

History of the Kentucky Academy of Science over Its First 100 Years¹

ABSTRACT

The Kentucky Academy of Science was founded in 1914 and now marks its 100th year. In celebration of the event, we have traced its evolution from the beginnings to an organization that now contains more than 2500 members. In 1993, Ted M. George of Eastern Kentucky University published an extraordinary history of the Kentucky Academy of Science covering the first 78 years (1914–1992). He meticulously reviewed Academy archives and back issues of the *Journal* along with input from a number of long-time Academy members to produce not only the history but also the flavor of the Academy as it grew and matured. Our objective here is not to begin again in documenting the history but to update what George had so nicely produced. Therefore, much of his manuscript has been reproduced verbatim with additions and edits that cover the past 22 years.

KEY WORDS: Kentucky Academy of Science, history, 100th anniversary

INTRODUCTION

The Kentucky Academy of Science (KAS) is beginning its 100th year of continuous operation. It is the largest scientific organization in the Commonwealth and embraces some 20 different disciplines of science. Membership is open to anyone who has an interest in science and includes citizens of Kentucky as well as many individuals outside the state. The Academy is an affiliate of the American Association for the Advancement of Science (AAAS) and the National Association of Academies of Science (NAAS).

The Kentucky Academy has changed dramatically since those early days as, indeed, has science, our country, and the world. Those early pioneers of the Academy are all deceased; therefore, much of the history must be taken from their writings. Also, much help has been obtained from present members who have been active in the Academy for many years. Not every one of the many activities or achievements of the Academy can be recognized there, and for the many omissions we must apologize in advance.

The objectives of the Academy are to encourage scientific research, to promote the diffusion of scientific knowledge, and to unify the scientific interests of the Commonwealth. The Academy holds an annual meeting in which concurrent sectional meetings are held; there also is an annual business meeting, a banquet, and general sessions intended to

stimulate the interests of all scientists. The Academy sponsors the Kentucky Junior Academy of Science (KJAS) that is conducted by and for students at the pre-college levels. KJAS sponsors a statewide spring symposium each year. KAS awards research funds generated by endowments, institutional or corporate affiliations, and the Kentucky Academy of Science Foundation.

The *Transactions of the Kentucky Academy of Science*, now the *Journal of the Kentucky Academy of Science* since 1998, is the official publication of the Academy. For simplicity, we use the designation *Journal* throughout. The *Journal* is now published semiannually in most years. It previously had been sent in hard copy to all members in good standing. Now it is available electronically to members. The *Journal* publishes results of original research and serves as the official record of the Academy. All papers undergo a review process and conform to the high standards of nationally respected journals. Information in the *Journal* is distributed widely through interlibrary exchange programs, international abstracting services, and the distribution of reprints. A *Newsletter* that contains items of general interest and official announcements is distributed electronically to members at least twice a year. KAS maintains a website (<http://kyacademyofscience.net/>) containing Academy information, announcements, and access to its *Journal* and *Newsletter*. The website has dramatically altered how the Academy interacts with its members and presents itself to the broader world.

¹ The history was edited by David White, KAS Vice President (dwhite@murraystate.edu), with assistance from those listed in the acknowledgements.

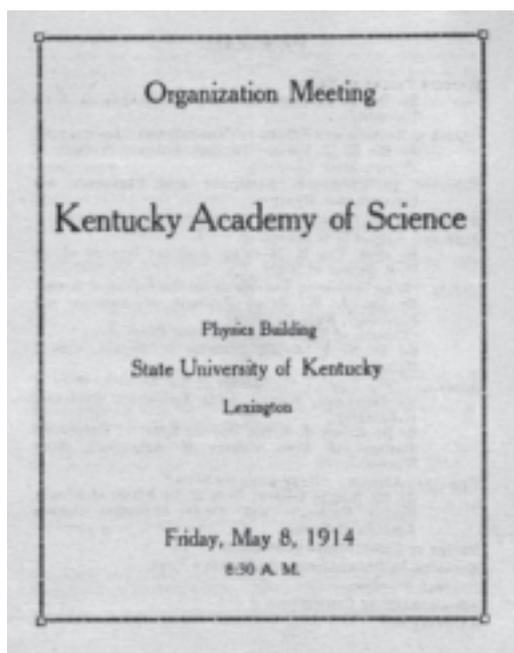


Figure 1. Flyer for the organizational meeting of the Academy, 1914.

HISTORY OF THE ACADEMY

Early History (100): Call for Organization of the Kentucky Academy of Science

What are the origins of this Academy which began so long ago? In the archives of the University of Kentucky, there is a letter, dated 13 November 1912 addressed to R. H. Spahr, Assistant Professor of Physics at State University (present day University of Kentucky) from E. W. Gudger of North Carolina Normal School that gives data about the North Carolina Academy of Science. There is a similar letter from Wilbur Nelson of the Tennessee Academy in the same month. Also, there are letters from the Indiana, Illinois, and Michigan academies dated November 1914 (1). The call for organization that was issued to all scientists in Kentucky (Figure 1) is as valid today as when it was first penned (probably in the spring of 1914). For this reason, it is reproduced here in toto.

The advantages and necessities of a State Academy of Science for the state of Kentucky, such as exist in at least seventeen other states, viz.: Wisconsin, Kansas, Iowa, Indiana, Minnesota, Nebraska, California, Ohio, Illinois,

Michigan, Colorado, Utah, Oklahoma, Maryland, Tennessee, North Carolina and New York, are too numerous to mention in this brief space. Science is essentially mutualistic - successes in one branch are hailed with delight by those interested in other branches. A discovery made in one may be the stepping stone to future achievements along another branch of science. At present it is difficult for one person to keep abreast with the discoveries and achievements in one branch of science alone. Thus, you obtain from the diversified program the grain from the chaff that of which the author of the paper has made a special study requiring months or even years. Then the value of submitting results for discussion, of discussing others' results of broadening the scientific mind, of mutual stimulus and encouragement, of personal education by coming in contact with fellow workers. Then, also, the value to the community at large, giving them that which is best and most useful from the various branches, in the form of publications and otherwise, must not be overlooked.

In many cases they have served as scientific advisors, governmental or otherwise, to the states in which they exist. As expert non-partisan investigators, they have linked science to the problems of everyday life, suggesting legislation for the betterment of human welfare in industry, public health, sanitation and social conditions. The results are that the past quarter of a century has witnessed a more rapid progress than any equal period in the world's history.

Another reason for such an organization is the opportunity for acquaintance and the establishment of good fellowship among the laborers in this line of work. This in itself would be sufficient.

The State's interests are promoted in a number of ways by the co-operation of these people who are interested in the welfare of its citizens. This service may be political, literary, scientific, or social, but after all they have in common the encouragement of the individual to nobler efforts and benefit to the community.

The membership shall in the main consist of Active Members, Nonresident and Corresponding Members and Honorary Members. Everyone in the State of Kentucky interested in any of the following subjects is urged to join



Figure 2. Paul P. Boyd, Dean of Arts and Sciences, University of Kentucky, 1917–1947, and Academy President, 1919–1920.

the proposed Association whether teacher or businessman: Mathematics, Astronomy, Physics, Geography, Geology, Botany, Zoology, Physiology, Medicine, Engineering, Social and Economic Science, Agriculture, and Anthropology. The meeting for the Organization of the Kentucky Academy of Science will be held at the State University of Kentucky, Lexington, April 10th and 11th, 1914. More details and the announcement of a program will be made later.

The Committee on Organization appointed by the Kentucky Association of Colleges and Universities urgently invites any criticism or suggestions from anyone interested.

*R. H. Spahr, State University, Chairman
F. L. Rainey, Central University
Garnett Ryland, Georgetown College*

The above call for organization was supported by 44 names (2).

The First Meeting and Papers Presented

Dr. P. P. Boyd (Figure 2), of State University (now the University of Kentucky), at the request of the Committee on Organization, called the meeting to order. A motion was

offered that a Kentucky Academy of Science be organized and duly incorporated under the laws of the State. Dr. Boyd was elected permanent chairman for the organizational meeting, and Dr. Charles Robinson of the University of Louisville was elected secretary. A committee was appointed to confer on a constitution and by-laws for the proposed organization. This committee was composed of Messrs. Spahr, Ryland, Rainey, W. M. Anderson, and Lloyd (3). The following papers and addresses were then presented:

Dr. J. W. Pryor of State University, “Some Interesting Features of the Ossification of Bones,” with many illustrations by lantern slides.”

Dr. N. F. Smith, Professor of Physics, Central University, Danville, “Theories of Thermal and Electrical Conductivity.”

Dr. Joseph H. Kastle, Director of the Kentucky Agricultural Experiment Station. “The Significance of the Scientific Work of the Experiment Station to the Agricultural Prosperity of the State.”

Dr. Stanley Coulter, Purdue University, La Fayette, Indiana. Address: “Science and the State.”

At the conclusion of the program, the Committee on Constitution reported a constitution and bylaws that were read and adopted unanimously, after some slight modification.

The Nominating Committee reported the following nominations for officers:

For President, Joseph H. Kastle (Figure 3), Experiment Station

For Vice-President, N. F. Smith, Central University

For Secretary, Garnett Ryland, Georgetown College

For Treasurer, W. M. Anderson, University of Louisville

It was moved, seconded, and unanimously carried that these nominees be elected as officers of the Academy for the ensuing year. Prof. Coulter was nominated and unanimously



Figure 3. Joseph H. Kastle, first President of the Academy.

elected as an honorary member of the Academy. The motion was offered and carried that a vote of thanks be extended by the Academy to the Organization Committee, and especially to Mr. Spahr, for its efforts in bringing about the organization. It was also moved and carried that the Academy extend a vote of thanks to the speakers on the program and especially to Prof. Coulter for his somewhat lengthy trip in order to address the meeting.

(Signed) Chas. J. Robinson, Secretary (4).

The Second Annual Meeting and Papers Presented

The second annual meeting was called to order by President J. H. Kastle in the Chemistry Lecture Hall of the State University on Saturday 15 May 1915 at 9:30 A.M. The report of the treasurer W. M. Anderson showed a balance on hand of two dollars. The secretary showed that the roll of members contained the names of 60 persons who had indicated a desire to be charter members of the Academy but that seven of these had left the state (5).

The Membership Committee nominated 65 persons for active memberships, 11 for corresponding memberships, and Professor Dayton C. Miller for Honorary Membership, all of whom were duly elected. The papers presented were

“Relation Between Matter and Radiant Energy.”
N. F. Smith, Centre College, Danville, Ky.

“Faulting in North Central Kentucky.” A. M. Miller, University of Kentucky.

“The Removal of Mineral Plant Food by Drainage Waters.” J. S. McHargue, Experiment Station, Lexington.

“The Translocation of the Mineral Constituents of the Seeds of Certain Plants during Growth.” G. D. Buckner, Experiment Station, Lexington.

The Academy then adjourned to the Phoenix Hotel for lunch and reassembled at 2:30 in the Physics Lecture Room. Dr. Dayton Miller, Professor of Physics, Case School of Applied Science, Cleveland, Ohio, by special invitation of the Academy, delivered an illustrated address on “The Science of Musical Sounds” (6).

The Third Annual Meeting

By the third meeting 6 May 1916, fiscal affairs had improved over that of the previous years:

From Garnett Ryland, Treasurer	\$ 8.80
Amounts collected as dues and initiation fees	76.00
Total	<u>84.80</u>
Total disbursements	26.50
Balance on hand	<u>\$58.30</u>
(Itemized statement and vouchers filed) (7).	

The first resolutions of record were made this third meeting by Professor A. M. Miller of the University of Kentucky (8):

RESOLVED. That the Kentucky Academy of Science heartily approves the move to substitute the Centigrade thermometer scale for the Fahrenheit scale in all government publications, and endorses the bill to that effect now pending in Congress, H.R. 528.

RESOLVED. That the Secretary transmit a copy of this resolution to the Thermometer Committee, A.A.A.S, Bureau of Standards, Washington.

Membership in the Academy

It is interesting to observe the evolution of the concept of membership in the Academy. In the original constitution (9), there were 3 classes of members, Active, Corresponding, and Honorary. Active members were residents of Kentucky who were interested in

scientific work. Dues were one dollar per year. Corresponding members were persons who were actively engaged in scientific work but were not Kentucky residents. They had duties and privileges of active members but could not hold office. Honorary members were those who had acquired special prominence in science and were not residents of Kentucky. They were not to exceed 20 in number at any time.

For election to any class of membership, early candidates must have been nominated in writing by 2 members, 1 of whom must have known the applicant personally, receive a majority vote of the Committee on Membership, and a three fourths vote of the members of the Academy that are present at any session or, in the interim between meetings of the Academy, the unanimous vote of the members of the council, present or voting by letter (9).

