

PROCEEDINGS
of the
**Indiana Academy
of Science**

Founded December 29, 1885

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Volume 74

1964

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RICHARD A. LAUBENGAYER, Editor
Wabash College
Crawfordsville, Indiana

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Spring Meeting
May 8-9
McCormick's Creek State Park

Fall Meeting
October 29-31
INDIANA CENTRAL COLLEGE

Published at Indianapolis, Indiana
1965

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2. **Instructions for Authors** appear at the end of this volume, P. 403.

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6. The Constitution and By-Laws reprinted from v. 74 are available to members upon application to the Secretary. Necrologies reprinted from the various volumes can be supplied relatives and friends of deceased members by the Secretary.

7. Officers whose names and addresses are not known to correspondents may be addressed care of the State Library.

Papers published in the Proceedings of the Indiana Academy of Science are abstracted or indexed in appropriate services listed here:

Annotated Bibliography of Economic Geology

Bibliography of Agriculture

Bibliography of North American Geology

Biological Abstracts

Chemical Abstracts

Chemisches Zentralblatt

Current Geographical Publications

Geological Abstracts

Mathematics Reviews

Metallurgical Abstracts

Psychological Abstracts

Review of Applied Entomology

The Torrey Bulletin

Zoological Record

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OFFICERS AND COMMITTEES

OFFICERS FOR 1964

President	EDWARD L. HAENISCH, Wabash College
Vice President	FRANK J. WELCHER, Indiana University
Secretary	CLARENCE F. DINEEN, St. Mary's College
Membership Secretary	CARROLLE A. MARKLE, Earlham College
Treasurer	JAMES C. LIST, Ball State Teachers College
Editor	RICHARD A. LAUBENGAYER, Wabash College
Press Secretary	FRANK N. YOUNG, Indiana University

CHAIRMEN ELECTED BY THE DIVISIONS

Anthropology	WESLEY HURT, Indiana University Museum
Bacteriology	ROBERT DEUFEL, Indiana Central College
Botany	P. A. ORPURT, Manchester College
Chemistry	Q. R. PETERSEN, Wabash College
Entomology	MERRILL CLEVELAND, 118 Chestnut Street, Vincennes, Indiana
Geology and Geography.....	J. F. HART, Indiana University
History of Science	A. T. GUARD, Purdue University
Mathematics (Acting)	R. M. BROOKER, Indiana Central College
Physics	K. KOLITSCHEW, Indiana Central College
Plant Taxonomy	R. PETTY, Wabash College
Psychology (Acting)	R. M. BROOKER, Indiana Central College
Soil Science	J. M. ROBBINS, 1727 14th Street, Tell City, Ind.
Zoology	R. H. COOPER, Ball State Teachers College

EXECUTIVE COMMITTEE

(Past Presidents*, Current Officers, Divisional Chairmen,
Committee Chairmen)

*Baldinger, L. H.	Haenisch, E. L.	Miller, G. R.
Brooker, R. M.	Hart, J. F.	*Morgan, W. P.
Carlson, K. H.	Heniser, Virgil	Orpurt, P. A.
*Christy, O. B.	Hurt, W.	Overmire, T.
*Cleland, R. F.	*Johnson, W. H.	Petersen, Q. R.
Cleveland, M.	Kaufman, Karl	Petty, R.
Coats, Nelle	Kessel, W. G.	*Porter, C. L.
Cooper, R. H.	Klinge, P.	*Powell, H. M.
*Daily, W. A.	Kolitschew, C.	Robbins, J. M.
*Davis, J. J.	Laubengayer, R. A.	Seymour, K.
*Day, H. G.	*Lilly, Eli	*Visher, S. S.
*Degering, E. F.	List, J. C.	*Wallace, F. N.
DeLanney, L. E.	McCoy, Scott	*Weatherwax, P.
Deufel, Robert	*Mackell, J. F.	Webster, J. D.
Dineen, C. F.	Markle, C. A.	*Welch, W. M.
*Edington, W. E.	*Markle, M. S.	Welcher, F. J.
*Edwards, P. D.	*Mellon, M. G.	Young, F. N.
*Girton, R. E.	*Meyer, A. H.	Youse, H.
*Guard, A. T.	*Michaud, H. H.	

BUDGET COMMITTEE

Consisting of: President (Haenisch), President-Elect (Welcher), Secretary (Dineen), Membership Secretary (C. Markle), Treasurer (List), Editor (Laubengayer), Sponsor of Junior Academy (Overmire), Library Committee (Coats), Program Committee (Brooker), and Relation of Academy to State (Daily). Invited participants: Retiring President (Michaud), Retiring Secretary (Bloom), Retiring Treasurer (Carlson), Youth Activities Committee (Klinge and Heniser).

COMMITTEES ELECTED BY THE ACADEMY

Trustees of the Academy Foundation: Chairman W. P. Morgan, Indiana Central College (term expires 1964); William A. Daily, Lilly Company (1965).

Bonding Trustees (elected yearly): Chairman, Scott McCoy, Technical High School, Indianapolis; D. J. Cook, DePauw University.

Research Grants (term 5 years): Chairman, P. Weatherwax, Indiana University (1966); K. M. Seymour, Butler University (1965); A. A. Lindsey, Purdue University (1968); J. F. Hart, Indiana University (1967); Edward L. Haenisch and C. F. Dineen, ex officio. (Vacancy expiring 1964—death of T. G. Yuncker.)

COMMITTEES APPOINTED BY THE PRESIDENT

(President an ex officio member of all committees)

Auditing Committee: Chairman, K. H. Carlson, Valparaiso University; W. W. Bloom, Valparaiso University.

Biological Survey: Chairman, J. D. Webster, Hanover College; R. H. Cooper, Ball State College; F. K. Daily, Butler University; C. J. Goodnight, Purdue University; Mrs. D. G. Graam, Commercial Solvents Corporation; C. Markle, Earlham College; H. H. Michaud, Purdue University; W. H. Welch, DePauw University; F. N. Young, Indiana University.

Fellows (Committee appointed in terms of change in constitution): Chairman, K. M. Seymour, Butler University; **Anthropology:** H. E. Driver, Indiana University (1966); **Bacteriology:** L. S. McClung, Indiana University (1966); **Botany:** W. H. Welch, DePauw University (1966); **Chemistry:** K. M. Seymour (1966); **Entomology:** L. Chandler, Purdue University (1966); **Geology and Geography:** F. Hurlburt, Anderson College (1965); **History of Science:** G. F. Hennion, University of Notre Dame (1965); **Mathematics:** J. C. Polley, Wabash College (1965); **Physics:** C. S. Morris, Manchester College (1965); **Plant Taxonomy:** A. T. Guard, Purdue University (1965); **Psychology:** E. J. Asher, Purdue University (1964); **Soil Science:** A. R. Bertrand, Purdue University (1965); **Zoology:** Murvel Garner, Earlham College (1964).

Index: Chairman, R. A. Laubengayer, Wabash College; Nelle Coats and Mrs. Lois Burton, Indiana State Library.

Invitations: Chairman, Glen R. Miller, Goshen College; G. D. Lovell, Wabash College; W. P. Morgan, Indiana Central College; F. D. Rossini, University of Notre Dame.

Library: Chairman, Nelle Coats, Indiana State Library; G. A. Black, Indiana University; Mrs. Lois Burton, Indiana State Library; Eli Lilly, Eli Lilly and Company.

Membership: Chairman, L. E. DeLanney, Wabash College; J. Barton III, St. Joseph's College; G. H. Bick, St. Mary's College; C. L. Bieber, DePauw University; M. Alan Brown, Franklin College; R. Coleman, Evansville College; J. Cope, Earlham College; J. H. Danehy, University of Notre Dame; H. M. Dixon, Butler University; W. E. Eberly, Manchester College; W. C. Gunther, Valparaiso University; Aubrey Larsen, Mead Johnson and Company; M. E. Hodson, Marion College; W. P. Hopp, Indiana State College; R. Howard, Oakland City College; R. Kent, Indiana Central College; G. M. Krueger, Taylor University; D. E. LeMaster, Huntington College; N. O. Long, Indiana Technical College; Mrs. M. J. Mayo, Anderson College; G. R. Miller, Goshen College; F. L. Murphy, Vincennes University; J. J. Nisbet, Ball State College; S. N. Postlethwait, Purdue University; H. M. Powell, Indiana University (Medical Center); Sr. M. Rose, Marion College; J. D. Webster, Hanover College; F. J. Zeller, Indiana University (Bloomington campus).

Necrologists: W. E. Edington, DePauw University; W. H. Welch, DePauw University.

Program: Chairman, Robert M. Brooker, Indiana Central College; Honorary Chairman, William P. Morgan, Indiana Central College; Robert Deufel, Indiana Central College; Max Stark, Eli Lilly Company; James Hayden, Pitman-Moore.

Publication of Proceedings: Chairman, Richard A. Laubengayer, Wabash College; J. A. Clark, State Department of Conservation; A. A. Lindsey, Purdue University.

Publicity: Chairman, F. N. Young, Indiana University; Nelle Coats, Indiana State Library; R. L. Henry, Wabash College; L. E. Weller, Evansville College.

