

1992

# In The Astronomy Tradition at Augustana

Harry E. Nelson

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*In the Astronomy  
Tradition at Augustana*

*Harry E. Nelson*



*In The Astronomy Tradition  
At Augustana*

Harry E. Nelson

Augustana Historical Society  
with  
East Hall Press



1992





# Acknowledgements

*In the Astronomy Tradition at Augustana* was written as a response to a suggestion made by Dr. Conrad Bergendoff, president emeritus at Augustana College, Rock Island, Illinois. I had prepared a paper for the Contemporary Club of Davenport, Iowa which dealt with the program of the John Deere Planetarium on the campus and its contribution to the Quad-Cities community. Dr. Bergendoff felt that a more inclusive report was needed, and he convinced me that I should write the complete history of the astronomy department. His many creative suggestions have made the story most interesting and I am indebted to him for all his help.

My wife has spent numerous hours proofreading the original manuscript and its many revisions. Nancy Johnson, Director of Alumni Relations at Augustana, entered the manuscript in her computer where material could be added or deleted with minimum effort on my part. I am grateful to Dr. Erick Schonstedt, member of the Augustana College Board of Trustees, for his generous financial contribution to help defray the cost of publication.

Harry E. Nelson

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To my wife  
Lillian  
~



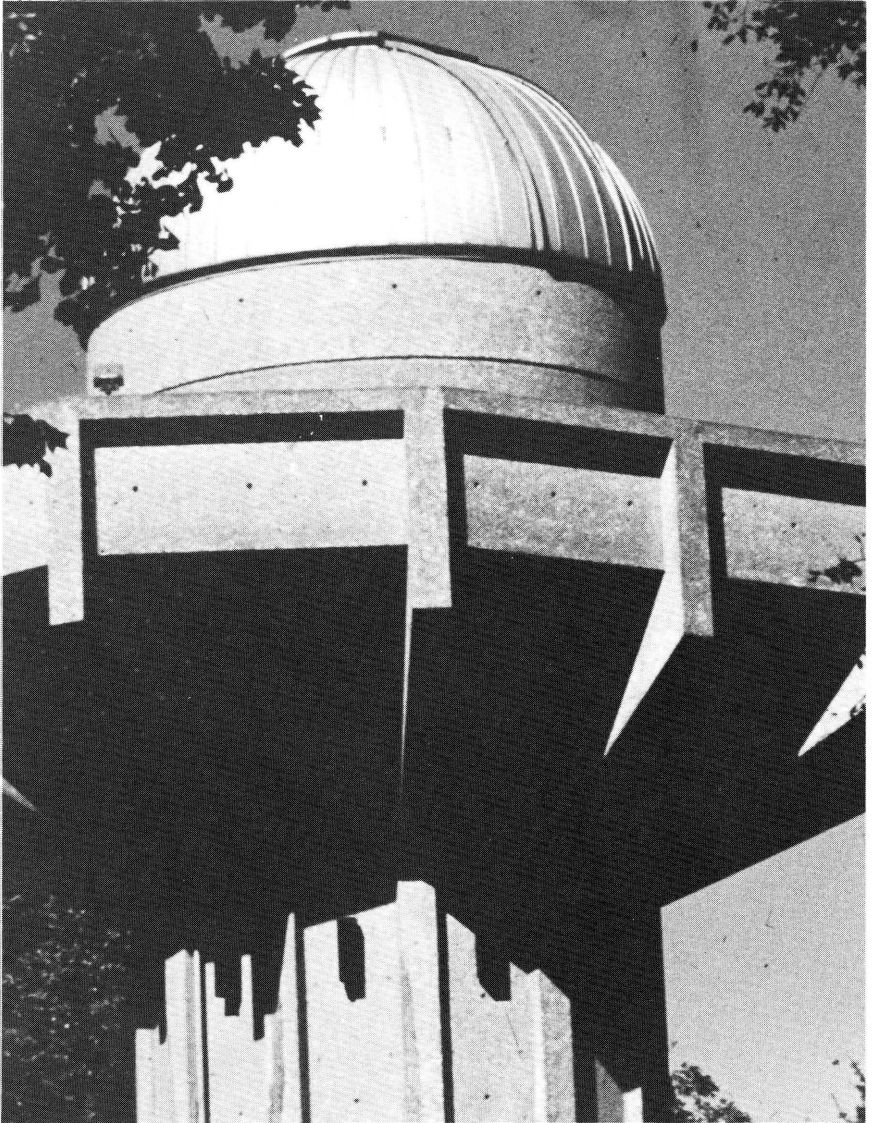
*This characteristic pose explains how chalk dust finds its way to a professor's chin!*





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*The John Deere Planetarium, which includes the Carl Gamble Observatory, is an impressive home for the Augustana College Astronomy program.*



## Foreword



**R**etired professors can sometimes render their college a unique service. They can place their careers in the perspective of a century or more as part of an unbroken tradition.

Harry Nelson, on the Augustana faculty from 1946 to 1988 as professor of mathematics and astronomy, has done just that for his college. As the title of his story indicates, the remarkable events of his years are in the tradition of astronomy at this institution. Augustana was founded by a graduate of the University of Uppsala who had to choose between a youthful interest in navigational aids and a theological calling. The college faculty has included teachers such as the humane Williamson and the brilliant mathematician Cederberg. To this tradition, Nelson added substance and lustre.

His account shows he was as happy in showing a planetarium program to wide-eyed school children as in viewing together with peers an eclipse of the sun from a jet plane above the earth's clouds. He has been very active in the community astronomy club (along with Carl Gamble) and in organizing an extraordinary seminar with Neil Armstrong and James Van Allen as star attractions supported by a cast of Augustana geologists.

We welcome this contribution as number 40 in the series of publications by the Augustana Historical Society.

Conrad Bergendoff



*Reverend Lars Paul Esbjörn, first president of Augustana College, suggested that an observatory be built on the Galapagos Islands.*

## *Astronomy Professors*



**A**lumni and friends of Augustana College boast of its high academic record and its continued stability of purpose over 131 years. Credit for these attainments focuses on the fact that Augustana has had very few presidents—seven to be exact. A similar pattern can be found in the astronomy program over 133 years (the extra two years come at the beginning when astronomy was taught by an Augustana professor before the College was founded!). Reverend Lars Paul Esbjörn, first president of Augustana, is well known for his help in founding the College, for his support of a struggling but growing synod, for his assistance in building churches, and for his teaching of theology to beginning pastors. What is not well known is his profound interest in all sciences, particularly astronomy, physics, chemistry, and mathematics. Among his papers he left a huge volume containing hundreds of pages of scientific data, problems, conjectures, and solutions. These are all written close together in English, Swedish, or French on page after page. He apparently gathered and analyzed the material for this book as a hobby. At one time he became interested in astronomical observations. He decided his data could be improved if they were obtained at an observatory located on the Galapagos Islands. He was convinced of this to the point where he contacted the governor of Ecuador regarding a commission to establish such an observatory. His request was not granted.

Reverend Esbjörn was offered the Scandinavian Professorship at Illinois University in Springfield. This was a college and seminary





*Reverend T.N. Hasselquist, second president of Augustana College, invited citizens of Paxton, Illinois, to join him in observing astronomical events.*

controlled by the Lutheran Synod of Northern Illinois, a body of congregations largely of German background, founded shortly after Esbjörn's coming to Andover, Illinois in 1849. Esbjörn accepted the appointment to this position in 1858 expecting to teach theology, but

he was assigned to teach chemistry and astronomy because of his deep interest in and knowledge of these subjects. In his report to the Synod over his first year at the University, 1858-59, he complained that eleven hours per week were devoted to instruction in chemistry, astronomy, and natural philosophy while only three hours per week were required for catechetics and Jewish antiquities. He continued at the University until the spring of 1860 when he resigned and moved to Chicago. He was followed by all but two of the Scandinavian students at Springfield. In June of that year the Augustana churches formed an independent body and established their own college and seminary.

The second president of Augustana College, Reverend T.N. Hasselquist, was also more than casually interested in astronomy. The following data are included in a report prepared by Commodore B.F. Sands, Superintendent of the United States Naval Observatory, Washington, D.C., entitled "Reports of the Total Solar Eclipse of August 7, 1869":

PAXTON, ILLINOIS    Second Station—three-fourths mile  
southeast of court-house

Observers—Professor T.N. Hasselquist, A.R.

Corwin, Rev. J.S. Harkey, \_\_\_\_\_, Student (S.H.)

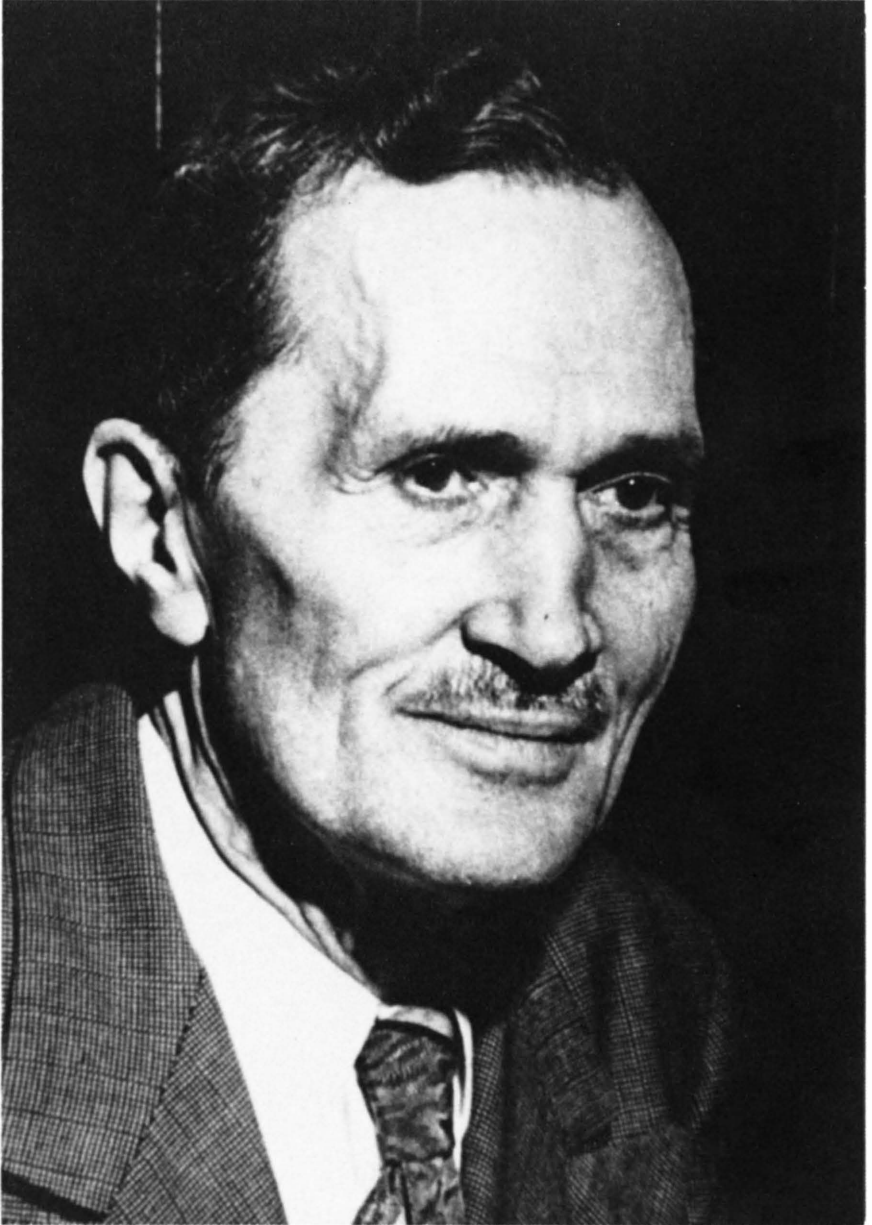
	Hrs.	Min.	Sec.	
Began	5	17	33	} Apparently original
End	5	18	13	