The early Academy seemed to be quite vigilant to prevent unworthy persons from entering the Academy! Indeed, in the minutes of the 1933 meeting we find that 33 people were elected but that 16 did not qualify (10)! In the 1934 minutes the names of 4 persons who did not qualify that year were actually listed (11)! Understandably, the record does not show why these people did not qualify. Could it be that when they say “elected” we would mean nominated? When they say “did not qualify” could that mean simply that they had not paid their dues?

A 1987 revision of the constitution, formalized what had actually been in practice for many years (12). Presently, the requirements for membership are simply an interest in science and payment of annual dues. In the 1987 revision of the constitution, the classes of membership were Regular, Life, Student, Honorary, Emeritus, Corporate Affiliate, and Institutional Affiliate. Regular Membership was the same as active but was not restricted to citizens of Kentucky. Life members could pay one single fee. Student members must be college students, and Honorary members were the same as before except that they may be residents of Kentucky. Emeritus members were members who are retired from active service. Corporate and Institutional Affiliates were business, industrial, or academic institutions that supported the aims and purposes of the Academy.

In 2008, a new category, Enhanced Affiliate Member, was enacted. Universities can pay an annual fee of \$2000 (large university) or \$750 (small university) that covers membership costs for all faculty and students at that institution (Table 1). Faculty and students from Enhanced Affiliate Members need only to go to the KAS website and register to become members. As of 2014, 19 Kentucky Universities and Colleges (including the Kentucky Community & Technical College System) had become Enhanced Affiliate Members. Ten other institutions and businesses are regular Affiliates, and individuals within those institutions can pay to become individual members. Present member categories and dues for individuals not at Enhanced Member institutions are Active Member, \$35; Student Member, \$15; Kentucky Junior Academy of Science Member, \$5; Family Member, \$50; and Lifetime Member, \$400. Other membership categories now include Honorary Patron, Sustaining Member (\$500/yr), regular Affiliate (\$250/yr) and Associate Member (\$100/yr). Between 1990 and 2014, the membership nearly tripled from 904 to 2671 (Table 1), largely in response to the Enhanced Membership option.

Affiliation with AAAS

At the eighth annual meeting in May 1921, KAS formally accepted affiliation with the American Association for the Advancement of Science (AAAS) (13). There had been prior collaboration because abstracts of papers presented at the 1916 meeting were published in the 14 July 1916 issue of *Science* (the official journal of AAAS). This practice continued until in 1923 when the editor of *Science* informed the secretary, A. M. Peter, that he could no longer continue this arrangement because of the limitation of space in the journal (14). The affiliation, however, has continued to this day. Over the years, KAS has maintained a representative to the AAAS and to the National Association of Academies of Science (NAAS), often the same person, and the collaborations are ongoing.

The Journal of the Kentucky Academy of Science

The early years were devoted primarily to Academy business along with transcripts of

Table 1. Membership in the Academy.

A. Memberships from Kentucky educational institutions. 2014 data in part reflect the change to Enhanced Affiliates (*) whereby individuals associated with those institutions may join at no cost.

	1920	1990	2014
Alice Lloyd College*			6
Asbury University			9
Bellarmino University*			77
Berea College*	2	8	123
Brescia University*			88
Cardome, Georgetown	1		
Campbellsville University*			21
Centre College*	4	11	55
College of Pharmacy, Louisville	1		
Eastern Kentucky University*		57	245
Georgetown College*	3	6	77
Ky Community and Technical College System (KCTCS)*			252
Kentucky State University*		16	96
Kentucky Wesleyan College		5	2
Lindsey Wilson College			4
Midway College*			162
Morehead State University*		23	215
Murray State University*		24	159
Northern Kentucky University*		29	185
UK Community Colleges		29	
Spalding University*			21
Thomas More College			8
Transylvania University*	1	7	28
University of the Cumberlands		5	15
University of Kentucky*	74	130	178
University of Louisville*	5	48	316
University of Pikeville*			78
Western Kentucky University*		62	278
Williamsburg Institute	1		
Other schools in Kentucky		27	9
Out-of-state schools		80	22

B. Memberships not connected with educational institutions in the state.

	1920	1990	2014
Ashland		27	1
Berea		9	1
Bowling Green	1	18	3
Frankfort	5	22	10
Jenkins	1		0
Lexington	5	66	21
Louisville	5	64	15
Morehead		6	0
Newport	1		2
Owensboro		12	0
Winchester	1		5
Others	26	113	65
Kentucky, private or public sector or unspecified			79
Out of State, private or public sector or unspecified			15

abstracts or presentations made at the meetings. Minutes of the annual Governing Board meetings still remain a component of each Volume. Volume 1 (Figure 4) covered the first 10 years of the Academy. Volumes 2–8 each contained 2–3 years of Academy business. Volume 9 (1941) saw the beginnings of the

evolution into a modern scientific publication, and the *Journal* went from multiyear to a quarterly format with the attempt to get papers into print in a timely manner. This often proved to be rather difficult at various times because in some of the years there was a scarcity of money and/or papers. But each

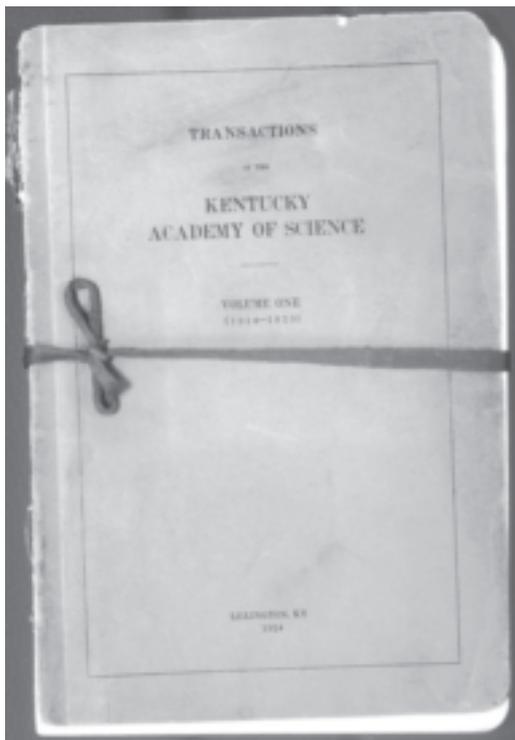


Figure 4. One of the few remaining copies of Volume One of the Transactions of the Kentucky Academy of Science. This volume covers the activities of the Academy over its first 10 years.

article was a true publication unto itself. Volumes 9–56 contained from one to four issues. Shorter scientific Notes were added in 1946. Under Bill Clay's editorship, the *Journal* achieved its present look in 1948. Through 1974, the *Journal* had been published locally, primarily through the University of Kentucky Press, until Louis Krumholz took the *Journal* to Allen Press in 1974. Beginning with Volume 24 in 1963, semiannual publication (Spring and Fall) was adopted and continues with 1 or 2 exceptions to the present. All back issues of the *Journal* have been scanned (thanks to the staff and students of the Hancock Biological Station) and now reside on the Academy website. The website also contains instructions for authors and how to electronically submit manuscripts.

The *Journal* has had many editors over the 74 volumes that span the 100 year history (Table 2). Each editor has had distinct challenges, and each has added to the evolution

Table 2. Editors of the *Transactions* and *Journal*. The name was changed in 1998 to the *Journal of the Kentucky Academy of Science*. The listing was compiled from the editors name(s) listed in each volume and issue and differs slightly from what George's provided in the original manuscript.

1924–	Willard Rouse Jillson, State Geologist, Frankfort
1924–1937	Alfred M. Peter & Ethel V T. Caswell, University of Kentucky
1938–1939	Alfred M. Peter, University of Kentucky
1940–1941	Charles Hire, Murray State Teachers College
1942–1944	John Kuiper, University of Kentucky
1945	Harlow Bishop, University of Kentucky
1946–1947	M. C. Brockman, Joseph Seagram & Sons, and David R. Lincicone, University of Kentucky
1948–1950	William M. Clay, University of Louisville, and M. C. Brockman, Joseph Seagram & Sons
1950–1956	William M. Clay, University of Louisville
1957–1958	Gerald A. Cole, University of Louisville
1959–1963	Roger W. Barbour, University of Kentucky
1964–1967	Raymond E. Hampton, University of Kentucky
1968–1973	William F. Wagner, University of Kentucky
1974–1980	Louis A. Krumholz, University of Louisville
1980–1995	Branley A. Branson, Eastern Kentucky University
1996–2005	John W. Thieret, Northern Kentucky University
2006–2011	David S. White, Murray State University
2011–2012	Martin Matisoff, Kentucky State University
2013–Present	Jerzy W. Jaromczyk, University of Kentucky

of the *Journal*. Willard Rouse Jillson, State Geologist, was president for the 1923–1924 term. He saw that the Academy did not have the funds to underwrite a new journal; therefore, he agreed to put up the money out of his own pocket. Five hundred copies of the first volume were printed at a cost of over \$600 that would average to about \$1.25 per copy. Each member was entitled to one free copy. Inasmuch as the treasury at that time had only about \$100, each member was encouraged to buy as many extra copies at \$1.25 as they could to help defray the cost of printing (14). Ultimately, W. R. Jillson paid \$242 and the Academy paid the rest (15). While 500 copies of Volume 1 were printed, the whereabouts of only a few are known (Figure 4).

Willard Rouse Jillson, graduated from Syracuse University in 1912, took a Master's Degree from the University of Washington, and did additional graduate work at Chicago and Yale. He was a very prolific writer. In his memoirs (16), he stated that he wrote 91 books, published 31 state maps, delivered 42 public addresses in this country and abroad, published 391 paper bound pamphlets, 121 historical articles, and 29 newspaper articles!

In the early days of the Academy, he contributed much - not only did he father the *Journal* but he also contributed many presentations at the annual meetings. Not only was he interested in geology, but he was very active in Kentucky history as well. He wrote articles for the Filson Club and the Kentucky Historical Society. He was president of the latter organization in 1958–1959.

Alfred M. Peter was a founding member of the Academy who also performed yeoman's service in the early days. In 1915, he was elected secretary of the Academy and served in that capacity for 18 years. He edited the *Journal* from 1918 to 1939 and continued to help in an unofficial capacity for many more years. We know something about Mr. Peter from a eulogy given at his death by Alfred Brauer of the University of Kentucky: "He was born in Lexington in 1857. He graduated from State College with the degree of Bachelor of Science in 1880. He was then appointed Assistant Professor of Chemistry at State College and was also appointed Assistant Chemist for the Kentucky Geological Survey. He obtained his Master's degree in 1885 [not stated, but probably from State College]. He was awarded an honorary Doctor of Science from his Alma Mater in 1913 (17)."

In the early editions of the *Journal* (volumes one through six), deceased members of the Academy were recognized in the *Journal* just before the membership list. It was stated,

IN MEMORIUM

*They have crossed the river and are resting in
the shade of the trees.*

Following this statement was a list of deceased members. The statement is attributed to Stonewall Jackson as his last words on his deathbed after the battle of Chancellorsville by *Bartlett's Quotations* (18). Jackson's original quote (10 May 1863) was, "Let us cross over the river, and rest under the shade of the trees." No meaning has ever been attributed to Jackson's words as he was delirious at the time he spoke them. What was the appeal to editor Willard Rouse Jillson (editor of Volume 1) and subsequent editors (A. M. Peter and Ethel Caswell)? (Caswell was secretary to Peter and apparently not a member of the Academy [19]). An evidence of



Figure 5. Branley Branson, Professor of Biology, Eastern Kentucky University, Journal Editor from 1980 to 1995.

southern sentiment? (Jillson was from New York.) A reference to the River Styx in Greek mythology? This statement of Jackson's was discontinued in 1938, Volume 7.

Editors of the *Journal* had a difficult and demanding job. Many long hours have been spent of their own free time in order to produce the *Journal*. All honors must go to them for their labors for the Academy. The modern professional format was initiated by Louis Krumholz who got the Academy firmly established with the Allen Press, a printer that specializes in scientific journals. His successor, Branley Branson (Figure 5), the editor from 1980 to 1995, continued the development of the *Journal*. He served through a difficult period when funds were very short. Today's *Journal* has a very professional appearance and is attractive to authors because worthwhile articles can be published in a timely manner, as contrasted with the rate of publication in larger journals. Branson labored long and hard and deserves much credit for the success of the journal today. John W. Thieret, Kentucky State University replaced Branson in 1996 and except for one issue remained editor until his death in 2005. During his editorship, the publication was renamed the *Journal of the Kentucky Academy of Science* in 1998. Today, the Editor receives a modest honorarium of \$1000 per year.

Anyone can submit an article to the *Journal* as long as the subject matter falls within the

realms of the biological, physical, or social sciences embraced by the Academy. There is no requirement that the author(s) has to be a Kentucky resident or even an Academy member. Historically about a third of authors do not or no longer lived in Kentucky at the time of their publications.

