

PROCEEDINGS

*of the*

Indiana Academy  
*of* Science

*Founded December 29, 1885*

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Volume 71

1961

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RICHARD A. LAUBENGAYER, Editor  
Wabash College  
Crawfordsville, Indiana

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Spring Meeting

May 12-13

Turkey Run

State Park

Fall Meeting

October 19-21, 1961

INDIANA STATE COLLEGE

Published at Indianapolis, Indiana

1962

1. The permanent address of the Academy is the Indiana State Library, 140 N. Senate Ave., Indianapolis 4, Indiana.

2. **Instructions for Authors** appear at end of this volume, P. 412.

3. **Exchanges.** Items sent in exchange for the Proceedings and correspondence concerning exchange arrangements should be addressed:

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5. **Reprints of technical papers** can often be secured from the authors. They cannot be supplied by the State Library nor by the officers of the Academy.

6. The Constitution and By-Laws reprinted from v. 62 and the Membership List reprinted from v. 67, 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 the State Library. The address of the editor of the present volume is Biology Department, Wabash College, Crawfordsville, Ind.

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**

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**Psychological Abstracts**

**Review of Applied Entomology**

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**Zoological Record**

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OFFICERS AND COMMITTEES OF THE INDIANA  
ACADEMY OF SCIENCE FOR 1961

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Spring Meeting: May 12-13, Turkey Run State Park, Marshall, Indiana.  
Fall Meeting: October 19-21, Indiana State College, Terre Haute, Indiana.

OFFICERS FOR 1961

President.....LAWRENCE H. BALDINGER, University of Notre Dame  
Vice President.....HARRY G. DAY, Indiana University  
Secretary.....WILLIAM W. BLOOM, Valparaiso University  
Treasurer.....KERMIT H. CARLSON, Valparaiso University  
Editor.....RICHARD A. LAUBENGAYER, Wabash College  
Press Secretary.....FRANK N. YOUNG, Indiana University

CHAIRMEN ELECTED BY THE DIVISIONS

Anthropology.....JAMES H. KELLER, Indiana University  
Bacteriology.....GORDON MALLET, Eli Lilly  
Botany.....JOSEPH HENNEN, Indiana State College  
Chemistry.....ARTHUR SMUCKER, Goshen College  
Entomology.....R. E. SIVERLY, Ball State College  
Geology and Geography..DUNCAN MCGREGOR, Indiana Geological Survey  
History of Science.....T. G. YUNCKER, DePauw University  
Mathematics.....MERRILL E. SHANKS, Purdue University  
Physics.....HOWARD BLACK, Indiana State College  
Plant Taxonomy.....MRS. HELENE STARCS, Health and Hospital  
Corporation of Marion County  
Psychology.....NICHOLAS LONG, Indiana University  
Soil Science.....RONALD TUKEY, Purdue University  
Zoology.....L. E. DELANNEY, Wabash College

EXECUTIVE COMMITTEE

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

L. H. Baldinger	J. Hennen	C. L. Porter
Howard Black	W. B. Hopp	H. M. Powell
W. W. Bloom	W. H. Johnson	W. J. Rice
K. H. Carlson	J. H. Keller	M. E. Shanks
O. B. Christy	P. Klinge	R. E. Siverly
R. E. Cleland	R. A. Laubengayer	A. Smucker
N. M. Coats	R. W. Lefler	Mrs. H. Starcs
W. A. Daily	N. Long	R. Tukey
J. J. Davis	S. McCoy	S. S. Visher
H. G. Day	G. Mallett	F. N. Wallace
E. F. Degering	M. S. Markle	P. Weatherwax
L. E. DeLanney	D. McGregor	Winona H. Welch
W. E. Edington	M. G. Mellon	F. N. Young
P. D. Edwards	A. H. Meyer	T. G. Yuncker
A. T. Guard	H. H. Michaud	



## BUDGET COMMITTEE

(Consisting of President, Secretary, Treasurer, Editor, Chairmen of the Junior Academy, Library, Program, and Relation of Academy to State.)  
L. H. Baldinger, W. W. Bloom, K. H. Carlson, R. A. Laubengayer, H. H. Michaud, Nelle M. Coats, W. B. Hopp, W. A. Daily.

## COMMITTEES ELECTED BY THE ACADEMY

**Trustees of the Academy Foundation** (term 4 years): Chairman, Ward J. Rice, W. A. Daily.

**Bonding of Trustees** (elected yearly): Chairman, Scott McCoy, F. J. Welcher.

**Research Grants** (term 5 years): Chairman, T. G. Yuncker, DePauw University; Keith M. Seymour, Paul Weatherwax, A. A. Lindsey, J. F. Hart; L. H. Baldinger and W. W. Bloom, ex officio.

## COMMITTEES APPOINTED BY THE PRESIDENT

**Auditing:** Chairman, C. Krekeler; J. P. Danehy.

**Biological Survey:** Chairman, C. A. Markle, Earlham College; F. K. Daily, D. G. Graam, C. J. Goodnight, H. H. Michaud, W. H. Welch, F. N. Young, J. Webster.

**Fellows Committee:** Chairman, L. S. McClung, Bacteriology; E. J. Asher, Psychology; H. Driver, Anthropology; Winona H. Welch, Botany; K. Seymour, Chemistry; R. T. Everly, Entomology; F. Hurlburt, Geology and Geography; M. S. Markle, History of Science; P. D. Edwards, Mathematics; A. C. Mitchell, Physics; A. T. Guard, Plant Taxonomy; A. R. Bertrand, Soil Science; N. Pearson, Zoology.

**Index:** Chairman, R. A. Laubengayer; Nelle Coats, Mrs. L. Burton.

**Invitations:** Chairman, R. E. Siverly, Ball State; Ned Guthrie, Hanover.

**Library:** Chairman, Nelle Coats, Eli Lilly, G. A. Black.

**Membership:** Chairman, Louis E. DeLanney, Wabash College; John A. Buehler, Anderson College; H. M. Dixon, Butler University; M. R. Garner, Earlham College; E. Niswander, Manchester College; J. Webster, Hanover College; J. F. Hennen, Indiana State College; J. J. Nisbet, Ball State College; G. F. Hennion, University of Notre Dame; R. G. Larson, Valparaiso University; G. R. Miller, Goshen College; F. J. Zeller, Indiana University; Ralph Green, Purdue University.

**Necrologist:** W. E. Edington, DePauw University.

**Program:** Chairman, W. B. Hopp, Indiana State College, William Brett, Normal Deal, James Guernsey, Joseph Hennen, Eugene Herbst, William Kessel, Jack Munsee, Woodrow Suttle.

**Publication of Proceedings:** Chairman, R. A. Laubengayer, Wabash College; A. A. Lindsey, James Clark.

**Publicity:** Chairman, F. N. Young; Nelle Coats, K. N. Campbell, C. Dineen.

**Relation of Academy to State:** Chairman, W. A. Daily, Eli Lilly Company; Eli Lilly, J. A. Clark, R. A. Laubengayer.

**Representative on Council of the A.A.A.S.:** Willis Johnson, Wabash College.

**Resolutions:** Chairman, Wm. Eberly; H. Youse, M. G. Mellon.

**Indiana High School and College Committee on Mathematics:** Chairman, J. C. Polley, Wabash College; G. N. Wollan, G. Vannatta.

**Youth Activities of Academy (Administrative Committee):** Chairman, Paul Klinge, Indiana University; W. J. Fullerton, K. Dale, R. Lefler, W. Smith, R. S. Shulz, H. N. Hardy (University School, Bloomington, Indiana), L. Poorman (Columbus High School), L. A. Willig, H. H. Michaud.

**Finance Committee:** Chairman, W. J. Fullerton.

**Junior Academy:** Chairman, H. H. Michaud; R. Cooper, P. E. Klinge, Lola Lemon, R. E. Niswander, R. W. Schulz, J. Cope, D. Webster, R. Weber.

**Science Talent Search:** Chairman, R. W. Lefler; L. H. Baldinger, P. D. Edwards, C. A. Markle, Robert L. Henry, Sears Crowell.

**Visiting Scientists:** Chairman, H. H. Michaud; K. H. Carlson, E. Litweiler, R. L. Cooper, Mrs. Elizabeth Crider.

**Science Fairs:** Chairman, L. W. Willig, Karl L. Kaufman, Ralph Lefler, A. C. Koester.



# SPRING MEETING EXECUTIVE COMMITTEE

TURKEY RUN STATE PARK  
May 12, 1961  
4:30 P. M.

The meeting was called to order by the president, Dr. Lawrence H. Baldinger. Twenty members were present at the opening of the meeting and a number of others were able to join the meeting as it progressed.

The treasurer, Dr. Kermit H. Carlson, presented a financial report through April 30, 1961:

Receipts:		
Bank Balance as of January 1, 1961.....	\$18,844.03	
Total Receipts thru April 30, 1961.....	6,483.85	\$25,327.88
Disbursements:		
Total Disbursements through April, 1961.....	11,405.21	11,405.21
Balance on Hand, May 1, 1961.....		\$13,922.67
Account Balances on Hand, May 1, 1961		
John Shepard Wright Memorial Library.....	\$ 2,426.68	
Indiana Science Talent Search.....	4.84	
Science Fair .....	198.65	
Indiana Academy of Science.....	3,596.61	
National Science Foundation Grant G-12417....	5,695.87	
National Science Foundation Grant G-17042....	2,000.00	
		\$13,922.67

The Youth Activities Committee was not ready to report at this meeting since Dr. Paul Klinge was attending the National Science Fair. A full committee meeting is planned for June.

