Dutcher	Bloomington.
A. A. Eberly	West Lafayette.
C. R. Eckler	Indianapolis.
Max Mapes Ellis	Vincennes.
H. E. Enders	West Lafayette.
Samuel G. Evans	Evansville.
William P. Felver	Logansport.
C. J. Fink	Crawfordsville.
M. L. Fisher	West Lafayette.
A. S. Fraley	Linden.
Austin Funk	Jeffersonville.
John D. Gabel	Madison.
Andrew W. Gamble	Logansport.
H. O. Garman	Lafayette.
J. B. Garner	Crawfordsville.
Robert G. Gillum	Terre Haute.

Vernon Gould	Rochester.
Frank Cook Greene	New Albany.
Walter L. Hahn	Springfield, S. D.
C. F. Harding	West Lafayette.
Mary T. Harman	State College, Pa.
Victor Hendricks	St. Louis, Mo.
John P. Hetherington	Logansport.
C. E. Hiatt	Bloomington.
John E. Higdon	Indianapolis.
Frank R. Higgins	Terre Haute.
S. Bella Hilands	Madison.
John J. Hildebrandt	Logansport.
G. E. Hoffman	Logansport.
Allen D. Hole	Richmond.
Lucius M. Hubbard	South Bend.
O. F. Hunzicker	West Lafayette.
John N. Hurty	Indianapolis.
J. Isenberger	Lebanon.
C. F. Jackson	Durham, N. H.
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.
Charles T. Knipp	Urbana, Ill.
L. V. Ludy	West Lafayette.
R. W. McBride	Indianapolis.
Richard C. McClaskey	Terre Haute.
N. E. McIndoo	Lyons.
Edward G. Mabin	West Lafayette.
James E. Manchester	Vincennes.
Wilfred H. Manwaring	Bloomington.
William Edgar Mason	Borden.
Clark Mick	Berkley, Cal.
A. R. Middleton	West Lafayette.
G. Rudolph Miller	Indianapolis.

F. A. Miller	Indianapolis.
Richard Bishop Moore	Indianapolis.
F. W. Muncie	Crawfordsville.
Fred Mutchler	Terre Haute.
Charles E. Newlin	Indianapolis.
John F. Newsom	Stanford University, Cal
J. A. Nieuwland	Notre Dame.
D. A. Owen	Franklin.
Rollo J. Pierce	Indianapolis.
Ralph B. Polk	Greenwood.
James A. Price	Ft. Wayne.
C. A. Reddick	Crawfordsville.
C. J. Reilly	Syracuse.
Allen J. Reynolds	Emporia, Kansas.
Giles E. Ripley	Decorah, Iowa.
George L. Roberts	Lafayette.
J. Schraumm	Crawfordsville.
E. A. Schultze	Chicago, Ill.
Will Scott	Bloomington.
* Charles Wm. Shannon	Bloomington.
Fred Sillery	Indianapolis.
J. R. Slonaker	Madison, Wis.
C. Piper Smith	Pacific Grove, Cal
Essie Alma Smith	Bloomington.
E. R. Smith	Indianapolis.
J. M. Stoddard	Indianapolis.
J. C. Taylor	Logansport.
Albert W. Thompson	Owensville.
W. P. Turner	West Lafayette.
W. B. Van Gorder	Worthington.
H. S. Voorhees	Ft. Wayne.
Frank B. Wade	Indianapolis.
Daniel T. Weir	Indianapolis.
A. E. White	Connersville.
Herbert Milton Woollen	Indianapolis.
J. F. Woolsey	Indianapolis.
G. A. Young	West Lafayette.
L. E. Young	West Lafayette.

W. J. Young	Hyattsville.	
Lucy Youse	Palo Alto, Cal.	
W. A. Zehring	West Lafayette.	
Charles Zeleny	Bloomington.	
Fellows, resident		48
Fellows, non-resident		10
Members, active		131
Members, non-resident		25
		214
Total		214

NOTE.—For list of Foreign Correspondents, see Proceedings of 1904.