A review of approximately 850 *Journal* articles (excluding Notes) from 1941 onward produced a good overview of Academy member interests during the past 70+ years (101). Articles could be more or less placed in 20 categories (Table 3) provided that some lumping was done. Zoology led the way with 45% of the articles followed by Botany (21%), Chemistry (11%), Ecosystem/Environmental Science (4%), Medical Sciences (4%), Agriculture (4%), Geology (2%), and Physics (1%). The remaining 8% covered a broad array of topics from Education to Computer Science to one manuscript on meter sticks. From 1941 to 1958, Chemistry articles outnumbered both Zoology and Botany. The number of Chemistry articles has declined steadily since the 1960s while Zoology has increased. The number of Botany articles has remained relatively constant. Ecosystem/Environmental Sciences articles emerged in the late 1960s and have remained fairly constant at 1–2 per year. The range of scientific disciplines submitting articles to the *Journal* has slowly increased, and that trend is expected to continue; however, Zoology and Botany appear that they will carry on as mainstays.

Historically, indexing of the *Journal* articles has been spotty. Hill and Madarash (102) provided a detailed description of the ups and downs through 2002. The *Journal* presently is indexed in BioOne, Cambridge Scientific Abstracts, State Academies of Science Abstracts, Selected Water Resource Abstracts, U.S. Fish and Wildlife Service, the Zoological Record, etc. Some of the latter services are restricted to specific subjects and not entire issues or volumes.

Officers of the Academy and Meeting Locations

Many officers, in addition to the editors, have contributed so much to make the Academy what it is today. As a tribute to them and to preserve the record, the Presidents are listed in Table 4, Secretaries in

Table 5, Treasurers in Table 6, Executive Secretaries/Directors in Table 7, Newsletter Editors in Table 8, Chairs of the Kentucky Junior Academy of Science in Table 9, and the Webpage Editor in Table 10.

From 1914 to 1928, the annual meetings were held at the University of Kentucky (Table 11). In 1929, the meeting was moved to Berea College and since has been held at most of the colleges and universities around the State. Three meetings have been held at Kentucky State Parks and one at Ashland Oil. The 2014 meeting is being held at the Lexington Convention Center and is not hosted by a university. Two joint meetings were held with the Tennessee Academy of Science, 1995 (Figure 6) and 2001. The 2001 meeting was at Tennessee State University and the only one held outside of Kentucky. In 1949, both spring and fall meetings were held, and in 1953, it was decided that there was enough interest to once again hold two meetings per year, but the annual meetings returned to one per year in 1962.

Composition of Membership

The membership list can be classified by subject (20,21) (Table 3). With respect to this list, A. M. Peter made this comment on the early membership in 1917:

The Secretary desires to call attention to the predominance of chemists among our membership, as shown in the list of members arranged by subjects, and to make an appeal to the workers in other branches of science to come to the support of the Academy. There must be more workers in Kentucky in the mathematical sciences and biological sciences than there are in chemistry. Are these satisfied to allow the chemists to outdo them in activity? Should not all scientists of the State vie with each other in supporting an organization like ours?

The historical changes in membership subjects or Sections somewhat mirror articles published in the *Journal*. All members now must indicate affiliation with a primary Section and can choose two additional Sections as minors (Table 3). One member of each Section is elected as Chair and one as Secretary. The number and designation of

Table 3. Composition of membership by Section in 1917, 1990, and 2014. 2014 data reflect just the Primary Section each member has chosen, thus the total reflects the actual number of the Academy members in those years. Presently members may elect also to be associated with two additional sections, so actual Section membership numbers are higher than numbers reported here. Section categories have changed over the years that reflect advances in the sciences. For example Chemistry recently split into two Sections, but many members have not reassigned themselves. “Chemistry” is no longer a Section choice for new members.

	1917	1990	2014
Agricultural sciences	5	11	144
Animal husbandry	2		
Anthropology		7	
Anthropology and Sociology			78
Astronomy	2		
Bacteriology	4		
Biology	6		
Botany, entomology and zoology	8		
Botany and microbiology		133	
Botany			67
Cellular and Molecular Biology			249
Chemistry	24	117	232
Chemistry — Analytical/Physical			33
Chemistry — Organic/Inorganic			48
Computer Science		16	
Computer and Information Sciences			79
Ecology and Environmental Science			250
Electrical engineering	1		
Engineering		33	106
Forestry	2		
Geography		25	58
Geology	10	37	80
Health sciences		21	307
Horticulture	1		
Industrial sciences		7	
Mathematics	6	22	117
Meteorology	2		
Microbiology			101
Microscopy	1		
Mining engineering	3		
Philosophy	1		
Physics	9	35	
Physics and Astronomy			153
Physiology	1		
Physiology, biophysics, biochemistry, and pharmacology		95	
Physiology and Biochemistry			126
Psychology			182
Science Education		32	117
Scientific information		20	
Sociology		6	
Unspecified	1	109	12
Zoology and entomology		148	
Zoology			132
TOTAL	91	904	2671

Sections and their memberships have changed considerably over the years, with some splitting and other either being eliminated or added as the sciences evolved. Historically not everyone has agreed on what the Sections should be (Figure 7), but presently 20 are recognized. The preponderance of chemists in the Academy has changed over the years, and now the life sciences predominate in

numbers. For comparisons, we may check the membership classified by discipline in 1920, 1990, and 2014 (Table 3) (21).

At the meeting in 1920, the secretary, A. M. Peter, listed the membership classified geographically (Table 1). His list contained nine educational institutions in the State (22). He noted the growth in membership and number of speakers in the early years of the Academy.

The membership grew rather slowly during the first years, but participation, as measured by the number of speakers, grew at a faster rate (23,24). By 1990, it had grown to 16 and to 25 in 2014 giving a much wider distribution of members at institutions across the state. Individual memberships not connected with educational institutions have had similar growth perhaps reaching a peak in the early 1990s and declining a bit by 2014.

Interest in the Teaching of Science and the Science Education Committee

The famous Scopes trial concerning the teaching of evolution in the public schools brought an immediate reaction from AAAS in January 1923 in the form of a resolution published in *Science* 26 January 1923. This resolution supported without reservation the teaching of evolution and argued vehemently against any state passing laws against the teaching of evolution (25). In the May meeting of 1923, the Academy passed a resolution strongly supporting the position of the AAAS, even though such a position was extremely unpopular in Kentucky at that time. This is the first indication of the long-term concern of the Academy for education in the public schools. In 1926, AAAS led in raising a scholarship fund for Mr. Scopes in view of his loyalty to the cause of science. A total of \$47 was raised in the Academy for this cause and forwarded to AAAS (26).

The teaching of evolution continued to be a sore spot with fundamentalist religious groups whose article of faith accepted a literal interpretation of the Bible. In the late 1970s, a group of people joined together to espouse what they called "Scientific Creationism." "Creationism" is the view that a Supreme Being created the world and all its creatures, including human beings, essentially as they are today, perhaps only thousands of years ago. Evolution is the widely taught theory that all animals and plants are descendents of simple organisms that evolved over billions of years into increasingly numerous and more complex forms (27).

The Creationists asserted that evolution was only a theory and should not be taught as fact. If evolution were a theory, then other theories should be taught. They, of course, advocated

Scientific Creationism. Furthermore, they argued that textbooks must present all sides of the argument, and they should contain Scientific Creationism as an alternative theory. This proposal was seriously considered by several states (among them: Texas, California, and Louisiana [27]).

The Kentucky Academy of Science appointed an ad-hoc committee chaired by Wallace Dixon of Eastern Kentucky University (28). In the 1981 meeting, the Academy adopted a policy statement that, in essence, objected to, "attempts to require any religious teaching as science" (2,9). This resolution was to be held in readiness in case a proposal for Creationism should be introduced in the Kentucky General Assembly. In 1981, the Louisiana legislature passed a law that Creationism must be taught along with evolution in public schools (30). In 1987, the U.S. Supreme Court struck down the Louisiana law. "Writing in a 7 to 2 opinion, Justice William J. Brennan, Jr. said that the First Amendment forbids alike the preference of a religious doctrine or the prohibition of a theory which is deemed antagonistic to a particular dogma. Therefore, Brennan noted, because the primary purpose of Louisiana's Creationism Act is to advance a particular religious belief, the act endorses religion in violation of the First Amendment" (27).

The Academy passed resolutions in its 1981 and 1983 annual business meetings in opposition to the legislature mandating specific content in K-12 science courses. The resolution was passed again in the 2005 business meeting. A similar resolution in regard to the teaching of evolution in Kentucky schools was passed at the 1999 business meeting. In December 2005, a letter was directed to Governor Ernie Fletcher by Academy Executive Director Jeanne Harris. In the letter, it was stated, "During the recent Kentucky Academy of Science (KAS) Annual Meeting, members voted unanimously to oppose any attempt by legislative bodies to mandate specific content of science courses. The KAS objects to attempts to equate "scientific creationism" or "intelligent design" with evolution as a scientific explanation of events." In 2013, the Kentucky Board of Education in its debate on Next Generation Science Standards eventually rejected the teaching of

Table 4. Presidents of the Academy.

1914	Paul P Boyd, Organizational Meeting, University of Kentucky
1914-1915	Joseph H. Kastle, Experiment Station, Lexington
1915-1916	N. F. Smith, Central University, Danville
1916-1917	A. M. Miller, University of Kentucky
1917-1918	R. C. Ballard Thruston, Louisville
1918-1919	J E. Barton, State Forester, Frankfort
1919-1920	Paul P. Boyd, University of Kentucky
1920-1921	W. H. Coolidge, Centre College
1921-1922	George D. Smith, State Normal School, Richmond
1922-1923	Lucien Beckner, Winchester
1923-1924	Willard Rouse Jillson, State Geologist, Frankfort
1924-1925	Cloyd N. McAllister, Berea College
1925-1926	Austen R. Middleton, University of Louisville
1926-1927	W. G. Burroughs, Berea College
1927-1928	W. D. Valleau, Experiment Station, Lexington
1928-1929	G. Davis Buckner, Experiment Station, Lexington
1929-1930	Frank L. Rainey, Centre College
1930-1931	V F. Payne, Transylvania University
1931-1932	Anna A. Schneib, Eastern Kentucky State Teachers College
1932-1933	George Roberts, Experiment Station, Lexington
1933-1934	John S. Bangson, Berea College
1934-1935	Alfred M. Peter, University of Kentucky
1935-1936	J. S. McHargue, Experiment Station, Lexington
1936-1937	R. T. Hinton, Georgetown College
1937-1938	L. Y. Lancaster, Western Kentucky State Teachers College
1938-1939	W. R. Alien, University of Kentucky
1939-1940	A. W. Hornberger, Louisville
1940-1941	Charles Hire, Murray State Teachers College
1941-1942	G. B. Pennebaker, Morehead State Teachers College
1942-1943	J. T. Skinner, Western Kentucky State Teachers College
1943-1944	L. A. Brown, Transylvania University
1944-1945	L. A. Brown, Transylvania University and Paul Kolachov, Joseph Seagram & Sons
1945-1946	Paul Kolachov, Joseph Seagram & Sons
1946-1947	Ward Sumpter, Western Kentucky State, Teachers College
1947-1948	Alfred Brauer, University of Kentucky
1948-1949	Morris Scherago, University of Kentucky
1949-1950	Walter E. Blackburn, Murray State Teachers College
1950-1951	E. B. Penrod, University of Kentucky
1951-1952	H. B. Lovell, University of Louisville
1952-1953	Thomas Herndon, Eastern Kentucky State College
1953-1954	C. B. Haman, Asbury College
1954-1955	R. H. Weaver, University of Kentucky
1955-1956	J. G. Black, Eastern Kentucky State College
1956-1957	A. M. Wolfson, Murray State College
1957-1958	William A. Clay, University of Louisville
1958-1959	William B. Ousley, Morehead State College
1959-1960	Pete Panzera, Murray State College
1960-1961	H. H. LaFuze, Eastern Kentucky State College
1961-1962	Charles Whittle, Western Kentucky State College
1962-1963	Lyle Dawson, University of Kentucky
1963-1964	R. A. Chapman, University of Kentucky
1964-1965	C. B. Haman, Asbury College
1965-1966	John M. Carpenter, University of Kentucky
1966-1967	Robert M. Boyer, University of Kentucky
1967-1968	Paul G. Sears, University of Kentucky
1968-1969	Orville Richardson, Kentucky Wesleyan College
1969-1970	Lloyd Alexander, Kentucky State College
1970-1971	Karl Hussung, Murray State University
1971-1972	Louis Krumholz, University of Louisville
1972-1973	Marvin Russell, Western Kentucky University
1973-1974	Donald Batch, Eastern Kentucky University
1974-1975	Ellis Brown, University of Kentucky
1975-1976	Frederick M. Brown, Kentucky State Hospital

Table 4. Continued.