Relation of Academy to State: Chairman, William A. Daily, Eli Lilly and Company; J. A. Clark, Department of Conservation; Eli Lilly, Eli Lilly and Company; Richard A. Laubengayer, Wabash College; Clarence F. Dineen, St. Mary's College, *ex officio*.

Representative on Council of the A.A.A.S.: W. H. Johnson, Wabash College.

Resolutions: Chairman, Howard Youse, DePauw University; Shelby Gerking, Indiana University; Lawrence Baldinger, University of Notre Dame.

Special Constitution Revision Committee: Chairman, Paul Weatherwax, Indiana University and Franklin College; R. H. Cooper, Ball State College; William A. Daily, Eli Lilly and Company; H. G. Day, Indiana University; Ray T. Everly, Purdue University; H. H. Michaud, Purdue University; *ex officio*: Edward L. Haenisch, Wabash College.

Special Committee on Finance: Chairman, W. A. Daily, Eli Lilly and Company; R. A. Laubengayer, Wabash College; ex officio: E. L. Haenisch, Wabash College.

Youth Activities Committee: Chairman, Paul Klinge, Indiana University; Vice-Chairman, Virgil Heniser, Indiana University; Otto Behrens, Eli Lilly Company; Robert Brooker, Indiana Central College; Kermit Carlson, Valparaiso University; Robert H. Cooper, Ball State College; Mrs. Elizabeth Crider, Washington High School, Indianapolis; Sears Crowell, Indiana University; Harry G. Day, Indiana University; Herschell Dassell, Evansville Public Schools, Evansville; Willis Johnson, Wabash College; Karl Kaufman, Butler University; Robert Kent, Title III Office, State House, Indianapolis; R. W. Lefler, Purdue University; Howard Michaud, Purdue University; Thomas Overmire, Ball State College.

Woodrow Pemberton, Bosse High School, Evansville; Lawrence Poorman, University High School, Bloomington; Mrs. Marion Rector, 104 Riley Road, Muncie; William Smith, Howe High School, Indianapolis; Erwin Steinkamp, New Albany High School, New Albany; L. A. Willis, Tri-State College, Angola; Miss Ruth Wimmer, Elmhurst High School, Fort Wayne; ex officio, Edward L. Haenisch, F. J. Welcher, J. C. List.

Indiana Junior Academy of Science: State Sponsor, Thomas Overmire, 1523 Norfolk, Falls Church, Va.; Council, Don R. Winslow, University High School, Bloomington; Miss Helen Reed, Manual High School, Indianapolis; Erwin Steinkamp, New Albany High School, New Albany; Sr. Marian Francis, Reitz Memorial High School, Evansville; Keith Hunning, New Haven High School, New Haven.

Indiana Science Talent Search: Director, Virgil Heniser, Indiana University; committee: L. H. Baldinger, University of Notre Dame; Sears Crowell, Indiana University; Harold Garner, Purdue University; Clinton Gass, DePauw University; Robert Henry, Wabash College.

Indiana Science Fairs: State Coordinator, K. L. Kaufman, Butler University; Regional Directors: P. V. Flannery, Purdue University Calumet Center, Hammond (**Calumet Regional**); A. C. Koester, Valparaiso University (**Northwestern Indiana Regional**); H. R. Weimer, Manchester College (**Northern Indiana Regional**); W. W. Hill, Jr., Tri-State College, Angola (**Northeastern Tri-State Regional**); R. L. Ewigleben, Purdue University, Fort Wayne Center (**Northeastern Indiana Regional**); C. E. Hess, Purdue University (**Lafayette Regional**); R. W. Neithamer, Rose Polytechnic Institute, Terre Haute (**West Central Indiana Regional**); G. E. Doeden, Ball State College (**East Central Indiana Regional**); M. H. Weinswig, Butler University (**Central Indiana Regional**); Virgil Heniser, Indiana University (**South Central Indiana Regional**); Brian Hill, Indiana University Center, Jeffersonville (**Southeastern Indiana Regional**); P. W. Hartmen, Evansville College (**Tri-State Regional**).

Visiting Scientists: Chairman, William G. Kessel, Indiana State College; K. H. Carlson, Valparaiso University; Robert H. Cooper, Ball State College; Mrs. Elizabeth Crider, Washington High School, Indianapolis; Ernest Litweiler, John Adams High School, South Bend.

SPRING MEETING
MINUTES OF THE EXECUTIVE COMMITTEE MEETING

McCORMICK'S CREEK STATE PARK

May 8, 1964

President Edward L. Haenisch called the Executive Committee Meeting to order at 4:30 p.m. Twenty-five members attended the meeting.

The treasurer James C. List submitted the financial report for the period January 1, 1964 to May 1, 1964. The balance of the State accounts was \$7,510.12. The National Science Foundation Grant balance was \$4,876.97. Thus making a total balance in all Academy accounts of \$12,387.09. The treasurer's report was accepted.

Editor Richard A. Laubengayer reported that the galley proofs would be sent to the authors on May 11. He requested a rapid return of the proofs for final printing.

The program chairman, Robert M. Brooker, stated that the plans for the fall meeting at Indiana Central College, Indianapolis, Indiana, were progressing very well.

President Edward L. Haenisch read a formal invitation from Reverend Theodore M. Hesburgh, President of the University of Notre Dame, to have the Academy hold the 1965 fall meeting at the University of Notre Dame. The invitation was accepted. Invitations have already been received for the 1966 meeting.

The chairman of the Special Constitution Revision Committee, Paul Weatherwax, stated that the members have worked diligently on the proposed revision of the Constitution and By-Laws. The revision is to be printed and distributed to the members at least two months before the fall meeting. The proposed revision will be placed on the agenda for the fall meeting. Dr. Weatherwax requested comments and suggestions for the revision. The election of officers and the nomination committee sections of the Constitution and By-Laws were discussed briefly.

The sponsor of the Indiana Junior Academy of Science, Thomas Overmire, asked to be relieved of this assignment. Necessary committee action to obtain a replacement was planned.

Dean Karl Kaufman, state coordinator of the Indiana Science Fairs, is planning to reorganize the committee of directors.

No major change is expected in the National Science Foundation support of the Visiting Science Program. Necessary action will be taken by the chairman, William G. Kessel, for directing this program for the academic year 1964-1965. President Elect, Frank J. Welcher attended a meeting in Washington, D.C. pertaining to this program

CLARENCE F. DINEEN, Secretary

Approved October 29, 1964

SPRING MEETING
MINUTES OF THE GENERAL SESSION

McCORMICK'S CREEK STATE PARK

May 8, 1964

Following the dinner in the main dining room of the Inn, the formal business session was called to order by the President, Edward L. Haenisch, at 8:00 p.m. President Haenisch welcomed the members and introduced the current officers and the divisional chairmen present.

The membership secretary, Carrolle A. Markle, reported that eleven applications for membership had been received. The applications were approved.

E. E. Kenaga, entomologist, Dow Chemical Company, Midland, Michigan, and immediate past-president of the Michigan Audubon Society presented an excellent illustrated address entitled "Birding in Michigan." About 125 attended the address.

The program chairman, Robert M. Brooker, introduced the leaders of the field trips for Saturday morning. The bird hike was planned by Dr. J. Hill, the botany trip by Dr. Joe Hennen, the geology trip by Drs. John Cleveland and Samuel Smith, and the zoology trip by Dr. Clarence Goodnight.

The following resolution was prepared by Howard R. Youse: "The Indiana Academy of Science would like to express their appreciation to Mr. Merle Richardson, manager of Canyon Inn, and his staff for all the arrangements for this spring meeting. The Academy also extends its thanks to the program chairman, speakers, and leaders of the field trips for their services." The meeting adjourned.

CLARENCE F. DINEEN, Secretary

Approved October 29, 1964

MINUTES OF THE EXECUTIVE COMMITTEE MEETING

INDIANA CENTRAL COLLEGE, INDIANAPOLIS, INDIANA

October 29, 1964

The Executive Committee of the eightieth session was called to order by President Edward L. Haenisch at 7:30 p.m. Thirty-four members were present.

The minutes of the Spring meeting of the Executive Committee and the General Session of the Academy held at McCormick's Creek State Park were read and approved.

Treasurer—Dr. James C. List: A summary of the financial report from January 1, 1964, through September 30, 1964, is as follows:

In the total State accounts: a balance of \$5,488.71 on January 1; receipts, \$14,572.68; disbursed \$10,878.13; a balance of \$9,183.26 on September 30, 1964.

In the National Science Foundation Fund (G. E. 1846); a balance of \$3,593.83 on January 1, 1964; receipts \$8,751.11; disbursed, \$9,711.67; a balance of \$2,633.27 on September 30, 1964.

