



Spring 2002

# Lux et Lex: Volume 8, Number 1

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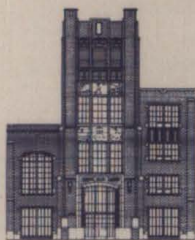
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## Recommended Citation

Slater, Sandy; Hanson, Curt; and Spaeth, Janet, "Lux et Lex: Volume 8, Number 1" (2002). *Lux et Lex*. 15.  
<https://commons.und.edu/lux-et-lex/15>

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# Lux et Lex

*"By the light of Knowledge we read the laws of life"*

Volume 8 Number 1

Chester Fritz Library, University of North Dakota

Spring 2002

## SCHJELDAHL THE PIONEER

What do bag-making machines and communication satellites have in common? Gilmore T. Schjeldahl. A plastics, adhesives, and circuitry inventor, Schjeldahl was known as "Shelly." His story may be Horatio Alger in nature, one of hard work, perseverance, and perhaps a bit of luck. More significantly his story is one of scientific genius and entrepreneurship. As one engineer scientist observed, Shelly possessed "the ability to look at a process or product and grasp its essence."

The Elwyn B. Robinson Department of Special Collections has recently acquired the business records of Gilmore Schjeldahl, in addition to over two hundred photographs. The Schjeldahl Entrepreneur Records have been fully processed and include annual reports, correspondence, sketch designs and patents, product samples, and publications.

Shelly's youthful inventor's inquisitiveness about how things work was honed in Northwood, ND. He frequented the blacksmith shop, power plant, farm machinery store, and newspaper. He built a static eliminator for the town's newspaper press and his family's first radio.

Shelly attended but never graduated from high school or college, yet he founded five companies and received 16 patents. Shelly's early employment and educational experiences all directed his entrepreneurship. He took courses in electrical machinery maintenance at the North Dakota State School for Science, after which he joined the Civilian Conservation Corps for two years as a drafting assistant. Beginning in 1937, Shelly continued coursework in chemistry, biology, and engineering at NDSU, where he met his wife, Charlene. He was drafted in 1943 and served in the infantry during World War II, participating in the Battle of the Bulge.

After returning from Europe, Shelly and his wife moved to Chicago where he worked for Armour & Co. researching resins for a lightweight plastic packaging material, polyethylene. Although it was tough, the material would not seal. Shelly and Charlene experimented on a solution in their kitchen, where they developed a hot knife-sealing process that cut and sealed two plastic sheets simultaneously.

Shelly continued his experiments after he left Armour in 1946 and moved to Minneapolis, eventually establishing a bag-making operation in his basement. What he initially produced were pickle-barrel liners using a foot-operated cutting knife. In 1948, this operation evolved into his first company Herb-Shelly, Inc., named in honor of his salesman who had lent him operating capital. Shelly's Farmington, MN thermoplastic manufacturing business eventually produced a variety of

polyethylene packaging materials and plastic bag liners. For instance, Shelly created the first plastic-lined airsick bag for Northwest Orient Airlines in 1949 (a bag is included in the collection).

In 1955, Shelly organized G.T. Schjeldahl Company in Northfield, MN, in another inauspicious location, the basement of a drugstore. He further developed his ideas and research with lamination and adhesives for bonding the then-new DuPont polymer called Mylar and his experimentation with atmospheric balloons. Shelly also continued manufacturing his uniquely

designed bag-making machines. From the beginning, the Schjeldahl Company was diversified. Initially, two departments emerged: the Mechanical Division manufactured packaging machinery and the Polyester Film Division developed adhesives and balloons.

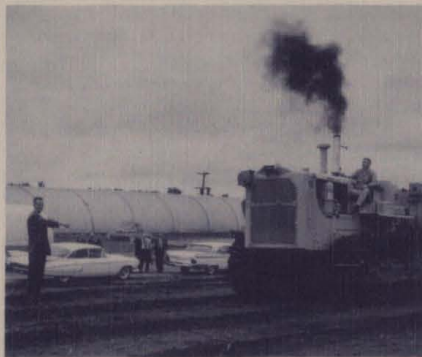
Shelly's discovery that created a revolutionary heat-sealing adhesive tape points to his genius. He found that his breath caused the surface of one of several resin samples to crystallize, becoming "less tacky and easier to handle." Shelly created an adhesive that provided polyester bonding of exceptional strength, in addition to

electrical insulation between electrical parts and printed circuits. The adhesive tapes were marketed as Schjel-Bond, which evolved into an extensive adhesive product line.