(No explanation is given as to why the student's name was omitted.) The Paxton data are due to the fact that Augustana was in Paxton from 1863 until 1875 when it was moved to Rock Island, Illinois.

The first formal course in astronomy at Augustana was introduced in 1884 by Andrew W. Williamson, professor of mathematics. He enrolled at Knox College in 1853, graduated from Marietta in 1857, and earned an M.A. at Yale in 1859. After serving in the Civil War he was engaged in teaching physics and history at the University of Minnesota. He came to Augustana January 29, 1880. His astronomy course was an elective and restricted to senior students in the fall term. Lectures were based on a textbook (Loomis' *Astronomy*) with "additional illustrations by methods of calculus." Some laboratory work

was required in that students were expected to operate a small telescope. Over the years Williamson updated the material, varied the number of credits given, and added required readings and examinations. The College catalog of 1902-1903 lists four courses:

*Dr. William E. Cederberg served Augustana for 51 years as professor of mathematics, astronomy and mechanical drawing.*



- 14a General Astronomy
- 14b Descriptive Astronomy
- 15 Historical Astronomy
- 16 Theoretical Astronomy

Professor Williamson was considered a little eccentric at times. Many true stories have been told about his growing up with the Indians and about talking to himself as he walked from building to building on campus. An equal number of false stories about his eccentric behavior have been told strictly for entertainment. Students marvelled at his amazing ability to find quaint illustrations to clarify abstract ideas. He may have been “over the heads” of his beginning algebra students, but they all loved and admired him as a real scholar, a man of integrity, and an extremely generous person.

Dr. William E. Cederberg, a former student of Williamson’s, was called to Augustana as Professor of Mathematics in 1902. In addition to his B.S. from Augustana in 1900, he obtained a Ph.B. from Yale in 1902, an A.M. at the University of Wisconsin in 1914, and the Ph.D. from the University of Wisconsin in 1922. He also pursued postgraduate work at Brown University (1902-03), at Goettingen, Germany (1903-05), and at Lund University in Sweden (1919-20). In contrast to his predecessor, Cederberg was a quiet, timid, and meticulous man. His diagrams on the blackboard and his penmanship on paper were works of art. He rarely referred to his notes and his lectures all seemed to end precisely at the bell. There was no end to his patience with his mechanical drawing and engineering students. In his later years he emphasized continually that his total contribution to Augustana was proficiency in the classroom with little or no public relations work. He earned the respect of his colleagues and students. Their admiration for him as a scholar expressed itself in a repeated rumor: “Dr. Cederberg is one of only ten men in the world who understands Einstein’s Theory of Relativity.”

Cederberg offered two courses in astronomy periodically until 1946 when I succeeded him in the mathematics department. I had been one of his students. Due to Cederberg’s outstanding success in one-on-one teaching situations, I recommended that he be retained as a part-time professor of mechanical drawing for many years beyond the normal retirement age. He retired to his native Sweden in 1953. In his personal letters he indicated his continued interest in the courses offered each quarter by the mathematics department and the number of



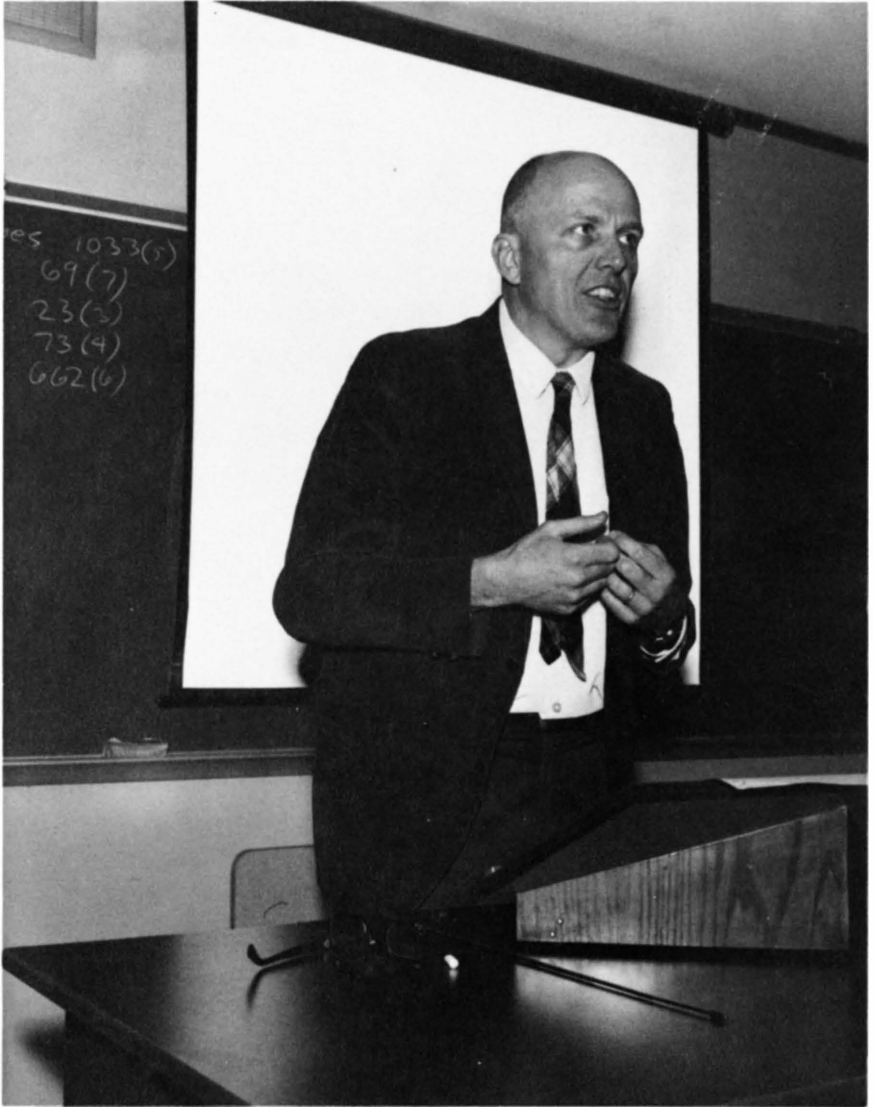
*Professor Andrew W. Williamson introduced the first formal course in astronomy at Augustana. Descriptions of his personality and eccentric behavior have given rise to many legends both true and false.*

Adolphus College, St. Peter, Minnesota. I earned the Ph.M. at the University of Wisconsin in 1941 and the Ph.D. at the University of Iowa in 1950. My dissertation for the Ph.D., *The Resistance of the Air to Stone-Dropping Meteors*, proved to be of interest to the United States military, and funds from the Office of Ordinance Research of the United States Army supported this study. During the late 1940's and

students enrolled in each course. He always concluded his letters with an expression of complete confidence in the work of the department he had served for fifty-one years.

My teaching experience included two years (1935-37) as instructor of mathematics at Cambridge High School, Cambridge, Illinois, five years (1937-42) as professor of mathematics at Luther College, Wahoo, Nebraska, and four years (1942-46) as professor of mathematics at Gustavus

early 1950's a fundamental question for the military had to do with what would happen to a high speed missile or man-made satellite when it collided with the earth's atmosphere. Since meteors travel at high velocities relative to the earth, they can be treated as simple unarmed missiles. Formulae had been developed earlier to account for the loss in mass and the resistance of air to small photographic meteors and also to the very large ones at the lower part of their path where the mass is constant. My equations are applicable to the entire trajectory of a meteor of any size.



*Dr. Edward Olsen of the Field Museum of Natural History in Chicago, Illinois, lectures on "Meteorites—A Poor Man's Space Probe."*



## *Search for Meteorites*

~

**M**y dissertation provided me with an interesting “spin-off”—that of searching for meteorites. Gathering data for this kind of work involved numerous interviews of persons who had reported the sightings of a bright meteor. Editors of local newspapers not only published requests for information from persons whomadethe sightings but also served as clearing-houses for these reports to be relayed to the Department of Astronomy at the University of Iowa in Iowa City. Each report contained the exact location of the observer, time of observation, point in the sky when first seen, point in the sky when last seen, and any strange noises. One can quickly determine a “preliminary path” and plot it on an ordinary road map. Appointments were made to meet the interviewees who lived close to this path. At the appointed hour I met with them and made careful measurements of angles and directions while each observer stood exactly in his reported location. Fine-tuning through the use of several additional interviewees gave the “adopted path” of the meteor. Final calculations provided a path which when extended to intersect the surface of the earth yielded an elliptical area in which a meteorite might be found. The final step would require a group of persons to line up shoulder to shoulder and walk through the elliptical area of some twenty-five square miles. It is estimated that one person can walk across a pasture of ordinary grass watching a strip twenty feet wide. This implies that one person would have to walk 264 miles to cover one square mile! The probability of success in such a search is not very high, but one is motivated by the

possibility of finding a “pearl of great price.”