FINANCIAL REPORT OF THE INDIANA ACADEMY OF SCIENCE

January 1, 1964 through December 31, 1964

	Balance Jan. 1, 1964	Receipts	Disbursed	Balance Dec. 31, 1964
1. Indiana Academy of Science (Budgeted)	\$ 2,269.49	\$ 5,970.84	\$ 7,451.53	\$ 788.80
2. Junior Academy	8.46	50.00	46.16	12.30
3. Academy Funds for Research	1,200.00	1,102.00	1,500.00	802.00
4. J. S. Wright Mem. Lib. Lilly Endowment	745.81		23.86	721.95
5. Science Fair	191.62	7,220.00	4,309.22	3,102.40
6. Science Talent Search	1,073.33	2,000.00	1,261.95	1,811.38
Total in State Accounts	5,488.71	16,342.84	14,592.72	7,238.83
N.S.F. Grant G E 1846	3,593.83	8,751.11	12,344.94	
N.S.F. Grant G E 4306		8,680.67	4,186.73	4,493.94
Total in all Indiana Academy Accounts	\$ 9,082.54	\$33,774.62	\$31,124.39	\$11,732.77
Bank Balances, American National Bank and Trust Company, Muncie, Indiana:				
Checking			\$ 2,896.75	
Savings			8,836.02	
				\$11,732.77

James C. List, Treasurer
December 31, 1964

We, the undersigned, have examined the accounts of the Indiana Academy of Science for 1964 and have found them to be accurate and in order.

Auditing committee
Kermit H. Carlson
William W. Bloom

Trustees of the Academy Foundation—William A. Daily, Chairman: The Academy Fund from October 1, 1963, to September 30, 1964, had a beginning balance of \$848.78; total receipts \$731.56; total disbursement \$768.30; an ending cash balance of \$812.04. The total carrying value was \$16,036.15. The John S. Wright Fund (March 1, 1964) had total receipts of \$3,814.89; total disbursement of \$467.74; and a cash balance of \$3,347.15. The total carrying value was \$241,609.28. The report was approved.

Bonding Trustees—Scott McCoy: The bond covering the Treasurer and the Trustees of the Academy was reported in good order. The bonding expires on November 18, 1965. The renewal cost is approximately \$62.50. The amount of the bonding was discussed. A motion was approved to maintain the bonding at the present level.

Research Grants—Dr. Paul Weatherwax, Chairman: Dr. Weatherwax has been appointed Chairman of this committee by the President after the death of Dr. Truman Yuncker. To date, several applications were received and evaluated. The committee is preparing a statement of policy with regard to grants and a procedure for making application.

Special Constitution Revision Committee—Dr. Paul Weatherwax, Chairman: The committee completed the proposed Constitution and By-Laws. Copies were mailed to the membership of The Academy more than two months prior to the date of this meeting. A clerical error was corrected in the list of recognized subject matter sections (Art. IV, Sec. 4), that is, the designation of *Taxonomy* was changed to *Plant Taxonomy*.

Several sections of the proposed Constitution and By-Laws were discussed. A desire to include student membership was expressed. The chairman of the committee moved that the proposed Constitution and By-Laws be approved and submitted to The Academy for adoption. The motion was carried.

Biological Survey—Dr. J. D. Webster, Chairman. The list of publications for 1963-1964 is as follows:

- | | |
|------------------|--|
| Algae: | Dailey, W. A., and R. T. Everly. 1964. Algae found growing in plastic enclosures covering ears of popcorn plants. Proc. Ind. Acad. Sci. for 1963. 73 :219. |
| | Harper, Sue. 1965. A qualitative and quantitative sampling of two days of phytoplankton in four areas of Dewart Lake, Indiana. Proc. Ind. Acad. Sci. for 1964. 74 : In press. |
| | Lipscomb, R. G., 1964. A study of the winter diatom (Bacillariophyciae) flora in Fall Creek, Indiana. Butler Univ. Botanical Studies. 14 (2):41-52. |
| Vascular Plants: | Crankshaw, W. B., A. A. Lindsey, and S. A. Qadir, 1965. Edaphic Controls of Tree Species in Presettlement Indiana. Ecology: in press. |
| | Hall, G. W., 1963. Notes on the comparative biology of the Eastern North American species of <i>Bidens</i> . Proc. Ind. Acad. Sci. for 1962. 72 :256. |
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- Vascular Plants: Markle, Carrolle A., Flora of Wayne County, Indiana.
- Gordon, Donald, Revision of *Gleditsia*.
- Mertens, T. R., Genus *Polygonum* (sect *Polygonum*)
- Crustacea: Wise, C. D., Ostracods.
- Chandler, L., Biosystematics of Indiana Bees.
- Development of community ordination using winter stoneflies.
- Giese, R. L., Climatic Release of Animal Populations.
- Mathematical Distribution of Insects.
- Hendricks, D. E., Ectoparasites and arthropod associates of the thirteen-lined ground squirrel, *Citellus tridecemlineatus*.
- Insecta: MacLean, Bonnie K., Internal parasites of bumble bees.
- Kirkton, R. M., Variation of *Halictus ligatus* throughout its range. (Halictidae: Hymenoptera)
- McWilliams, J. G., Population Dynamics of Mosquitos.
- Munsee, J. R., Ecology of ants in strip mine areas.
- Pedigo, Larry, The ecology of Collembola.
- Sanders, D. P., Ecological studies of insects associated with cow manure.
- Schuder, D. L., Insect pests of trees, shrubs, and turf.
- Siverly, R. E. Systematics and ecology of Indiana mosquitoes.
- Ward, Gertrude L., Insects of Whitewater Valley.
- Wood, Gerald, Pollinators of *Cucurbita* spp.
- Zimmuck, Harold, A collection of immature insects of Indiana.
- Arachnida: Ward, Gertrude L., Spiders of Indiana.
- Mammalia: Cope, J. B., Bats of Indiana.

Fellows—Dr. K. M. Seymour, Chairman: A motion was approved to elect the following as fellows: Dr. Joe F. Hennen, Professor of Botany, Indiana State College; Dr. Albert E. Reynolds, Professor and Head of the Department of Zoology, DePauw University.

Editor—Richard A. Laubengayer: Twelve hundred hard bound copies and six hundred paper bound copies of the Indiana Academy Proceedings were printed.

Invitations—Dr. Glen R. Miller: The 1965 fall meeting of The Academy will be held at the University of Notre Dame. The Committee recommended: Ball State Teachers College in 1966, Wabash College in 1967, Indiana Technical College in 1968. A motion was approved to accept the recommendation of the committee.

Library—Nelle M. Coats: Two hundred paper-covered items in the John Shepard Wright Memorial Library were prepared for binding. Volume 73 of the Proceedings of the Academy has been mailed to members as a service rendered by the Indiana State Library. Forty-five new titles have been acquired and will be received regularly.

Relation of Academy to the State—William A. Daily: The committee requested an increase of \$1,500.00 per annum making a total of \$5,500.00 per annum for publication of the Proceedings of the Academy.

Representative on the Council of the A.A.A.S.—Dr. Willis Johnson: Dr. Johnson reported that there was no discussion of anything specifically pertaining to State Academies at the meeting of the A.A.A.S. Council in Cleveland in December, 1963.

Press Secretary—Frank N. Young: Dr. Young reported that news releases were sent out on the spring and fall meetings to wire services and state newspapers. Individual releases on some papers and local news items on many individuals presenting papers at the meeting were sent out. Press coverage was generally good.

Youth Activities Committee—Paul Klinge: A grant (U.S. Office of Education Grant) of \$5,000.00 (to be paid in installments) has been made to the State Superintendent of Public Instruction for the work of this Committee. Trustees for the expenditures of this grant have been designated as: Mr. Robert Kent, State Superintendent's office; Mr. Paul Klinge, Chairman of the Youth Activities Committee; Dr. Edward Haenisch, President of The Academy.

Junior Academy—Mr. Donald Winslow: Dr. Thomas Overmire resigned as director in July 1964. President Edward Haenisch appointed Mr. Donald Winslow as director. Mr. Winslow reported that action has been taken for a regional reorganization and a complete revision of the annual program of the Junior Academy of Science.

Indiana Science Talent Search—Virgil Heniser: Virgil Heniser, who was named director in the fall of 1963, reported that the continued financial support of the Tri Kappa Sorority has assured another year of operation. Mrs. Marian Rector of Tri Kappa has been named as their representative.

Science Fair—K. L. Kaufman: Virgil Heniser read the report submitted by K. L. Kaufman, State Coordinator. The 1963-1964 program was very successful. The committee members have studied means of obtaining finances for the activities.

Visiting Scientist Program—William G. Kessel: The fifth consecutive successful year of this program for Indiana high schools was conducted during the past academic year, 1963-1964. Seventy-nine scientists from twenty-three colleges and universities and three industries participated in this program. Requests for 223 visits were approved, 190 of these were completed. Better communications with high schools is being planned.

Emeritus membership status approved for: Frank M. Setzler, Frederick John Allen.

After a short discussion of the possibility of scheduling the fall meeting of The Academy on Saturday, a motion was passed which requested that the incoming President appoint an ad hoc committee to study the problem.

The meeting was adjourned at 9:25 p.m.

CLARENCE F. DINEEN, Secretary

Approved October 30, 1964

MINUTES OF THE GENERAL SESSION

October 30, 1964

The annual meeting of the Indiana Academy of Science was held in the Ransburg Auditorium of Indiana Central College, Indianapolis, Indiana, on October 30, 1964, at 9:00 a.m. Dr. Edward L. Haenisch, President, called the meeting to order. Dr. I. Lynd Esch, President of Indiana Central College, welcomed The Academy.

The minutes of the Executive meeting on Thursday, October 29, 1964, were read by the secretary and approved as read.

Dr. Winona Welch, in the absence of Dr. Will E. Edington, read a biographical sketch of members who had died since the 1963 annual meeting. These sketches are printed under Necrology in the Proceedings of the Indiana Academy of Science.

