

PROCEEDINGS

OF THE

Indiana Academy of Science,

1894.

EDITORIAL COMMITTEE.

STANLEY COULTER,

J. C. ARTHUR,

R. ELLSWORTH CALL,

A. WILMER DUFF.

INDIANAPOLIS, IND..

OCTOBER, 1895.

INDIANAPOLIS, IND.
W. W. B. BURFORD, PRINTER.
1895.

TABLE OF CONTENTS.

	PAGE.
Act to Provide for the Publications of the Proceedings	4
Officers 1894-95	6
Committees 1894-95	7
Complete List of Officers	8
Constitution	9
By-Laws	10
List of Members	11
Tenth Annual Meeting	16
Field Meeting of 1895	16
Proceedings of the Winter Meeting, 1894	17
President's Address	17
Papers read	27
Biological Survey	144
Botany	144
List of Additions to the State Flora	147
Host Plants of Fungi	153
Parasitic Fungi Distributed	154
Flora Hamilton and Marion Counties	156
Index	179

ILLUSTRATIONS.

RESPIRATION APPARATUS	62
ARTHUR'S CENTRIFUGAL APPARATUS	63
GAS CHAMBER FOR MICROSCOPE STAGE	63
GLASS SLIDE WITH BINDING POSTS	64
DARWIN AWN HYGROMETER	64
DARWIN AWN HYGROMETER IN USE	64

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 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.

Editing reports.

of illustration approval of

Number of printed reports.

Proviso.

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,

Disposition of reports.

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 **Emergency.** and be in force from and after its passage.

OFFICERS, 1894-95.

PRESIDENT,
AMOS W. BUTLER.

VICE-PRESIDENT,
STANLEY COULTER.

SECRETARY,
JOHN S. WRIGHT.

ASSISTANT SECRETARY,
A. J. BIGNEY.

TREASURER,
W. P. SHANNON.

EXECUTIVE COMMITTEE.

AMOS W. BUTLER,	W. A. NOYES,	JOHN M. COULTER,
A. J. BIGNEY,	W. P. SHANNON,	O. P. HAY,
J. P. D. JOHN,	T. C. MENDENHALL,	J. C. BRANNER,
D. S. JORDAN,	J. L. CAMPBELL,	JOHN S. WRIGHT.
STANLEY COULTER,	J. C. ARTHUR,	

CURATORS.

Botany	JOHN M. COULTER.
Ichthyology	CARL H. EIGENMANN.
Ornithology	AMOS W. BUTLER.
Herpetology	O. P. HAY.
Entomology	F. M. WEBSTER.
Mammalogy	E. R. QUICK.

COMMITTEES, 1894-95.

P. S. BAKER,	PROGRAMME.	G. W. BENTON.
R. E. CALL,	MEMBERSHIP.	J. S. WRIGHT,
	H. A. HUSTON.	
J. C. ARTHUR,	NOMINATIONS.	C. L. MEES,
	C. H. EIGENMANN.	
W. E. STONE,	AUDITING.	L. M. UNDERWOOD.
	STATE LIBRARY.	
C. A. WALDO,	W. A. NOYES,	A. W. BUTLER,
J. S. WRIGHT,	A. W. DUFF.	
LEGISLATION FOR THE RESTRICTION OF WEEDS.		
J. C. ARTHUR,	J. M. COULTER,	J. S. WRIGHT.
PROPAGATION AND PROTECTION OF GAME AND FISH.		
C. H. EIGENMANN,	A. W. BUTLER,	PH. KIRSCH.
EDITORS.		
STANLEY COULTER,		R. ELLSWORTH CALL.
J. C. ARTHUR,		A. WILMER DUFF.
BIOLOGICAL SURVEY.		
L. M. UNDERWOOD,	A. W. BUTLER,	J. M. COULTER.
DIRECTORS BIOLOGICAL SURVEY.		
L. M. UNDERWOOD,	C. H. EIGENMANN,	V. F. MARSTERS.
CHANGE OF FORM OF ORGANIZATION OF THE ACADEMY WITH ITS RELATION TO THE STATE.		
C. L. MEES,	J. C. ARTHUR,	T. C. MENDENHALL.
RELATIONS OF THE ACADEMY TO THE STATE.		
C. A. WALDO,	A. W. BUTLER,	C. H. EIGENMANN.
	FINANCE.	
C. H. EIGENMANN,		STANLEY COULTER.

OFFICERS OF THE INDIANA ACADEMY OF SCIENCE.