The Schjeldahl Company began engineering and fabricating high-altitude balloons in the early 1950's for the Office of Naval Research at the University of Minnesota. By 1956, the company had constructed forty Mylar balloons, the smallest 8 feet in circumference, the largest 500 feet. One balloon made from 0.00025 inch Mylar attracted national headlines when it reached a record altitude of 27 miles and traveled from Minnesota to Kentucky in three days.

Commercially, Shelly applied his plastic and adhesive expertise to build unique "Schjeldomes," which were air-supported plastic buildings. By 1962, his own 340 foot long "Schjel-Mile" factory had expanded into a 54 acre "Schjel-Town" consisting of two "Schjel-Miles," one 540 feet long, a general office and laboratory, and other small buildings.

The accumulation of research, experimentation, and testing of high-altitude balloons laid the foundation for Shelly's pioneering participation in the United States space race with the



Shelly at Schjel-Town Site



Soviet Union. The Russians launched *Sputnik*, the first man-made earth satellite, on October 4, 1957. The United States responded with *Explorer* three months later on January 31, 1958 and the race in the use and exploration of space was on.

On August 12, 1960, NASA launched G.T. Schjeldahl

Company's 100 foot *Echo I* Satelloon, at the time the largest man-made object ever sent into orbit, from Cape Canaveral, Florida. Larger than a ten-story building, it could be seen from earth and circled it every two hours 1000 miles out in space.

Fabricated from very thin polyester film vapor deposited with aluminum and sealed with a Schjel-Bond adhesive tape, *Echo I* acted as an electromagnetic reflector. As testimony to the durability of its construction materials, *Echo I* circled the earth

approximately 36,000 times for eight years sending radio and television signals back to earth, creating the first coast-to-coast transmission of a television picture in 1963.

NASA Administrator, Dr. T. Keith Gleman, described the importance of *Echo I* in Schjeldahl Company's 1960 annual report, "*Echo I* is one more significant step in the United States' program of space research and exploration. The program is being carried forward vigorously by the United States for peaceful purposes for the benefit of all mankind. This satellite balloon may be used freely by any nation for experimentation."

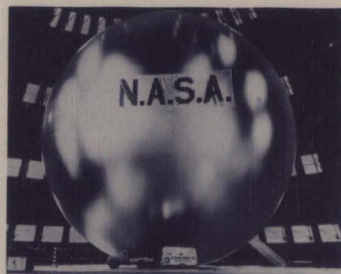
NASA launched Schjeldahl's *Echo II*, a 135 foot thirteen story high sphere of laminated aluminum foil on either side of thin Mylar, in 1964 from Vandenberg Air Force Base in California. Its purpose was "to relay the first American-Russian talks via space." Again, Schjel-Bond sealed the laminates and the "orange peel like sections" of the rigid communication Satelloon. Schjeldahl scientists developed optical coatings to control the surface temperature of the balloon's skin, initiating the Company's thermal control business.

*Echo II* orbited the earth for five years. A 1969 newspaper account suggested that "The two *Echo* satelloons probably have been seen by more people than any other man-made object ever created, including the Great Pyramids, the Taj Mahal, or the Brooklyn Bridge."

Besides pioneering *Echo I* and *Echo II*, the Schjeldahl Company fabricated other balloons. *PAGEOS* (Passive Geodetic Earth-Orbiting Satellite) was launched in 1966 to provide information for remapping the earth. This satellite orbited twice as high as either *Echo* satelloon. *ROSE* (Rising Observational Sounding Equipment) was a free-rising super pressure balloon that detected meteorological phenomena. Heavy-load balloon systems designed to carry telescopes and other instruments were developed for the Stratoscope and Stargazer programs.