An alternative to this exceedingly long walk—assuming that one is looking for a very large meteorite—is to use a helicopter and fly over the designated area hoping to spot a suspicious hole in the ground. A thousand pound meteorite will drive down to a depth of eight to ten feet depending upon the type of soil it may enter.

The Army furnished us with a helicopter in November 1952 to test the feasibility of a meteorite search from the air. Four days of flying were scheduled but inclement weather in South Dakota forced the curtailment of the experiment after a day and a half. It was found that by flying slowly at a height of two hundred feet an observer can watch a strip nearly a quarter of a mile wide in good terrain. If a suspicious stone or hole is seen, the helicopter can hover within three feet of the ground for a closer examination—or the helicopter can even land. No meteorites were found in the part of the area searched, but the interest of farmers and hunters was aroused. Samples of meteorites were shown to all observers and their many friends who accompanied them in their interviews. The general public is very interested in genuine meteorites and the stories behind their acquisition!

The Augustana meteorite collection is augmented by several specimens on indefinite loan from the Field Museum of Natural History in Chicago. While choosing these specimens from the extensive collection at the Field Museum, Dr. Edward Olsen, Curator of Mineralogy, stumbled over a large iron meteorite on the floor of the Museum. Irritated, he threatened to find a better place for “that object.” I immediately interjected, “I have a good place for it in Rock Island.” Olsen smiled.

On a later visit I learned that Olsen had three large iron meteorites which he wanted sliced for polishing and display. He had trouble finding a company with equipment large enough to do the job. I was sure Deere and Company in Moline, Illinois, had the equipment needed. I volunteered to make the necessary arrangements. A telephone call to A.B. Lundahl, vice-president of Deere and Company, assured us the meteorites could be sliced, with the explicit understanding that we supervise the cutting. Mr. Lundahl wanted no responsibility for any errors which might occur while working with “celestial material.”

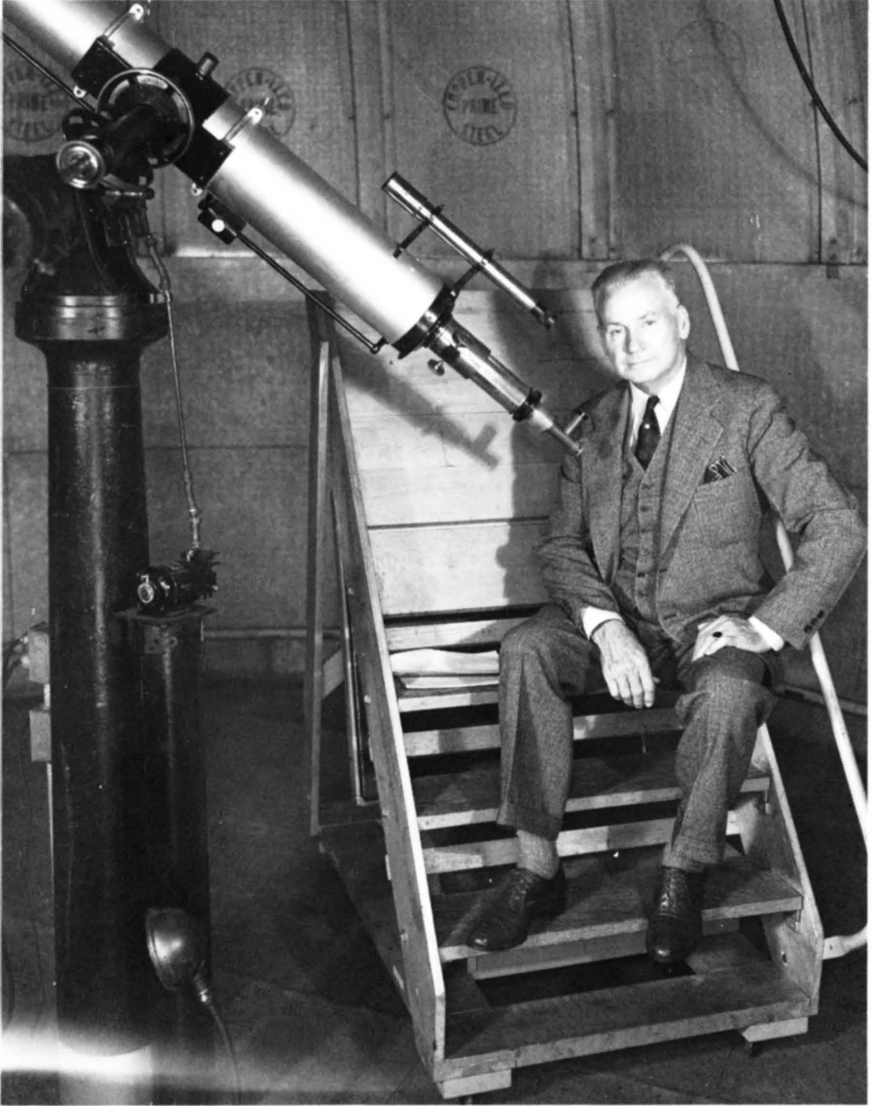
Several weeks later Olsen arrived with the three pieces for slicing.

Needless to say, the normal operation of the whole plant came to a standstill as the workers assembled to observe the procedure. The cutting went faster than anticipated and when the first two pieces were finished, it was clear that the third would be completed before the regular working day ended. The foreman expressed a concern that his boss, who was out of the city for the day, would be unhappy to have missed a full day of sawing meteorites. Olsen agreed to stay with us overnight and reported back to Deere the next morning to complete the job. Loaded and ready to leave, Olsen asked me if I remembered the large iron meteorite on the floor of the Museum. I did indeed!

“Why don’t you pick it up some time?” he asked.

The following week Mrs. Nelson and I drove to Chicago in the college pickup truck to transport the 556-pound Canyon Diablo meteorite. Thrilled with my “prize,” I detoured through Rockford to show my parents and their friends the latest acquisition for our collection.

One question remained: Why would the Field Museum permit the John Deere Planetarium to display this classic meteorite when every college and/or museum in the United States would be anxious to have it for display? Olsen’s answer was most interesting: “The Field Museum is a private museum and lives on foundation grants and contributions from corporations and individuals just as the John Deere Planetarium does. If we can feature an exhibit which serves a community of a third of a million people in the Quad-Cities area, we feel that this is good for our program also.”



*Dr. Carl H. Gamble, president of the Popular Astronomy Club, sits at the eye end of his 15-centimeter Zeiss Refractor Telescope.*

## *Carl Gamble and the Popular Astronomy Club*



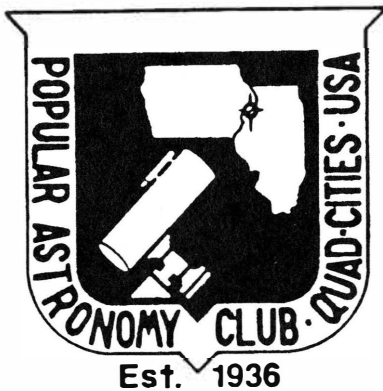
*T*he emphasis on science and technology after World War II, coupled with the development of the United States Space Program, led to a quantum leap in astronomical facilities at Augustana, culminating in the construction of the John Deere Planetarium.

How did Augustana College get these exceptional astronomical facilities? This is a question asked frequently by parents of students and other visitors to the campus. The answer begins on a clear moonless night 46 years ago in the fall of 1946 shortly after I returned to my Alma Mater to teach in the mathematics department.

I had just finished teaching an evening class and while walking home I pondered the question: "What special project shall I work for during my productive life at Augustana?" I knew that Augustana stressed then, as it does today, excellence not only in academic programs but also in developing the personality of its students. When I looked up into the moonless sky that night and saw the stars so clearly, I realized that Augustana did not afford its students an opportunity to look through a telescope. That was it! Augustana should have an observatory!

When I shared this idea with Dr. C.C. Wylie, professor of astronomy at the University of Iowa and my adviser for the Ph.D., he informed me of the fine observatory south of Moline, Illinois. SkyRidge Observa-

tory was owned by a well known retired John Deere executive and amateur astronomer, Carl H. Gamble. Mr. Gamble not only had an excellent observatory which he built on his spacious parklike property in 1941, but also was the sponsor of a very active Popular Astronomy Club which he founded in 1936. Before the observatory was built, the Club held its monthly observing meetings on a golf course in Moline, and the public was invited. Many members ground lenses and made their own telescopes. These instruments were exhibited by their owners who were more than happy to demonstrate their finished products to anyone who cared to look through them. Other members were skilled in photography and very successful in developing good pictures of astronomical objects. Carl Gamble received copies of the better ones and added them to his collection. In addition children were invited to join their parents and friends at these meetings. Over the years a special program was developed for these "Junior Astronomers," as they were called. Mr. Oscar Anderson of the Putnam Museum in Davenport, Iowa spent many years working with the young people, challenging them with routine events for beginners and special events for the advanced. The Junior Astronomers no longer exist since



*The Popular Astronomy Club logo designed by Paul Castle.*

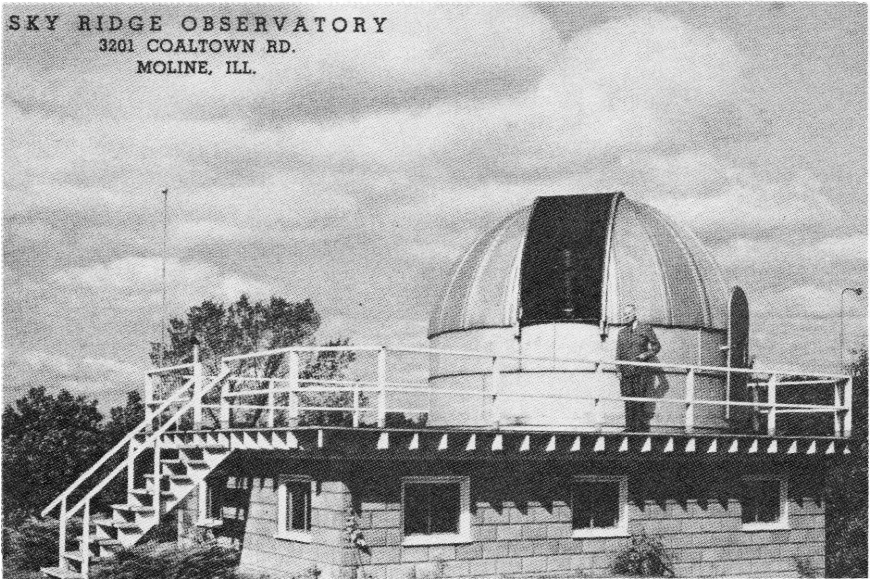
the public schools have incorporated astronomical materials into their regular science curriculum.