PROGRAM
OF THE
TWENTY-FOURTH ANNUAL MEETING
INDIANA ACADEMY OF SCIENCE,
PURDUE UNIVERSITY, LAFAYETTE, INDIANA,
NOVEMBER 26. 27 AND 28, 1908.

OFFICERS AND EX-OFFICIO EXECUTIVE COMMITTEE.

GLENN CULBERTSON, <i>President</i>	A. J. BIGNEY, <i>Assistant Secretary</i>	
A. L. FOLEY, <i>Vice-President</i>	G. A. ABBOTT, <i>Press Secretary</i>	
J. H. RANSOM, <i>Secretary</i>	W. A. McBETH, <i>Treasurer</i>	
DAVID M. MOTTIER	D. W. DENNIS	J. C. ARTHUR
ROBERT HESSLER	C. H. EIGENMANN	O. P. HAY
JOHN S. WRIGHT	C. A. WALDO	T. C. MENDENHALL
C. L. MEES	THOMAS GRAY	JOHN C. BRANNER
W. S. BLATCHLEY	STANLEY COULTER	J. P. D. JOHN
H. W. WILEY	AMOS W. BUTLER	JOHN M. COULTER
M. B. THOMAS	W. A. NOYES	DAVID S. JORDAN

All sessions of the Academy will be held in the Chemical Building on the campus of Purdue University. Rooms will be provided in this building for the Secretary and other officers, and for committees. A general lounging room will also be furnished.

ENTERTAINMENT.

Arrangements have been made to care for those attending the Academy in fraternity houses within two blocks of the University grounds. A very low rate of \$1.50 has been secured for supper on Friday night, night's lodging and breakfast on Saturday morning.

On Friday noon a lunch will be served at the University for 50 cents.

Those desiring to have accommodations reserved for them should notify Dean Stanley Coulter at once.

All attending the Academy should report at once at the Chemical building, where their reservation will be given them and they will then be shown to their lodging places.

PROGRAM COMMITTEE.

M. B. Thomas, Crawfordsville	C. H. Eigenmann, Bloomington
Glenn Culbertson, Hanover	

LOCAL COMMITTEE.

Stanley Coulter	Perey N. Evans
C. H. Benjamin	

GENERAL PROGRAM.

THURSDAY, NOVEMBER 26.

Meeting of the Executive Committee at the Lahr House..... 8:30 p. m.

FRIDAY, NOVEMBER 27.

CHEMICAL BUILDING.

General Session..... 9:00 a. m.
 President's Address..... 11:00 a. m.
 Lunch at the University..... 12:00 m.
 Inspection of University and Exhibits..... 1:00 p. m.
 Section Meetings..... 2:30 p. m.
 Lecture and Demonstration--High Frequency Currents. By Professor H. T. Plumb, Associate Professor of Electrical Engineering, Purdue University. Lecture Room, Electrical Building..... 8:00 p. m.

SATURDAY, NOVEMBER 28.

CHEMICAL BUILDING.

General Session followed by Section Meetings..... 9:00 a. m.
 Round Table.

PAPERS TO BE READ.

At eleven o'clock November 27 the Academy will hear the address of the retiring president, Professor Glenn Culbertson, on "Deforestation and Its Effects Among the Hills of Southern Indiana."

GENERAL.