1976–1977	Charles Payne, Morehead State University
1977–1978	Charles E. Kupchella, University of Louisville
1978–1979	Sanford L. Jones, Eastern Kentucky University
1979–1980	Rudolph Prins, Western Kentucky University
1980–1981	John C. Philley, Morehead State University
1981–1982	Ted M. George, Eastern Kentucky University
1982–1983	J. G. Rodriguez, University of Kentucky
1983–1984	Gary Boggess, Murray State University
1984–1985	Joe Winstead, Western Kentucky University
1985–1986	Charles Covell, University of Louisville
1986–1987	Larry Giesmann, Northern Kentucky University
1987–1988	William P. Hettinger, Ashland Petroleum Company
1988–1989	Richard Hannan, Kentucky Nature Preserves Commission
1989–1990	Debra K. Pearce, Northern Kentucky University
1990–1991	W. Blaine Early, III, Cumberland College
1991–1992	Douglas L. Dahlman, University of Kentucky
1992–1993	Charles N. Boehms, Georgetown College
1993–1994	Larry Elliott, Western Kentucky University
1994–1995	Robert Creek, Eastern Kentucky University
1995–1996	William S. Bryant, Thomas More College
1996–1997	Marcus T. McEllistrem, University of Kentucky
1997–1998	Patricia K. Doolin, Ashland Petroleum Company
1998–1999	Gordon K. Weddle, Campbellsville University
1999–2000	Blaine Ferrell, Western Kentucky University
2000–2001	Ron Rosen, Berea College
2001–2002	Jerry Warner, Northern Kentucky University
2002–2003	Robert Barney, Kentucky State University
2003–2004	Robert Kingsolver, Kentucky Wesleyan College
2004–2005	Bruce Mattingly, Morehead State University
2005–2006	Miriam Steinitz-Kannan, Northern Kentucky University
2006–2007	Nigel Cooper, University of Louisville
2007–2008	John Mateja, Murray State University
2008–2009	Robin Cooper, University of Kentucky
2009–2010	Nancy Martin, University of Louisville
2010–2011	Barbara Ramey, Eastern Kentucky University
2011–2012	Dawn Anderson, Berea College
2012–2013	Cheryl Davis, Western Kentucky University
2013–2014	K. C. Russell, Northern Kentucky University
2014–2015	David White, Murray State University

creationism as science and included both evolution and climate change in the curriculum. The Academy again was among a number of the state's scientific organizations in contributing its written opinion. The Next Generation Science Standards were adopted and signed by Governor Steve Beshear.

Over the years, the Academy realized that the health of science in Kentucky rested upon the efforts of science teachers in the public schools. In 1925, Cloyd N. McAllister of Berea College (31) in his President's Address devoted his entire time to a critique of science teaching in the public schools. This concern for science teaching appears repeatedly over the years: Robert T. Hinton, in his President's Address (32), devoted his entire speech to this concern; in 1940, a resolution

was presented against the reduction of science training for prospective teachers (33); in 1955, a resolution was presented which exhorted members of the Academy to promote better science teaching in the public schools in any way possible (34); in 1958, a resolution was presented which supported requiring 12 credit hours in science for all prospective teachers (35).

In 1934, Elmer Sulzer, a geologist from the University of Kentucky, suggested that the Academy make some radiocasts (36). He proposed to arrange 3 Academy radiocasts from the University studio of WHAS (Louisville) that was accepted. There are no descriptions, but we can surmise that they were broadcasts put on by various members about subjects in their fields of endeavor.

Table 5. Secretaries of the Academy.

1914	Charles J. Robinson, Louisville, Organizational Meeting
1914–1915	Garnett Ryland, Georgetown College
1915–1934	Alfred M. Peter, University of Kentucky
1934–1937	A R. Middleton, Georgetown College
1937–1947	Alfred Brauer, University of Kentucky
1947–1948	J. R. Stuetz, Joseph Seagram & Sons, Louisville
1948–1952	C. B. Haman, Asbury College
1952–1956	Mary E. Wharton, Georgetown College
1956–1964	Gerrit Levey, Berea College
1964–1966	Dwight Lindsey, Georgetown College
1966–1971	Robert S. Larance, Eastern Kentucky University
1971–1976	Rudolph Prins, Western Kentucky University
1976–1978	Thomas N. Seay, Georgetown College
1978–1987	Robert Creek, Eastern Kentucky University
1988–1989	Virginia Eaton, Western Kentucky University
1989–1991	Varley E. Wiedeman, University of Louisville
1992–1997	Peter X. Armendarez, Brescia College
1998–1999	Joseph W. Wilson, University of Kentucky
2000–2002	Stephanie Dew, Centre College
2003–2004	Dawn Anderson, Berea College
2005–2006	Kenneth Carstens, Murray State University
2007–present	Robert Kingsolver, Bellarmine University

Table 6. Treasurers of the Academy.

1914–1915	W. M. Anderson, University of Louisville
1915–1916	Garnett Ryland, Georgetown College
1916–1918	Paul P. Boyd, University of Kentucky
1918–1921	J. S. McHargue, Experiment Station, Lexington
1921–1922	Charles A. Shull, University of Kentucky
1922–1935	W S Anderson, Experiment Station, Lexington
1935–1937	Alfred Brauer, University of Kentucky
1937–1938	Julian H. Capps, Berea College
1938–1947	William J Moore, Eastern Kentucky State College
1947–1953	Ralph H. Weaver, University of Kentucky
1953–1961	Richard A. Chapman, University of Kentucky
1961–1962	Paul Ray, Asbury College
1962–1965	J. H. B. Garner, University of Kentucky
1965–1971	C. B. Haman, Asbury College
1971–1976	Wayne Hoffman, Western Kentucky University
1976–1978	Bartlett G. Dickinson, Georgetown College
1978–1987	Morris Taylor, Eastern Kentucky University
1988–1990	Paul H. Freytag, University of Kentucky
1991–1993	David R. Hartman, Western Kentucky University
1994–1997	Julia Carter, Wood Hudson Cancer Research Laboratory
1998–2000	William E. Houston, Bowling Green, Kentucky
2001–2013	Ken Crawford, Western Kentucky University
2014–present	Rodney King, Western Kentucky University

Table 7. Executive Secretaries/Directors of the Academy.

1987–1996	J. G. Rodriguez, University of Kentucky
1998–2004	Donald Frazier, University of Kentucky
2005	Linda Hightower, University of Kentucky
2006–2013	Jeanne Harris, Lexington, Kentucky
2013–present	Amanda Fuller, Louisville, Kentucky

Undoubtedly, busy members had great difficulty finding time for such productions in their already busy days. Such public education in science is today carried out by Kentucky Educational Television (KET). They broadcast all school subjects (including science) to the public schools during the day. In addition, during the evening hours, they broadcast many excellent programs in science such as Nova, Nature, Planet Earth, and many others. These programs are beautifully produced with resources that are far beyond what the Academy could have mustered.

In 1963, a 10 member committee began to draw up a proposal to the National Science Foundation (NSF) for a Visiting Scientist Program. They envisioned making a list of scientists and their expertise available to public high schools. At the invitation of the teacher, the selected speaker would travel to the school and give a lecture on the desired subject. The proposal would be for money from NSF to pay the expenses of the program (37). This proposal was funded by NSF for \$8005 in March 1963 (38). In the fall of 1964, it was reported that E. Fergus of the University of Kentucky was acting director of the program and that a visitor roster list had been sent to 462 high schools. This roster contained a list of 105 scientists. Twenty-one requests had been received, but about 75 visits were available with the money on hand (38). In 1965, Dr. Fergus announced that there was a considerable improvement in the second year because there were 69 requests for speakers compared with 21 at the same time the previous year. Dr. Fergus announced

Table 8. Recent Academy *Newsletter* Editors.

1993–1995	Vincent DiNoto, Jefferson Community College
1996–2000	Maria K. Falbo-Kenkel, Northern Kentucky University
2001	Brent Summers, Campbellsville University
2001–present	Susan Templeton, Kentucky State University

Table 9. Chairs of the Kentucky Junior Academy of Science.

1931–1952	Anna Schneib, Eastern Kentucky State College
1953–1954	Harvey H. la Fuze, Eastern Kentucky State College (listed as Counselor to the JKAS)
1955–1960	R. M. Boyer, University of Kentucky
1961–1962	Maurice Christopher, Murray State College and Thomas A. Hutto, Eastern State College
1963–1975	not listed among officers although the position was in the KJAS in budget
1976–1985	Herb Leopold, Western Kentucky University
1986–1989	Joseph “Pat” Stewart, Warren East HS, Bowling Green
1990–1991	Randall Sale, Paris City Schools
1992	open
1993–1995	Valgene L. Dunham (no affiliation listed)
1996–1999	Vincent DiNoto, Jefferson Community College
2000–2005	Elizabeth K Sutton, Campbellsville University
2006	open
2007–present	Ruth Beattie, University of Kentucky

his resignation (39), and he was succeeded by Roger Barbour of the University of Kentucky. In 1966, Dr. Barbour reported that 16 visits had been completed but there was money for 60 more visits (40). From the available records, it does not seem that this program met expectations. The reason seemed to be lack of interest or time in the high schools. This idea was revived in 1983 in the form of a Speakers Bureau. Again Academy members were called upon to volunteer their services; however, this time, there was no funding for the program (41).

In 1972, the Academy started on the road to become a more active participant in science education in the public schools-kindergarten through the twelfth grade. In that year, the Academy passed a resolution asking President Marvin Russell of Western Kentucky University to appoint an ad hoc committee on Science Teacher Certification. This committee should review requirements to certify science teachers in the public schools and make recommendations for any changes and any action thereof. The rationale for this action was that the good of the country and of science depended on public understanding of science as well as assuring a future supply of scientists (46).

Table 10. Webpage Editor. Position did not exist until 2001.

2001-present	Claire Rinehart, Western Kentucky University
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Ted M. George (Figure 8) of Eastern Kentucky University was appointed chairman of this committee and gave an interim report at the next annual meeting in 1973 (47). This report proposed 3 levels of certification: K-5, 6–8, and 9–12 grades. This was a radical departure from the guidelines that existed, i.e., 2 levels: K-8 and 7–12 grades. The proposal was rejected by the Kentucky Council on Teacher Certification at that time. Several years later, the same council agreed to reconsider the proposal. In 1977, the Academy committee reported that the Teacher Council had accepted this idea, keeping the same requirements then in force for elementary teachers for grades K-5 and for secondary teachers for grades 9–12. They then proposed a new set of guidelines for middle school teachers for grades 6–8. Unfortunately, the new middle school guidelines appeared too weak to the Academy committee (48).

The Academy Committee on Teacher Certification then enlisted the aid of many other science groups throughout the Commonwealth and argued against this proposal. Later, this plan was withdrawn by the Kentucky Teacher Council on Certification (49). In 1984, this plan was resurrected by the Kentucky Teacher Council and approved by the Kentucky Board of Education in the following July to take effect for entering freshmen effective 1 September 1989. Thus the Academy, through its Committee on Teacher Certification, played a part in effecting this change. But there were still reservations that the requirements for middle school teachers were too weak.

Another proposal of the Department of Education was to pay schools different sums of money for certain classes (Vocational Education was emphasized). Payment for science classes would have been no more than for English, History, etc. Because science is so much more expensive to teach because of lab and demonstration equipment and special rooms, it was thought that the teaching of science would be seriously hurt. The

Table 11. Academy annual meeting locations.

1914–1915	State College (presently University of Kentucky)
1916–1928	University of Kentucky
1929	Berea College
1930	Centre College
1931	Transylvania University
1932	Eastern Kentucky State Teachers College
1933	University of Kentucky
1934	Berea College
1936	University of Kentucky
1936	Western Kentucky State College
1937	University of Louisville
1938	Morehead State Teachers College
1939	Murray State Teachers College
1940	University of Kentucky
1941	Eastern Kentucky State Teachers College
1942	University of Kentucky
1943	University of Louisville
1944	University of Kentucky
1945	No Annual Meeting
1946	University of Louisville
1947	Western Kentucky State College
1948	University of Kentucky
S1949	Cumberland Falls State Park
F1949	Eastern Kentucky State College
1950	University of Louisville
1951	University of Kentucky
1952	Georgetown College
S1953	Ashland
F1953	University of Kentucky
S1954	Berea College
F1954	University of Louisville
S1955	Cumberland Falls State Park
F1955	Kentucky State College
S1956	Kentucky Dam Village
F1956	Eastern Kentucky State College
S1957	Western Kentucky State College and Mammoth Cave National Park
F1957	Berea College
S1958	Natural Bridge State Park
F1958	University of Kentucky
S1959	Lake Cumberland State Park
F1959	Western Kentucky State College
S1960	Murray State College
F1960	University of Louisville
S1961	Morehead State College
F1961	University of Louisville
1962	Eastern Kentucky State College
1963	University of Kentucky
1964	Morehead State College
1965	University of Kentucky
1966	Kentucky Wesleyan College
1967	University of Louisville
1968	Western Kentucky University
1969	Murray State University
1970	Georgetown College
1971	Eastern Kentucky University
1972	Morehead State University
1973	Transylvania University
1974	Centre College
1975	University of Louisville
1976	University of Kentucky

Table 11. Continued.