The program chairman, Dr. William B. Hopp, reported that plans for the fall meeting were progressing well. He reported that Indiana State College would provide an outstanding speaker for the meeting and asked for suggestions for a suitable speaker. He announced that suitable projection equipment would be available if divisional chairmen would notify the program chairman in advance of the fall meeting.

Considerable discussion centered about the emeritus memberships. The secretary and treasurer were asked to make a study to identify such members as should be put on emeritus status and to report at the fall meeting.

The secretary was instructed in a motion to secure the names of Department Heads of Science Departments in the various colleges throughout the state and make the information available to the various members of the academy who need this information.

Dr. Guard reported on Dr. Den Uyl's illness and urged members to send him greetings.

The meeting adjourned to permit members to join together in small groups for an informal dinner served in the regular dining room of the Inn.

WILLIAM W. BLOOM, *Secretary*

Approved 10-19-61

SPRING MEETING  
DINNER MEETING

TURKEY RUN STATE PARK  
May 12, 1961

The members of the Academy were seated informally in the dining hall of the Inn for the dinner and assembled in the meeting room at 8:00 P. M. for the general business meeting and program. The members were welcomed by Dr. Lawrence H. Baldinger, president of the Academy. The current officers were introduced to the group.

The membership chairman, Dr. Louis E. DeLanney, presented 31 applications for membership in the Senior Academy and one application for membership in the Junior Academy. The applications were approved.

Marvin Bell of Indiana State College then presented an illustrated talk on "Nature Photography" in which he showed a number of interesting nature slides, especially of the same object at different magnifications.

Dr. William H. Hopp, the general program chairman, announced the details concerning the field trips to be held Saturday morning.

A resolution was adopted expressing the appreciation of the Academy to Mrs. Marcia Murphy and her staff for the kind hospitality and gracious service extended to the Academy on the occasion of the 77th annual spring meeting held at Turkey Run State Park.

WILLIAM W. BLOOM, *Secretary*

Approved 10-19-61

# FALL MEETING EXECUTIVE COMMITTEE

INDIANA STATE COLLEGE, TERRE HAUTE, INDIANA  
October 19, 1961

The meeting was called to order by President Lawrence H. Baldinger at 7:30 P. M.

The minutes of the spring meeting of the Executive Committee and the minutes of the dinner meeting held at Turkey Run State Park on May 12, 1961 were read by the secretary and approved as read.

**Treasurer**—Kermit H. Carlson: Financial report of the Indiana Academy of Science, January 1, 1961 through December 31, 1961.

## FINANCIAL REPORT OF THE INDIANA ACADEMY OF SCIENCE JANUARY 1, 1961 THRU DECEMBER 31, 1961

Account Number	Account Name	Balance Jan. 1 plus Receipts	Disbursed	Account Balances Surplus	Deficit
1	Ind. Acad. of Science.....	\$6,005.28	\$4,588.26	\$1,417.02	
2	Jr. Academy of Science.....	195.00	53.81	141.19	
3	Academy Funds Designated for Research Grants .....	900.00	300.00	600.00	
4	John Shepard Wright Mem. Library .....	3,426.68	2,432.15	994.53	
5	Science Fair .....	2,396.52	2,787.20		\$390.68
6	Science Talent Search.....	2,067.69	2,316.27		248.58
	Sub-totals in Acct. Balances			3,152.74	639.26
				—639.26	
	Totals in State Accounts.....	\$14,991.17	\$12,477.69	\$ 2,513.48	
7	NSF grant G-12417.....	14,463.65	11,568.43		
	Returned to Nat. Sci. Found....		2,895.22		
	NSF Grant G-17042.....	17,150.00	2,249.28	14,900.72	
	Total in Federal Accounts....	31,613.65	16,712.93	14,900.72	
	Totals .....	\$46,604.82	\$29,190.62	\$17,414.20	
	Balance Checking Account Dec. 31, 1961....			\$ 2,801.70	
	Balance Savings Account, Dec. 31, 1961....			14,612.50	
	Total .....			\$17,414.20	

**Editor**—Richard A. Laubengayer: There were 1,200 hard bound and 600 soft bound copies of the Proceedings, Volume 70, printed, giving a total of 1,800 copies. Thirty-six contributors ordered reprints. A ten-year index will be prepared and published as a part of the Proceedings for 1961.

**Trustees of the Academy Foundation**—Chairman Ward J. Rice reported as of September 30, 1961:

Cash income, ending balance.....	\$ 742.55
Principal cash, ending balance.....	619.84
Securities held, carrying value.....	14,563.92

**Research Grants Committee**—Dr. T. G. Yuncker, chairman of the committee: Two grants were made during the year as follows: Mrs. Fay

Daily, Butler University, \$100.00 as aid in her studies on fossil charophytes. Mr. Charles Hall, DePauw University, \$100.00 as aid in a taxonomic study of the algal flora of Putnam County. The committee has approximately \$800.00 available at the present time for Academy-supported research and it is suggested that anyone interested in securing a small grant apply to the committee. It was recommended by the committee that the President of the Academy in his annual letter call the attention of the membership of the Academy to this fund.

**Biological Survey Committee—Carroll A. Markle, Chairman:**

**Report of the Biological Survey Committee of the  
Indiana Academy of Science**

**Publications of 1960-1961 Dealing with the Flora and Fauna of Indiana**

- Bryophyta :** Welch, Winona H., 1960. A Monograph of the Fontinalaceae. 357 pages ; 35 figures. Martinus Nijhoff, The Hague.
- Vascular Plants :**
1. Adams, William P., 1961. A re-evaluation of the generic status of *Asecyrum* and *Crookea* (Guttiferae). *Rhodora* **63** : 10-16.
  2. Biology Staff, 1961. A Guide in the Study of Trees on Ball State Teachers College Campus. 90 pages.
  3. Clewell, Andre F., 1961. Taxonomic Problems in *Lespedeza*. Proceedings of the Indiana Academy of Science for 1960. **70** : 207-208.
  4. Cooper, Robert H., and O. B. Christy, 1960. Christy Woods Outdoor Laboratories. 46 pages.
  5. Heiser, Charles B. Jr., 1961. Morphological and cytological variation in *Helianthus petiolaris* with notes on related species. *Evolution* **15** : 247-258.
  6. Lindsey, A. A., 1961. Vegetation of the Drainage-aeration Classes of northern Indiana Soils in 1830. *Ecology* **42** : 432-436.
  7. Lindsey, A. A., R. O. Petty, D. K. Sterling, and W. Van Asdall, 1961. Vegetation and Environment along the Wabash and Tippecanoe Rivers. *Ecological Monographs* **31** : 105-156.
- Insecta :**
1. Chandler, Leland, 1960. A preliminary study of the bees and wasps of the Hovey Lake (Indiana) area. Proceedings of the North Central States-E. S. A. **15** : 77.
  2. Chandler, Leland, 1960. Life history of *Halictus ligatus* Say (Hymenoptera, Halictidae). (prog. abs.) *Bulletins Entomological Society of America* **6**(3) : 155.
  3. Chandler, Leland, 1960. The nesting habits of *Osmia albi ventris* Cresson (Hymenoptera, Megachilidae). (abstract) Proceedings of the Indiana Academy of Science for 1959, **69** : 149.
  4. Chandler, Leland, 1961. Differential Predation in *Osmia cordata* Robt. *O. lignaria* Say Nesting Associations (Hymenoptera, Megachilidae). Proceedings of the Indiana Academy of Science for 1960, **70** : 138.
  5. Chandler, Leland, Nancy Work, and Fred Shewman, 1960. The life history of *Pemphredon lethifer lethifer* (Shuckard) (Hymenoptera, Sphecidae). (abstract) Proceedings of the Indiana Academy of Science for 1959, **69** : 148.
  6. Dobson, R. C., 1960. *Musca autumnalis* De Geer, A new Livestock Pest in Indiana. Proceedings of the Indiana Academy of Science for 1959, **69** : 165-166.

7. Everly, Ray T., 1960. Insecticidal control of thrips on corn. Proceedings of the North Central Branch of the Entomological Society of America, 15: 89-91.
8. Everly, Ray T. 1960. Loss in corn yield associated with the abundance of the corn leaf aphid, *Rhopalosiphum maidis* (Fitch), in Indiana. Journal of Economic Entomology 53: 924-932.
9. Everly, Ray T. and R. C. Pickett, 1960. The Effect of phorate applied to seed on the growth, development and insects attacking grain sorghums. Journal of Economic Entomology 53(1) : 154-160.
10. Gould, George E., 1960. Problems in the control of mint insects. Journal of Economic Entomology 53: 526-531.
11. Gould, George E., 1960. The effect of Japanese beetle feeding on the yield of soybeans. Proceedings of the Indiana Academy of Science for 1959, 69: 178-181.
12. Gould, George E., 1960. Vegetable Insect Resistance in Indiana. Proceedings of the North Central Branch of the Entomological Society of America 15: 113.
13. Schuder, D. L., 1960. The Columbian Timber Beetle, *Corthylus columbianus* Hopk. Proceedings of the North Central Branch of the Entomological Society of America 15: 23-24.
14. Schuder, Donald L., 1960. The Zimmerman pine moth. Research Bulletin 698, Purdue University.
15. Siverly, R. E., 1961. Occurrence of *Aedes thibaulti* Dyar and Knab in Indiana. Proceedings of the Indiana Academy of Science for 1960. 70: 137. (abstract)
16. Wilson, M. C. and R. L. Davis, 1960. Culver alfalfa, a new Indiana variety developed with insect resistance. Proceedings of the North Central Branch of the Entomological Society of America 15: 30-31.
17. Wilson, M. C., H. F. Hodges, R. L. Gallum, and R. E. Kirk, 1960. The use of phorate to control aphids and the Hessian fly on winter wheat. Journal of Economic Entomology 53(2) : 197-200.
18. Young, Frank N., 1961. Pseudosibling species in *Peltodyks* (Coleoptera: Halipidae. Annals of the Entomological Society of America 54: 214-222 (includes *Peltodyks dunavani* n. sp. in part ex Indiana).