Carl Gamble's motivation to establish the Popular Astronomy Club can best be expressed in his own often quoted words: "The diffusion of knowledge can be placed secondary only to discovery. There is a shortage of interpreters; and in my small way, I feel I am able to serve as one of those interpreters." Astronomy was his hobby!

Gamble's original interest in astronomy began very suddenly. He was standing on the roof of the Pioneer Hotel in Tucson, Arizona with a friend. Through binoculars they were looking at the mountains. His friend remarked, "The Orion Nebula is beautiful tonight." Gamble had never heard of it, and when he focused in on Orion something

“snapped inside of me that set me going on this hobby of mine!” He could not wait to get back to Moline and get an armful of books from the library. After reading all of the astronomical books in the public library he decided to acquire a library of his own.

Gamble invited me to join him in the work of disseminating information in astronomy and offered me the position of vice-president of the



*Dr. Carl H. Gamble stands on the deck of the Sky Ridge Observatory ready to meet with an incoming group for a "Night Under the Stars."*

Popular Astronomy Club in charge of programs. For twelve years we worked together promoting the Club, sponsoring popular lectures by professional and amateur astronomers at both the college and observatory, attending and entertaining state conventions of the Astronomical League, and leading a total solar eclipse expedition to Cumberland, Wisconsin in 1954.

The Popular Astronomy Club sponsored an open guest night with its first paid speaker on October 13, 1938. The program featured Dr. George Van Biesbroeck of the Yerkes Observatory, Williams Bay, Wisconsin. To save expenses for the club the Gambles offered to entertain the guests in their home. Dr. C.C. Wylie of the University of Iowa, Iowa City, and Dr. C.M. Huffer of the University of Wisconsin, Madison also visited under similar arrangements in the early years of



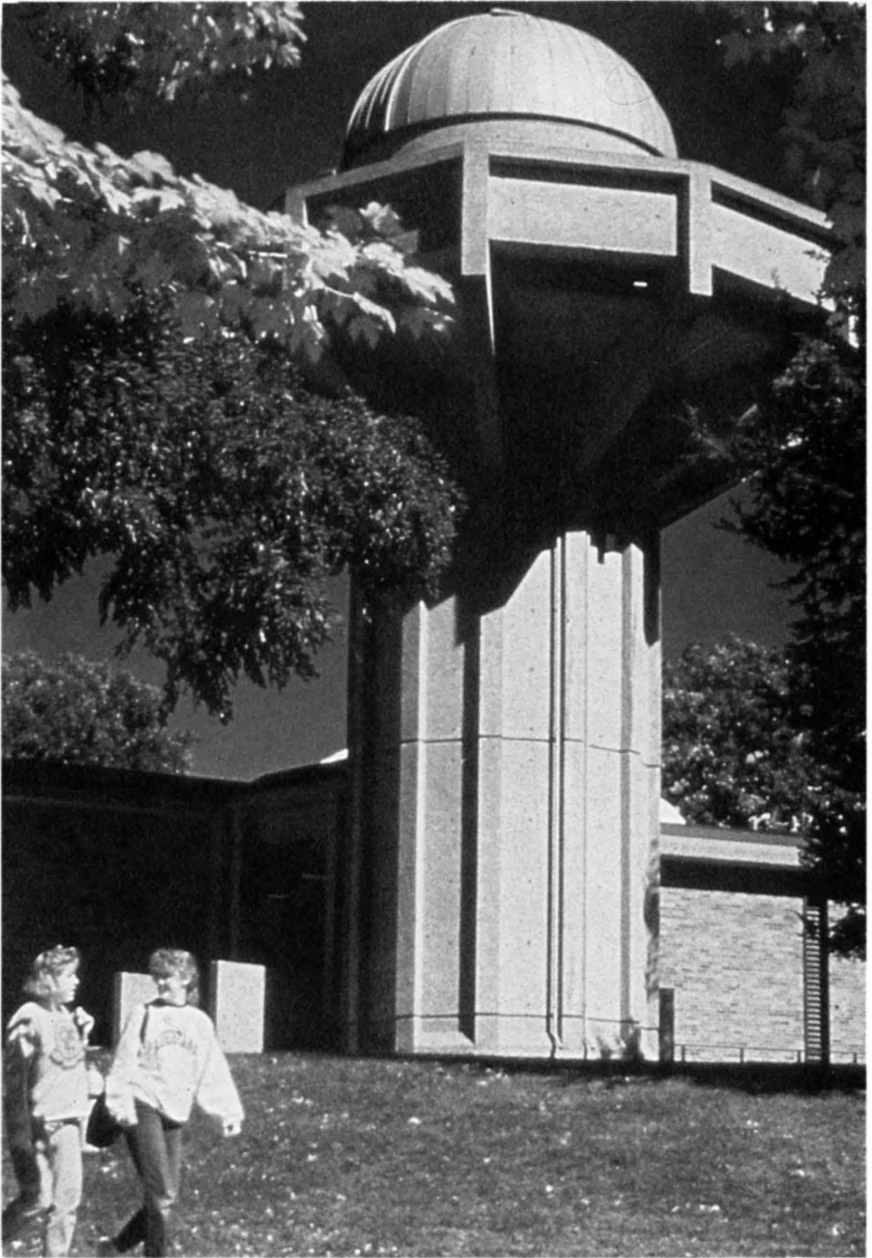
the Club. With financial assistance from the American Astronomical Society through its Visiting Scientist Program we were privileged to invite Dr. Seth B. Nicholson, University of California, and Dr. John B. Irwin, University of Indiana.

Our relationship with the invited scientists was most pleasant and rewarding. Great scientists with their celebrity status demonstrated quickly that they are ordinary friendly people. During a three-day visit each speaker gave a lecture in a science division meeting as well as several lectures in classrooms and for the general public. Opportunities for individual persons to meet and speak with the visitors were provided in an informal setting around a pot of coffee.

In the early 1950's Carl Gamble approached Dr. Conrad Bergendoff, president of Augustana, and confided to him, "Harry's ideas on popularizing astronomy coincide with mine. If I will my equipment to Augustana will you find a place for it on the campus?" Dr. Bergendoff answered in the affirmative and in accordance with Gamble's will the equipment became college property shortly after his death on January 25, 1958. Included in the materials at the Observatory was a hobby book which contained a summary of all the engagements which Carl had made as a result of his hobby. The list includes the date, place, topic, number in attendance, and a brief description of the audience reaction. From 1936 to 1958 he had lectured to a total of 81,589 persons. Note the entry in his hobby book for June 4, 1954:

"This date will stand out during the remainder of my life as the crowning Glory of my hobby career if not my entire lifetime. It was the occasion of Augustana College Convocation and awarding of diplomas and honorary degrees, at which time I was awarded the Honorary Degree, L.H.D., Doctor of Humanities. I was showered with praise and compliments of the highest degree for days after. Mrs. Gamble and I were included among those attending the luncheon at the Fort Armstrong Hotel at noon that day. A wonderful write-up in the local press including picture of Dr. Bergendoff handing me the degree diploma. Dr. F.M. Fryxell head of the Science Department presented the citation. What a day for me!"





*In 1970, the John Deere Planetarium was named winner of national architectural and international lighting awards.*

## *John Deere Planetarium*



**I**njoyed going to the Sky Ridge Observatory for a period of years. I soon discovered, however, that weather can be a real problem in the Quad-Cities area. Too many times a group had booked a night under the stars, waited excitedly for a month for the date to materialize, and then discovered an overcast sky at the appointed hour. More people were disappointed than satisfied. It became apparent that there was a real need for a planetarium with its instruments to simulate the sky for any position on earth at any time past, present, or future. One can view this sky free from all clouds and light pollution!

An Advisory Committee of the Popular Astronomy Club recommended to the Augustana College Board of Directors that a Carl Gamble Memorial Fund drive be undertaken to make possible the expansion of the observatory to include a planetarium when it was moved to the campus. Official action to accept the recommendation was taken by the College Board. Additional space was planned in the building for meeting rooms, lecturer rooms, and for the headquarters of the Popular Astronomy Club. Contributions to this fund were solicited and an annual Carl Gamble Memorial Lecture was sponsored which featured a professional astronomer. The entire project soon became part of an overall package as outlined in the Augustana Acceleration Program of the 1960's—a fund drive to generate ten million dollars to

be used for three main projects: expansion and remodeling of the Denkmann Library, a new physical education center, and a conversion of the former Seminary Library into a New Science Center coupled with a Planetarium Observatory.

Ground was broken for the John Deere Planetarium on June 19, 1967. Guests and friends of the college filled the courtyard immediately north of the building to witness the dedication program on a beautiful spring afternoon, May 2, 1969. C.W. Sorensen, president of Augustana, I as director of the planetarium, and Henry Newman, president of the student representative assembly, spoke briefly on the significance and potential of the new facilities. Following the Ceremony of Dedication, William Hewitt, chairman of Deere and Company, delivered the main address. He emphasized that the two institutions, Augustana and Deere and Company, had shared a common ideal of service to the community ever since both arrived in the Quad-Cities area at approximately the same time. His audience responded warmly when he suggested that they must continue to work together in the future just as they had for more than a century in the past.

The name of the building recognizes the pace-setting gift of the Deere Foundation and the leadership of many individuals within the Deere and Company organization. Mr. Elwood Curtis, president of Deere and Company, served as national co-chairman of the Augustana Acceleration Program. Included in the Deere Planetarium is the Carl Gamble Observatory which contains Gamble's 130mm Zeiss refractor telescope, a Spitz A-3-P projector instrument with auxiliary equipment, and the Getz-Rogers Gallery (a gift from two families) which features a collection of meteorites, astronomical models, stellar transparencies, and memorabilia of the United States Space Program. A special display case in memory of Claude E. Frankenburger, Rio, Illinois, one of the early "out of town" members of the Popular Astronomy Club, was given by Mrs. Frankenburger and her daughter, Mrs. Alvin Walgren. The 556-pound iron meteorite on indefinite loan from the Field Museum of Natural History in Chicago is a constant challenge for growing boys who expect to gather around it and lift this quarter-ton remnant of the huge meteor that formed the Barringer Crater near Winslow, Arizona about 25,000 years ago. A large science lecture hall accommodates 168 persons at fixed tables. The room is equipped with a demonstration table, projection booth, and built-in

audio-visual equipment. The lower floor has physics and geology preparation rooms and laboratories.