Dr. Paul Weatherwax, chairman of the Special Constitution Revision Committee, reviewed the actions of the committee. In accordance with the recommendation of the Executive Committee, Dr. Weatherwax moved that the proposed Constitution and By-Laws be adopted by The Academy. The motion was carried.

The President introduced Dr. Price, the main speaker at the general session. Dr. Charles C. Price, Chairman, Department of Chemistry, University of Pennsylvania, gave a stimulating and thought-provoking address entitled, "Evolution and World Order."

The service of the Air Force Materials Information Center was discussed by Dr. Ralph K. Birdwhistell.

The meeting was adjourned at 11:00 a.m.

The annual dinner meeting of The Academy was held in the College Dining Hall of Indiana Central College. Dr. Frank J. Welcher, President Elect of The Academy, presided.

Dr. L. E. DeLanney, chairman of the Membership Committee presented the applications for new membership in The Academy. The applications were approved. The membership secretary, Dr. Carrolle A. Markle, reported a gain in membership for the past year making a total Academy membership of 1040.

Dr. Howard Youse, DePauw University, presented the following resolutions to The Academy which were approved:

- 1) Resolved: That The Academy members here assembled express their sincere thanks to Indiana Central College through Dr. I. Lynd Esch, President of the College, for all the courtesies which have been shown The Academy during the meetings. Special appreciation and thanks are due Professor Robert Brooker and his committee in charge of the program and local arrangements for the splendid and efficient manner in which all arrangements were made, for the conduction of the business of The Academy, and for the comfort and convenience of the entire membership.

2) Resolved: That The Academy members here assembled express their sincere appreciation to Dr. Paul Weatherwax and his committee for their conscientious study and work in the preparation of the revised draft of the Constitution and By-Laws of the Academy, which was presented and adopted at this meeting.

Dr. Harry G. Day, Chairman of the nominating committee, read the names of the divisional chairmen which had been elected in the divisional meetings. They are as follows: Anthropology, King Burton Hunter, Indiana University; Bacteriology, Morris Wagner, University of Notre Dame; Botany, John F. Schafer, Purdue University; Chemistry, Kenneth Cook, Anderson College; Entomology, Gertrude L. Ward, Earlham College; Geology and Geography, John B. Patton, Indiana University; History of Science, Nelle Coats, State Library; Physics, H. K. Hughes, Indiana State College; Plant Taxonomy, Gayton C. Marks, Valparaiso University; Soil Science, Helmut Kohnke, Purdue University; Zoology, William Eberly, Manchester College.

The following slate of Officers and Committees to be elected by The Academy for 1965 was presented by Dr. Harry G. Day, the Nomination Committee chairman: President, Frank J. Welcher, Indiana University (as 1964 President-Elect accedes Presidency according to the Constitution); President-Elect Carrolle A. Markle, Earlham College; Secretary, Clarence F. Dineen, Saint Mary's College; Director of Public Relations, Frank N. Young, Indiana University; Treasurer, James C. List, Ball State Teachers College; Editor, Richard A. Laubengayer, Wabash College; Academy Foundation Committee, W. P. Morgan (1966), Indianapolis; Bonding Committee, Scott McCoy, Indianapolis, and Donald J. Cook, Greencastle; Research Grants Committee, Otto K. Behrens (1969), Indianapolis. A motion was carried to instruct the secretary to cast a unanimous ballot for the slate of officers and committee members.

President Edward L. Haenisch presented a scholarly address entitled, "Johnny and Relativity." The address is printed elsewhere in the Proceedings of the Indiana Academy of Science.

The meeting was adjourned at 9:00 p.m.

CLARENCE F. DINEEN, Secretary

INDIANA ACADEMY OF SCIENCE CONSTITUTION AND BY-LAWS

Adopted at the Fall Meeting, 1964

Article I. NAME, PURPOSES, AND OFFICIAL PUBLICATION

Sec. 1. The Indiana Academy of Science (herein referred to as The Academy) is organized under the laws of the State of Indiana as a non-profit corporation devoted to scientific and educational purposes.

Sec. 2. The objectives of The Academy shall be to promote scientific research and the diffusion of scientific information; to encourage communication and cooperation among scientists, especially in Indiana; to prepare for publication such reports of investigation and discussion as may further the aims and objectives of The Academy as set forth in these articles; and to improve education in the sciences.

Sec. 3. Inasmuch as the State makes an annual appropriation to assist in publication, The Academy shall, upon request of appropriate officials, act through its Executive Committee as an advisory body in the direction and execution of any investigation within its province as stated. The Academy shall assume no responsibility for expenses incurred in the prosecution of any such investigation except as provided for in its annual budget.

Sec. 4. The official publication of The Academy, known as the Proceedings of the Indiana Academy of Science, insofar as it is published by the State, shall become a public document and shall be circulated by the Indiana State Library as agreed upon by the Library and the Committee on Relation of The Academy to the State.

Article II. MEMBERSHIP

Sec. 1. The membership of The Academy shall consist of: annual members, life members, emeritus members, fellows, honorary members, and clubs.

Sec. 2. **Annual Members.** Any person interested in science and in accord with the objectives of The Academy may, on proper application, accompanied by the initiation fee and dues for one year, be elected to annual membership.

Sec. 3. **Life Members.** Any annual member in good standing may, on contributing to the funds of The Academy an amount designated by the Executive Committee, become a life member and shall be entitled to all the privileges of annual membership without further payment of dues.

Sec. 4. **Emeritus Members.** Any member who, because of retirement or disability, petitions the Executive Committee, may be elected to emeritus membership. Emeritus members shall pay no dues and shall have all the privileges of annual membership.

Sec. 5. **Fellows.** Any member actively engaged in scientific work, with recognized standing in his field, who has been a member in good

standing for three years, may, on recommendation of the Committee on Fellows and approval of the Executive Committee, be elected a fellow of The Academy.

Sec. 6. **Honorary Members.** On recommendation of the Executive Committee, The Academy may, in exceptional instances elect honorary members. Honorary membership shall be reserved for persons who, by their efforts, influence, or contribution to science, have rendered distinctive and meritorious service to The Academy.

Sec. 7. **Clubs.** Any science club operating in connection with a junior or senior high school in the State, may, on recommendation of the Director of the Junior Academy of Science and approval of the Executive Committee, be elected a member of The Academy. The initiation fee and dues of each club shall be determined by the Executive Committee. The individual members of such affiliated clubs shall constitute the Junior Academy of Science.

Article III. OFFICERS

Sec. 1. The officers of The Academy shall be: President, President-Elect, Secretary, Treasurer, Director of Public Relations, and Editor.

Sec. 2. The term of office of the President and President-Elect shall be one year. They shall not be eligible for reelection. The terms of the other officers shall be three years, and they may be reelected. Each officer shall continue to hold office until his successor has been duly elected and qualified.

Sec. 3. **Election of Officers.** Officers shall be elected at the annual fall meeting, and each shall assume his duties on January 1 of the following year. For the election of officers, the Committee on Nominations shall submit to The Academy nominations for the offices at that time becoming vacant. Additional nominations may be made from the floor. Election shall be by majority vote of the members present and voting.

Sec. 4. **President.** The President shall have been a member of The Academy for at least five years. He shall preside over all meetings of The Academy, the Executive Committee, the Budget Committee, and the Council, and shall be responsible for the administration of the business of The Academy during his term of office. He shall appoint all standing committees not otherwise provided for and such other committees as he may deem necessary. He may, with approval of the Council, call such special meetings as to him seem necessary.

Sec. 5. **President-Elect.** The President-Elect shall have been a member for at least four years. He shall have the ordinary status of vice-president. He shall familiarize himself with the duties of the presidency and shall accede to that office the following year.

Sec. 6. **Secretary.** The Secretary shall have been a member for at least three years. He shall serve as secretary of all meetings of The Academy, the Executive Committee, the Budget Committee, and the Council. He shall keep permanent records of the activities of these bodies and shall issue notices of all meetings. He shall maintain a

correct and up-to-date list of members in good standing and shall be prepared at all times to provide officers and committees with membership lists necessary to their operation.

Sec. 7. **Director of Public Relations.** The Director of Public Relations shall provide notices of meetings and any other information which will acquaint the public with the work of The Academy.

Sec. 8. **Treasurer.** The Treasurer shall have been a member for at least three years. He shall have custody of all funds of The Academy except as otherwise provided. He shall issue statements and receive payment of dues and assessments and shall pay bills chargeable to The Academy. He shall promptly submit his records for audit and shall report to the Executive Committee annually on the financial standing of The Academy. He shall be responsible for filing such financial reports as may be required by State or Federal offices.

Sec. 9. **Editor.** The Editor shall have been a member for at least three years and shall be familiar with procedures of publication. With the advice of the Publications Committee, he shall have charge of assembling, editing, and publishing the Proceedings of The Academy and shall be responsible for other duties assigned to his office by the Executive Committee.

Sec. 10. **Vacancies.** Except as otherwise provided, a vacancy occurring in any office shall be filled until the next annual meeting by appointment by the President, with approval of the Council.

Article IV. SECTIONAL ORGANIZATION

Sec. 1. The organization of Sections, defined by subject matter, may be authorized by the Executive Committee when such action is requested. A Section may be dissolved by the Executive Committee on becoming inactive or with the consent of members of the Section. Any member of The Academy may register as a member of any Section or Sections by notifying the Secretary of The Academy and meeting the requirements and obligations imposed by the Section.