Nemathelminthes: Ferris, J. M., 1960. Effect of storage temperatures on survival of plant parasitic nematodes. (abstract) Phytopathology 50: 635.

### Work in Progress or Completed in 1960-1961 But Not Yet Published

- Algae:
1. Daily, Fay K. Glacial and post-glacial Charophytes from New York and Indiana. Micropaleontology.
  2. Daily, W. A. Some algae of the Cabin Creek Raised Bog.
  3. Reimer, Charles W. Some aspects of the diatom flora of Cabin Creek Raised Bog, Randolph County, Indiana.
- Bryophyta:
1. Welch, Winona H. Bryophytes and Lichens of American Bryological Society 1961 Foray at High Bridge, Warren Co., Indiana. Bryologist.
  2. Welch, Winona H. History of the DePauw University Herbarium. Proceedings of the Indiana Academy of Science.
  3. Welch, Winona H. Hookeriaceae of the United States and Canada.
- Vascular Plants:
1. Clewell, Andre. *Lespedeza*—taxonomy.
  2. Coleman, James. *Verbesina*—taxonomy.

3. Davidson, Thomas. Ecological study of a natural area—primarily ecology of the vascular plants.
  4. Hall, Gustav. *Bidens*—taxonomy and evolution.
  5. Heiser, Charles B. Jr. *Magnolia* and *Liriodendron* (floral ecology).
  6. Markle, Carrolle A. Flora of Wayne County, being continued.
  7. Montgomery, B. Edwood. Characteristics of Nectar and Pollen available to Bees in Indiana.
- Arachnida :
- Schuder, D. L. Ecology and control of mites on woody ornamentals.
- Aves :
1. Cope, James B. Birds of Indiana.
  2. Hodson, Margaret. Ecological Study of a natural area.
- Insecta :
1. Butts, William L. Comparison of neural response in insecticide-resistant and normal cockroaches.
  2. Butts, William L. Comparison of toxicity of diene insecticides to *Reticulitermes* spp.
  3. Butts, William L. Vapor toxicity of organo-phosphate insecticides.
  4. Cartwright, W. B. Entomological aspects in the breeding of Hessian fly and wheat jointworm resistant wheats and Hessian fly resistant barleys. (W. B. Cartwright and R. L. Gallun)
  5. Cartwright, W. B. Screening of foreign wheat and barley introductions and Indiana breeding material for resistance to Hessian fly and wheat jointworm. (W. B. Cartwright and R. L. Gallun)
  6. Cartwright, W. B. Genetics and bionomics of Hessian fly races. (R. L. Gallun, W. B. Cartwright, and A. E. Bell)
  7. Cartwright, W. B. The use of chemical plant inhibitors as a means of studying the nature of resistance in wheats to Hessian fly.
  8. Chandler, Leland. Biosystematic studies of Indiana bees and wasps.
    - a. Factors relating to the distribution of sexes in nests of *Osmia albiventris* Cresson.
    - b. Records of parasites in the nests of bees and wasps.
    - c. Orientation of developing stages in inverted nests of *Pemphredon lethifer* (Shuckard).
    - d. A life table for *Pemphredon lethifer* (Shuckard).
    - e. *Omalus auratus* (L.)—the relationship of pupation site to host conditions.
    - f. The species of *Psacrythia* in Indiana.
    - g. Life history studies of the following bee species: *Colletes inaequalis*, *Halictus confusus*, *Melitoma taurea*, *Melisodes bimaculata*, *Prochelostoma philadelphia*.
  9. Chandler, Leland. The attraction of *Sphecodogastra texanum* Cresson to light.
  10. Chandler, Leland. Interspecific competition in *Osmia lignaria* Say—*O. cordata* Robt. nesting associations.
  11. Dobson, R. C. Biology and control of the cattle grubs.
  12. Dobson, R. C. Biology and control of the Face Fly *Musca autumnalis*.
  13. Dobson, R. C. Control of Insect Pests of Livestock.
  14. Everly, Ray T. Resistance of sorghums and dent corn to the corn leaf aphid.
  15. Everly, Ray T. Insecticidal control of the clover root borer, meadow spittlebug, lesser clover leaf weevil, and miscellaneous clover insects.



16. Everly, Ray T. Differential attractiveness of dent corn to the European corn borer.
17. Everly, Ray T. Inheritance of attractiveness of dent corn to the European corn borer.
18. Everly, Ray T. Further studies of the damage, location of larvae in respect to the placement of eggs on corn plants for the first and second generation of the European corn borer on attractive and unattractive single cross dent corn.
19. Gallun, R. L. Entomological aspects in the breeding of Hessian fly and wheat jointworm resistant wheats and Hessian fly resistant barleys. (W. B. Cartwright and R. L. Gallun)
20. Gallun, R. L. Screening of foreign wheat and barley introductions and Indiana breeding material for resistance to Hessian fly and wheat jointworm. (W. B. Cartwright and R. L. Gallun)
21. Gallun, R. L. Genetics and bionomics of Hessian fly races. (R. L. Gallun, W. B. Cartwright, and A. E. Bell)
22. Gallun, R. L. Monosomic analysis of Hessian fly resistant wheat varieties to determine the chromosomes responsible for the W38, PI 94587 and Ribeiro types of resistance. (R. L. Gallun and F. L. Patterson)
23. Gallun, R. L. Barley translocation studies to locate the chromosome responsible for the Delta type of resistance to Hessian fly. (F. L. Patterson and R. L. Gallun)
24. Gallun, R. L. Radioisotope studies to determine the length and amount of feeding done by Hessian fly larvae on Hessian fly resistant and susceptible wheats. (R. L. Gallun and Ruble Langston)
25. Giese, R. L. The impact of insect defoliation on Indiana hardwoods.
26. Giese, R. L. The European pine sawfly, *Neodiprion sertifer* (Geoff.) sequential sampling; population dynamics.
27. Giese, R. L. The columbian timber beetle, *Corthylus columbianus* (Hopk.): damage losses, spatial distribution, symbiotic relationships, survey techniques, development of market for defected lumber, population dynamics and control.
28. Giese, R. L. The walkingstick, *Diaperomera* sp.: taxonomy, physiology (diapause) and population dynamics.
29. Giese, R. L. and J. D. Paschke, The parasite and predator complex of *Neodiprion sertifer* (Geoff.), the European pine sawfly, in Indiana.
30. Giese, R. L. and D. L. Schuder. Host preference and survival potential of *Neodiprion sertifer* (Geoff.), the European pine sawfly, on native and introduced trees in the genus *Pinus*, with particular reference to the selection of elite trees.
31. Gould, George E. Control of the cucumber beetle.
32. Gould, George E. Control of insects attacking peppermint and spearmint.
33. Gould, George E. The Japanese beetle, its potential danger to agricultural crops in Indiana.
34. Gould, George E. The control of wireworms and other soil insects.
35. Grothaus, Roger. Comparative ecology of the three species of *Ceratina* in Indiana.
36. McCoy, C. Edward. Biology and ecology of nine species of *Drosophila* (Diptera, Drosophilidae), common in Indiana. A comparative study.
37. McMillan, Harlan. Progressive changes in natural and laboratory populations of *Culex pipiens* Linnaeus.

38. Montgomery, B. Elwood. Odonta of Indiana.
  39. Montgomery, B. Elwood. Catalogue of New World Odonta.
  40. Montgomery, B. Elwood. Anthophilous Insects of Indiana. (Continuation of two papers previously published.)
  41. Montgomery, B. Elwood. Distribution Patterns of New World Odonta, Proc. XIth International Congress of Entomology, Vienna.
  42. Munsee, Jack. The strip mine spoil bank ecosystem with especial reference to the role of ants.
  43. Paschke, J. D. Virus complexes as pathogens of insects, especially loopers associated with mint.
  44. Paschke, J. D. Control of Japanese beetle with microbial agents.
  45. Paschke, J. D. Fungus diseases of insects.
  46. Paschke, J. D. Survey and collection of parasites and predators associated with hosts found in major agricultural crops.
  47. Paschke, J. D. and J. J. Hamm. A nuclear polyhedrosis virus disease of *Rachipsectia ou* (Guenee). Journal of Insect Pathology.
  48. Schuder, D. L. Biology of the Zimmerman Pine Moth.
  49. Schuder, D. L. Borers of woody ornamentals.
  50. Schuder, D. L. Ecology and control of scale insects attacking ornamentals.
  51. Siverly, R. E. Ecology of mosquitoes, Delaware County, Indiana.
  52. Ward, Gertrude L. Insects of Indiana.
  53. Wilson, M. C. Development of the spotted alfalfa aphid in Indiana.
  54. Wilson, M. C. Insect resistance in alfalfa to the spotted alfalfa aphid, meadow spittlebug, and potato leafhopper.
  55. Wilson, M. C. Studies on control of aphid vectors of virus diseases.
  56. Wilson, M. C. Low dosage rates of phorate and the influence granular particle numbers on hessian fly control.
  57. Wilson, M. C., R. L. Gallun, G. F. Florentine, and R. E. Kirk. Toxicity of phorate and other systematic insecticides to *Phytophaga destructor* (Say). Proceedings of the XIth International Congress of Entomology, Vienna.
  58. Wilson, Nixon. A systematic study of the ectoparasites of Indiana mammals.
  59. Wood, Vida G. The Effect of X-Radiation on Longevity of *Drosophila melanogaster*.
- Mammalia :  
 Nematelminthes : Cope, James B. Bats of Indiana.
1. Ferris, J. M. Indiana nematode survey and collection.
  2. Ferris, J. M. Study of the effect of plant parasitic nematodes on the growth of blue spruce.
  3. Ferris, J. M. Investigations of ecological relationships and factors affecting the population dynamics of the nematode *Pratylenchus penetrans* Cobb.
  4. Ferris, J. M. Nematode physiology.
  5. Ferris, J. M. Greenhouse culture of plant parasitic nematodes.
- Nematelminthes  
 and Insecta : Ferris, J. M., M. C. Wilson, and D. Wiersma. The effects of interactions of nematodes, insects, soil fertility, and moisture on alfalfa stands and yields.