The contemporary look of the Observatory tower results from a small change in the original design to make the observatory deck more functional. The original concept was that the dome should resemble a golf ball on a tee with the circular observation deck surrounding the base of the dome. To accommodate groups of forty or more persons for constellation study, it was necessary to enlarge the deck area. In the opinion of the architect this change would make the building top-heavy. Responding to a suggestion, he revised the drawing by elongating the north and south portions of the deck and limiting the east and west portions to narrow walkways. This change meant additional strength had to be built into the tower, and the added steel gave rise to the ribbed structure in the final design. This ribbed structure gives the building a contemporary look and makes it a unique planetarium building. The president of Ashdome, Inc. commented: "We sell domes all over the world and the building on which each is installed is either a rectangular box or a cylindrical silo. The John Deere Planetarium looks very modern—and it is exciting!"

Representatives of the local architectural firm of Parkhurst, Appier, Marolf and Mogler were so pleased with their "first-ever drawings of a planetarium" that they submitted their plans in competition for architectural and lighting awards. In 1970, *College and University Business Magazine*, a national publication, judged the John Deere Planetarium to be number one in the category of College Science Buildings. It was chosen as one of sixteen winners from a total entry of three hundred academic facilities in five different categories. After surviving local, regional, and national levels of competition for interior-exterior lighting, the Planetarium was awarded top prize by the International Illuminating Engineers Society at Vancouver, Canada in 1970. A race track in Canada finished second and a cathedral in South America was judged third.



*The author with the Carl Gamble Observatory in the background.*



## *Visiting Astronomers*



*T*he general philosophy controlling the overall program of the Planetarium is based on two concepts: a popular presentation for the general public and a resource for the latest information available on astronomical topics and the United States Space Program. Carl Gamble insisted that programs for the Popular Astronomy Club be on a popular level. He did not appreciate a technical program for the general public. If a participant in a discussion began to sound off on technicalities Gamble very graciously cut him off with the suggestion, "You might like to discuss that interesting topic with Dr. Nelson." After the meeting Gamble would ask two questions: "Did you speak to the gentleman after the program?" and "Is it a technical subject?" If the answer to the latter were "yes," he would counter with "I thought so." If, however, the answer were "no" he would want to know if we could have a program on that topic in the near future. Today we continue to strive for this attitude in all our program planning designed for the general public.

Our success in becoming the astronomical resource for the surrounding community began with the fortunate circumstance that Augustana was a good place to be in the early years of the National Science Foundation. Institutes were sponsored and funded by the NSF under the directive that there be participants from all geographical areas in the

U.S. and that representation should come from large schools, small schools, private schools, state schools, and church-related schools. Here was Augustana in the middle of the country, a small church-related college with a strong science curriculum and its candidate for participation has a Ph.D. in mathematics and astronomy. As a participant in five different NSF institutes I became acquainted with mathematicians and astronomers throughout the United States. This opened many doors for me, the most important one being an opportunity to serve a two-year appointment with the U.S. State Department under its program of Technical Aid to Underdeveloped Countries. The assignment was to teach mathematics in the graduate school at the University of Indonesia at Bandung, Java, and to act as Director of the Bosscha Observatory.

Numerous astronomers from all over the world visited Bosscha Observatory, one of whom was Dr. Victor Blanco of the Warner-Swasey Observatory in Cleveland, Ohio. He came to Bosscha in 1959 to install a twenty-six inch telescope donated by Yerkes Observatory and funded by UNESCO. Blanco and I developed a very close relationship and upon our return to the U.S. we worked together to invite well known astronomers to our respective campuses beginning in 1960.

The invited astronomers comprise a veritable "Who's Who" in astronomy and space science: Harlow Shapley of Harvard University, a world leader in research on galaxies; Jason J. Nassau of the Warner-Swasey Observatory, Cleveland, Ohio, who discovered two novae; Frank Edmonson of Indiana University, whose interest was motions of stars and the rotation of the Milky Way Galaxy; Karlis Kaufmanis of the University of Minnesota and a native of Latvia, author or co-author of twenty textbooks in astronomy published in Europe; Bart Bok of the University of Arizona, an emeritus professor in constant demand as a research consultant and popular lecturer on the Southern Milky Way; James Van Allen of the University of Iowa, who discovered the radiation belt around the earth and was one of the leaders in unmanned satellite research, and Wernher von Braun, who was most prominent in developing rockets and manned satellites for the United States Space Program. Harlow Shapley, considered by his peers as "Mr. Astronomy," added a little human interest to his visit when, on the final night at a reception for him at our home, he asked for the privilege of

spending fifteen minutes alone with our three children before meeting with the invited guests. After fifteen minutes he emerged from the room smiling and expressing himself as “fully relaxed now” and ready to meet the guests.

I tried to add the name of Carl Sagan to this illustrious list. As we prepared for a year-long celebration of one hundred years of science teaching at Augustana, my colleagues encouraged me to invite Carl Sagan as a participant in this series of lectures. Carl Sagan was and still is the best known astronomer in the United States and serves as Director of Planetary Science at Cornell University in Ithaca, New York. He appeared frequently on the *Johnny Carson Show* which originated in California. I wrote a letter to Sagan asking if it were possible to pick him up at O’Hare Airport in Chicago on his way out to California (or on his way back) and thus include him on the list of scientists who have lectured on campus. Sagan answered immediately saying his doctor had advised him to curtail his speaking schedule. However, if we could raise \$10,000 he would be glad to arrange for an appearance at Augustana. Ten thousand dollars in those days would cover the entire Science Division budget for five years! Needless to say, the correspondence with Carl Sagan ended abruptly!



*Dr. James Van Allen of the University of Iowa listens as astronaut Neil Armstrong makes a point at the press conference during the "Seminar on Space Exploration" held on campus, February 10-12, 1972.*

## *United States Space Program*

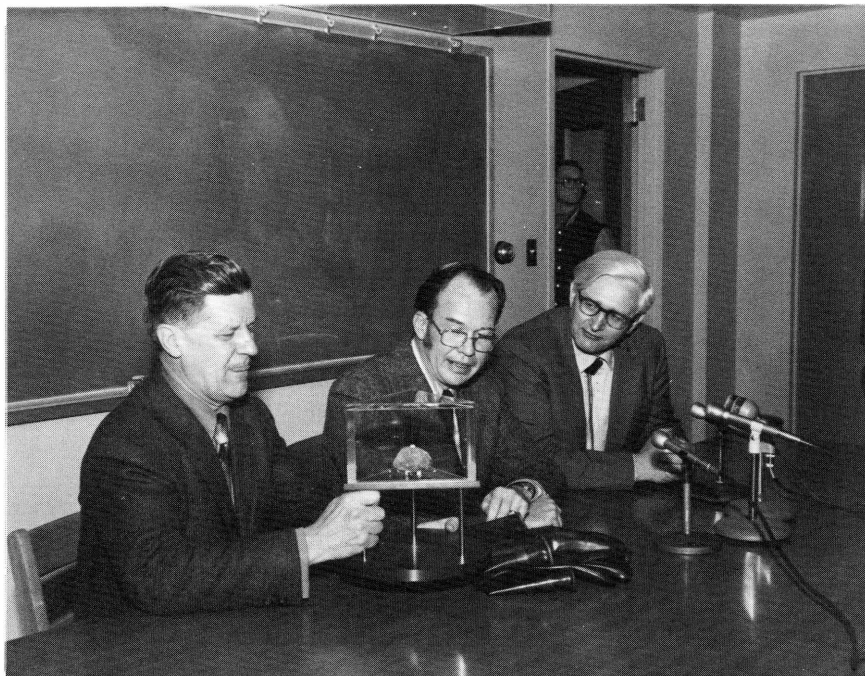


Concurrently the U.S. Space Program bloomed in the sixties. Opportunities to attend the launch of an Apollo Satellite at Cape Kennedy, Florida, were made available by NASA. At each of the three launches I attended we were briefed by scientists who described their equipment on board, explained what data they expected to collect, and concluded with a preview of what the next step would be. Following this briefing we were ushered to a grandstand seat about three miles away from the launch site to witness lift-off. In each case the roar of the engine and the resultant shaking of the earth beneath us seemed to announce the birth of a volcano or possibly a major earthquake!

The Apollo-Soyuz link-up added a political touch, but Apollo XVII, the only nighttime launch, was nothing short of spectacular. The rocket roared away with a brightness comparable to the Sun. Each minute thereafter the brightness dimmed in turn to a full moon, a bright planet Venus, a bright star, a dim star, and finally disappeared from view. A short “wrap-up” session with a summary statement of the current position of Apollo XVII ended our stay at the Cape.

The great public interest in the space program, together with the opportunity to hear world renowned astronomers, added up to a tremendous success for our local planetarium program. The capstone came during a three-day “Seminar on Space Exploration” held on

campus February 10-12, 1972. Featured were astronaut Neil Armstrong, first man on the moon; Dr. James Van Allen, America's leader in unmanned satellite exploration; Dr. Roald Fryxell, a 1956 Augustana graduate who examined the first moon rocks and helped stabilize the core sample drilled from the moon; Dr. Thor Karlstrom, a 1943 Augustana graduate who prepared geological maps of the moon for the



*The author and Dr. Thor Karlstrom listen as Dr. Roald Fryxell (center) identifies the particular moon rock on loan from NASA.*

astronauts, and Dr. Edward Olsen of the Field Museum in Chicago, a worldwide authority on meteorite research.

A moon rock (Apollo Lunar Sample No. 10020) was on display throughout the Seminar. During his public presentation Neil Armstrong revealed that the rock was one he had collected while on the Moon. He gave it a name: Bok-the-Rock. A fascinated audience listened intently while Armstrong focused on the genesis of a single rock as he described the evolution of the Earth-Moon system from the point of view of Bok-the-Rock. Bok is approximately 3.84 billion years old.