Sec. 2. At the annual meeting, each Section shall elect, by vote of its members present, a chairman to preside at its meetings the following year and to serve as a member of the Executive Committee. The chairman of a Section shall appoint a proxy for any temporary emergency. Subject to approval of the Executive Committee, each Section may provide for its own organization and conduct its own meetings.

Sec. 3. Expenses incurred by a Section shall in no way become a financial obligation of The Academy except as provision has been made for them in the annual budget of The Academy.

Sec. 4. The following are hereby recognized as Sections de facto and authorized to continue operation, subject to the provisions of this Article, without further action by The Academy: Anthropology, Bacteriology, Botany, Chemistry, Entomology, Geology and Geography, History of Science, Mathematics, Physics, Psychology, Soil Science, Plant Taxonomy, and Zoology.

Article V. COMMITTEES

Sec. 1. **Standing Committees Appointed Annually.** The following named committees shall be appointed by the President, to serve for

one year except as rotation is provided, and, except as otherwise provided, shall be announced at the beginning of his term of office. He shall designate one member of each committee as chairman. All appointees to membership on committees shall be members of The Academy in good standing.

(1) **The Academy Representative on the Council of the American Association for the Advancement of Science.**

(2) **Auditing.** The Auditing Committee shall audit the books of the Treasurer and of any other officers or committee having custody of funds of The Academy. It shall report such audits at the annual meeting or at other times as required by the Executive Committee.

(3) **Youth Activities.** The Youth Activities Committee shall consist of 12 members representing diverse scientific backgrounds and about equally divided among colleges, universities, and secondary schools, and including the directors of the various youth activities related to The Academy. The duties of this Committee shall be to coordinate the Academy-sponsored programs in science for secondary schools, to formulate general policies for such activities for which The Academy has accepted some responsibility, and to advise the President on the appointment of persons to lead such activities.

(4) **Library.** The Library Committee shall have charge of all matters concerning the John Shepard Wright Memorial Library and its relation to the State Library.

(5) **Nominations.** The Committee on Nominations shall consist of at least three members selected from past presidents of The Academy. At the annual meeting, it shall submit nominations for the elective officers of The Academy. At the discretion of the President, announcement of the membership of this committee may be withheld until the time of its report.

(6) **Program.** The Program Committee shall prepare the programs and make all arrangements for regular or special meetings of The Academy and its various Sections.

(7) **Publication.** The Committee on Publication shall advise the Editor in matters pertaining to the publication of the Proceedings of The Academy and to other duties assigned to the Editor's office by the Executive Committee.

(8) **Relation of Academy to State.** The Committee on the Relation of The Academy to the State shall have charge of all relations between The Academy and the State government.

(9) **Membership.** The Membership Committee shall receive applications for membership and submit reports and recommendations on such applications at regular meetings of The Academy.

10. **Fellows.** The Committee on Fellows shall be composed of Fellows, one from each subject-matter Section. The regular term of membership shall be three years, except, that on the adoption of this constitution, the President shall appoint approximately one-third of the members for terms of three years, one-third for two years, and one-third for one year. Any interim vacancy shall be filled by appointment for the remainder of that term.

This committee shall review the membership, receive nominations, and, at least two weeks before the date of annual meeting, submit to the Secretary, for transmittal to the Executive Committee, nominations for the rank of Fellow.

(11) **Resolutions.** The Committee on Resolutions shall prepare and submit resolutions at meetings of The Academy.

(12) **Invitations:** The Committee on Invitations shall receive invitations from institutions which offer their facilities and services as hosts for meetings of The Academy and shall make recommendations to the Executive Committee as to places for future meetings.

(13) **Necrologist.** The Necrologist shall report annually on the loss of members by death and shall offer memorial resolutions.

(14) **Parliamentarian.** In addition to the performance of the regular duties of this office, the Parliamentarian shall make his services available, in an advisory capacity, for the formulation of proposed amendments to the Constitution and By-Laws and shall keep these documents up to date by incorporating in them all amendments adopted by The Academy.

Sec. 2. **Elected Committees.** The following are recognized as de facto elected standing committees, and vacancies as they occur in the rotating membership shall be filled by election by the Executive Committee. Interim vacancies shall be filled by appointment by the President for the remainder of the terms.

(1) **Academy Foundation.** The Trustees of The Academy Foundation (two members, with rotating two-year terms) shall have custody of the funds and investments of The Academy Foundation and shall report, annually or on demand, to the Executive Committee on the state of these resources.

(2) **Bonding.** The Bonding Committee (two members, elected annually) shall be responsible for the adequate bonding of all officers and committees having charge of funds or investments of The Academy.

(3) **Research Grants.** The Research Grants Committee (five members, elected for five-year rotating terms, with the President and Secretary as members ex-officio) shall receive applications and make research grants from funds designated by The Academy for that purpose. This Committee shall report annually to the Executive Committee.

Sec. 3. Special committees may be appointed by the President at his discretion or by order of the Executive Committee.

Sec. 4. Expenses incurred by committees shall in no way become a financial obligation of The Academy except as provision has been made for them in the annual budget.

Article VI. EXECUTIVE COMMITTEE, COUNCIL, AND BUDGET COMMITTEE

Sec. 1. The **Executive Committee** shall consist of the past presidents, the current officers, the chairmen of the Sections, the chairmen of all committees, the directors of the programs of the Youth Activities Committee, and representatives of affiliated organizations. (See By-

Laws, Art. VI.) This Committee shall be responsible for all matters of policy and shall supervise all activities of The Academy not expressly provided for otherwise.

Sec. 2. The Executive Committee shall hold regular meetings preceding the fall and spring meetings of The Academy. The members of the Committee present at any meeting shall constitute a quorum, provided that notice of the meeting has been given at least 15 days in advance of the meeting.

Sec. 3. The **Council** of The Academy shall consist of the current officers, with the chairman of the Committee on Relation of the Academy to the State as a member ex-officio. The Council shall transact all emergency business of The Academy that cannot be postponed until the next regular meeting of the Executive Committee. The Council may be called in session at any time by the President. He may submit specific questions to the Council by correspondence at any time. The Council may invite committee chairmen or other members to meet with it at any time.

Sec. 4. The **Budget Committee** of The Academy shall consist of the following who will hold the specified positions for the next calendar year: (1) The Council; (2) the retiring President and the retiring Secretary and Treasurer (in the year in which these officers change); (3) the Director of the Junior Academy of Science; (4) the chairman of the Program Committee; (5) the chairman of the Library Committee; and (6) the chairman of the Youth Activities Committee. Other committee chairmen and members, retiring or current, may be present by invitation. The Budget Committee shall meet in the period between November 15 and December 15 to formulate and approve the budget of The Academy for the following calendar year.

Article VII. MEETINGS

Sec. 1. The Academy shall hold two regular meetings each year, one to be known as the **annual** (or **fall**) **meeting** and one to be known as the **spring meeting**. The place of the annual meeting shall be determined by the Executive Committee on recommendation of the Committee on Invitations. The exact time of both meetings and the place of the spring meeting shall be determined by the Program Committee in consultation with the President.

Article VIII. AMENDMENT

Sec. 1. This constitution may be amended at any annual meeting of The Academy by affirmative vote of three-fourths of the members in attendance and voting, provided that the amendment has been approved by the Executive Committee and has been submitted to the membership at a previous regular meeting, or by mail, at least 30 days prior to the date on which the amendment is presented for adoption.

Article IX. ADOPTION AND CONTINUANCE OF POWERS

Sec. 1. This constitution may be adopted by affirmative vote of three-fourths of the members of The Academy present and voting at any annual meeting, provided that it has been approved by majority

vote of the Executive Committee of that body and has been presented to the membership by mail at least 60 days prior to the date on which it is presented for adoption.

Sec. 2. All actions taken by The Indiana Academy of Science previous to adoption of this constitution, and not in conflict with it, are hereby specifically confirmed until changed by formal action under the provisions of this constitution.

BY-LAWS

Article I. DUES

Sec. 1. Initiation fees and annual dues for the different classes of membership shall be determined by the Executive Committee.

Sec. 2. Annual dues are payable in advance on a calendar basis.

Sec. 3. Any members whose dues are in arrears for two years as of December 31 shall be dropped from the roll of membership. A member dropped for delinquency in payment of dues may be restored to full and continuous membership by payment of all delinquent dues.

Sec. 4. Each member is entitled to one copy of the Proceedings of The Academy for any year for which his dues have been currently paid. On payment of delinquent dues, a member may receive the Proceedings for those years if copies are available. Any member elected at either the spring meeting or fall meeting, with his membership to begin the following January, is entitled to one copy of the Proceedings for the year in which he is elected.

Article II. BONDING

Sec. 1. On recommendation of the Bonding Committee, the Executive Committee shall determine the amounts for which officers or committees having responsibility for the custody of funds or investments of The Academy shall be bonded.

Article III. EXPENDITURES

Sec. 1. The Treasurer is authorized to issue checks in payment of bills submitted by officers or committees for which provision has been made in the budget for that year, provided that any bill for fifty dollars or more shall be approved by the President.