CARROLLE MARKLE, *Chairman*  
 Biological Survey Committee

**Fellows Committee**—L. S. McClung: The following members were recommended for fellows in the Indiana Academy of Sciences and their nominations approved: John H. Billman, Dept. of Chemistry, Indiana University; W. W. Brown, Emeritus Professor of Chemistry, Indiana University; Howard B. Burkett, Dept. of Chemistry, DePauw University; Kermit H. Carlson, Dept. of Mathematics, Valparaiso University; Leland Chandler, Dept. of Entomology, Purdue University; Martin Dworkin, Dept. of Microbiology, School of Medicine, Indiana University; M. K. Hine, Dean, School of Dentistry, Indiana University; Herschel Hunt, Dept. of Chemistry, Purdue University; H. M. James, Dept. of Physics, Purdue University; James H. Kellar, Dept. of Anthropology, Indiana University; C. S. Morris, Dept. of Physics, Manchester College; John B. Patton, Dept. of Geology, Indiana University; S. N. Postlethwait, Dept. of Botany, Purdue University; Donald L. Schuder, Dept. of Entomology, Purdue University; R. E. Siverly, Dept. of Biology, Ball State College.

**Invitations Committee**—R. E. Siverly, chairman: Invitations have been received from three institutions for the fall meeting in 1962. A motion carried to accept the invitation of Evansville College to hold the fall meeting of 1962 on their campus.

**Library Committee**—Nelle Coats, chairman, submitted the following report for the John Shepard Wright Memorial Library:

Supplying labor and wrappings, the Indiana State Library has mailed copies of volume 70, 1960, published Aug. 2, 1961, to members using labels prepared by the secretary of the Academy. Checking the Wright Library holdings of serial titles has been completed for inclusion in the Union List of Serials, 3rd edition.

Mrs. Lois Burton has prepared two groups of binding, one for the sum of \$1,000.00 allotted in the Academy budget, the second for the sum of \$1,432.15, an amount provided for by the Lilly Endowment, Inc. gift. Certain pamphlets have been encased by the Indiana State Library staff, other materials have been variously cared for.

During the fiscal year 21 new titles have been added including further publications from Bucharest; Porto Alegre, Brazil; Guatemala City; Melbourne; Nairobi; Karachi; Mexico City; Seville; Quito and Tromso.

Attention is called to the fact that copies of the following references issued by the Academy are available: Index Proc. volumes 1-50; Index Proc. volumes 51-60 in Proc. volume 61; Indiana Scientists 1951, compiled by S. S. Visher; Periodical Literature Currently Received by the Wright Library, 1959.

**Press Secretary**—Frank N. Young: Notices of the 77th Annual Meeting were sent to all Indianapolis papers, the Associated Press, United Press International, and to larger papers throughout the state. Releases were also prepared on a number of individual papers. An attempt was made this year to obtain publicity in local newspapers of each individual on the program. Excellent cooperation was obtained from the news bureaus of various institutions.

**Program Committee**—William B. Hopp. The chairman reported that everything was in readiness for the sectional meetings and for the Junior Academy on Saturday and expressed his appreciation to all who helped

make the arrangements for the meetings and for the assistance of the previous program chairman.

**Nominations Committee**—W. A. Daily, chairman of the committee: The following nominations were submitted to the executive committee and approved:

- A. Trustee of the Academy Foundation, second member: W. A. Daily.
- B. Bonding Trustees: Scott McCoy, chairman, and Frank Welcher.
- C. Research Grants Committee: Dr. Paul Weatherwax.

**Relation of Academy to State**—F. N. Wallace and W. A. Daily, co-chairmen of the committee: Mr. Daily reported that the legislature had appropriated the sum of \$4,000.00 per annum for the fiscal year 1961-62 and 1962-63 for the Academy to assist in the publication of the proceedings.

**Visiting Scientists**—Howard H. Michaud, chairman of the committee, reported the following for the 1960-61 academic year:

1. A total of 83 scientists representing 20 Indiana colleges participated in the program.
2. 211 visits were made, a 20% increase over the previous year; 77 in biology, 23 in physics, 41 in chemistry, 46 in mathematics, 9 in entomology, 4 in geology, 1 in general science, 4 in radiology, 3 in astronomy, 3 in bacteriology.
3. \$2,667.38 in 49 individual research grants were made to High School students.
4. The program appears to be successful in improving the quality of science teaching and student accomplishments.
5. A similar grant for \$17,150.00 has been approved for 1961-62 and an application for 1962-63 has been made.

**Indiana School and College Committee on Mathematics**—J. C. Polley: The chairman reported that the N. S. F. had granted an extension of the termination date on the 1960-61 grant to August 1962 so that the program will be continued during the 1961-62 academic year. A new proposal for \$11,500.00 has been submitted for the year 1962-63.

The committee sponsored and supported various kinds of meetings for mathematics teachers and school administrators to promote interest in the improvement of mathematics programs in Indiana schools and colleges. Local meetings were held in 10 locations. Six larger-scale meetings were also conducted.

The committee has assumed responsibility in organizing the participation of Indiana High Schools in the Annual National Mathematics Contest. They are assisted in this work by the Indianapolis Actuarial Club.

**Youth Activities of the Academy**—Paul Klinge, chairman. The Youth Activities Committee is concerned at present with three major activities in the state.

A. Science Fairs—L. A. Willig, Tri-State College, director. At present the state is divided into 11 regions and each regional fair is registered in the National Science Fair and eligible to exhibit at the National Fair.

B. Science Talent Search—Sears Crowell, Indiana University, director. This is a well-established program for High School seniors on a

national basis but in which Indiana also judges the entrants from Indiana and promotes a Junior Scientist Assembly held in March in which Indiana entrants exhibit their projects.

C. Junior Academy—Howard H. Michaud, Purdue University, state sponsor. The 28th annual meeting was held Saturday, October 8, 1960 at Manchester College. Two hundred fifty students, club sponsors, and guests registered. Fifteen exhibits were displayed, 21 papers were read, and conferences with staff members of the host institution were held. Richard Ferrell of Central Junior-Senior High School, South Bend, received the "best boy" award and Diane Osting of Washington High School, Indianapolis, received the "best girl" award. Paul Everman of Arsenal Technical High School, Indianapolis, received the American Society of Bacteriology Award for the best paper in bacteriology. There are currently 52 clubs in the Junior Academy. The 29th annual meeting will be held October 21, 1961 here at Indiana State College, Terre Haute, Indiana.

Dr. Klinge announced that Mr. W. J. Fullerton, General Science Manager of the Bell Telephone Laboratories, Indianapolis, has consented to serve as chairman of the subcommittee on finance. This committee hopes to raise \$25,000.00 to support the youth activities of the Academy for the 1961-62 academic year.

WILLIAM W. BLOOM, Secretary

Approved 10-20-61



FALL MEETING  
GENERAL SESSION

FRIDAY, OCTOBER 19, 1961  
9:00 A. M.

The regular annual meeting of the Indiana Academy of Science was held in the auditorium of the Student Union Building of Indiana State College, Terre Haute, Indiana, on October 20, 1961 at 9:00 A. M. The meeting was called to order by President Lawrence H. Baldinger. Dr. Raleigh W. Holmstedt, President of Indiana State College, welcomed the Academy to the campus. The minutes of the Executive Committee meeting of Thursday, October 19, were read by the secretary and approved as read.

The necrologist, Dr. Will E. Edington, presented his report in which he gave a brief biographical sketch of the following members who had died since the last annual meeting:

Herman T. Briscoe  
Daniel DenUyl  
Henry B. Froning  
John A. Molter  
Harry J. Reed  
Mary Louise Stork

As the main speaker at the general sessions, Dr. Fritz W. Went, director of the Missouri Botanical Garden, St. Louis, Missouri, and president elect of the American Institute of Biological Sciences for 1962, spoke on "The Relation between the Plant and Its Environment." Dr. Went discussed the role of the environment in the development of plants and the need to carefully control every aspect of the environment in plant researches. He pointed out the dual role of the Missouri Botanical Garden in bringing plant science to the public, and through the financial support secured from the public, in carrying on research.

Following Dr. Went's stimulating presentation a panel discussion on the Visiting Scientist Program was conducted. The panel consisted of H. H. Michaud, Purdue University, Director of the program, Paul Klinge, W. G. Kessel, P. D. Edwards, and Kenneth Robinson. It was obvious from the discussion that considerable work needs to be done to improve science education in the high schools of Indiana and that the Visiting Scientist Program was achieving its goals in assisting in upgrading science teaching.

The meeting adjourned at 11:15 for the beginning of the section meetings.

WILLIAM W. BLOOM, Secretary



## FALL MEETING DINNER MEETING

OCTOBER 20, 1961

The annual dinner meeting of the Indiana Academy of Science was held in the East Ballroom of the Student Union Building, Indiana State College. Dr. Harry G. Day, Vice-President of the Academy, presided. He introduced the guests at the speaker's table and gave special recognition to the out-of-state guests, Mr. and Mrs. Arch Addington of Fresno, Calif., and Mr. Charles Reimer of Philadelphia, Pa.