Before dissection and distribution of small pieces to scientists, it had an original weight of 425 grams (approximately .94 pounds) on earth.

The success of the Seminar made the Augustana Planetarium the space resource for a community extending roughly in a 50-mile radius centered on the campus. The staff offers lectures and field trips to school groups, provides information for the news media on all astronomical events, answers questions on the future plans of America's space program, promotes solar eclipse expeditions around the world, interprets many local UFO reports, and is frequently called upon to authenticate genuine meteorites. When an AP or UPI story comes over the wire the staff expects telephone calls from the media—TV, radio, and newspapers—asking for additional information: What does it mean for our community? Will it ever happen again? Has it happened before? Where should we look to observe the phenomenon? Will you observe it through your telescope?

Augustana is pleased with the response from the local community to the service it can provide. There is no charge for these services. As the first director of the John Deere Planetarium, I am grateful for the support of the college Board of Directors not only to provide the facilities but also for carrying out the program on an admission free basis. This is possible because of many donors—individuals, corporations, foundations, businesses, alumni, and friends—who have contributed, and continue to contribute, the funds which underwrite the costs involved.

Attendance at the Planetarium averages close to 10,000 persons per school year and of these 1500 are attracted by the Christmas show, "The Star of Bethlehem." Total attendance for the first 21 years of operation was just short of 210,000 persons.

The majority of the attendees are made up of elementary and secondary students from schools within a 50-mile radius of the campus who come to the Planetarium as part of a science field trip. Teachers are encouraged to make reservations and to suggest astronomical topics of interest to their specific groups. The final fifteen minutes of each session are reserved for questions from the students. In most instances the elementary students are encouraged by their teachers to write a "Thank-you letter" to the director of the planetarium. Some of these letters are priceless as they reveal not only the information absorbed during the hour but also the misinformation that infiltrated



the discussion. There was, for example, the sixth grade girl who was disappointed because she did not see the plants of the plant-a-tarium. A fifth grader wrote, "This was absolutely the best field trip we ever have had—especially when we stopped at Hardee's for a hamburger!" A fourth grader's letter follows:

*Dear Dr. Nelson,*

*I thank you for letting us look at the stars and all the planets and if any thing goes wrong, I have something for you. \* I am glad I didn't fall out of my sete.*

*Your friend,*

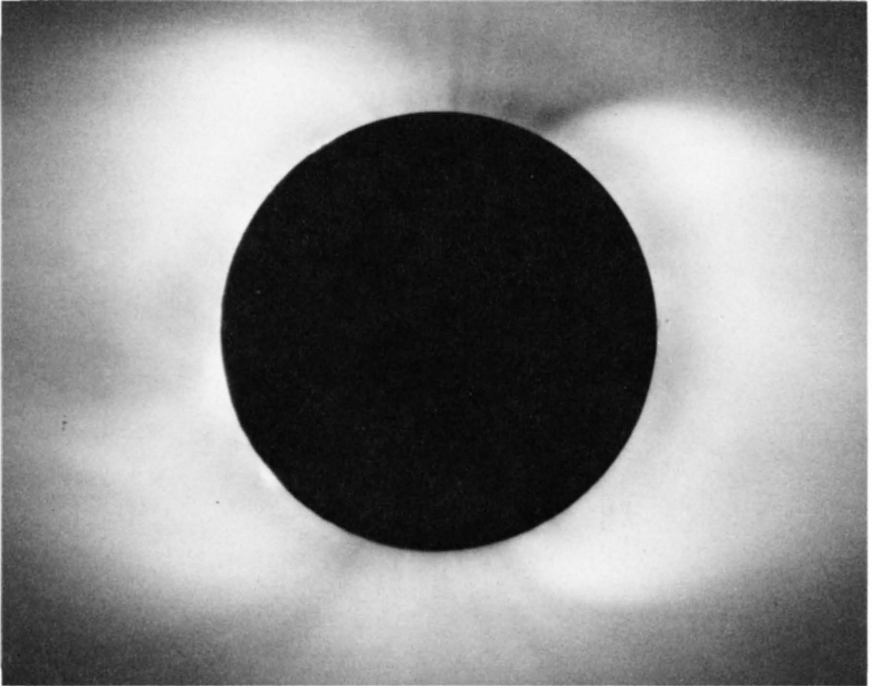
*Kris J. Hatfield*

(With masking tape she attached a nickel at the place marked by the asterisk above.)

The Popular Astronomy Club continues its programs and serves its membership through monthly meetings at the Planetarium. In addition the astronomy department offers annually a four-credit course (AS311) which attracts 25-45 students per year. In this class constellation study and observation of astronomical objects can be scheduled at any time, day or night, in the Planetarium. Observing sessions need not be postponed due to cloudy skies or inclement weather. Further, one can repeat a presentation over and over as needed and not have to wait for an exact date or a given situation to return in the real sky.

Astronomical literature is available in three areas: Office of the Director, Library of the Popular Astronomy Club, and the Augustana Library. There is a total of some 1250 items including books, tapes, NASA pictures of the Moon and Planets, and astronomical research papers. In addition a generous collection of older textbooks and popular books provides material for displays in the Getz-Rogers Gallery. The development of a given topic can be traced by comparing books of different years of publication. The most recent exhibit of this type showed how authors have treated the planet Mars from the early days of "Canal Theory" to the most recent pictures of the surface of Mars taken by the Viking satellites in 1976.





*The corona of the sun can only be observed during a total eclipse. Wendy Carlos, builder of her own equipment and a specialist in astronomical photography, obtained this prize winning photo on October 12, 1977 while on board the S.S. Fairsea in the Pacific Ocean.*

## *Eclipse Chasers Club*



**I** not only taught mathematics courses at all college levels and a four-credit course in descriptive astronomy, but also found it possible to enjoy a “professional” hobby—that of witnessing total solar eclipses all over the world. Starting in the early 1950s large groups of so-called “eclipse chasers” could be found. Amateur astronomers and other lovers of natural history formed groups to view a solar eclipse. One such group of sixty-five members from coast to coast was the Eclipse Chasers Club based in the Quad-Cities. Plans were developed years in advance to choose a place near maximum totality, to arrange for mobility if needed at a critical time, to enjoy cultural aspects of travel in foreign countries, and to plan for a forum where the results of observations could be compared and discussed. In more recent years the use of a chartered jet plane flying high above all clouds has not only guaranteed viewing the eclipse successfully but also provided the opportunity to extend the length of the period of totality.

The Eclipse Chasers Club demonstrated the feasibility of such a flight on June 20, 1974 over the Indian Ocean six hundred miles west of Perth, Australia. This first commercial eclipse flight not only proved to be the perfect answer to eclipse weather uncertainties but also added three minutes and nine seconds of additional totality.

The rarity of a total solar eclipse needs to be placed in perspective.

The solar system contains one sun, nine planets, at least 52 moons, and millions of small bodies such as comets, asteroids, meteoroids, dust, and gaseous particles. Seven of the planets have moons—some of them larger than the earth's moon, but most of them smaller. The remarkable fact is that *only* the earth's moon is just the right size and at just the right



*The logo of the Eclipse Chasers Club was designed by Horst Engel to show a total solar eclipse in progress, to call attention to the many attachments available for the telescope, and to illustrate that the club is under the direction of an astronomy professor.*

distance from its planet to “cover” the sun completely. Larger moons will blot out the whole corona; smaller ones will permit a ring of light around the moon. In either case we could not observe the corona. In other words, there is only *one place* within the confines of our whole solar system where a spectacular solar eclipse is available and that is right here on the earth!

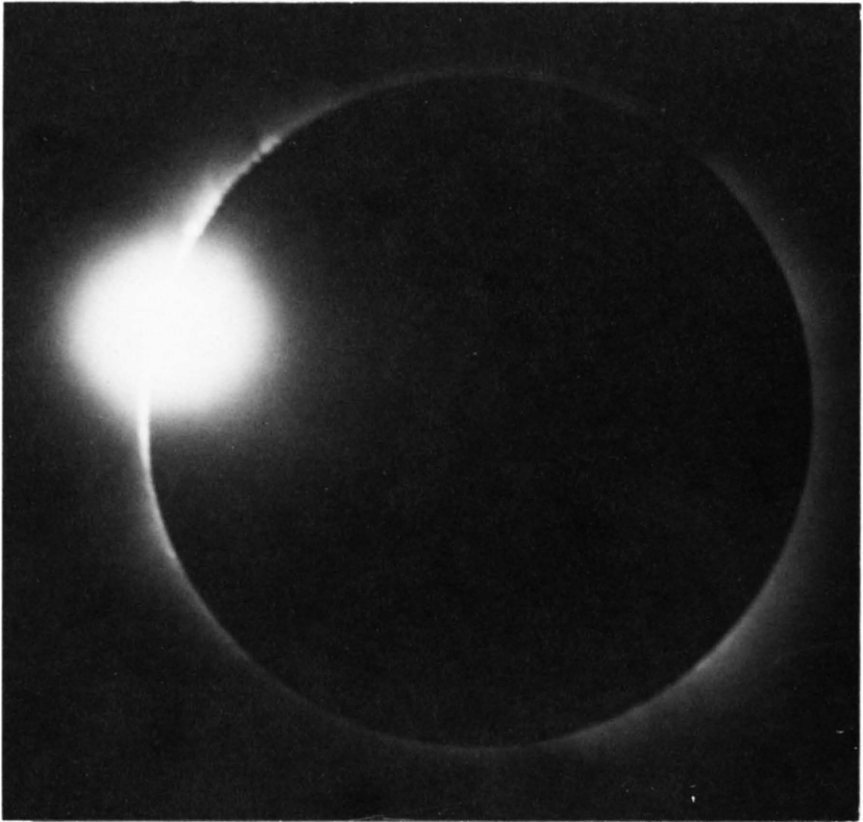
The rarity of a total solar eclipse is not the only motivation for amateurs and non-specialists. Some look upon an eclipse as the supreme challenge to their photographic skills. (Note the accompanying photo of the corona taken by Wendy Carlos, a professional musician from New York City. The diamond ring is courtesy of Janine Missimer, a travel agent in Los Angeles, California.) Others are engaged in gathering certain technical data—temperature changes, comets, meteors, structure of the corona, reactions of birds and animals—but most are content to view the eclipse as a pure aesthetic experience and to be thrilled by its awe-inspiring beauty.