	PRESIDENT.	SECRETARY.	ASST. SECRETARY.	TREASURER.
1885-6	David S. Jordan.	Amos W. Butler.	. . . . .	O. P. Jenkins.
1886-7	John M. Coulter.	Amos W. Butler.	. . . . .	O. P. Jenkins.
1887-8	J. P. D. John.	Amos W. Butler.	. . . . .	O. P. Jenkins.
1888-9	John C. Branner.	Amos W. Butler.	. . . . .	O. P. Jenkins.
1889-90	T. C. Mendenhall.	Amos W. Butler.	. . . . .	O. P. Jenkins.
1890-1	O. P. Hay.	Amos W. Butler.	. . . . .	O. P. Jenkins.
1891-2	J. L. Campbell.	Amos W. Butler.	. . . . .	C. A. Waldo.
1892-3	J. C. Arthur.	Amos W. Butler.	{ Stanley Coulter. W. W. Norman.	C. A. Waldo.
1893-4	W. A. Noyes.	C. A. Waldo.	W. W. Norman.	W. P. Shannon.
1894-5	A. W. Butler.	John S. Wright.	A. J. Bigney.	W. P. Shannon.

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, 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 programmes 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 specially 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 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 evening of one of the days of the meeting at the expiration of his term of office.

3. 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.

4. No bill against the Academy shall be paid without an order signed by the president and countersigned by the secretary.

5. 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.

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

MEMBERS.

HONORARY FELLOW.

*Daniel Kirkwood Riverside, Cal.

FELLOWS.

J. C. Arthur Lafayette.
P. S. Baker Greencastle.
W. S. Blatchley Indianapolis.
J. C. Branner Palo Alto, Cal.
A. W. Butler Brookville.
R. E. Call Cincinnati, O.
J. L. Campbell Crawfordsville.
John M. Coulter Lake Forest, Ill.
Stanley Coulter Lafayette.
H. T. Eddy Minneapolis, Minn.
C. H. Eigenmann Bloomington.
W. F. M. Goss Lafayette.
Thos. Gray Terre Haute.
O. P. Hay Chicago, Ill.
H. A. Huston Lafayette.
J. P. D. John Greencastle.
D. S. Jordan Palo Alto, Cal.
V. F. Marsters Bloomington.
C. L. Mees Terre Haute.
T. C. Mendenhall Hoboken, N. J.
D. M. Mottier Bloomington.
W. W. Norman Austin, Texas.
W. A. Noyes Terre Haute.
J. T. Scovell Terre Haute.
W. P. Shannon Greensburg.
Alex. Smith Chicago, Ill.
W. E. Stone Lafayette.
M. B. Thomas Crawfordsville.
L. M. Underwood Auburn, Ala.
T. C. Van Nuys Bloomington.
C. A. Waldo Lafayette.
F. M. Webster Wooster, O.
J. S. Wright Indianapolis.

*Deceased.

NON-RESIDENT MEMBERS.

D. H. Campbell	Palo Alto, Cal.
B. W. Evermann	Washington, D. C.
Charles H. Gilbert	Palo Alto, Cal.
C. W. Green	Palo Alto, Cal.
C. W. Hargitt	Syracuse, N. Y.
Edward Hughes	Palo Alto, Cal.
O. P. Jenkins	Palo Alto, Cal.
J. S. Kingsley	Tufts College, Mass.
Alfred Springer	Cincinnati, O.
Robert B. Warder	Washington, D. C.

ACTIVE MEMBERS.

J. Alex. Adair	Hanover.
R. J. Aley	Bloomington.
Timothy H. Ball	Crown Point.
H. H. Ballard	Terre Haute.
C. L. Barnes	Indianapolis.
George W. Benton	Indianapolis.
A. W. Bitting	Lafayette.
Alexander Black	Greencastle.
Henry L. Bolley	Fargo, N. D.
M. A. Brannon	Ft. Wayne.
Charles C. Brown	Indianapolis.
W. V. Brown	Greencastle.
H. L. Bruner	Irvington.
Wm. Lowe Bryan	Bloomington.
J. B. Burris	Cloverdale.
Noble C. Butler	Indianapolis.
J. T. Campbell	Rockville.
J. Fred Clearwaters	Greencastle.
H. J. Clements	Washington.
U. O. Cox	Mankato, Minn.
M. E. Crowell	Indianapolis.
Will Cumback	Greensburg.
Alida M. Cunningham	Kirkpatrick.
George L. Curtiss	Greencastle.
B. M. Davis	Irvington.
D. W. Dennis	Richmond.
Chas. R. Dryer	Terre Haute.
A. Wilmer Duff	Lafayette.
Joseph Eastman	Indianapolis.