1977	Western Kentucky University
1978	Eastern Kentucky University
1979	Northern Kentucky University
1980	Transylvania University
1981	Murray State University
1982	Ashland Oil Inc, Ashland
1983	University of Louisville
1984	Kentucky State University
1985	Morehead State University
1986	Lexington, Kentucky (with School Science and Mathematics Association)
1987	Western Kentucky University
1988	Eastern Kentucky University
1989	University of Kentucky
1990	Northern Kentucky University
1991	Owensboro, Kentucky
1992	Ashland Community College
1993	Georgetown College
1994	Paducah Community College
1995	Western Kentucky University (joint meeting with Tennessee Academy of Science)
1996	Kentucky State University
1997	Morehead State University
1998	Jefferson Community College, S. W.
1999	Eastern Kentucky University
2000	University of Kentucky
2001	Middle Tennessee State (joint meeting with Tennessee Academy of Science)
2002	Northern Kentucky University
2003	Western Kentucky University
2004	Murray State University
2005	Eastern Kentucky University
2006	Morehead State University
2007	University of Louisville
2008	University of Kentucky
2009	Northern Kentucky University
2010	Western Kentucky University
2011	Murray State University
2012	Eastern Kentucky University
2013	Morehead State University
2014	Lexington Convention Center

Education Committee of the Academy then enlisted the aid of other science societies across the state and opposed the program vigorously. This proposal was subsequently dropped (50).

The Academy Committee met with failures as well as successes. A proposal for a Science Advisory Council to the Superintendent of Public Instruction was never approved (51). A regulation was approved by the Department of Education that teachers of Vocational Education could teach academic science courses. This ruling was allowed to stand over the vigorous protests of the Academy and its Education Committee (52).



Figure 6. 1995 joint Kentucky and Tennessee academies of science meeting at Western Kentucky University.

More recently, in April 2013, the Academy Education Committee recommended to the Board and the Board approved an endorsement of the NAAS statement entitled, “Adherence by STEM (Science, Technology, Engineering, & Mathematics) schools and STEM education programs to scientific inquiry and technological or engineering design.” The entire statement is too lengthy to reproduce here. However, it urges all STEM schools, STEM education programs, or other variations of student STEM activities to adhere to the fundamentals of science, technology, engineering and mathematics and to ensure that students shall conduct original research and technological or engineering projects.

The following statement of endorsement was prepared by the Science Education Committee of the Academy and approved by the Academy Governing Board in July 2013, “The Kentucky Academy of Sciences supports the adoption of the Next Generation Science Standards (NGSS) for the benefit of Kentucky because students in the Commonwealth both need and deserve a 21st century science education that is grounded in inquiry, rich in content, and internationally benchmarked. The standards, to replace those adopted in 1996, rely on modern research on science and learning science to identify science that all

K-12 students should know. Further, they provide performance standards stating what students at all grade levels should be able to do to demonstrate their knowledge. Because the standards give proper attention to physical sciences, life sciences, earth and space sciences, and engineering, technology and application of sciences and integrating expectations across disciplines and grade levels, the Academy is confident that these standards will lead to scientifically literate graduates ready for college and careers armed with an understanding of how science impacts their lives. The Kentucky Academy of Sciences has confidence in the inclusive, two-step process that led to the Next Generation Science Standards. First, the National Research Council, relying on modern research on science and learning science, developed a framework for K-12 Science Education that identified science that all K-12 students should know. Second, scientists, science educators, representatives from higher education and industry from 26 states, including Kentucky, worked together to develop performance expectations of students stating what they should be able to do to demonstrate that they have met the standards. Advisory committees and many stakeholders reviewed drafts of the standards and provided valuable input. The strength of the standards is a result of this inclusive

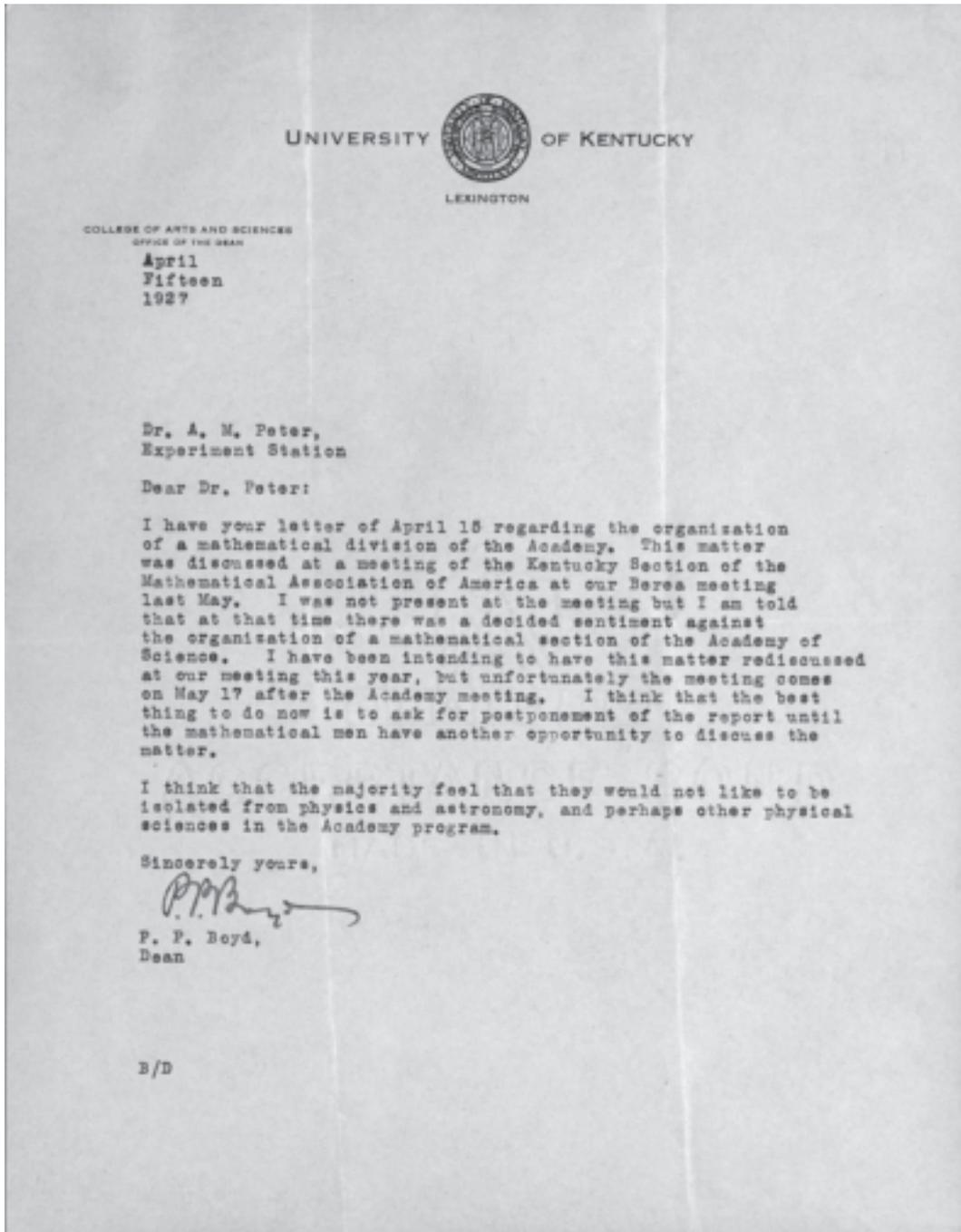


Figure 7. 1927 letter from Paul P. Boyd, UK Dean of Arts and Sciences, to A. M. Peter, Academy Secretary on the creation of Mathematical Division in the Academy and expressing the concern of the mathematicians in doing so.

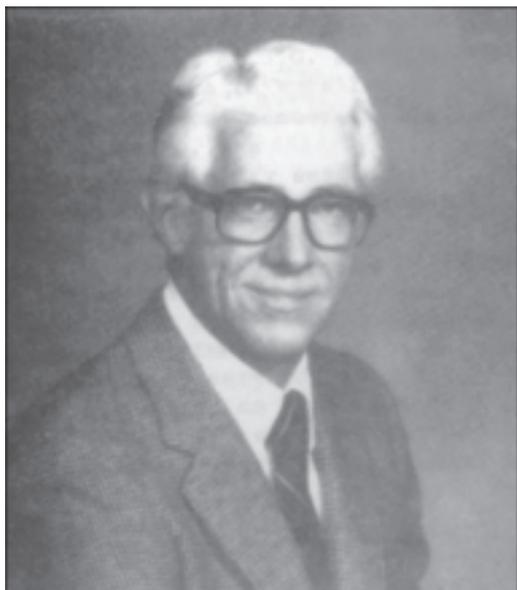


Figure 8. Ted George, Academy President 1982 and author of the history of the first 75 years of the Academy.

process.” After review and recommendation by members of the Kentucky Academy of Sciences Education Committee, the Board of the Kentucky Academy of Sciences endorsed the Next Generation Science Standards for the Commonwealth. The Next Generation Science Standards were not without controversy. In 2014, SB 1 (BR 856) proposed to amend Section 29 of the Constitution of Kentucky relating to administrative regulations that would “Create a new section of the Constitution of Kentucky to permit the General Assembly by general law to prohibit the adoption of administrative regulations that it has found to be deficient.” This was a thinly veiled attempt to undermine the Science Standards, particularly in the area of evolution and climate change. Fortunately Governor Steve Beshear did not go along.

The Kentucky Junior Academy of Science

It was in 1932 that the Kentucky Junior Academy of Science (KJAS) was formed under the leadership of A. M. Peter of the University of Kentucky and Anna Schneib of Eastern Kentucky State College in an early attempt to interest high school students in science (Figure 9). Peter showed his interest in this organization by giving an annual award for the

best effort by a student (17). The membership of KJAS would be composed of high school students who were interested in science. Professor Louis A. Astill, then director of the Illinois Junior Academy of Science, gave much helpful information and encouragement. The KJAS held its first meeting on 19 May 1934 in Berea. Five hundred students and teachers were in attendance, and KJAS began life with 310 student members in 9 science clubs. The dues were set at 15 cents per year (42).

The first issue of the official *The Junior Science Bulletin* was published in November 1934 with Anna Schneib serving as editor. The listed advantages of membership were

- (1) volunteer speakers from the Academy for the local science clubs,
- (2) each club received a copy of the *Journal of the Kentucky Academy of Science*,
- (3) The Junior Science Bulletin published 3 times a year was distributed to each member,
- (4) competitions would be held each year for awards for the best science paper or project, and
- (5) each member was entitled to wear a pin in the form of an official insignia of KJAS.

The KJAS was governed by an executive committee appointed by the President of the Academy. Dr. Schneib was the chair of that committee and was also editor of *The Junior Science Bulletin* (see Table 9 for a list of KJAS Chairs). Much of the early success of KJAS must be attributed to Anna Schneib’s hard work and leadership. Enrollment steadily increased to over 1000 in 45 clubs in 1942. Anna Schneib served as Chair, Director and Editor until 1952, when she retired from active teaching.

The Junior Academy has had its ups and downs in the later years. Herb Leopold of Western Kentucky University struggled valiantly to keep KJAS alive and oversaw many innovations. He started a Spring Symposium in which KJAS members presented papers on their own research. The winners often competed in the national meetings of the American Junior Academy of Science. A Science Bowl competition was introduced (patterned after popular game shows on television) in which opposing teams competed to answer various

questions in science. A lab skills competition also was added (43).

In 1992, membership in the Junior Academy was approximately 1000 students. At the Spring Symposium in that year, 162 research papers were submitted for presentation. At this meeting, a resolution was passed that the AAAS award that supports the attendance of 2 KJAS members and a sponsor to the annual AAAS meeting would henceforth be known as the William P. Hettinger, Jr. AAAS Award. This action was motivated by the active interest William Hettinger had had over the years in the Junior Academy (44,45). Membership has remained relatively constant over the past 20 years with 113 presentations being made at the April 2014 meeting.

KJAS has been highly successful with the students it does reach. One would wish that it would reach far more of the hundreds of thousands of students in Kentucky schools. Doubtless, it would require far more resources to expand its operations. As of 2014, the Academy supports travel awards for four students to attend the annual AJAS meeting. The students present a poster about the work that led them to be selected as winners at the state AJAS competition. In addition, the students participate in visits to STEM-focused educational institutions, museums, and private corporations and many attend sessions at the national AAAS meeting.

Effects of Wars and Depression

One would expect that the two world wars would have a significant effect on the operations of the Academy. Strangely, little reference can be found in the minutes with respect to World War I. In 1918, we find "on motion of Dr. Buckner, it was unanimously resolved that the Academy go on record as offering its services to the Government in any capacity, during the time of war." (53) There is no further reference to the resolution, to whom it was sent, or if it was ever sent.