Dr. L. E. DeLanney, Chairman of the membership committee, presented the applications of 60 individuals for membership in the Academy. The applications were approved.

Dr. William Eberly read the report of the resolutions committee and the resolutions were approved. The first resolution expressed the thanks of the entire membership of the Academy to Dr. Raleigh W. Holmstedt, president of Indiana State College, Dr. William B. Hopp, chairman of the program, and all the members of the staff of Indiana State College for their kind hospitality and the excellent arrangements for this, the 77th annual meeting of the Academy. The second resolution expressed the approval of the Academy and our deep appreciation of the Nature Conservancy group for their part in having the Pine Hills Area adjacent to the Shades State Park set aside as a natural area. Their further work in the area of nature conservancy was strongly encouraged.

Mr. William A. Daily, as chairman of the Nominating Committee, presented the following names of division chairmen elected by the divisions at their sessions: Anthropology, Mr. Downey D. Raibourn, Gary Extension of Indiana University; Bacteriology, Dr. Gordon Mallet, Eli Lilly and Indiana University; Botany, Dr. Paul Weatherwax, Indiana University and Franklin College; Chemistry, Dr. Frederic Schmidt, Indiana University; Entomology, Dr. B. Elwood Montgomery, Purdue University; Geography and Geology, Dr. Lowell Dillon, Ball State College; History of Science, Prof. Ned Guthrie, Hanover College; Mathematics, Dr. John Yarnelle, Hanover College; Physics, Prof. R. T. Duffard, Evansville College; Plant Taxonomy, Dr. Grady Webster, Purdue University; Psychology, Dr. S. M. Gerger, Indiana University; Soil Science, Dr. Dan Wiersma, Purdue University; Zoology, Dr. James B. Cope, Earlham College.

Mr. Daily then presented the slate of officers to be elected by the Academy as follows: President, Dr. Harry G. Day, Indiana University; Vice-President, Dr. Howard H. Michaud, Purdue University; Secretary, Dr. William W. Bloom, Valparaiso University; Treasurer, Dr. Kermit H. Carlson, Valparaiso University; Editor, Dr. Richard A. Laubengayer, Wabash College; Press Secretary, Dr. Frank N. Young, Indiana University; Trustee of the Academy Foundation, Mr. W. A. Daily, Eli Lilly; Bonding of Trustees, Mr. Scott McCoy, chairman, Dr. Frank Welcher; Research Grants Committee, Dr. Paul Weatherwax, Indiana University and Franklin College. A motion carried instructing the secretary to cast a unanimous ballot for the slate.

Following the conclusion of the business session President Baldinger presented a thought-provoking and informative address on "The Genesis of a Drug" in which he traced the steps in developing and marketing a new drug.

WILLIAM W. BLOOM, Secretary

## NEW MEMBERS

Adams, Dr. William Preston, Dept. of Botany and Bacteriology, DePauw University, Greencastle, Indiana	PT
Anderson, Mr. Charles E., Dept. of Bio. Science, Purdue University, West Lafayette, Indiana	BO
Baker, Mr. Phil C., Botany Department, University of North Carolina, Chapel Hill, North Carolina	PT
Barrett, Gary Wayne, R. R. 2, Glezen, Indiana	BO
Baxter, Dr. John W., University of Wisconsin—Milwaukee, 3203 N. Downer Ave., Milwaukee 11, Wisconsin	BO
Benda, Gerd T. A., 618 Park Avenue, South Bend 16, Indiana	BO
Bender, Prof. Harvey A., Dept. of Biology, University of Notre Dame, Notre Dame, Indiana	Z
Berger, Seymour M., Dept. of Psychology, Indiana University, Bloomington, Indiana	PS
Bick, George H., St. Mary's College, Notre Dame, Indiana	Z
Bowers, Elmer J., Goshen High School, Lincolnway East, Goshen, Indiana	E
Bready, John Kerr, 22-10 Ross Ade Dr., West Lafayette, Indiana	E
Brittingham, Joe Nolan, R. R. 1, Francisco, Indiana	BO-Z
Burger, Prof. W. Leslie, Department of Biology, Franklin College, Franklin, Indiana	Z
Burton, Prof. Milton, Radiation Laboratory, University of Notre Dame, Notre Dame, Indiana	C
Campbell, Miss Marilyn F., 2420 Liberty, Terre Haute, Indiana	BO-Z
Carr, Dr. Lloyd G. K., Dept. of Biology, Franklin College, Franklin, Indiana	BA-BO-Z
Carr, Miss Rebecca Ann, 2712 College Ave., Terre Haute, Indiana	BO
Chapman, Mrs. Florence E., 612-N 3rd Street, Vincennes, Indiana	Z
Coleman, Dr. Ralph H., 529 S. Spring St., Evansville, Indiana	M
Connell, Gerald Michael, Zoology Dept., Indiana University, Bloom- ington, Indiana	Z
Crider, Miss Kathryn, 1404 W. 58th Street, Indianapolis, Indiana	BO-Z
D'Alelio, Prof. G. F., 2011 E. Cedar Street, South Bend 17, Indiana	C
Decker, R. Dean, 136-11 Nimitz Dr., West Lafayette, Indiana	BO
Dial, Dr. Norman A., Indiana State Teachers College, Terre Haute, Indiana	Z
Dishner, Miss Gayla, 308 Mecca Avenue, Birmingham 9, Alabama	E
Douglas, Dr. Charles F., Fertilizer Distribution Branch, Tenn. Valley Authority, Wilson Dam, Alabama	SS
Dudley, Richard F., SW Great Plains Field Station, Bushland, Texas	SS
Dupree, Miss Deanna M., 1249 Catherwood Dr., South Bend 14, Indiana	BA
Edmonds, Nuel F., 730 Leopold, Rensselaer, Indiana	G-SS
Egar, Dr. Joseph M., Mathematics Dept., Ball State College, Muncie, Indiana	M
Eiler, Galen C., Box 103, Roann, Indiana	BO
Evans, Samuel D., Agronomy Dept., Purdue University, Lafayette, Indiana	SS

Eversole, Prof. Wilburn J., Dept. Science, Indiana State Teachers College, Terre Haute, Indiana	Z
Gifford, Prof. Cameron E., Earlham College, Richmond, Indiana	Z
Green, Thomas Justin, 625 S. Fess Ave., Bloomington, Indiana	Z
Hale, Prof. Robert E., 901 Ray Street, Huntington, Indiana	PH
Hallerberg, Prof. Arthur E., Dept. of Mathematics, Valparaiso University, Valparaiso, Indiana	M
Harmon, N. Paul, Box 535, Earlham College, Richmond, Indiana	Z
Hayat, M. Arif, Dept. of Botany, Indiana University, Bloomington, Indiana	BO
Hendrix, Jon Richard, Highland High School, Munster, Indiana	BA-BO-E-Z
Henson, Miss Janet, Room 204A, Reeve Hall, Terre Haute, Indiana	BO
Hershey, Stephen C., 612 Ingleside, Flint 7, Michigan	E
Hessler, Miss Ruth H., Dept. of Biological Sciences, Purdue University, West Lafayette, Indiana	BO
Hinton, Prof. Henry D., 412 Tonti Ave., South Bend, Indiana	C
Hiratsuka, Yasuyuki, Dept. Botany & Plant Pathology, Purdue University, Lafayette, Indiana	BO
Hodges, Harry F., R. R. 10, Lafayette, Indiana	BO
Howald, Prof. James C., Huntington College, Huntington, Indiana	C
Kaney, Anthony Rolland, 515 Jennison St., Crawfordsville, Indiana	BA
Karpinski, Prof. Zygmunt, Box 303, South Bend, Indiana	M-C-PH
Keim, William A., 426 East Wayne St., Ft. Wayne, Indiana	C
Kelley, Alden G., Dept. of Biological Sciences, Purdue University, Lafayette, Indiana	BO
Kordes, Joseph A., R. R. 1, Hazleton, Indiana	BO
Lane, Rev. Thomas James, Chemistry Department, Notre Dame, Indiana	C
Langhammer, James K., Zoology Department, Indiana University, Bloomington, Indiana	Z
Lavy, Terry L., 208-12 Airport Road, West Lafayette, Indiana	SS
Long, Prof. Nicholas, F109 Hoosier Cts., Bloomington, Michigan	PS
McCoy, Scott, Jr., Geology Dept., University of Arizona, Tucson, Arizona	G
McGregor, Dr. Duncan J., Indiana University, Bloomington, Indiana	G
McIntosh, Dr. Robert P., University of Notre Dame, South Bend, Indiana	BO
Mahoney, Donald L., Dept. of Horticulture, Purdue University, Lafayette, Indiana	BO
Marina, Sister, 3200 Cold Springs Rd., Indianapolis, Indiana	PH
Mehall, Andrew G., 226 S. McKinley Avenue, Rensselaer, Indiana	Z
Merritt, Prof. Clair, Dept. Forestry & Conservation, Purdue University, Lafayette, Indiana	BO
Metzger, Miss Mary Jo, Single Student Dorm, Room 307, 1300 West Michigan Street, Indianapolis 2, Indiana	Z
Miles, C. Donald, 699 E. Main Street, Greenwood, Indiana	BO
Moe, Dr. Paul G., Agronomy Dept., Purdue University, Lafayette, Indiana	SS
Riley, David Lee, 322 S. 6th Street, New Castle, Indiana	Z