1. Work of the Pathological Laboratory of the Central Indiana Hospital for the Insane, 15m..... Dr. Geo. F. Edenharter
- * 2. New Species of Birds in Indiana, 10m..... Amos Butler
- * 3. The Recent International Congress on Tuberculosis, 10m..... Severance Burrage
- * 4. Biography and the Influence of Environment, 15m..... Robert Hessler
- * 5. Felkner Island, Wabec Lake, Kosciusko County, Indiana, 10m..... J. P. Dolan
6. A Strange Nurse, 5m..... A. J. Bigney
- * 7. The Shake Dance of the Quilente Indians, with drawing, by an Indian in the Indian School. Presented by..... Albert B. Reagan
- * 8. Invasion of School Building by Bed Bugs, *Acanthia Hirundinis*, Parasites on Chimney Swifts. H. E. Enders
- * 9. Photographs of Morehouse's Comet, 1908 (lantern)..... W. A. Cogshall
- * 10. Selective Fertilization Among Fishes..... W. J. Moenkhaus
- * 11. Nature Study..... J. G. Coulter

BOTANY.

- * 1. Field Observations on Rusts for the General Botanist, 5m..... J. C. Arthu
- * 2. The Rust of Timothy, 10m..... F. D. Kern
- * 3. Notes on the Heteroecious Rusts of Indiana, 10m..... Aaron G. Johnson
- * 4. Some Anomalies in the Endosperm of Pinus, 5m..... D. M. Mottier
- * 5. Notes on the Seedless Persimmon, 5m..... Wm. L. Woodburn
- * 6. A Preliminary List of the Fungi of Indiana, 5m..... J. M. VanHook

*Papers read.

- * 7. Testing Seed Corn by Specific Gravity, 5m. H. A. Dunn
- * 8. Notes on the Flora of Cass County, Indiana, 10m. Robert Hessler
- * 9. Bean Anthracnose, 10m. M. F. Barrus
- *10. Endophytic Algae, 10m. Jacob Schramm
- *11. Report of Work in Corn Pollination, 5m. M. L. Fisher
- *12. Effect of the Recent Drought Upon Forest Trees, 10m. Stanley Coulter
- *13. Difference Between *Pinus taeda* and *Pinus palustris*, 10m. Katherine G. Bitting
- 14. A Forest Problem, 10m. W. H. Freeman
- *15. Botany in the High School, 10m. E. C. Snarr
- *16. The Killing of Mustard and Other Noxious Weeds in the Grain Fields of South Dakota, 10m. E. W. Olive
- *17. The Plankton of an Underground Stream. Will Scott
- 18. Anthracnose on Cereals and Grasses. A. D. Selby and T. F. Manns

CHEMISTRY AND MATHEMATICS.

- * 1. The Meyer Molecular Weight Calculation, 10m. Percy N. Evans
- * 2. The Vapor Pressure Method of Determining Molecular Weights, 15m. J. B. Garner
- 3. Reaction of Sulphuric Acid Interpreted Upon the Basis of the Electrolytic Dissociation Theory, 10m. W. A. Ruth
- * 4. Action of Alpha Bromoacylesters on Sodium Acetylacetonate, 10m. G. A. Reddick
- * 5. Action of Alpha Bromoacylesters on Sodium Benzoylacetonate, 10m. J. B. Garner and G. J. Fink
- * 6. Relation of Fats to Moisture Content of Butter, 10m. O. F. Hunziker
- 7. Note on a Class of Definitions, 5m. F. R. Higgins
- 8. A Graphical Representation of the Epsilon-Delta Definition of the Limit of a Function and Continuity, 5m. F. R. Higgins
- * 9. The Beckmann Rearrangement. J. B. Garner
- *10. The Use of the Polariscopes in Testing High Tension Insulators. C. F. Harding
- *11. A Contribution to the Chemistry of Mucoid. C. E. May
- *12. The Determination of Lead by Titration of Lead Chromate. C. E. Brooks
- *13. An Evolution Method for the Determination of Sulfur in Sulfates and Sulfides. F. C. Mathers
- *14. The Deterioration of Platinum through Ignition of Phosphates. R. E. Lyons

GEOLOGY.