Article IV. OPERATION OF COMMITTEES

Sec. 1. The operation of committees shall be conducted by correspondence as far as practicable, but meetings may be called by the chairmen. Except as otherwise provided, each committee shall determine its own policies and operational procedures.

Sec. 2. The President and President-Elect shall be members ex-officio of all committees.

Article V. YOUTH ACTIVITIES

Sec. 1. The Youth Activities Committee shall advise the President of The Academy on policies agreed upon by its authorized representatives concerning any program for secondary school students for which The Academy has assumed any degree of sponsorship. At present, these programs include: (1) The Indiana Science Talent Search, (2) The Indiana Science Fairs, and (3) The Indiana Junior Academy of Science.

Sec. 2. Each of these programs shall have a Director and an Advisory Committee, appointed by the President of The Academy on

advice of the Youth Activities Committee. The Director of each program shall report to the Executive Committee of The Academy and to the Youth Activities Committee at the annual meeting of The Academy.

Sec. 3. The Advisory Committee of the Junior Academy shall be called the Junior Academy Council. At least four members of this Council shall have been acting science club sponsors for at least three years. Each member of the Council shall serve for five years, and the terms shall be staggered. The Council shall include representatives from as many geographical regions of the State as possible. It shall administer the program of the Junior Academy and shall work cooperatively with the Youth Activities Committee in determining policies and in appointment of new Council members. The Council shall designate one of its members as Director of the Junior Academy of Science.

Sec. 4. The Visiting Scientists' Program, a temporary enterprise, dependent upon grants from the National Science Foundation, shall have a Director, appointed by the President to The Academy, on consultation with the Youth Activities Committee. He shall be free to select his own steering committee.

Sec. 5. The financial support and working policies of the various youth activities shall be the responsibility of their respective directors and advisory committees, with the assistance of the Youth Activities Committee. No financial obligation shall be incurred in the name of The Academy.

Article VI. AFFILIATED ORGANIZATIONS

Sec. 1. The Academy may, by act of the Executive Committee, offer its services to any other organization whose objectives are essentially the same as those of The Academy and which may petition to be affiliated with it.

Sec. 2. The Academy shall not be held responsible for any expenses incurred by any affiliated organization beyond those specifically provided for in the annual budget of The Academy.

Article VII. QUORUM

Sec. 1. Twenty-five members in good standing shall constitute a quorum for the transaction of business in any regular meeting of The Academy or in any special meeting, notice of the time, place, and purposes of which has been given to the membership by mail at least 30 days in advance.

Article VIII. RULES OF PROCEDURE

Sec. 1. The procedure of meetings of The Academy and of the Executive Committee shall be governed by Robert's Rules of Order.

Article IX. AMENDMENT

Sec. 1. These By-Laws may be amended at any annual meeting of The Academy, provided that notice of the proposed amendment has been given to the membership at a previous meeting of The Academy, or by mail, at least 30 days in advance of the meeting.

NEW MEMBERS — 1964

Adams, James Edwin, 707 Anita St., Bloomington, Ind.	A
Adams, William H., 707 Anita St., Bloomington, Ind.	A
Arnold, Vernon (Wilson), 7410 Delaware, Hammond, Ind.	C
Bakker, Dr. Gerald R., Earlham College, Richmond, Ind.	C
Barr, David J., 3303 E. Powell Ave., Evansville, Ind.	G
Bascom, Miss Karleen A., Dept. of Pharmacology, Myers Hall 308, Indiana Univ., Bloomington, Ind.	Z
Beers, Dr. Thomas W., Dept. of Forestry and Cons., Purdue University, Lafayette, Ind.	Bo, PT
Bellis, James O., 403 Redbud Hill Apts., Bloomington, Ind.	A
Bennett, Mrs. Alice, 1723 Alden Rd., Muncie, Ind.	C
Bennett, Escal S. (Meteorologist), 438 S. High School Rd., Indianapolis, Ind. 46241	G
Bevington, Mr. John, 206 Lincoln St., Rensselaer, Ind.	Bo
Birdwhistell, Dr. R. K., Dept. of Chem., Butler Univ., Indianapolis, Ind.	C
Bram, Dr. Ralph A., Dept. of Entomology, Purdue Univ., Lafayette, Ind.	E
Brigadier, Mr. Walter, c/o Westcott, 257 College Ave. Chambersburg Pa.	Z, E
Britt, Miss Bonnie Jean, 615 N. Woodlawn, Bloomington, Ind.	A
Burkhardt, Richard Wellington, Jr., 6 Woodridge Drive, Muncie, Ind.	H
Burns, John Thomas, R. R. No. 3, Crawfordsville, Ind.	Z
Burns, Dr. Maurice, Dean of College, Marion College, Marion, Ind.	Ba
Buskirk, William H., 9500 E. 86th Street, Indianapolis, Ind.	Z
Butcher, Dr. J. W., Dept. Ent. M. S. H., East Lansing, Mich.	E
Byrnes, Dr. William R., Dept. of Forestry & Cons., Purdue Univ., Lafayette, Ind.	SS
Cavender, Dr. James C., Wabash College, Crawfordsville, Ind.	Bo
Cole, Dr. Thomas A., 614 E. Wabash Ave., Crawfordsville, Ind.	Z
Corliss, Prof. Donald James, Box 289, Marion College, Marion, Ind.	M
Craig, Michael A., R. R. 1, c/o Homer Jeffrey, Yorktown, Ind.	Bo, Z
Crankshaw, Dr. William B., Dept. of Biol., Ball State College, Muncie, Ind.	Bo
DeBlase, Mr. Anthony F., Box 453, Earlham College, Richmond, Ind.	Z
Dellinger, Robert Donald, 4163½ Otterbein Ave., Indianapolis 27, Ind.	Bo, Z
Deufel, Robert D., Indiana Central College, Indianapolis, Ind.	Ba

Eddleman, Harold Lee, Dept. Biol. Science, Purdue Univ., Lafayette, Ind.	Ba
Eiser, Dr. Arthur L., 921 W. Yale Ave., Muncie, Ind.	PT
Evers, Philip Alden, 1500 S. 8th St., Terre Haute, Ind.	Z
Gammon, Dr. James Robert, 510 S. Jackson St., Greencastle, Ind.	Z
Gehring, Charles Lewis, R. R. 7, 6052 N. Fruitridge Ave., Terre Haute, Ind.	Bo
Giese, Ronald L., Dept. of Entomology, Purdue Univ., West Lafayette, Ind.	E
Gillooly, Charles J. Jr., 139 Hugo 8, San Francisco, Calif.	E
Gruber, Cheryl Ann, 420 S. Fess, Bloomington, Ind.	A
Gussin, Dr. Arnold E. S., Butler Univ., Indianapolis, Ind.	Z
Harper, Miss Sue E., 213 S. W. 18th St., Richmond, Ind.	Bo
Hassler, Mr. Craig, 413 E. Henna St., Greencastle, Ind. 46135	Ba, Z
Hastings, John R., 1882 Princeton Ave., St. Paul 5, Minn.	C
Hatcher, Charles O., Box 415, Earlham College, Richmond, Ind.	Z
Henzlik, Dr. Raymond E., 1805 Winston Dr., Muncie, Ind.	Z
Hofstetter, Prof. Henry, Div. of Optometry, Indiana Univ., Bloomington, Ind.	Ps
Houlihan, Mr. John Frank, 717 N. 17th St., Springfield, Ill.	Ph
Howe, Mrs. Jean M., 106 Drury Lane, West Lafayette, Ind.	C
Hughes, Dr. Harold K., Dept. of Physics, Indiana State College, Terre Haute, Ind.	Ph
Hull, Dr. Jerome, Dept. of Hort., Purdue Univ., West Lafayette, Ind.	SS
Hully, Don, 1404 E. Stop 11 Road, Indianapolis, Ind.	G
Humphrey, Stephen, Box 464, Earlham College, Richmond, Ind.	Z
Jacobs, Merle E., Research Prof. in Zoology, Goshen College, Goshen, Ind.	Z
Koble, John R., 4256 Otterbein Ave., Indianapolis, Ind.	Ba, C
Koyanagi, Mr. Elliott Y., 2630 Dekist St., Bloomington, Ind.	C, Ph
Lallathin, Prof. Bernard R., 2808 W. 12th St., Anderson, Ind.	Bo
Lease, William H., 104 S. 9th St., Lafayette, Ind.	E
MacLean, Dr. David B., 1007 S. College, Greencastle, Ind.	C
McLain, Stuart, 2323 South 9th Street, Lafayette, Indiana	A
McReynolds, H. E., 5345 Mark Lane, Indianapolis, Ind.	Z
Miller, Melvin (Saul), Dept. Ento. c/o J. M. Ferris, Purdue Univ., Lafayette, Ind. 47907	E
Monke, Dr. Edwin J., Dept. of Agric. Engineering, Lafayette, Ind.	SS
Montgomery, Robert H., 333 Bluebird Ave., Crown Point, Ind.	SS
Morgan, William E., 918 7th St., Tell City, Ind.	G
Newman, Prof. James E., Dept. of Agron., Purdue Univ., West Lafayette, Ind.	SS