Reich, Robert J., 3721 N. Lakewood Avenue, Chicago, Illinois	PT-BO
Robbins, John M., Jr., Soil Conservation Service, Federal Bldg., Shelbyville, Indiana	SS
Robbins, Miss Louise M., Dept. Anthropology, Indiana University, Bloomington, Indiana	A
Rossini, Dr. Frederick D., University of Notre Dame, Notre Dame, Indiana	C
Sanders, Dr. Rosaltha H., Indiana Central College, 4001 Otterbein, Indianapolis, Indiana	Z
Scheffe, Charles E., 360 South Spencer Avenue, Indianapolis, Indiana	Z
Sever, Stephan Grant, R. R. 1, Waldron, Indiana	BO
Slabaugh, Eugene J., Dept. Anthropology, Indiana University, Bloomington, Indiana	A
Smucker, Prof. Arthur A., Goshen College, Goshen, Indiana	C
Tihen, Dr. Joseph A., Dept. of Biology, University of Notre Dame, Notre Dame, Indiana	Z
Tjwan, Kang Biau, Agron. Dept., Purdue University, West Lafayette, Indiana	SS
Trealer, Prof. P. C., Lobund, Notre Dame, Indiana	BA
Trinler, Dr. W. A., Science Dept., Indiana State College, Terre Haute, Indiana	C
Utley, Clarence C., R. R. 3, Owensville, Indiana	BO
Waynick, Quincy L., Indiana Central College, Indianapolis 27, Indiana	M-PS
White, Miss Rebecca Jane, 1227 S. Sixth Street, Terre Haute, Indiana	Z
Webster, Dr. Grady L., Jr., Dept. Biological Sciences, Purdue University, Lafayette, Indiana	PT
Weist, Barney Lester, 323 E. State St., Princeton, Indiana	BO
Wert, Prof. William G., 68 Home Avenue, Terre Haute, Indiana	BO-Z
West, Larry Jack, R. R. 1, Glezen, Indiana	BO
Williams, Robert D., Stone City Bank Building, Bedford, Indiana	BO
Westmann, Dr. Bernard S., Lobund Lab., Dept. of Bio., U. of Notre Dame, Notre Dame, Indiana	C
Zassenhaus, Prof. Hans J., 1154 Helmen Dr., South Bend 15, Indiana	M
Zimmer, David E., 23-3 Ross Ade Dr., Lafayette, Indiana	BO





Officers of the Junior Academy: l. to rt., Secretary, Margaret Weir, John Adams High School, South Bend; President, Stephen Ridgway, Central Junior-Senior High School, South Bend; Vice-President, Mark Schafer, Central Catholic High School, Fort Wayne, was absent.

## INDIANA JUNIOR ACADEMY OF SCIENCE OFFICERS FOR 1961

President: STEPHEN RIDGWAY, Central Junior-Senior High School, South Bend.

Vice-President: MARK SCHAFFER, Central Catholic High School, Fort Wayne.

Secretary: MARGARET WEIR, John Adams High School, South Bend.

Members of the Council: Mrs. Elizabeth Crider, Indianapolis (1957-1961); Robert Weber, Fort Wayne (1958-1962); Sister Suzanne, Vincennes (1959-1963); V. C. Cripe, South Bend (1960-1964); Don R. Winslow, Bloomington (1961-1965).

## PROGRAM OF THE TWENTY-NINTH ANNUAL MEETING OCTOBER 21, 1961

- Science Building, Indiana State College, Terre Haute, Indiana
- 8:30-10:00 A. M. Registration and Placement of Exhibits, Room 203.
- 10:00-11:00 A. M. Conferences in Science and Mathematics by faculty representatives of Indiana State College.
- 11:00-12:00 Noon. Visits to Instructional Facilities and Laboratories of Indiana State College.
- 12:00 Noon. Luncheon, Cafeteria, Student Union Building.
- 1:15 P. M. General Assembly, Auditorium, Student Union Building.  
Greetings, Dr. R. W. Holmstedt, President, Indiana State College.

Business Meeting. Election of Officers and Presentation of Awards.

1:45-4:30 P. M. Program of Papers, President Stephen Ridgway, presiding.

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

1. Growth Curves in Nature—Logarithmic Spirals on Geometric Progressions, Margaret Weir, Adams Walton Science Club, John Adams High School, South Bend.
2. Reactions of Animals at High Altitude, Bruce Greenberg, Westlane Science Club, Westlane Junior High School, Indianapolis.
3. Hydrolysis of Starch by Salivary Amylase, Dennis Panarisi, George Washington High School Science Club, George Washington High School, Indianapolis.
4. Image of a Scientist, Pam Parker, MSE Academy Club, University Junior High School, Bloomington.
5. A Study of the Protolytic Enzymes in the A. Caninum Hookworm, John Reuthe, Central Jets, Central High School, South Bend.
6. Mathematical Approach to Geotropism, Gordon Clark, George Washington High School Science Club, George Washington High School, Indianapolis.
7. Developing a Variety of *Staphylococcus aureus* that is Resistant to Penicillin, Janet Holscher, Sigma Tau Science Club, St. Rose Academy, Vincennes.
8. Radio Telescopes, Stephen Ridgway, Central Jets, Central High School, South Bend.
9. Identifying Pollen from Peat and Spores from Coal of Indiana, Thomas Bose, Westlane Science Club, Westlane Junior High School, Indianapolis.
10. The Effect of Temperature Variations on the Frog's Pulse Rate, Frank Steiner, Central Jets, Central High School, South Bend.
11. Optical Illusions, Patricia Jones, Aquinas Science Club, Washington Catholic High School, Washington.
12. The Effects of Ultra-Violet Light on the Amino Acid Requirements of *Colpidium*, Paul Everman II, Natural Science Club, Arsenal Technical High School, Indianapolis.
13. Some Behavioral Patterns of Baby Chicks, Elizabeth Johnson, MSE Academy Club, University Junior High School, Bloomington.
14. A Study of Digital Computers, Dennis Henry, Up-N-Atom, Crawfordsville High School, Crawfordsville.
15. Uptake of Radioactive Elements in Coleus Plants, Patricia Kira, George Washington High School Science Club, George Washington High School, Indianapolis.
16. The Effects of Nutrition of Light on *Euglena*, Annette McMullen, Sigma Tau Science Club, St. Rose Academy, Vincennes.
17. The Diesel Engine, Mike Bullock, Aquinas Science Club, Washington Catholic High School, Washington.



18. Effect of Temperature on the Ventricular Beat of the Frog Heart, Kathryn Crider, North Central High School, Indianapolis.
19. The Design, Construction, and Testing of a Liquid Propellant Laboratory Rocket, John Gaiser, Junior Academy Science Club, The University School, Bloomington.
20. The Effects of Gibberellin on the Growth of Dodder, Pat Nowas-  
kie, Sigma Tau Science Club, St. Rose Academy, Vincennes.
21. Resolution of Octyl Alcohol Secondary into its Optically Active  
Components, Frank Starkey, Science Club, George Washington  
High School, Indianapolis.
22. Cloud Formations, Mary Jo Hooten, Aquinas Science Club,  
Washington Catholic High School, Washington.
23. Endpoint Titration of T<sub>2</sub> Bacteriophage, Craig Johnson, Science  
Club, George Washington High School, Indianapolis.
24. The Yeast Cell, Rosemary DeBeeze and Lauranne Lanning,  
Heterogeneous Geniuses, Academy of Immaculate Conception,  
Oldenburg.

### Minutes

The twenty-ninth annual meeting of the Indiana Junior Academy of Science was held Saturday, October 21, 1961 in the Science building and the Auditorium of the Student Union Building of Indiana State College, Terre Haute, Indiana.

Sixteen exhibits of science projects by high school students were displayed in Room 203, Science Building. Exhibits included the following: A Study of Digital Computers; An Electronically Controlled, Self-contained Robot; Insect Collections; Rocks, Minerals and Fossils; Paths of Pendulums; Growth Curves in Nature; Spectroscopy; Identifying Pollen from Peat and Spores from Coal in Indiana; Foreign Languages of Mathematics; A Mathematical Approach to Geotropism; The Effect of Temperature on the Ventricular Beat of the Frog's Heart; A Fork Type Equatorial Telescope Mount; Design, Construction and Testing of a Liquid Propellant; Uptake of Trace Elements in Coleus Plants; Determination of the End-point Titration of T<sub>2</sub> Bacteriophage; Hydrolization of Starch by Salivary Amylase.

Conferences in science and mathematics were held at 10:00 a.m. by members of the faculty of Indiana State College. The science areas represented included biology, chemistry, geography and geology, mathematics, medicine, physics and psychology. Following the science conferences the Junior Academy Club members were conducted through the science laboratories of the college. The cooperation of the science faculty of Indiana State College in this program was greatly appreciated by club sponsors and members of the Junior Academy.

The afternoon general session was held in the auditorium of the Student Union Building beginning at 1:45 p.m. President Stephen Ridgway, Central Junior-Senior High School, South Bend, opened the meeting by introducing the Secretary, Margaret Weir, John Adams High School, South Bend. Vice-President Mark Schafer, Central Catholic High School, Fort Wayne, was not present.

Following the introductions, President Ridgway called upon Dr. R. W. Holmstedt, President of Indiana State College, to welcome the Junior Academy on the occasion of its twenty-ninth annual meeting. President Holmstedt extended the greetings of the college to those present and he particularly emphasized the advantages to young students of getting an early start in education to become adequately prepared for scientific as well as other careers.

Mr. Harry McDaniel, Kroger Grocery Company, Indianapolis, was called upon next to present the annual Kroger Awards. The first place award of \$50 and a plaque was presented to Garfield High School, Terre Haute. Miss Grace DeVaney, Principal, accepted the award for the school. Two runner-up awards of \$25 and a plaque were presented to both Schulte High School, Terre Haute, and Washington Township School, Logansport. Sister Thomas Mary accepted the award for Schulte High School and Washington Township School received the award in absentia. The Kroger awards are presented annually to the three top-ranking high schools for outstanding school science programs judged from self-evaluating questionnaires sent to all Indiana high schools.