World War II had a more definite effect. No meeting was held in 1945 (primarily because of rationing of gasoline). Prospective speakers, however, submitted their articles to be published in Volume 12 of the *Journal*. In the meeting of 1942, a resolution points with pride to the number of members in the service of the country (54).

The meetings of 1944 and 1946 were held but were published only in abstract form in 1947 (55). In July 1947, the President, Alfred Brauer of the University of Kentucky, wrote an editorial that called for more active participation in the Academy (56). While agreeing that the Academy had operated under great difficulties during World War II, he urged that much more work must be done if the Academy were to meet its obligations. He listed things to be done or improved:

- (1) obtain sustaining memberships,
- (2) enroll more workers from industrial research labs,
- (3) affiliate with more scientific associations,
- (4) be more active in conservation of resources, and
- (5) greater participation by members, i.e., give more papers, present ideas, present resolutions, etc.

At the time of the Great Depression, in the early 1930s, "a worldwide financial panic and depression began with the 1929 stock market crash. Twelve million wage earners were jobless in the United States in 1932 and many bankruptcies." (57) In 1932, there were very few two-wage earner families, and an out-of-work wage earner was in serious trouble. There were no government services to aid those with no income as there are today. As a consequence, in Kentucky as in the rest of the nation, tax revenues fell precipitously and many salaries were late, reduced, or paid in part. It was proposed to the Council of the Academy that dues should be reduced because of the financial situation. The Council, however, rejected this idea (58).

Incorporation of the Kentucky Academy of Science

In 1936, Dr. L. Oatley Pindar, a physician and a member of the Medical Science section, left a bequest to the Academy. In the discussion of how to handle this transaction, Judge Samuel Wilson of Lexington, Ky., was asked for advice. Judge Wilson advised the Academy to incorporate and offered to do the legal work without charge. Consequently, in 1937, the Academy incorporated with the headquarters of the Kentucky Academy of Science, Inc. located in Lexington, Ky.

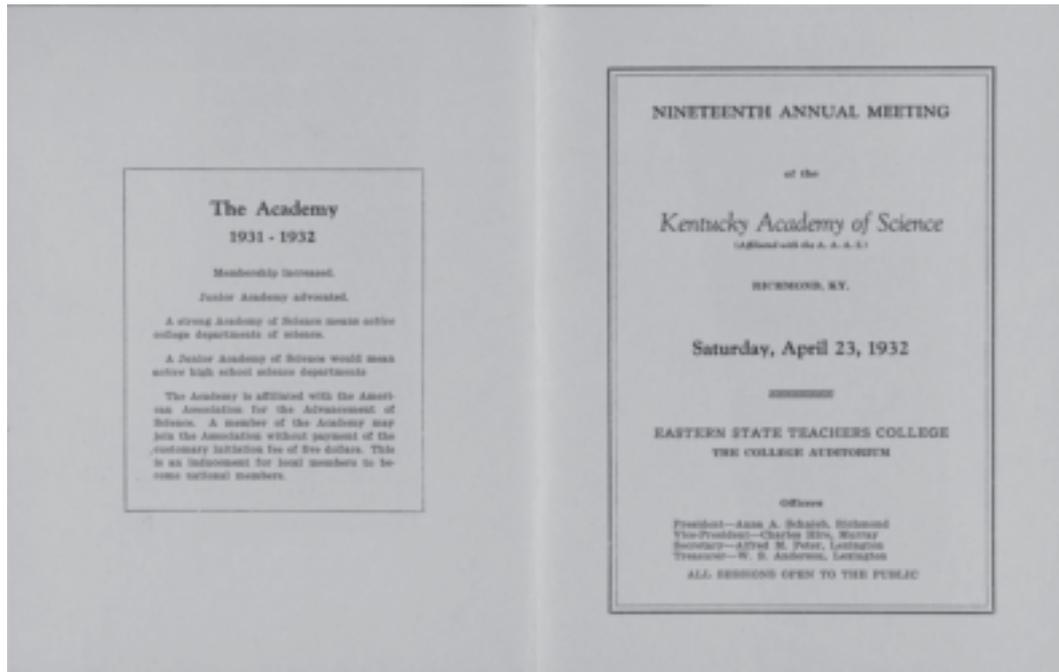


Figure 9. Cover of the program booklet for the 19th Annual Meeting of the Academy and call for the creation of a Kentucky Junior Academy of Science.

(59,60). Dr. Pindar's legacy was \$281.30, which brought the endowment to \$356.30. In 1932, at the 19th annual meeting the financial report makes reference to \$75 in Life Memberships invested in Building and Loan Association stock (61). Dr. Pindar's bequest must have been added to this amount to total \$356.30. The interest from this was used to help pay costs of publication of the *Journal* (62).

Surprisingly, no further mention of the endowment can be found in the *Journal* for many years. In fact, no financial report can be found from 1939 to 1955. In 1955, the financial report refers to the "balance on hand of \$1200.35" (63). There is no mention of the endowment. Presumably, it had been added to the operating funds at some time.

When the Academy incorporated in 1937, a Board of Directors was added to the officers of the Academy by an amendment to the constitution. Normally a Board of Directors of a corporation would set the policy for that corporation. When one reads the constitutional amendment, however, it is not really clear what

the function of this board is. "In said Board shall be vested and by said Board shall be exercised all the ordinary and appropriate corporate powers and functions of the Kentucky Academy of Science." (60) Such a Board was duly elected and continued to be elected but never seemed to function in any viable way.

At the meeting in 1969, at Murray State University, it was stated that the Board was not now meeting but should become active in stimulating industry to support the activities of the Academy (64). In 1974, the Board became more active and attempted to find a role for itself (65). In 1975, the Board proposed, and the Academy accepted, an amendment to the constitution, in which the Board would explicitly assume the overall direction of the Academy, and the Executive Committee would carry on the day-to-day activities of the Academy (66).

Although the Board did serve some useful functions, such as selecting and awarding honors for Outstanding Scientist, Outstanding Teacher, etc., it still did not set policy for the Academy. The Board of Directors was dissolved in the new constitution installed in 1987 (67).

Support of Research

Of course, the reason for being for the Academy is the advancement and enjoyment of science. A prime occupation of the organization members is engaging in scientific research (Figure 10). The Academy has, over the years, aided in the publication of the research of its members and, in the later years, has sponsored some research, particularly college students and its own members. In the early days, when the Academy did not have a journal, members were allowed to publish in *Science*, the official AAAS journal. When this was no longer possible, Willard Rouse Jillson published, partially at his own expense. The quality and quantity of the published articles was not a steady progression of excellence. The Great Depression of the 1930s was a very difficult and troubling time. Very little money was available. Paydays were missed and salaries were reduced; therefore, there was virtually no money for research (68). The Second World War was also a *severe* setback. The home front was denuded of many able-bodied young men and women because of this mighty upheaval. Since the Second World War, the *Journal* has improved steadily in both quantity and quality. It is instructive to compare activity in 1920 when 26 papers were presented at the meeting and were published in first 10 years of Volume 1 (69) with those presented in 1990 (70) and 2013 (Table 12). In 1990, 285 papers were read at the meeting, 46 abstracts of those papers were in the *Journal*, one workshop was given at the meeting, 42 poster presentations were made, and 19 separate articles were printed in the *Journal* that were not read at the meeting. In 2013, 233 papers were presented orally and 245 presented as posters. The practice of publishing the abstracts in the *Journal* (for a cost to each author of \$5 each) was discontinued in 2013. The research presented at meetings (Table 12) and the membership by Sections (Table 3) give an excellent picture of the increase and changes in scientific activity by discipline of the Academy from its early beginnings.

The Academy, never too flush with funds, made a rather slow start in making grants for the encouragement of scientific research. In 1925, at the Twelfth Annual Meeting, W. R.

Jillson proposed that a gold medal be frequently given for "first excellence in scientific investigation" to a member of the Academy (71). He had found a donor who wished to remain anonymous who would pay for the medals. The project apparently fell through since there is no record of a medal ever being given to anyone.

The first mention of money to encourage research occurred in April 1939 at the Twenty-Sixth Annual Meeting at Murray State Teachers College. Mr. Fain W. King and Mrs. Blanch B. King of Wickliffe, Ky., announced that they were offering to the Academy an annual prize award of 50 dollars for 5 consecutive years. The prize was to be awarded by the Academy to the individual presenting the most meritorious paper of original research. The first award was given at that meeting to W. R. Allen of the University of Kentucky. His paper was entitled "Science and Human Mores." (72) Other awards were made over the next 40 years.

At the meeting in 1974 at Centre College, Joe Winstead of Western Kentucky University announced that "through the generosity of an anonymous donor, the Kentucky Academy of Science is authorized to periodically award a cash grant of \$500 to any student who is a member of the Kentucky Academy of Science and who is enrolled in a course of study with an emphasis in botanical science at any college or university in the Commonwealth" (73). Basically, the grants were to support county floristic studies. In 1976, this same anonymous donor established an endowment fund of \$10,000 to support students doing botanical research in Kentucky. That endowment was in addition to the donor's continuing support of county floristic work (74).

Eventually, it became known that the anonymous donor was Mr. Raymond L. Athey of Paducah, Kentucky. In 1982, Mr. Athey and the family of his late wife, Marcia Athey, made a donation of \$50,000 to set up an endowment. The earnings were to be used only for scientific research in Kentucky, and it was named The Marcia Athey Fund in honor of Mrs. Athey (75). In 1986, the Academy recognized Mr. Athey by according him a Citizen Scientist Award in recognition of his many achievements in the documentation of rare and unusual plants of Kentucky and for

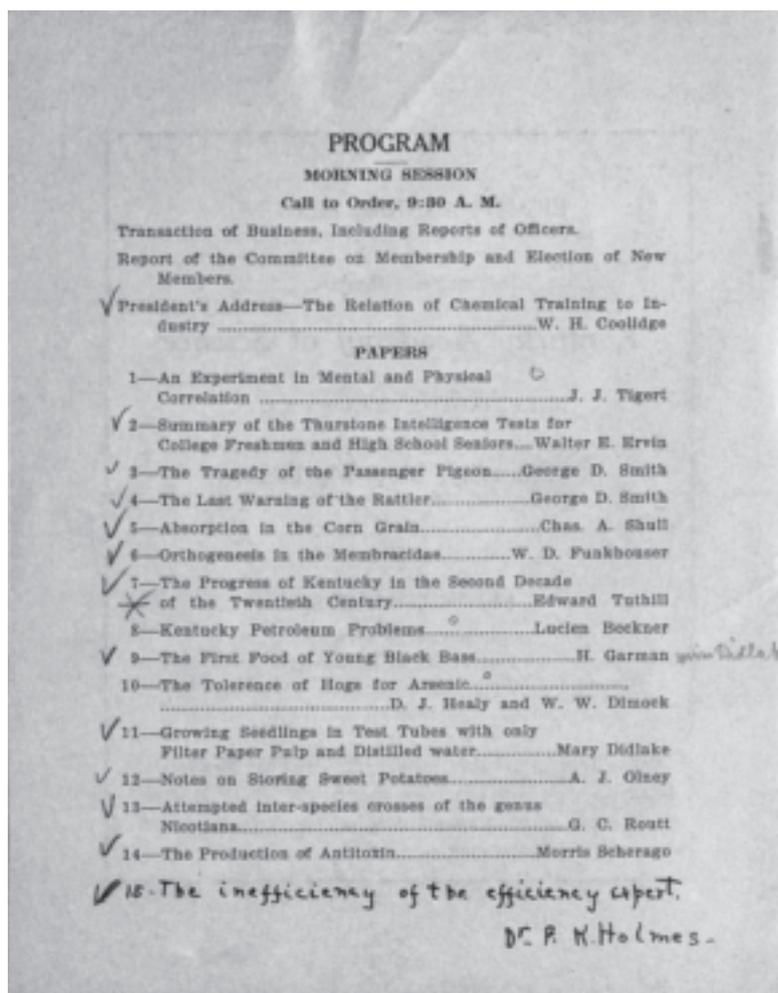


Figure 10. Program from the 1921 Annual Meeting with two interesting presentations noted.

his support of botanical and scientific research in the mid-south (76).

Quoting from the Citation, "Among plant taxonomists of the southeastern United States, the name of Raymond Athey is well known for his collection, documentation, and dissemination of information concerning the herbaceous flora, particularly grasses, of Kentucky and the surrounding states. Perhaps less well known is his personal support of numerous students in sharing his knowledge about Kentucky plants as well as his support in developing permanent endowment funds to provide financial support of botanical and scientific research. Since 1979, no fewer than 18 students and faculty of colleges and universities in Kentucky,

Indiana, North Carolina and New York have had individual research projects supported financially via the Kentucky Academy of Science from endowment funds developed through the interest and efforts of Raymond Athey" (76).