As science consultant for the Eclipse Chasers Club I was responsible for choosing the place of maximum totality. Horst Engel, president of VIP Travel in Los Angeles, California then built a 15-day trip around that given date and place. He prepared brochures with schedules,

hotels, meals, cost, and other necessary details. On the evening before the eclipse I held a briefing to explain exactly what was to happen the next day and to answer any questions. At the end of this meeting each member would be ready for the main event.

The next day the group would assemble and board the bus which would get them to the selected place roughly three hours ahead of time. This would allow time for those who wished to set up special equipment. Those who did not have equipment could review once more that which was to transpire as the moon slowly moved across the face of the sun and they could “sneak a peek” through the instruments that were ready to go.

Observers are unaware of any unusual happening until about twenty



*The Diamond Ring was photographed by Janine Missimer during a total eclipse of the sun visible from Melbourne, Australia, on October 10, 1976.*

minutes before totality. The sky now begins to darken and with each minute thereafter the sky becomes noticeably darker. Flowers close up; chickens go to roost; bats fly out of buildings, bushes, and trees; birds are disturbed, and cows head for the barn. During these minutes one must not view the partially eclipsed sun without protective cover for the eyes.

About four minutes before totality there may be “shadow bands” seen moving across the landscape like ripples on a pond of water. These are not always present. In another minute the sunlight takes on an eerie color. Faces appear ghostlike with a pallor suggesting death masks! We can understand how primitive people might become frightened when such a scene appeared to them without a warning! Some people today who understand what is happening still heave a sigh of relief when these minutes have passed!

The fear is replaced by excitement as Bailey’s Beads appear. These Beads, made up of pinpoints of light sprinkled around the common limb of the sun and moon, are caused by sunlight shining through deep valleys along the profile of the moon. Six to eight seconds later we see one last bright point of sunlight on the limb of the sun as it disappears behind the moon. That bright point, coupled with the first glimpse of the inner corona, is appropriately named the Diamond Ring. For approximately ten seconds that diamond shines brilliantly—truly a rare and dazzling sight! Suddenly the diamond disappears and the outer corona flashes into view. It is now safe to observe with the naked eye until the partial eclipse returns. The corona is the outer tenuous atmosphere of the sun consisting of sparse gases extending in all directions from the apparent surface of the sun. The corona is a part of the sun and is there all the time; it can be seen only during the few minutes of totality, however. Each corona is different in shape but exhibits characteristic looped structures, radial lines, and reddish solar prominences which resemble plumes of feathers near the solar limb. The corona will vary in shape from almost a circle centered on the sun to an irregular elongated ellipse that extends for millions of miles out to four and five solar radii from the sun. Astronomers concentrate their research during an eclipse on the structure of the corona, hoping to learn from its shape the mechanism by which the sun and other stars continue to radiate energy.

Although our sun is just an average garden variety star, it is, at the same time, the only star close enough to the earth to appear as a disc and thus provide astronomers with details on its surface and atmosphere. All other stars are so far away that they can be seen only as pinpoints of light even when viewed through the largest telescopes. During totality the sky is as dark as it is at midnight. Planets and stars can be observed—also a comet if one is nearby. A map or diagram of the sky is prepared ahead of time on which the bright celestial bodies are plotted relative to the sun's position so instant identification is possible in the darkness. The temperature drops quickly—as much as 15 degrees in the first minute. This is especially noticeable if the observer is in shirtsleeves in the spring enjoying a comfortable 60-degree temperature, and suddenly the thermometer drops to 45 degrees. On the other hand, in the 90-plus temperature on board ship in the South Pacific, the sudden drop is balanced by the quick reradiation of the heat from the deck of the ship.

Totality ends abruptly and now we have the opportunity to review the earlier aspects of the eclipse as they arrive in reverse order. The diamond ring appears on the limb diametrically opposite from its first appearance. Bailey's Beads and the solar prominences again outline the limb of the moon and a tiny sliver of the sun erases the corona. The eerie pallor of light slowly gives way to the normal bright light of the sun, "shadow bands" may appear, and the eclipse is over.

All the events of interest to the scientist during an eclipse of the sun are not lost to the non-specialists. Amateur astronomers and non-scientists can experience the same exhilaration as their trained professional friends. In many cases amateurs can enjoy the phenomena more since they are spared the responsibility of supervising instruments. The human eye is the most marvelous instrument for viewing an eclipse and it functions automatically! Special cameras can be built to gather technical data better than the eye can, but the latter can not only "photograph" the bright inner corona and the thin tenuous outer corona simultaneously, but also can oscillate its concentration from one to the other, over and over again without checking light meters, f-stops, filters, or film!

The following is a list of the dates, places, and durations of totality of the solar eclipses I have witnessed over a period of 37 years:



Date	Place	Duration (in minutes)
1. 6/30/54	Cumberland, Wisconsin	2.5
2. 7/20/63	Dexter, Maine	1.7
3. 3/7/70	Greenville, North Carolina	3.3
4. 7/10/72	Cap Chat, Quebec, Canada	2.7
5. 6/30/73	Lake Rudolph, Kenya, Africa	7.2
6. 6/20/74	via plane 600 miles west of Perth, Australia	7.3
	(Lat. 31° 55' S Long. 102° 50' E)	
7. 10/23/76	Melbourne, Australia	4.9
8. 10/12/77	via <i>S.S. Fairsea</i> 1200 miles west of Los Angeles, California	2.8
	(Lat. 13° 42' N Long. 123° 7' W)	
9. 2/26/79	via plane over Winnipeg, Canada	4.7
10. 2/16/80	Taita Hills, Kenya, Africa	4.3
11. 6/11/83	Jogjakarta, Java, Indonesia	5.4
12. 7/11/91	San Blas, Mexico	6.5
	Total	<u>53.3</u>

The Eclipse Chasers Club confers the title of “Star” on those who accumulate 35 minutes and “Superstar” on those who exceed 45 minutes. The author leads the group at this date with his Superstar rating of 53.3 minutes!





*Reverend Henry Cox contributes a very rare Bloomington Meteorite to the John Deere Planetarium collection of meteorites.*

## *Recent Acquisitions*



**D**espite the careful planning preceding all programs at the Planetarium, there are some surprises! The most interesting unplanned activity at the Planetarium grew out of a routine appointment for a "Star of Bethlehem" show. Reverend Henry Cox, pastor of the Cambridge Methodist Church, Cambridge, Illinois, requested reservations for a group of his parishioners. A half hour later I noticed that the pastor was still looking at the meteorite exhibit in the Gallery. I approached Reverend Cox and said, "You must be more than casually interested in meteorites."

"I think I have one of those at home, but I am not sure," Cox replied.

"Bring it with you when you return with your group and we can soon determine whether or not it is a genuine meteorite."

Two weeks later Reverend Cox brought a small leather money bag which contained two pieces of rock that obviously fit together to form one piece. I identified it immediately as an authentic meteorite and at the same time noticed an unusual knobby structure of the specimen. I asked for permission to send one piece to the Field Museum in Chicago for analysis by Dr. Edward Olsen, curator of mineralogy and a worldwide authority on meteorites. The Bloomington Meteorite, as it is now known, is registered in the current Catalogue of Meteorites published by the British Museum of Natural History, which serves as

a clearing house for this type of information throughout the world. The Catalog lists one piece in the Field Museum and one piece at the John Deere Planetarium at Augustana College.

Reverend Cox brought the Bloomington meteorite to the Planetarium in 1973. Actually it was found in the summer of 1938 when he and his parents lived in Bloomington, Illinois. One Saturday evening while listening to the *Fibber McGee and Molly* radio program they heard a noise on the back porch. A search in the dark revealed nothing. The next morning Henry's father, Luther D. Cox, noticed a deep indentation on the second step. Close by were two pieces of rock which when placed together made one stone which had split on impact. The father gave the two pieces to Henry and suggested they be added to his rock collection. In later years as a pastor Reverend Cox had taken the "Bloomington" to summer camps and allowed the young people to see and feel a "possible meteorite."

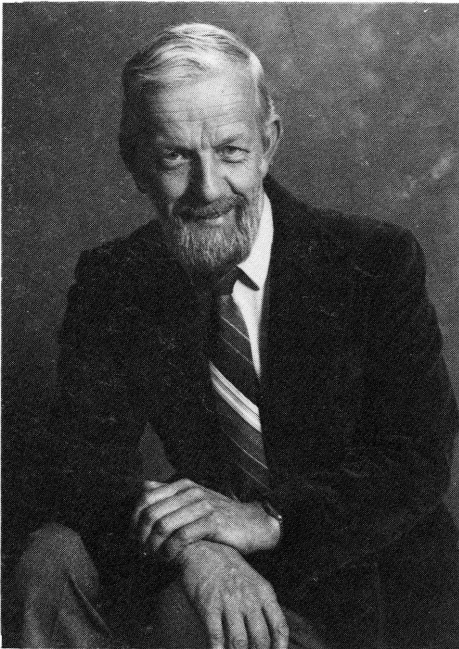
Dr. Olsen's analysis identified the Bloomington as a uniquely old rock—possibly older than our Sun! It is about the size of an egg, weighs 67.81 grams, and is only the seventh authentic meteorite to be found in the State of Illinois. Upon reading Dr. Olsen's report Reverend Cox was thrilled with the results. With tears in his eyes he presented the two pieces to me with the statement, "If it is as valuable to science as you say it is I don't *dare* to keep it!" One piece remains in the Planetarium while the second was traded to the Field Museum in exchange for a one and one-half pound stone meteorite from a larger mass which fell in Chihuahua, Mexico in 1865.

We have recently learned from a collector of Zeiss instruments manufactured in Germany before World War II that Gamble's telescope is one of the five largest Zeiss refractors available to the general public in the United States and Canada. There is a 300mm at Griffith Observatory in Los Angeles, California; a 250mm at Franklin Institute, Philadelphia, Pennsylvania; a 150mm at NASA, Greenbelt, Maryland; a 150mm at MacMillan Planetarium, Vancouver, Canada, and the 130mm at Augustana College, Rock Island, Illinois. The most recent acquisition at the Planetarium is a rare and valuable Carl Zeiss Jena UV Spectograph manufactured in the 1930's. It was designed for use at the Netherland's Observatory in Groningen, Holland and used there until light pollution forced abandonment of the site. A spectograph enables an astronomer to list the chemical makeup of a star or any other source

of light under study. He is also able to determine the velocity at which that object is approaching or receding from the earth. The spectograph will make an interesting additional display in the Planetarium.