The first item of business was the election of officers. A new system of balloting by mail was employed for the first time. A list of nominees submitted by club sponsors was prepared by the Junior Academy Council and sent to all Junior Academy Clubs. A brief outline of personal qualifications of each candidate was included with the ballot. The ballots were mailed to the Council or could be delivered by a club representative at the meeting. The results of the election of officers for 1962 were as follows: President, Craig Johnson, Washington High School, Indianapolis; Vice-President, Janet Holscher, Saint Rose Academy, Vincennes; and Secretary, Kathryn Crider, North Central High School, Indianapolis.

Mrs. Elizabeth Crider, Washington High School, Indianapolis, reporting for the Council, announced that Miss Helen Reed, club sponsor, Junior Explorers of Science, Lebanon High School, Lebanon, was named the new council member to replace Mrs. Crider, Indianapolis, whose term expired this year.

Award for the "best boy" in science was received by Stephen Ridgway, Central Junior-Senior High School, South Bend. Patricia Kira, George Washington High School, Indianapolis, and Margaret Weir, John Adams High School, South Bend, tied for the "best girl" in science award. A certificate of merit and a year's membership in the American Association for the Advancement of Science were presented to each of the above students. Dennis Henry, Crawfordsville High School, Crawfordsville, and Frances Walker, Washington Catholic High School, Washington, received honorable mention and each was given a certificate of merit.

Miss Rachel Mason, Pfizer Company, and Dr. D. F. Johnson, Indiana State College, served as judges for the best paper on bacteriology or microbiology. Since the judges were unable to attend the afternoon session, the papers were collected and mailed to them. An award of \$25 is presented by the American Society of Bacteriologists to the student presenting the best paper.

Professor H. H. Michaud, State Sponsor, Purdue University, expressed appreciation on behalf of the Junior Academy of Science for the

excellent cooperation of Indiana State College in providing facilities for the meeting. Special recognition was given to Dr. William B. Hopp, Chairman, Department of Science of the College, for his efforts as local program chairman in making the program a success. Professor Michaud announced that the thirtieth annual fall meeting of the Junior Academy would be held at Evansville College, Evansville, on Saturday, October 20, 1962.

The 29th annual meeting of the Junior Academy of Science was attended by 230 registered members, sponsors and guests. A total of nineteen high schools were represented with club sponsors present from seventeen schools. Several visitors were present from Illinois.

Twenty-one papers as listed on the program were read at the meeting. A brief review of each paper follows:

"Growth Curves in Nature" was presented by Margaret Weir, John Adams High School, South Bend. In this project an experiment was made to discover if the growth curves of the common land snail, *Helix Albolabris*, and the large sunflower, *Helianthus Annuus*, could be represented by mathematical equations. The equations used were the following: logarithmic equation,  $\log r = a\theta$ , the Spiral of Archimedes,  $r = a\theta$ , the parabolic spiral,  $r^2 = a^2\theta$ , the law of natural growth,  $dx/x = kd\theta$ , and the geometric progression,  $tn = ar^{n-1}$ .

Through this experiment it may be concluded that these natural growth curves in nature, within the limits of reasonable error, can be represented by certain mathematical formulas, and that these mathematical formulas can be graphed as spirals on the polar coordinate system.

"Hydrolysis of Starch by Salivary Amylase," read by Dennis Panarisi, George Washington High School, Indianapolis, explained that hydrolysis is a process through which compounds are decomposed through removal of water. Salivary amylase is a substance of protein nature presented in saliva. It was concluded that salivary amylase does hydrolyze starch much better than hydrochloric acid.

In the "Image of a Scientist" Pam Parker, University Junior High School, Bloomington, was interested in how the average student pictures a scientist. She circulated a twenty question poll to 500 students. Some of the opinions found were as follows: (a) one-half thought that scientists were indifferent; (b) three out of every four students thought scientists were Republicans; (c) many thought scientists believed in God, but were not religious; and (d) most thought scientists should marry although they make poor husbands and fathers.

"A Study of the Protolytic Enzymes in the *A. Caninum* Hookworm" was presented by John Reuthe, Central High School, South Bend. The hypothesis made was that nematodes must excrete enzymes into the intestines of their hosts. He studied these enzymes after adding phenolphthalein indicator. He extracted the matter from the intestines, diluted it, and titrated it. A two percent casing was described.

In the report on "Mathematical Approach to Geotropism" Gordon Clark, George Washington High School, Indianapolis, explained that geotropism is a living thing's reaction to gravity. In 1805 the theory was stated that gravity is the strongest tropism to plants. Roots respond to gravity by growing downward; leaves and stems respond by growing

upward. The purpose of this experiment was to prove the following: (a) if plants are grown under specified conditions, the results can be predicted; and (b) this predication can be made from Einstein's Principle.

Coleus, periwinkle, and rye grass were grown in a container on a turntable. The stems bent toward the center, especially at first. These results could also be determined with Knight's formula,  $\tan \theta = \frac{g}{r_w^2}$ .

"Developing a Variety of *Staphylococcus aureus* that is Resistant to Penicillin" was the topic presented by Janet Holscher, St. Rose Academy, Vincennes. She said that one *Staphylococcus aureus* cell is about one micron in diameter. The cells are non-spore forming, extremely hardy, and can be frozen, dehydrated, and stored for future use. Thus, *Staphylococcus aureus* seemed to be a good bacteria to work with. The bacteria cultures were grown in test tubes with a Triptas Phosphate broth as the medium. Various concentrations of penicillin were added a little at a time. In those tubes where a diluted form of penicillin was added, the culture continued to grow. These resistant strains may represent a genetic mutation. Thus it may be concluded that these forms of bacteria in the human body may also become resistant to antibiotics.

"Radio Telescopes" were discussed by Stephen Ridgway, Central High School, South Bend. For his project he planned to construct a radio telescope to receive radio transmissions from the sun and to study solar radiations. A converter will lower the number of megacycles from 1,000 to fourteen. He plans to measure the intensity of output from the sun with the radio telescope while photographing eruptions simultaneously on the sun's surface with his regular telescope. By examining the intensity of radio output as measured on a graph with the sequence of photographs of the solar surface, he hopes to learn more about the nature of solar radiation.

"Identifying Pollen from Peat and Spores from Coal of Indiana" was the title of the paper read by Thomas Bose, Westlane Junior High School, Indianapolis. Peat samples were taken from the Fox Ferry Bog. The peat was oxidized with a concentrated form of nitric acid to break it down. However, the coal was not oxidized. Samples of all nine types of coal in Indiana were examined. The coal and peat were examined under the microscope, and the numbers of spores were counted and recorded.

In coal, oak pollen grains were most abundant. However, in the fourth level coal, pine pollen grains seemed to be the most common. The presence of walnut, maple and elm pollen grains indicated that the climate was getting warmer.

"The Effect of Temperature Variations on the Frog's Pulse Rate" was the research study reported by Frank Steiner, Central High School, South Bend. The hypothesis made was that the rate of the frog's heart beat varies directly with the temperature, except at those temperatures when the frog naturally hibernates or estevates. The brain and spinal cord were destroyed and the chest was cut open. Various compounds were used to stimulate the heart. The temperature and heartbeat rate were taken every two minutes. A metal drum with a pen attached recorded the results on a sheet of graph paper. The original hypothesis was found to be true.

Patricia Jones, Washington Catholic High School, Washington, reported on "Optical Illusions." She said that normal illusions are experienced by people with normal eyes such as things further away looking



smaller and darker objects looking smaller than light objects. However, some illusions are merely mistakes. Thus, scientists make several tests and tabulate the results in order to account for optical illusions.

"Some Behavioral Patterns of Baby Chicks" was discussed by Elizabeth Johnson, University High School, Bloomington. The hypothesis stated was that chicks hatched in a dark incubator would still react normally when they heard and saw the mother hen. A wooden duck was placed a few feet from the chickens. If the baby chicks advanced toward the duck they were given a "+", and if they did not advance they were given a "-". The chicks were given three minutes to respond. Next the same type of experiment was made to see what reaction the chicks had to the clucking of a hen. The following data were collected: (a) Wooden duck, (1) 90% given "+", (2) 10% advanced slightly; (b) Clucking, (1) 50% given a "+" rating, (2) 45% failed to react, (3) 5% given a "-" rating. The difference of a few hours of the age of the chicks might have caused the variations in the reactions.

"A Study of Digital Computers" was the topic read by Dennis Henry, Crawfordsville High School, Crawfordsville. He found that an analog computer is more exact but that it takes longer to give answers, while the digital computer gives its answers in seconds. The answer is fed into the computer through a telephone dial, a photoelectric relay, and a magnetic tape recorder. The maximum number the computer can accommodate is 99. The panel lights on the front tell what is going on inside the computer. The answers are given in binary code. Dennis said that he made an electronic decimal computer which cost about \$300. The Junior Academy paid \$85.00 of this expense. Electronic computers are fast, light weight, easy to carry, but not as accurate as a mechanical computer.

"Uptake of Radioactive Elements in Coleus Plants" was discussed by Patricia Kira, George Washington High School, Indianapolis. In this experiment Patricia wanted to learn more about the trace elements and some other elements in plants. She said that about sixty different elements have been identified in plants: Zinc 65, Iron 55, Sulfur 35, and phosphorus 32, were some of the radioactive elements used in this experiment. The elements were introduced into the roots of seven Coleus plants. An eighth Coleus plant was used as a control and received no trace elements. The plants were put on aluminum foil in glass jars and left for 48 hours. Then the plants were tested with a geiger counter to see where the trace elements had settled. The following discoveries were made: the phosphorus settled throughout the entire plant; only a trace of iron is necessary in plants; and zinc is related to the formation of chlorophyll in some unknown way. From her experiment Patricia concluded that trace elements are necessary for the growth and development of plants, and that certain elements are found in the roots while other elements are found only in the stems and leaves.