Parrish, Dr. Clyde F., Chem. Dept., Indiana State College, Terre Haute, Ind.	C
Persell, Mrs. Joan V., 60 Venoy Dr., Indianapolis 27, Ind.	Bo, PT
Pettee, Miss Ruth E., Box 512, Earlham College, Richmond, Ind.	Z
Phelps, James M., Jr., 305½ National Rd. West, Richmond, Ind.	Z
Porman, Lawrence (Gene), 540 Grandview Drive, Bloomington, Ind.	Ph
Randall, Rogers E., 2750 W. 12th Ave., Gary, Ind. 46404	C, Ph
Reynolds, Dr. W. Ann (King), 2214 N. Linden, Muncie, Ind.	Z
Rhykerd, Dr. Charles L., 164 Blueberry Lane, West Lafayette, Ind.	Bo
Salaba, David G., 649 Tyler St., Gary, Indiana	Ba
Saxman, (Francis) Ray, 1316 N. Wabash Ave., Hartford City, Ind.	C
Segal, Edwin S., Evermann Apts., No. 243, Bloomington, Ind.	A
Sherfey, Miss Geraldine Richards, 7023 Wicker Ave., Hammond, Ind.	Ps, Z
Smail, J. Kenneth, 615 East 11th St., Bloomington, Ind.	A
Smith, James Mitchell, P. O. Box 478, Anderson College, Anderson, Ind.	G, SS
Smith, Paul L., Jr., 425 S. River Road, West Lafayette, Ind.	Ba, Bo
Steele, A. Logan, 9111 Kerwood Drive, Indianapolis, Ind. 46240	Ps
Steele, Mrs. Joan P., 9111 Kerwood Drive, Indianapolis, Indiana 46240	A
Swartz, Dr. B. K., Jr., Ball State Teachers College, Muncie, Ind.	A
Tomak, Curtis H., 210 N. E. 9th St., Linton, Ind.	A
Tukey, Dr. Ronald B., Dept. of Hort., Purdue Univ., West Lafayette, Ind.	C, SS
Uhlhorn, Dr. Kenneth W., 1812 South 25th St., Terre Haute, Ind.	Z
Urbont, Allan L., 515 East 10th St., Bloomington, Ind.	A
Wade, Miss Susan E., Box 796, Earlham College, Richmond, Ind.	Z
Waltman, William B., 2216 Riveria Dr., Indianapolis Ind.	A
Wenner, Kenneth A., 858 Carol Drive, Crown Point, Ind.	SS
West, Terry R., School of Engineering, Purdue Univ., Lafayette, Ind.	G
Wilhelm, Prof. H. G., Jr., Franklin College, Franklin, Ind.	Ba
Yablonsky, Charles, 926 Sheridan Street, Union, N. J.	Z
Ziemer, Dr. Paul L., Bionucleonics Dept., Purdue Univ., Lafayette, Ind.	Ph
Zimmack, Dr. Harold L., 2517 Lancaster Drive, Muncie, Ind.	E
Zimmerman, Earl G., 1100 Buckeye, Terre Haute, Ind.	Z
Zimmerman, Dr. John F., Wabash College, Crawfordsville, Ind.	C
Northwest High School Science Club, 34th & Moeller Sts., Indianapolis, Ind.	
Science Club, Hartford City High School, Hartford City, Ind.	

INDIANA JUNIOR ACADEMY OF SCIENCE

OFFICERS 1964-65

President: Gary Gunther, Washington High School, Indianapolis.

Vice-President: Bob Stallman, John Adams High School, South Bend.

Secretary: Susan Mann, University High School, Bloomington.

Junior Academy Council: Dr. Howard Michaud, Purdue University, Lafayette (chairman); Miss Helen Reed, Manual High School, Indianapolis (1962-1966); Mr. Erwin Steinkamp, New Albany High School, New Albany (1963-1967); Sister Marian Francis, Reitz Memorial High School, Evansville (1964-1968); Mr. Keith Hunnings, New Haven Senior High School, New Haven (1965-1969).

Director: Professor Donald Winslow, University High School, Bloomington.

PROGRAM OF THE THIRTY-SECOND ANNUAL MEETING

October 31, 1964

- 8:30-10:00 a.m. Registration of all members, sponsors, and guests, lobby of Ransbury Auditorium, Academic Hall.
- 9:00-10:15 a.m. Interviews of the Junior Academy Council, Room 18, Lilly Science Hall.
- 9:30-10:00 a.m. Election of new officers, lobby of Ransbury Auditorium.
- 10:00-12:00 noon Presentation of papers in science and mathematics by Junior Academy members, Ransbury Auditorium.
- 12:00-1:00 p.m. Luncheon, College Cafeteria, Academic Hall.
- 1:15-3:00 p.m. Annual business meeting, Ransbury Auditorium. Greetings by Mr. Wayne Dunbar, Emmerich Manual Training High School, Indianapolis; Address: "Discovery," by Dr. Howard T. Black, Associate Professor of Physics, Indiana State College, Terre Haute; presentation of new officers, Junior Academy Council, special guests and awards. President Gary Gunther, presiding.

The following papers were read by members of the Junior Academy during the morning session:

1. A Study of Common Metals and Metallic Oxides Used as Catalysts in Oxygen Liberation. Jack Dahl, Sigma Mu Club, Franklin Central High School, Acton.
2. Can Turtles Learn? Dennis Waltke, MSE Academy, University Junior High School, Bloomington.
3. Rocketry. William Reisz, Reitz Memorial Chapter of FSA, Reitz Memorial High School, Evansville.

4. The Spark Chamber, Bill Inwood, Junior Engineering Technical Society, Central High School, South Bend.
5. Lasers. Paul Froehle, Reitz Memorial Chapter of FSA, Reitz Memorial High School, Evansville.
6. Effect of Certain Spices on Food Decay. Malinda Finch, Portland Science Club, Portland High School, Portland.
7. Analysis of the Color-Magnitude Diagram of the Globular Cluster M53. Phil Bowers, Science Club, Huntington High School, Huntington.
8. The Electroencephalograph: Detector and Recorder of Brain-Wave Patterns in Normal and Abnormal Brain Functions Patricia Bredhold, Reitz Memorial Chapter of FSA, Reitz Memorial High School, Evansville.
9. Basic Structure and Constituents of Nicotinic Vitamins. Gordon B. Linn, Sigma Mu Club, Franklin Central High School, Acton.
10. An Antibiotic from the Soil. Nerrida King, MSE Academy, University Junior High School, Bloomington.
11. Condensing of Natural Gas into "Drip Gasoline." Steve Kincaid, Reitz Memorial Chapter of FSA, Reitz Memorial High School, Evansville.
12. Polyanions as Inhibitors of Ribonuclease. David Jones, Sigma Nu Club, Franklin Central High School, Acton.
13. Groups and Subgroups of Projective Transformations on a Line and About a Point. Cynthia Hedstrom, Hartford City Science Club, Hartford City High School, Hartford City.
14. The Chemotherapy of Plant Callus Growth. Mickey O'Leary, Reitz Memorial Chapter of FSA, Reitz Memorial High School, Evansville.
15. Theory of Semiconduction. Michael Humnicky, Junior Engineering Technical Society, Central High School, South Bend.
16. The Influence of Age on Stereopsis. Susan Hofstetter, E. Wayne Gross Academy of Science, University High School, Bloomington.
17. Absorption of Gamma Radiation from ^{226}Ra , Mary Ellen Lancaster, Sigma Mu Club, Franklin Central High School, Acton.
18. Determination of Artificial Coloring in Oranges by Paper Chromatography. Marsha Russell, George Washington High School, Indianapolis.
19. Hydrolysis of Adenosine Triphosphate by Myosin ATP-ase Within the Actomyosin Complex. Gary Gunther, George Washington High School, Indianapolis.
20. Immunization Against Streptococcal Infections in Mice. John Darsee, John Adams High School, South Bend.

MINUTES

The thirty-second annual meeting of the Indiana Junior Academy of Science was held Saturday, October 31, 1964, on the campus of Indiana Central College in Indianapolis. The host for the meeting was the Saturday Morning Science Club of Emmerich Manual High School, Indianapolis. Mr. Wayne Dunbar and Mr. Dave Otto are the faculty sponsors of this host club.

Members, sponsors, and guests attending the annual meeting registered from 8:30 to 10:00 a.m. in the lobby of the Ransbury Auditorium of Academic Hall. Authorized members from attending science clubs were given ballots with a list of nominees which were submitted by the Junior Academy Council from names received from club sponsors. A brief statement describing each candidate's achievements in science was included in the listing. Voting for the 1965-66 officers took place at this time.

Mr. Erwin Steinkamp, member of the Council of the Junior Academy, opened the general session of the program at 9:45 a.m. in the Ransbury Auditorium. Mr. Steinkamp briefly welcomed all students and sponsors to the meeting and then introduced Bob Stallman, vice-president of the Junior Academy. Bob presided over the presentation of papers in the fields of science and mathematics by Junior Academy members. A total of twenty papers, as listed in the program, covering varied student projects were heard during the morning meeting.

During the presentation of papers in the Ransbury Auditorium, the Junior Academy Council conducted interviews for the award of "Best Boy" and "Best Girl" in science. Vice-President Bob Stallman excused himself briefly from the program for one such interview. In his absence, Susan Mann, secretary of the Junior Academy, presided during the presentation of papers.

Following the completion of all twenty papers, Bob introduced Mr. Wayne Dunbar, sponsor of the host club, the Saturday Morning Science Club. Mr. Dunbar directed those in attendance to the College Cafeteria in Academic Hall where luncheon was served.