When I retired as Director of the Planetarium in 1988, I was succeeded by a former student of mine, Dr. Melbert Peterson, who graduated from Augustana in 1953, earned an M.S. from Illinois in 1955 and a Ph.D. from Oklahoma State University in 1967. Under Peterson's leadership and with the cooperation of the members of the Popular Astronomy Club—particularly president Paul Castle—the Planetarium continues to serve the community through regular and special events.

Club members Arlene and Clifford Newman of Bettendorf, Iowa, have invited the members of the Popular Astronomy Club to their home



*Dr. Melbert Peterson, Director of the John Deere Planetarium, 1988 to the present.*

annually to view the Perseid Meteor Shower which occurs on August 11 or 12. A combination of no clouds, no moon, and a minimum of bright lights promises a clear dark sky against which members can count sixty or more meteors (shooting stars) per hour. These are sent to *Sky and Telescope* magazine, an international publication, and a full report on worldwide observations appears in a subsequent issue. It was at this routine event on August 11, 1982, that the Newmans revealed they had decided to name their new observatory "Harry E. Nelson Observatory"! I was stunned

and thrilled at the announcement.

A most recent special project was the Neptune Encounter of August 24-25, 1989. Coordinated by Club member Barry Ward, and assisted by Public Radio Station WVIK-FM Augustana College, arrangements were made to have the information from Neptune "down-linked"

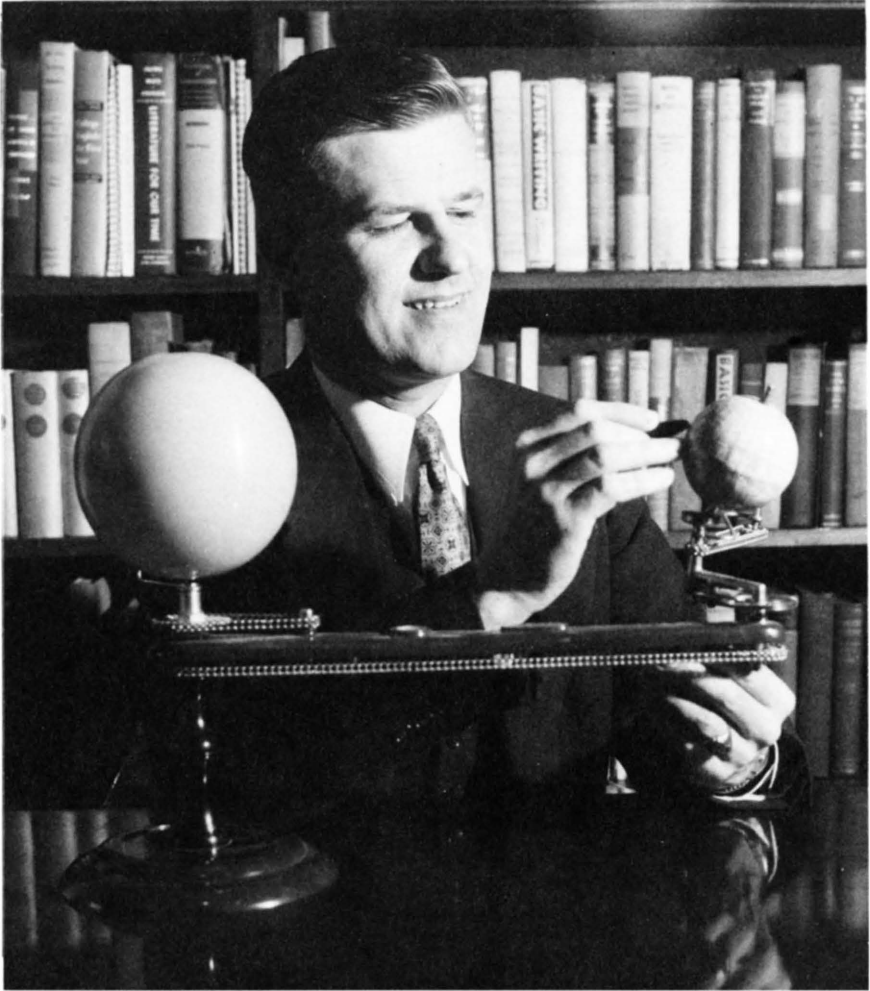
from the NASA Satellite as it gathered data from the planet Neptune. From a central point on campus the information was distributed to six different stations in and around the Planetarium where the general public could view these historic pictures displayed on TV throughout the night of August 24 and early morning of August 25. Dr. Peterson estimates that more than 2,000 persons attended this event.

Future programs of this type will feature astronomical events—be they a part of the NASA Space Program or an event of natural occurrence. It is anticipated that the Hubble Telescope and other scientific equipment launched by NASA will provide new information, clearer pictures, and a better understanding of the whole universe. In the spirit of Carl Gamble, Augustana stands ready to interpret that information and disseminate it among those residing in the surrounding community.

Carl Gamble is gone but the Quad-City community is grateful to him for the impetus his gift provided. He enjoyed a hobby called astronomy. Through it, he modestly claimed a little success in interpreting knowledge and disseminating information in the field of science. I cherish the memory of the years spent with Carl Gamble. I am indebted to Carl for the privilege of sharing his hobby with him and others as Carl intended it. From my little niche, I often reflect on the years spanning the time from 1946 through the early 1990's—years that began with a dream which I now see as a reality each day as I approach the John Deere Planetarium.







*At the invitation of Rock Island's WHBF-TV, Augustana sponsored "Augustana Presents"—a weekly show during the 1951-52 school year which featured academic departments and various activities on campus. Hosted by Dr. Donald Davis and produced by Clarence Meyer, the program continued for thirty-five years. The photograph above was taken during a rehearsal for the very first show.*

## Bibliography



*T*he early history of Augustana College is gathered from the official records of the College as published in the annual Catalogues, in the Minutes of the Faculty, and in the Minutes of the Board of Directors. Mrs. Judith Belan, Special Collections Librarian at the Augustana Library, has been most helpful in “discovering” references and photographs relating to the Chicago and Paxton years. Since most of this material is written in Swedish, I am indebted to President Emeritus Conrad Bergendoff for his help in translating these publications into English.

Interesting glimpses into the personalities of the first two presidents, L.P. Esbjörn and T.N. Hasselquist, are revealed in their annual reports to the Lutheran Synod of Northern Illinois. Dr. Fritiof Fryxell has summarized the facts and reminiscences regarding the early days of science at Augustana.

He notes that L.P. Esbjörn was profoundly interested in all sciences and studied these subjects throughout his life. From Commodore B.F. Sands we learn that T.N. Hasselquist availed himself of the opportunity to conduct a total solar eclipse expedition in 1869 which included not only students from the College but also residents of the local community.

Books on astronomy have been written at all levels of sophistication.

There are those of interest to only professional research astronomers and those written primarily for the general public. The following is a list of recommended reading for those who seek greater detail in the topics which have contributed to the astronomy tradition at Augustana.



*Commemorative Booklet: Seminar on Space Exploration. Rock Island: Augustana College, 1972.*

*Fryxell, F.M. Science at Augustana. Augustana Bulletin. Rock Island: Augustana College, 1922.*

*Meuss, Grosjean and Vanderleen. Canon Of Solar Eclipses. Oxford: Pergamon Press Ltd., 1966.*

*Nelson, H.E. The Resistance of the Air to Stone-Dropping Meteors. Rock Island: Augustana Library Publication #24, 1953.*

*Nelson, H.E. and E. J. Olsen. Illinois Meteorite Transactions. The Bloomington, Illinois State Academy of Science, Vol. 68 No. 4, pp. 403-408, 1975.*

*Pasachoff, J.M. Astronomy: From the Earth to the Universe. Philadelphia: CBS Publishing, 1987.*

*Sands, B.F. Reports on the Total Solar Eclipse of August 7, 1869. Washington D.C.: Government Printing Office, 1869.*

*Sebelius, S.J. Master Builders of Augustana; Rock Island: Augustana Book Concern, 1949*

### *Augustana Historical Society Publications:*

For more than fifty years the Augustana Historical Society has been publishing scholarly works on the history of the College and the Church and their contributions to American culture.

1. *T. N. Hasselquist: The Career and Influence of a Swedish-American Clergyman, Journalist and Educator* by Oscar Fritiof Ander, Ph.D. 1931. x, 260 pp. (out of print)

2. *The Early Missionary Work of the Augustana Synod in New York City, 1865-1866* by Gustav Andreen.

*The Iowa Synod's Attempt at Missionary Work Among the Indians, 1859-1869*  
by Henry F. Staack  
*Thomas Moran's Journey to the Tetons in 1879* by Fritiof Fryxell. (Out of Print)  
*The Historical and Cultural Background of Swedish Immigrants of Importance to their Assimilation in America* by Albert F. Schersten. (out of print)  
*Swedish-American Newspapers and the Republican Party, 1855-1875* by O. Fritiof Ander. 1932. 89 pp. (out of print)

3. *Augustana Book Concern* by Ernest W. Olson.  
*Christina Nilsson's Visit to Brockton, Massachusetts in November, 1870* by Evald B. Lawson. 1934. 96 pp.

4. *Early Life of Eric Norelius (1833-1862): A Lutheran Pioneer* Translation by Rev. Emory Johnson.  
*A Guide to the Material on Swedish History in the Augustana College Library* by O.F. Ander. 1934. 320 pp. (out of print)

5. *C. W. Foss; An Appreciation* by George M. Stephenson.  
*Diary Kept by L. P. Esbjörn, 1849.*  
*Reports to the American Home Missionary Society, 1849-1856.*  
*The Sources of the Original Constitution of the Augustana Synod.*  
*Early Letters to Erland Carlsson.*  
*Sources on the Revolutionary Europe* by George Gordon Andrews. 1935. 160 pp.  
*The Augustana Historical Society* by O. L. Nordstrom (out of print)

6. *Swedish American Library Periodicals* by G. N. Swan. 1936. 91 pp. (out of print)

7. *Letters Relating to Gustaf Unonius and the Early Swedish Settlers in Wisconsin* translated by George M. Stephenson. Assisted by Olga Wold Hansen. 1937. 91 pp. (out of print)

8. *The Problem of the Third Generation Immigrant* by M. L. Hansen. 1938. 24 pp. (out of print)  
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