"The Effects of Nutrition of Light on *Euglena*" was the subject reported by Annette McMullen, St. Rose Academy, Vincennes. She described *Euglena* as one celled organisms which contain chlorophyll and are half-way between a plant and an animal. Four cultures were placed under an ultraviolet light for forty days and then under regular light. The cultures under ultraviolet light were not as dark and did not increase as fast.

However, these cultures became green again and grew quickly when they were returned to normal light. The cultures that were grown in darkness died. Also, lights of different colors affected the *Euglena* cultures in various ways. Under red light the cultures reproduced faster, but had water formations. Under blue-green light growth was retarded and the cultures were gray. Blue light seemed to destroy the chlorophyll.

"The Diesel Engine" was the next paper read by Mike Bullock, Washington Catholic High School, Washington. He explained that in a diesel engine air is admitted or sucked into the starting piston where it is compressed to 500 pounds per square inch under an increased temperature of 800 to 1,000 degrees Fahrenheit. Oil is forced into the chamber which pushes the piston down and the power stroke starts.

In the "Effect of Temperature on the Ventricular Beat of the Frog Heart" Kathryn Crider, North Central High School, Indianapolis, said that in this experiment the frog was dissected and various fluids were introduced into the ventricular muscle to raise or lower the temperature of the heart. The temperature was varied from 2 to 62 degrees Fahrenheit. At 2 degrees the heart beat was sluggish and at 42 degrees it was irregular. The most activity occurred between 12 and 32 degrees. The heart beat stopped at low temperatures because of the formation of ice crystals. It was concluded that the heart beat rate was directly proportional to temperature, and the length of each beat was inversely proportional to the temperature.

A paper on "The Design, Construction and Testing of a Liquid Propellant Laboratory Rocket" was read by John Gaiser, University School, Bloomington. He said when liquid oxygen passes through ethanol, it condenses. Thus he had to use certain compressors. He changed the design of the rocket three times because he could not obtain certain compressors.

In a research project on "The Effects of Gibberellin on the Growth of Dodder" Pat Nowaskie, St. Rose Academy, Vincennes, reported that dodder is a parasitic flowering plant which entwines itself about its host. One plant produces about 300 black seeds a year. Dodder infests plants such as wheat and clover. Some dodder seeds were soaked in a growth stimulus while others were not. All these seeds were planted with clover. The following observations were made: (a) Dodder seeds soaked in a growth stimulus germinated immediately and stopped growth after three weeks, but later resumed growth; and (b) Dodder seeds not soaked in the growth stimulus took longer to germinate, but eventually grew better.

The next topic discussed was "Resolution of Octyl Alcohol Secondary into Its Optically Active Components" by Frank Starkey, George Washington High School, Indianapolis. Using a material which has no effect upon a beam of polarized light he separated it into two substances. One of the substances rotated a beam of polarized light to the left and was referred to as the levorotary. The other substance rotated a beam of polarized light to the right and it is known as the dextrorotary. Octyl alcohol secondary was the optically inactive substance, dextrorotary and levorotary form by fractional crystallization. Diffuse salts were usually used to yield dextrorotary octyl alcohol and levorotary octyl alcohol.

"Cloud Formations" were discussed by Mary Jo Hooten, Washington Catholic High School, Washington. She said that clouds, which are made



up of water particles smaller than those in fog, never form in the stratosphere because of the lack of water vapor. She described the four types of clouds as follows: (a) Cirrus clouds, often transparent, are composed of slender crystals of ice and often predict fair weather; (b) Cumulus are massive, low hanging clouds that develop locally, but rise to great heights. They are most common and also indicate fair weather; (c) Stratus clouds are grey, flat, and low hanging; and (d) Nimbus are dark grey clouds from which rain or snow is falling.

The last paper on "Endpoint Titration of T<sub>2</sub> Bacteriophage" by Craig Johnson, George Washington High School, Indianapolis, explained that T<sub>2</sub> is a virus which eats bacteria. A phage is an organism that eats bacteria. T<sub>2</sub> is protein coated and hexagonally shaped. This bacteriophage has a hollow tail and DNA inside. If scientists could discover what DNA is, they would know the secret of life. In destroyed bacteria T<sub>2</sub> attaches its tail to the cell wall, then the enzymes in the tail destroy the cell wall and DNA destroys the cell nucleus.

In his experiment, Craig tried to concentrate the bacteriophage into the smallest amount of liquid possible. He used *Escherichia coli* for the bacteria because T<sub>2</sub> does not attack it. *Escherichia coli* in liquid form was added to different dilutions of the phage, and the mixture was filtered. The virus particles remained on the filter. On the sixth day the end point of titration was reached; that is, a certain amount of liquid held the maximum number of virus particles that it could.

In the future, Craig said he hopes to inject the phage into a rabbit and study the effect of the injection.

Following the reading of papers, the meeting was adjourned at 4:30 p.m.

## INDIANA JUNIOR ACADEMY OF SCIENCE CLUBS

1960-1961

<i>Town</i>	<i>School and Club</i>	<i>Sponsor</i>
Acton	Franklin Central, Sigma Mu (1958)	Jerry Colglazier
Bloomington	H. S., National Scientific Honor Society (1931)	Merril L. Crisler
Bloomington	M.S.E. Club, University Jr. H. S. (1960)	Chas. Souers
Bloomington	University H. S. Jr. Academy (1938)	Don R. Winslow
Chesterton	H. S. Science (1954)	Robert McCord
Clarksville	Our Lady of Providence H. S., Phy-Chem (1956)	John Chilks
Clayton	H. S., Jr. Academy (1951)	Howard C. Leslie
Connorsville	Alquina H. S., Science Club (1960)	Walter Gronning
Columbus	Junior H. S., Science Club (1959)	Albert Sheets, Jr.
Crawfordsville	H. S., Up-N-Atom (1950)	David Wells
Edinburg	H. S., The Alchemists (1954)	S. C. Harrell
Elkhart	H. S., Jr. Academy (1940)	Robert Mahan
Evansville	Reitz Memorial H. S., Phi Chi Mu (1958)	Sr. Francetta Sr. Peter

<i>Town</i>	<i>School and Club</i>	<i>Sponsor</i>
Fort Wayne	Central H. S., Biology (1940)	Iva Spangler
Fort Wayne	Central Catholic H. S., Albertus Magnus Science Club (1952)	Sr. M. Magdelen, S. P. Sr. J. Margaret S. P.
Fort Wayne	Elmhurst H. S., Phy-Chem (1935)	Ruth Wimmer
Fort Wayne	North Side H. S., Nature (1936)	Vesta Thompson
Fort Wayne	South Side H. S., Jr. Academy of Science (1956)	Robert Weber Don Weaver
Gary	Lew Wallace H. S., Biology (1935)	Lola Lemon
Gary	Lew Wallace H. S., Klub Kem (1941)	Mrs. Helen McKenzie
Gary	Tolleston H. S., Biology (1952)	John Reidel
Gary	Tolleston H. S. Future Scientists of America (1949)	Arthur Kline
Gary	Wirt H. S., Biology (1945)	Mrs. F. Huddleston
Gas City	Mississinewa Joint H. S. Science (1936)	Roy McKee
Griffith	H. S., Science (1953)	George M. Bunce
Hamlet	H. S., Science (1954)	Lawrence Cushman
Hobart	H. S., Science (1952)	Lola Stewart
Indianapolis	Ladywood School, Guerin Science Club (1957)	Sr. Pauline Marie Sr. Louise
Indianapolis	St. Agnes Academy, Science (1959)	Sr. Amelia
Indianapolis	Shortridge H. S., Naturalists' Club (1947)	Robert A. Weaver
Indianapolis	Shortridge H. S., Science (1931)	Mrs. H. A. Parker
Indianapolis	Technical H. S., Nature (1932)	Chas. E. Russell
Indianapolis	Howe H. S., Science (1949)	Jerry Motley
Indianapolis	Washington H. S., Science (1931)	Mrs. E. H. Crider
Indianapolis	Westlane Jr. H. S., Science (1959)	John Van Sickle
Jeffersonville	Clark & Floyd County Seminar (1959)	Harold E. Cook 1019 Springdale Dr. Jeffersonville, Ind.
LaPorte	H. S., Bi-Phi-Chem (1958)	Francis M. Gourley Byron Bernard
Lebanon	H. S., Jr. Explorers of Science (1953)	Helen Reed
Loogootee	St. John H. S., Science (1959)	Sr. Mary Ellen
Madison	Fr. Michael Shawe Memorial High School, Shawe Science Club (1957)	T. A. Winkel
Mishawaka	H. S., Science (1936)	
New Albany	H. S., Science (1935)	Erwin Steinkamp
New Castle	H. S., Science (1947)	Betty Jo Montag
New Haven	H. S., Phi-Chi (1954)	Keith Hunnings
Oldenburg	Imm. Conception Academy, Heterogeneous Geniuses (1958)	Sr. M. Constance
Richmond	H. S., Science (1950)	Von Alexander
Rossville	H. S., Science (1954)	Martin Silverthorn
Sandborn	H. S., Up and Atom (1954)	Paul Carter

South Bend	Central H. S., JETS (1939)	V. C. Cripe
South Bend	John Adams H. S., Adams Walton (1953)	Ernest Litweiler
Terre Haute	Schulte H. S., Pius X Science Teens (1961)	Sr. Thomas Mary
Vincennes	St. Rose Academy, Sigma Tau (1959)	Sister Suzanne
Washington	Washington Catholic H. S., Aquinas Science (1958)	Sr. Marian Francis