E. G. Eberhardt	Indianapolis.
M. N. Elrod	Hartsville.
F. L. Emory	Ithaca, N. Y.
Samuel G. Evans	Evansville.
E. M. Fisher	Lake Forest, Ill.
J. J. Flather	Lafayette.
A. L. Foley	Bloomington.
Robert G. Gillum	Indianapolis.
J. R. Francis	Indianapolis.
J. B. Garner	Crawfordsville.
U. F. Glick	Newbern.
Katherine E. Golden	Lafayette.
Michael J. Golden	Lafayette.
W. E. Goldsborough	Lafayette.
C. F. Goodwin	Brookville.
S. S. Gorby	Indianapolis.
Vernon Gould	Rochester.
E. H. Heacock	Leadville, Colo.
Edwin Stanton Hallett	Corydon.
A. S. Hathaway	Terre Haute.
Wm. Perry Hay	Irvington.
Franklin W. Hayes	Indianapolis.
Robert Hessler	Logansport.
T. H. Hibben	Indianapolis.
George C. Hubbard	Moore's Hill.
J. W. Hubbard	Bloomington.
Thomas M. Iden	Irvington.
Alex. Jameson	Indianapolis.
A. E. Jessup	Carmel.
Sylvester Johnson	Irvington.
W. B. Johnson	Franklin.
E. M. Kindle	Bloomington.
J. G. Kingsbury	Irvington.
W. H. Kirehmer	Minneapolis, Minn.
Ph. Kirsch	Columbia City.
Charles T. Knipp	Bloomington.
Daniel Layman	Indianapolis.
W. S. Lemen	Indianapolis.
Robert E. Lyons	Bloomington.
Herbert W. McBride	Chicago, Ill.
Robert Wesley McBride	Indianapolis.
Kate McCarthy	Wabash.
Rousseau McClellan	Indianapolis.
D. T. McDougal	Minneapolis, Minn.
F. M. McFarland	Palo Alto, Cal.
J. W. Marsee	Indianapolis.

W. J. Moenkhaus	Bloomington.
G. T. Moore	Crawfordsville.
Joseph Moore	Richmond.
Warren K. Moorehead	Columbus, Ohio.
J. P. Naylor	Greencastle.
Charles E. Newlin	Indianapolis.
E. W. Olive	Frankfort.
J. H. Oliver	Indianapolis.
D. A. Owen	Franklin.
Elwood Pleas	Dunrieth.
A. H. Purdue	Chicago, Ill.
Ryland Ratliff	Fairmount.
D. C. Ridgley	Delphi.
George L. Roberts	Greensburg.
L. J. Rettger	Terre Haute.
Adolph Rogers	New Castle.
John F. Schnaible	Lafayette.
C. E. Schafer	Huntington.
Claude Siebenthal	Bloomington.
G. W. Sloan	Indianapolis.
Harold B. Smith	Lafayette.
F. P. Stauffer	Logansport.
M. C. Stevens	Lafayette.
Joseph Swain	Bloomington.
A. E. Swann	Indianapolis.
Geo. A. Talbert	Laporte.
Frank B. Taylor	Ft. Wayne.
Erastus Test	Lafayette.
F. C. Test	Washington, D. C.
Wm. M. Thrasher	Irvington.
A. L. Treadwell	Oxford, Ohio.
Joseph H. Tudor	Baltimore, Md.
E. B. Uine	Lake Forest, Ill.
A. B. Ulrey	Bloomington.
W. B. Van Gorder	Knightstown.
Ernest Walker	New Albany.
F. A. Walker	Anderson.
W. O. Wallace	Wabash.
M. W. Wells	Indianapolis.
Wm. M. Whitten	South Bend.
J. R. Wiest	Richmond.
H. W. Wiley	Washington, D. C.

W. L. Wood	Covington.
A. J. Woolman	Duluth, Minn.
Honorary fellow	1
Fellows	33
Non-resident members	10
Active members	121
Total	<u>165</u>

TENTH ANNUAL MEETING OF THE INDIANA ACADEMY OF SCIENCE.

The tenth annual meeting of the Indiana Academy of Science was held in Indianapolis, December 27 and 28, 1894, preceded by a session of the Executive Committee of the Academy, 8 P. M., December 26.

The Academy met in general session, 9 A. M., December 27, at which committees were appointed and various other business transacted, after which there was an adjournment until 2 P. M., whereupon it met in two sections—biological and physico-chemical—for the reading and discussion of papers. After adjournment of the sectional meetings, at 5 P. M., the Academy again met in general session at 7 P. M., for the address of the retiring President, Prof. W. A. Noyes, subject, "Lavoisier."

December 28, 9 A. M., the Academy met in general session for the transaction of business, after which followed the reading and discussion of papers until adjournment at 1 P. M.

After the adjournment of the Academy the Executive Committee met with a committee of the Science Club of Indianapolis to discuss the publication of the proceedings of the Academy by the State.

FIELD MEETING OF 1895.

The 1895 Field Meeting of the Indiana Academy of Science was held at Wyandotte Cave May 15, 16 and 17. The business session of the meeting was held at 8 P. M., May 15. In the absence of the President and the Vice-President, Dr. P. S. Baker acted as chairman. The remaining time of the meeting was spent in the field.