- * 1. Probable Origin of Depressions in the Mesa South of the Tijeras Canyon, New Mexico, 10m. Albert B. Reagan
- * 2. Headwaters of the Tippecanoe River, 10m. J. T. Seovell
- * 3. Origin of Cyclones and Anticyclones of Temperate Latitudes, 10m. W. A. McBeth
- 4. Some Drainage Modifications in Southeastern Indiana. W. M. Tucker
- 5. Soil Survey of Daviess County. L. C. Snyder
- 6. Caves and Cave Formations of the Mitchell Limestone of Indiana. F. C. Greene

ZOOLOGY.

- 1. The Nasal Muscles of the Reptiles, 10m. H. L. Bruner
- 2. Swell Mechanisms of Vertebrates, 10m. H. L. Bruner
- * 3. Life Zones of Indiana as Illustrated by the Distribution of Orthoptera and Coleoptera Within the State, 15m. W. S. Blatchley
- * 4. Animals of the Olympic Peninsula, Washington, 10m. Albert B. Reagan
- 5. The Effect of Successive Removal on the Rate of Regeneration. Charles Zelency
- 6. Proportional Regeneration. M. M. Ellis
- 7. Curves Representing the Rate of Regeneration. M. L. Durbin
- 8. Circulation of Mixed Blood in the Adult Reptile and Amphibian as well as in the Fetal Mammal and Bird. A. G. Pohlman

*Papers read.

EXHIBITS AND DEMONSTRATIONS.

All of the laboratories of the University will be open for inspection during the session of the Academy and from 1:00-2:30 on Friday members of the Instruction Staff will be present to explain apparatus and methods of work.

Some special exhibits will be made as follows:

TESTING LABORATORY OF THE MECHANICAL BUILDING.

In the Timber Testing Laboratory will be demonstrated the methods used in the Forest Service for testing wood.

CHEMICAL BUILDING.

Exhibit of Literature and Apparatus used in the fight against Tuberculosis.

AGRICULTURAL BUILDING.

The Departments of Agronomy and Extension Work and the State Chemist will make exhibits in the Soil Physics Laboratory and the Agronomy Class Room.

The Department of Agricultural Engineering will exhibit in Room 201.

The Department of Animal Husbandry will exhibit micro-photographic work, hog cholera vaccine and other research work in the Veterinary Science Laboratory and Museum.

HORTICULTURAL LABORATORY.

Exhibit of appliances used in spraying infected plants.

DAIRY LABORATORY.

Exhibit of appliances used in the care of dairy products.

UNIVERSITY FARM.

Exhibit of experimental feeding work, the dairy herd and various breeds of sheep and hogs.

THE TWENTY-FOURTH ANNUAL MEETING OF THE INDIANA
ACADEMY OF SCIENCE.

The twenty-fourth annual meeting of the Indiana Academy of Science was held at Purdue University, Lafayette, Indiana, Thursday, Friday and Saturday, November 26, 27 and 28, 1908.

Thursday evening the Executive Committee met at the Lincoln Club and transacted the business coming before them. They directed the Secretary to request of the Legislative Committee, having the matter in charge, the doubling of the appropriation for the Academy. It was voted that the next meeting be a celebration of the twenty-fifth anniversary of the founding of the Academy and that an attempt be made to bring together all the educational interests of the State, as well as to have present all the living ex-Presidents of the Academy.

At nine o'clock Friday morning the Academy met in the chemistry building at Purdue. President Culbertson presided. The transaction of business and the reading of papers occupied the attention of the meeting until eleven o'clock, when the President delivered his address on "Deforestation and Its Effects Among the Hills of Indiana."

At noon a luncheon was served on the top floor of the chemistry building, followed by an inspection tour of the buildings of the University.

On reconvening at two o'clock a short business meeting was held, after which papers were read in sectional meetings. In the evening Professor H. T. Plumb, of the University, delivered an interesting lecture on the subject of "High Frequency Electric Currents."

Saturday morning at nine o'clock the Academy reconvened and completed the reading of papers and the transaction of business, adjourning at eleven o'clock to meet in next annual session at time and place selected by the program committee.