Gary Gunther, president of the Junior Academy of Science, called the annual business meeting to order at 1:25 p.m. in the Ransbury Auditorium. Mr. Wayne Dunbar opened the meeting by officially greeting all students and teachers. He pointed out that the caliber of the papers presented earlier predicts that science teachers of the future will have to "run hard to keep up" with their students. Mr. Dunbar encouraged the students when he remarked that although the Junior Academy may be small in number, it is always the greatness of the minds in a group that counts—not the size of the group.

Gary introduced Susan Mann who read the minutes of the thirty-first annual meeting to the Junior Academy. No additions or corrections were offered; thus, the minutes were approved.

Gary then introduced Dr. Howard T. Black, Associate Professor of Physics at Indiana State College in Terre Haute, who addressed the group. Dr. Black admitted that the title of his talk—"Discovery"—was chosen before he had planned exactly what the lecture would entail. He reviewed many historic discoveries and from these drew an interesting generalization concerning the process of human exploration in science. Dr. Black began by describing Sir Isaac Newton's discovery of the spectrum of the sun which appeared as a fascinating rainbow. Fraunhofer, a German scientist, later improved upon Newton's findings when he discovered a discontinuous or line emission spectrum. This is an example, Dr. Black pointed out, of how additional information is gained in science by "taking a closer look" at a subject matter with improved equipment and technology.

Continuing along the same line of inquiry, Dr. Black described how Kirchhoff and Bunsen devised laws for spectral analysis through extensive study of light given off by different gases. To illustrate this achievement, Dr. Black distributed small diffraction gratings to the audience and illuminated three different gases—helium, mercury, and neon. Thus, the Academy members "made discoveries" of their own of the difference of spectral lines produced by different types of light.

Dr. Black explained how, because of his curiosity, man has continued to take a closer and closer look at the beautiful rainbow seen by Newton. This process of investigation has included many separate experiments by several different scientists. Dr. Black acknowledged that what he had presented was mainly a survey of information. It was presented, however, as a lesson revealing the requirements of a discovery. Discovery is a "slowly evolving process of events" brought about by "many careful observers over a long period of time." The process is one of observation, then analysis, then development of a theory, then application of theory, and finally the evolution of new theories. This, Dr. Black concluded, is discovery.

Gary expressed the appreciation of the group to Dr. Black for having spent his time to prepare his informative address. Gary then recognized Professor Don Winslow, the Director of the Junior Academy, and thanked him on behalf of the other officers for his assistance with their work. The members of the Junior Academy Council were introduced at this time. The Council includes Dr. Howard Michaud, chairman, Purdue University; Miss Helen Reed, Manual High School, Indianapolis; Mr. Erwin Steinkamp, New Albany High School, New Albany; Sister Marian Francis, Reitz Memorial High School, Evansville; and Mr. Keith Hunnings, New Haven Senior High School, New Haven.

Mr. Erwin Steinkamp, Junior Academy Council member, was recognized to announce the results of the officer elections conducted during the morning. The officers for the 1965-66 school year will be John Darsee, president, John Adams High School, South Bend; Ed Emery, vice-president, New Albany High School, New Albany; and Mickey O'Leary, Reitz Memorial High School, Evansville.

Dr. R. M. Kline, Eli Lilly and Company, presented an award to Malinda Finch, Portland High School, Portland, on behalf of the

Indiana Branch of the American Society for Microbiology. Dr. H. J. Florestana, Pittman Moore and Company, Research Division; and Dr. D. J. Niederpruem, Department of Microbiology, Indiana University Medical Center; helped in the selection of the best paper in the areas of microbiology and bacteriology. For her paper entitled "The Effect of Certain Spices on Food Decay," Malinda received a check for \$25.

Miss Helen Reed, Junior Academy Council member from Manual High School, announced the winners of the awards for "Best Boy" and "Best Girl" in science for 1964. Cynthia Hedstrom, Hartford City High School, Hartford City, received the "Best Girl" in science award; and Gary Gunther, George Washington High School, Indianapolis, was named the "Best Boy" in science. The recipients of these honors will receive an honorary membership in the American Association for the Advancement of Science and a year's subscription to *Science*, a publication of the AAAS.

Before turning the meeting over to Professor Winslow, Gary thanked the faculty of Indiana Central College for the generous use of their facilities and wished all the students luck in all of these endeavors in the coming year.

Mr. Winslow, opened his remarks by congratulating the three officers—Gary Gunther, Bob Stallman, and Susan Mann—for their fine work before and during the thirty-second annual program. He felt that they had set a example which would be difficult for others to follow. Mr. Winslow then congratulated all the students who presented papers pointing out that the quality of the papers improves greatly each year. Mr. Winslow thanked particularly Mr. Dunbar, Emmerich Manual High School, Indianapolis, and Dr. Robert Brooker, Program Chairman of the Indiana Academy of Science, who gave their time and energies to make the Junior Academy meeting possible.

Mr. Winslow appealed to all students, sponsors and guests present to bring to him any suggestions for the improvement of the program for next year's meeting. One possibility suggested has been to limit the number of papers presented to provide time for other activities. If the number of papers were cut down, abstracts of each paper submitted would be required in advance. From these abstracts a certain number of papers would be selected for the privilege of presenting a paper before this group. Another suggestion has been to divide the state into two portions and to have regional meetings rather than state-wide meetings. Mr. Winslow pointed out that approximately one-half of the thirty-four member clubs were situated in the northern portion of Indiana and one-half are located in southern Indiana. This division of the Junior Academy into two branches—one to accommodate the northern half of Indiana and the other the southern half—may be made necessary by the growing number attending meetings. Two hundred and twenty-eight students, thirty-five sponsors and eighty-nine guests had registered for the thirty-second annual meeting. This total of three hundred and fifty-two people attending is an increase of one hundred and eighty-eight from last year's total figure. A division of the Junior Academy would mean two separate meetings in the ex-

tremities of the state. Mr. Winslow requested comments concerning these suggestions from all Junior Academy members and sponsors.

Mr. Winslow announced that next year's meeting will be held in South Bend on the campus of Notre Dame University. The following year the meetings will be at Ball State Teacher's College in Muncie.

Mr. Winslow thanked all students, sponsors and guests in attendance expressing gratitude for their time and interest. President Gary Gunther adjourned the meeting at 2:15 p.m.

Respectfully submitted,
SUSAN MANN, Secretary

INDIANA JUNIOR ACADEMY OF SCIENCE CLUBS

JANUARY 1, 1965

<i>Town</i>	<i>School and Club</i>	<i>Sponsor</i>
Acton	Sigma Mu Chapter of FSA Franklin Central High School	Jerry Colglazier
Bloomington	National Scientific Honor Society Bloomington High School	Merril L. Crisler
Bloomington	E. Wayne Gross Academy University High School	Lew Wise
Bloomington	Freshman Academy of Science University Junior High School	Eugene Schlebecker
Bloomington	MSE Academy of Science University Junior High School	Charles Souers
Columbus	Science Club Columbus Senior High School	L. N. Carmichael
Crawfordsville	Up-N-Atom Crawfordsville High School	David Wells
Evansville	Reitz Memorial Chapter of FSA Reitz Memorial High School	Sister Marian Francis
Fort Wayne	Albertus Magnus Science Club Central Catholic High School	Sister Winifred
Fort Wayne	Phy-Chem Club Elmhurst High School	Ruth Wimmer
French Lick	Springs Valley Science Club Springs Valley High School	D. L. Clark
Gary	Biology Club Lew Wallace High School	Lola Lemon
Hartford City	Hartford City H. S. Science Club Hartford City High School	F. Ray Saxman
Highland	Science Club Highland High School	Jon Hendrix
Huntington	Science Club Huntington High School	Robert Diffenbaugh
Indianapolis	Brebeuf Science Club Brebeuf Preparatory School	Rev. Richard J. Middendorf, S.J.
Indianapolis	Science Club Howe High School	Jerry A. Motley
Indianapolis	Manual High School Science Club Manual High School	Wayne E. Dunbar Dave Otto
Indianapolis	Nature Club Arsenal Technical High School	Charles E. Russell
Indianapolis	Science Club George Washington High School	Elizabeth Crider
Indianapolis	Science Club of Westlane Westlane Junior High School	John Van Sickle
La Porte	Bi-Phi-Chem Club La Porte High School	Frances Gourley Byron Bernard

Town	School and Club	Sponsor
Lebanon	Junior Explorers of Science Lebanon Junior High School	Tom Ewing
New Albany	Science Club New Albany Senior High School	Erwin Steinkamp
New Haven	New Haven Science Club New Haven High School	Keith Hunnings
Portland	Science Club Portland Junior High School	Bill Norris
Portland	Portland Senior High School Science and Mathematics Club Portland Senior High School	Ralph Settle Robert Freemyer
South Bend	Junior Izaak Walton League John Adams High School	Ernest Litweiler
South Bend	JETS Junior Engineering Technical Society Central High School	Lawrence K. Cox
South Bend	IONS J. W. Riley High School	Robert C. Smith
Terre Haute	Pius X Science Teens Schulte High School	Sister Thomas Mary
Vincennes	Sigma Tau Science Club St. Rose Academy	Sister Suzanne