Mr. Athey died in July 1991. In his will, Mr. Athey set up a trust fund which contained all of his assets (estimated to be over a million dollars). One-half of the earnings from this trust fund are to go to the Academy and the other half to his children. Eventually, all of the earnings of the trust fund will come to the Academy.

It is no exaggeration to say that Mr. Athey literally transformed the Kentucky Academy of Science—not only with his gifts of money—but

Table 12. Papers read and posters presented at annual meetings, 1920, 1990, and 2013. Poster data are presented only for the 2013 meeting where there are better records.

	1920	1990	2013 (papers/posters)
The Future of KAS	1		
Agricultural science	7	3	20/12
Anthropology		21	
Anthropology and Sociology			9/1
Astronomy	1		
Botany and microbiology	3	25	
Botany			7/5
Cellular and Molecular Biology			9/32
Chemistry	2	23	
Chemistry — Analytical/Physical			9/16
Chemistry — Organic/Inorganic			15/27
Coal and petroleum	1	9	
Computer science		9	
Computer and Information Sciences			17/0
Ecology and Environmental Science			24/36
Engineering		10	14/5
Genetics	1		
Geography		14	5/1
Geology	2	12	12/1
Health Sciences		2	8/9
Industrial sciences		9	
Mathematics		12	14/0
Microbiology			5/11
Nutrition	1		
Physics	2	20	
Physics and Astronomy			14/15
Physiology, biophysics, biochemistry and pharmacology		14	
Physiology and Biochemistry			15/25
Science education		17	15/8
Psychology	1	31	16/26
Sociology		9	
Zoology and entomology	4	34	
Zoology			6/15
Oral Presentations			233
Poster presentations	42		245
Abstracts	46		478
Kentucky Junior Academy of Science			113 (April 2014)

also by his example of enthusiasm for scientific research and his desire to improve the scientific literacy of the Commonwealth. It was reported that the day before his death, Mr. Athey was asked by his lawyer and trust officer why he was giving so much of his estate to the Kentucky Academy of Science. His reply was, “By God, I want the future generations of Kentuckians to have the opportunity to know something about science.”

Much of the credit for the relationship between the Academy and Mr. Athey must go to Joe Winstead. Joe met Mr. Athey in 1972, and they realized that they had common interests and they eventually became close friends. All of Mr. Athey’s donations to the

Academy were made through Joe, because Athey had complete confidence in Joe’s honesty and scientific acumen.

Kentucky Academy of Science Foundation

At the suggestion of Mr. Athey, a separate organization was established to keep the money that he and the Athey family had donated separate from the day-to-day operation of Academy affairs. Therefore, in 1980, the Kentucky Academy of Science Foundation was established. A Board of Trustees was to address the affairs of the Foundation and the President of the Academy was the President of the Foundation. The officers of the Academy and the Board of Directors were automatically members of the Board of

Trustees of the Foundation. The Board of Trustees may, at its discretion, elect additional members up to a total of twenty (77).

With the new constitution of 1987, control of the Foundation was taken over by the Governing Board of the Academy. The Board of Trustees of the Foundation as well as the Board of Directors of the Academy was eliminated (67).

Improving Kentucky's Research Status

In the early 1970s, a study funded by the Kentucky Department of Commerce was conducted under the joint auspices of the Kentucky Academy of Science and the Task Force on Public Science and Technology. A series of reports based on that study were published in 1973 and 1974 and covered various aspects of science and technology in the Commonwealth. One of these reports, written by William G. Lloyd (1974), showed that Kentucky fared poorly in comparison with the rest of the United States in terms of federal support for research and development activities (79). The Academy was involved to the extent that many members of the study panel were members of the Academy.

The results of this report were far more disturbing than anyone realized. Quoting from the Lloyd report, "in fiscal 1971 the United States government committed a total of \$15,180,000,000 to support research and development activities throughout the nation. That amounted to \$74.71 for every man, woman and child in the nation. In Kentucky, the federal research and development investment for that year (1971) amounted to \$7.14 per capita, less than one-tenth of the national average. This was the lowest per capita share of federal research and development money received by any state in the union" (79).

The Lloyd report also showed that if funds for research and development were adjusted for personal income, the Commonwealth received one-tenth of its equitable share, which gave Kentucky a rank of 50th in the 50 states and Washington D.C. Kentucky ranked 21st among the states in federal taxes paid but, again, received one-tenth of its equitable share, which again placed it in 50th position (79).

"In December 1977, letters were written by the President of the Kentucky Academy

of Science to the Governor, the Executive Director of the Council on Higher Education, the Director of the Legislative Research Commission, the President of the Senate, and the Speaker of the House. In these letters, findings of the Lloyd report were highlighted and appeal was made to join the Academy in a comprehensive study of the health of the federally-funded research and development enterprise in the Commonwealth. The letter suggested that the task would be to update the Lloyd report, and then go beyond to explore reasons why Kentucky ranked so low and possible ways of correcting any continuing disparity. It was also pointed out that while the health of science and technology in the Commonwealth was of direct concern to the Academy, the research and development enterprise was directly related to the economy and many other facets of life in the Commonwealth to state government." (80)

"As a result of this appeal by the Academy, Senate Resolution 33 was passed in 1978 that directed the Council on Higher Education in cooperation with the Legislative Research Commission and the Academy to conduct a new study. The tasks especially outlined were

- (1) document Kentucky's share of federal research and development funds for the most recent fiscal year,
- (2) determine "why" Kentucky ranks and has ranked relatively low, and
- (3) make recommendations relative to this problem.

During the summer of 1978, a fifteen member advisory committee was established. Seven members of the committee were appointed by the president of the Academy and the presidents of the 8 state-supported universities in Kentucky (UK, UofL, WKU, NKU, ECU, Morehead, Murray & KSU) were each asked to appoint an institutional representative. In addition, there were 3 members from the Council on Higher Education." (80)

To summarize a masterful presentation of the research of this committee, Charles Kupchella of Western Kentucky University stated, "In summary, in fiscal 1977, Kentucky ranked 36th among the states in total federal research and development obligations. While it ranked 23rd in population, it ranked only 47th in federal research and development

obligations per capita, it ranked 25th in federal taxes paid in 1976, but ranked 40th in federal research and development obligations adjusted for tax dollars. The Commonwealth ranked 24th in personal income, but could only achieve 38th place in federal research and development obligations per dollar of personal income in 1976." On the basis of funding per capita going to colleges and universities, Kentucky ranked 51st behind all other states and the District of Columbia (81).

A list of suggestions to help the situation was sent to the then Governor John Y. Brown (82):

- (1) appoint a science advisor with a science background,
- (2) appoint a commission or charge an existing commission with making recommendations for improving the health of science in Kentucky,
- (3) encourage the Council on Higher Education to set up a research and development council to look into solutions to the problem and to be charged with looking after university research and development on an ongoing basis,
- (4) encourage the Council on Higher Education to establish a fund to be used to establish centers of research and development of excellence in one or more scientific areas at each of the state's institutions of higher education,
- (5) work toward the establishment of a federal laboratory in Kentucky, on the order of Oak Ridge in Tennessee, and
- (6) encourage state university presidents to develop latent research potential that exists in their respective institutions.

In a concluding article, Kupchella et al. (83) considered the economic effect on Kentucky if the state received its fair share of federal research and development funds. "In any kind of injection of funds from an outside source, there is a "multiplier effect." As people receive additional money in salaries from an outside source, they purchase more goods, which in turn increases trade and the manufacturing of more goods, which increases the standard of living. Thus, the net regional product may grow by a factor greater than the original injection.

The multiplier effect varies, depending on the particular characteristics of the region, from 1 to 2.5. A rough estimate for Kentucky would be from 1.2 to 1.5. Using these figures, Kupchella et al. estimated that if Kentucky achieved parity with similar states, the effect would be the equivalent of adding 9800 to 12,000 jobs.

Creation of the Federal EPSCoR Program. In 1978, the National Science Foundation (NSF) began its EPSCoR program (Experimental Program to Stimulate Competitive Research). This program recognized that many states had fared poorly in the distribution of R&D funds from the federal government, and EPSCoR was an attempt to give these states "seed money" to help them come into a more competitive position with respect to R&D funding. Incredibly, Kentucky was omitted from an initial competition limited to seven states. Subsequently, Kentucky was again not going to be included in a second round. This oversight was noticed by Charles Kupchella who, with others, went to NSF to argue the case for Kentucky. He found that the states were chosen by NSF on the basis of the *gross* amount of federal R&D funds granted to the states instead of per capita, Kentucky had indeed ranked higher than those states selected in terms of gross funds. When presented with the results of the research by Kupchella et al. (81,83). NSF agreed to review its position and did ultimately include Kentucky in its second list of EPSCoR states. Kentucky joined EPSCoR in 1985 as a member of the second cohort of states.

Kentucky's First EPSCoR Award. Upon acceptance into the program, Kentucky's Governor appointed a Statewide EPSCoR Committee to develop a planning grant for an EPSCoR program in the state. The Committee included representatives from industry, state government and higher education. Mr. Ted Lassiter, the Director at that time of IBM Lexington was selected as Chairman of the Statewide EPSCoR Committee. In developing its plan, the Statewide Committee established an Advisory Committee consisting only of members of the National Academy of Sciences and National Academy of Engineering for the purpose of visiting all universities in the state and assessing research

strengths, weaknesses and systemic deterrents to quality research. The Advisory Committee made a report to the Statewide EPSCoR Planning Committee, which was shared with university presidents.

Lieutenant Governor Steve Beshear was also concerned about the future of Kentucky, and particularly its role in science and technology. He had set up a program entitled “Kentucky Tomorrow” to plan for a technological future. The then Academy president, Gary Boggess of Murray State University, along with Kupchella and others from the Academy, joined with Kentucky Tomorrow to form an ad hoc Kentucky Science and Technology Council to write a proposal for the EPSCoR program (81).

NSF granted \$75,000, and the state, through the governor’s office, granted \$25,000 to support the planning. A call for proposals was sent to all state colleges and universities and 146 proposals were submitted by researchers. Of these, 15 projects were selected by the ad hoc committee, and the proposals were combined into one package and sent to NSF. The package was funded in August 1986 for a total of \$16,426,262 to be expended over the next 5 years. Of this total, \$3 million was furnished by NSF, \$3 million by the state, \$0.6 million by various industries, and the remainder, \$9,826,262, was furnished by the universities involved. The share of the universities was primarily released time of faculty involved and waiver of their usual indirect cost allotment (84).

At the annual meeting of the Academy in 1990 at Northern Kentucky University, Kupchella gave a report indicating that “Kentucky’s EPSCoR Program, generally by then, was regarded as one of the most successful programs nationally.” Annual external funding (outside of EPSCoR) received by EPSCoR target faculty increased by more than 100% from 1985 to 1989 (85).

In 1992, the Statewide KY EPSCoR Committee became affiliated with the Kentucky Science and Technology Corporation (KSTC) in order to better coordinate among the various state programs. The second KY EPSCoR Committee Chairman Lee Todd, founder of DataBeam, Inc., served from 1990 to 2001 when he stepped down to become President of the University of Kentucky. Todd

was succeeded by Wimberly Royster, former Vice President for Research and Graduate Studies at the University of Kentucky. Royster chaired the committee for 8 years, until he stepped down in 2009. Nancy Martin, former Senior Vice President of Research at the University of Louisville and President of the Academy in 2009–2010 is the current Chairperson. Wimberly Royster died in early 2014, and he will be missed as one of the most influential science leaders in Kentucky.

The Statewide Committee that oversees all KY EPSCoR programs now consists of two members from each state university, one administrator, one faculty member, plus representatives from industry. Many members of the committee are also members of the Academy. Subcommittees have been established for each of the federal agencies that support EPSCoR programs. Membership on these subcommittees consists of two Statewide Committee members, industry representatives, and university faculty, again many of whom are Academy members. This structure has served Kentucky EPSCoR well in that awards have been received from all agencies and a broader representation of university and non-university personnel is now involved.

During 1992, the Kentucky EPSCoR Committee received awards from the Department of Energy (DOE), the Environmental Protection Agency (EPA) and the National Aeronautics and Space Administration (NASA). The DOE awards included a \$100,000 planning grant to inventory existing energy related research and to propose a final plan for linking energy-related research activities and \$250,000 in doctoral traineeship grants to increase training in energy-related disciplines. The EPA grant awarded \$50,000 for plans to develop a proposal to improve quality of environmental training in colleges and universities. The NASA award provided a \$25,000 planning grant to inventory present programs in aerospace and to propose a program to improve training of professionals for the aerospace industry. As a result, Kentucky EPSCoR proposed a 3-year program to improve quality of aerospace education and research (86).

Between 1994 and 2005 congress expanded its funding of EPSCoR type programs under the following seven federal agencies: NSF, DOE, USDA, NIH, DOD, NASA and EPA.

This translated into tremendous potential for Kentucky's universities to accelerate research under all STEM disciplines. Kentucky's federal EPSCoR award budgets grew from \$1.6 M per year in 1992 to \$27 M in 2006. Although two of the EPSCoR programs have since been eliminated at the federal level (EPA in 2005 and DOD in 2010), Kentucky collectively has averaged \$25 M per year in Federal EPSCoR awards from 2006 until present.

The latest NSF EPSCoR grant for \$24 million was awarded to Kentucky in August 2014 for research to diversify Kentucky's energy economy. Under the grant, faculty will look to nature, and plants especially, to develop three research areas: bio-inspired membrane technologies that have broad applications for energy production and water purification; chemical biology for advanced materials that can help biofuel manufacturing processes; and improved components for electrochemical energy storage.

The grant will support 150 jobs over the five year period and will be a collaborative effort involving faculty, students and staff from ten of Kentucky's academic institutions: the University of Kentucky, the University of Louisville, Kentucky State University, Northern Kentucky University, Western Kentucky University, Eastern Kentucky University, Morehead State University, Murray State University, and the Kentucky Community and Technical College System, represented by the Big Sandy and Bluegrass CTCs.

The inclusion of Kentucky in to the EPSCoR program means that university faculty are conducting cutting edge research and students are learning to apply the basics of Science, Engineering, and Math in laboratories and fields to solve health, energy, environmental, transportation, agricultural, technological, security, as well as first world problems. It means that money is being provided to create jobs that implement these solutions. While the Academy has not been "officially" involved in these programs, many of its members have been and are. The Academy can take pride in that many of its members were instrumental in getting the process started and continue to be highly involved. Much of the information above was taken from the KY EPSCoR website (www.kyepscor.org/) that contains not only the history but how to become involved.

kyepscor.org/) that contains not only the history but how to become involved.

Concern for the Environment

From the early years, the Academy has been deeply concerned with the environment and with taking action for its protection. In May 1921, C. A. Shull (87), who was chairman of the Legislative Committee at that time, proposed a 10-point program to be sent to the Kentucky Legislature. Among them were 5 programs relating to the environment:

- (1) an increased appropriation for the hastening of the completion of topographic mapping of the state,
- (2) a request that a soil survey be begun, to follow as rapidly as possible the topographic and geological mapping of the state,
- (3) a law compelling each person or corporation drilling a well for oil or gas or other purpose to a depth greater than 100 feet, to file with the State Geological Survey a complete log of that well showing the formations gone through, and a careful description of the location of the well so that it can be carefully mapped,
- (4) endorsement of the law now before congress to make of Mammoth Cave and its environs, a national park, and
- (5) a law enabling the State of Kentucky to acquire and set aside for the benefit of future generations, such areas as are deemed worthy of preservation in natural condition, for the purpose of study and enjoyment of nature.

Such resolutions have followed almost yearly; only a few will be indicated here:

In April 1924 a letter was sent supporting the position of the Ecological Society of America that Glacier Bay in Alaska should be set aside as a National Monument (88),

At the Twelfth Annual Meeting in 1923, the Academy passed a resolution that the Congress adopt an adequate program covering the acquisition of forest lands by the federal government. This resolution was sent to Congress in cooperation with the American Forestry Association (89),

A resolution in 1954 against encroachments on public lands (90), and

A resolution in 1967 against the construction of a dam in Red River Gorge (91).

All of the above resolutions were sent either to members of Congress or members of the legislature. Many were successful-some were not. But successful or not, certainly the Academy has taken a leading role in conservation during its entire lifetime.

Rare and Endangered Species

As early as 1972, in its fifty-eighth annual meeting at Morehead State University, the Academy passed a resolution about its concern that there was no list of Rare and Endangered Species of plant and animal life compiled for the Commonwealth (46). In its continuing concern for the environment, in 1972, Glenn Murray presented a paper concerning the problems of rare and endangered species in Kentucky. He promised the cooperation of the Soil Conservation Service in accumulating a list of rare and endangered species. As a consequence, a resolution was introduced to the Academy that a committee be established to

- (1) prepare a list of the state's rare or endangered plant and animal species,
- (2) describe the measures needed to preserve the habitat of these species, and
- (3) develop a monitoring program that would provide an advanced warning of actions or disturbances that might further endanger these species so necessary protective actions can be taken (92).

The Committee on Rare and Endangered Species was formed and 15 specialists from differing fields in a monumental work compiled a list of endangered, threatened and rare animals and plants in Kentucky by Branson et al. (93). The Kentucky State Nature Preserves Commission, a State agency under the Kentucky Energy and Environment Cabinet, is mandated to identify and protect natural areas, worked jointly with the Academy's committee. This list was later updated by Warren et al. in 1986 (94). A list of Kentucky's rare and endangered species as of 2012 is available on the Kentucky State Nature Preserves

Commission website (http://naturepreserves.ky.gov/pubs/publications/ksnpc_ets.pdf).

Awards

Throughout its history, the Academy has recognized those who have made significant contributions to science or to the Academy itself. The first awards were in the form of honorary memberships. Over the years, a variety of other awards have been made. At the meeting in 1976 at the University of Kentucky, the Academy made its first honorary award. John Philley (95) of Morehead State University, speaking for the Board of Directors, gave the Distinguished Scientist Award to Louis A. Krumholz of the University of Louisville for outstanding service in science to the University of Louisville, the Commonwealth of Kentucky and the Kentucky Academy of Science. A suitable plaque commemorating the event was given.

Since that time, a number of other annual awards have been given in addition to the Distinguished Scientist Award. At this writing they are Outstanding Academy Service, Distinguished College/University Scientist, Outstanding College/University Teacher, Outstanding Early Career in Post Secondary Education, Outstanding Secondary School Science Teacher, and Distinguished Professional Scientist (non-academic). These awards recognize outstanding service from different populations within the Academy. They focus public attention on the accomplishments of the individuals so recognized and also bring the Academy to the attention of the general public. Candidates for the awards are nominated by the membership, but not all the awards have been given in any one year. It is not possible here to list all those recognized by the academy since its beginning, but we do recognize their service and dedication to the Academy and to science and science education.

The Executive Secretary/Director

At the meeting of 1965 at the University of Kentucky, Mary Wharton (96) of Georgetown College made a report as the AAAS representative. She commented that "several nearby states had academies that were considerably larger and stronger than was our academy. Perhaps one of our greater needs is that of

a permanent officer, such as an executive secretary. This need was voiced very frequently thereafter. In 1969, Wharton reported that AAAS recommended that each academy have an executive secretary. AAAS would supply without charge a consultant to any state academy that wishes to set up and operate under the Executive Secretary system (97).

It was realized by everyone that a permanent secretary was needed very much to make the Academy affairs run more smoothly and to provide more continuity from one year to the next. The financial situation of the Academy would not support such an expense. Indeed, in the late 1970s and early 1980s expenses exceeded income. Through the activity of several presidents and other members of the Academy, recruiting of new members and particularly Educational Affiliates and Industrial Affiliates, the finances of the Academy improved significantly. In the new constitution of 1987, provision was made for an Executive Secretary should one be available. Provision was also made if one were not available (98).

In 1987, the Academy became very fortunate. J. D. Rodriguez (6) of the University of Kentucky volunteered his services as assistant to the president and would, in effect, become the Executive Secretary. Upon acceptance of the new constitution in 1987, the Governing Board accepted his generous offer to serve as the Executive Secretary without compensation from the Academy. He retired from his position at the University in 1989 but maintained an office, a telephone and a mailbox for the Academy that gave a quasi-permanent address for the Academy for a few years. In 1990, the Governing Board authorized a part-time secretary to work under the direction of the Executive Secretary, and a committee was established to work toward finding a permanent headquarters for the Academy (98). The address was at Science Outreach Center when Dr. Frazier served as Executive Secretary, but the goal of finding a headquarters beyond just the mailing address of the Executive Secretary was not achieved until 2013 when Executive Director Amanda Fuller found a willing host in the Kentucky Science Center, and the headquarters of the Academy now resides at 727 W, Main St, Louisville, KY 40202.

Programs that have been sponsored by the Academy under the direction of the Executive Secretary, J. D. Rodriguez (99), have been a national symposium on the "Utilization of Wetlands," a series of workshops across Kentucky on the "use of animals in the classroom" and organizing, establishing and publishing a directory of the "Kentucky Mentor Program-Women in Science, Math and Engineering." The installation of the Academy at the Science Center likewise is making new programs and partnerships possible in science education, reaching a more general audience to promote science literacy, and looking forward to promoting better teaching of science in Kentucky's secondary schools.

SUMMARY

In its 100 years of life, the Academy has certainly come far. Much of the progress occurred in the first few decades and then again in the last few decades. The middle years were marked by wars and low budgets. One of the big turning points for the Academy was the support of Raymond Athey and his family. Their generous support has made it possible to actively support research and thus encourage the members of the Academy to be more active scientists. As second turning point was the initiation of Enhanced Affiliate memberships that dramatically increased the membership and participation in the annual meetings. A third was the internet allowing for creation of a website and instantaneous communication with the membership.

Another improvement has been the addition of an Executive Secretary/Director. With a new president each year, continuity had suffered. Many projects were started by one president but were not continued by the successor, who may have had other emphases in mind. We are indeed fortunate to have the services of Amanda Fuller and a permanent office and fixed address which it did not have before.

The membership has surpassed the 2500 mark, and the number of sections is now 19. The Academy seems to be approaching a critical mass and has a large number of capable leaders as was shown in the background work leading up to the first EPSCoR grant that documented how poorly Kentucky

pared with respect to other states for R&D funds from the federal government.

The finances of the Academy are the best they have ever been in its history. The size of the membership and the number of Enhanced Affiliates has resulted in more money for support of administration and other enterprises. However, it has not been a steady improvement. In the late 1970s and early 1980s, the Academy was spending more than its income. Many people worked to change that situation - certainly the presidents of the 1980s onward contributed immensely. Growth in membership along with financial help from the affiliates changed the financial situation. The Academy had financial help before from various outside sources, but credit must go to Louis Krumholz for initiating the idea of Educational Affiliates during his presidency. Credit must also go to William Hettinger who, during his presidency, made tremendous progress in enlarging the number of Industrial Affiliates and to John Mateja for beginning the Enhance Affiliates.

The improvement in the *Journal* is very noticeable. The use of the Allen Press improved the professional appearance. The *Journal* also reflects the scientific activity of Academy members. The journal has aimed to have about 200 pages in two issues per year, which is quite respectable for an organization of this size, but there are still ups and downs in the number of submissions. This also increases the workload of the editor who contributes large amounts of time for modest compensation, or even as a volunteer. The *Journal* along with the website are the public faces of the Academy, and they look good!

Members of the Academy have been instrumental in helping to increase research funding in the Commonwealth, particularly by participating in EPSCoR and other federally-funded efforts and then showcasing that research through its annual meetings. Providing a venue for undergraduate and graduate students to present their research at the annual meetings also has been a strong point for the Academy.

The Academy must continue its concern for science teaching in the public schools. Its effect on science teaching has never been what it should be, but it is getting better. This seems to be tied in with another



Figure 11. Bill Staddon, Amanda Fuller, and Bob Creek go through the Academy archives at Eastern Kentucky University.

problem-the Academy has still has very little visibility to the general public. Scientists are not prone to toot their own horns or advocate for science in public discussions. But this must be done. A large percentage of Kentucky politicians are only vaguely aware that the Academy exists. It is sad to note that the same issues with teaching science that occurred in 1914 still exist 100 years later. More recently the Academy has done a much better job of advocating its positions on science and STEM education, and this needs to continue.

Would the founding members recognize the Academy today? Would they be pleased?

ACKNOWLEDGMENTS

From George 1993. The author is deeply indebted to many who have given help in the writing of this history. George H. Paine of Ludlow, Ky., graciously furnished a rare copy of Volume 1 of the *Transactions*. Charles Hay, Archivist of Eastern Kentucky University, was extremely helpful in giving access to the material in the Academy archives. Varley Wiedeman furnished data and additional copies of the *Journal* from the library at the University of Louisville. Douglas Dahlman of the University of Kentucky also helped with data unavailable in print. I appreciate the comments and valuable suggestions given to me by the following members of the Academy: Branley Branson of Eastern Kentucky University, Charles Kupchella of

Western Kentucky University, J. G. Rodriguez of the University of Kentucky and Joe Winstead of Western Kentucky University.

New acknowledgments. Although different from present *Journal* formatting, we have kept the original format in the George (1993) manuscript and added some newer references at the end. Updating the history was a group effort. Contributors included Amanda Fuller, Nancy Martin, Liz Knapp, and Blaine Farrell. Amanda Fuller, Cheryl Davis, Bill Staddon, Bob Creek, and Bill Lyons spent several days digging through the Academy archives at the University of Kentucky (Figure 11) and Eastern Kentucky University. We appreciate the assistance of both universities for both maintaining the archives and their staffs for making them available. Figures used in this history are from the archives.

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