Shelly resigned as Chairman of the Board in 1966 to establish the Gil-Tech Development Company, although he remained on the Board and continued as Schjeldahl's major stockholder. Gil-Tech continued Shelly's packaging interests. The company developed systems-related packaging machinery to manufacture molded plastic containers using the blow molding process and

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*Echo II* dwarfs a Schjeldahl truck

## ARCHIVES ON THE WEB

The Internet and the World Wide Web have revolutionized the ways in which archives "get the word out" regarding their manuscript holdings. In the past, archives primarily relied on printed guides, which provided very brief introductions to manuscript collections, often no more than several paragraphs. Archives also relied on word of mouth recommendations between users, footnoted citations in scholarly publications, and public outreach presentations.

The Internet allows archives to disseminate much more detailed collection information today than was previously possible. Since 1999, the Elwyn B. Robinson Department of Special Collections has steadily been placing inventories of its collections in the Orin G. Libby Manuscript Collection on the Web. The result is that researchers across the globe can visit the Special Collections web site and search through detailed collection inventories. An expectation of access to an ever greater amount of information is a user trend seen in archives throughout the country.

The genesis of this process was a Library Services and Technology Act grant from the North Dakota State Library. The Chester Fritz Library's Special Collections and Cataloging Departments worked in tandem to place inventories of Women's History Collections onto the Web, and to create collection level bibliographic records. These records were then added to ODIN, a statewide library catalog, and two worldwide library databases, OCLC's WorldCat and RLIN's Archival Resources. Each library record contains a hyperlink that takes the user directly to the appropriate page on the Special Collections website.

Both Departments have continued their partnership beyond the end of the fifteen month grant. Besides women's history, collection information related to a number of subjects, including agriculture, business, education, exploration, genealogy, Grand Forks history, the law, literature, maps, military history, Native Americans, politics, religion and the University of North Dakota have been added. Presently, the web site offers a total of 221 inventories, with more added on a weekly basis.

In selecting inventories for inclusion, Special Collections identifies those manuscript collections which are used frequently, those which can be converted to HTML (HyperText Markup Language) with a minimum of enhancement, or those which are likely to see an increase in use following their conversion to HTML. To date, the Department has converted a number of its critical inventories, including the papers of William Langer, William Lemke, Usher Burdick, Maxwell Anderson and those for the North Dakota-Montana Wheat Growers Association.

Many inventories were created years ago and require significant revisions in content and format. More detailed biographical or historical sketches, scope and content notes, and box and folder listings are created, and any audio-visuals are also noted. The enhanced inventory is then converted to HTML and uploaded to the Web. Key words are assigned to each inventory, which facilitates better retrieval on standard web search engines, such as Yahoo, Google and Lycos. E-mail also allows researchers around the country to contact the Department directly, to ask specific questions or have photocopied materials sent to them.

The result is a blending of the traditional means of outreach, with the possibilities and potentials of the digital age. It is now easier to access collections of primary historical materials than it has ever been.

Web address: <http://www.und.nodak.edu/dep/library/Collections/spk.html>

Curt Hanson, Assistant Archivist, Special Collections

## EARLY HONOR, ACHIEVEMENT, and RECOGNITION

Institutions of higher learning do not realize a national reputation upon establishment. Recognition is not automatic. Founded in 1883, less than thirty years were required for the University of North Dakota to earn national achievement. Between 1910 and 1914, the University was recognized by the United States Bureau of Education and the North Central Association of Colleges and Secondary Schools, and its Medical and Law Schools were approved by their respective national associations.

Phi Beta Kappa recognized the academic achievement of University of North Dakota students in 1913 when the prestigious national honor society granted UND a charter, first applied for in 1908. Spring 1914 witnessed the official installation of "Alpha Chapter of the Phi Beta Kappa Society in the State of North Dakota." That year ninety alumnae were elected Foundation Members, including Cora Smith from the first graduating class, in addition to nine regular members.

Two years later, the Mu Chapter of Sigma Alpha Iota, an international music fraternity for women, was established at Wesley College in 1916. Mu Chapter hosted the SAI national convention seven years later in 1923. "Music lovers of Grand Forks" were entertained by the delegates' public concert and a twilight musicale. When the music departments of UND and the College combined in 1953, the fraternity was chartered to the University. The Greater Grand Forks Alumnae Chapter was established in 1968 by many active and well-known community musicians.

The genesis of many of today's campus honor societies began in the 1920s, which observed an upsurge in honorary society charters. Although each had a focus specific to its particular discipline, all recognized and encouraged scholarship, leadership, professional standards and principles, research, service, and fellowship. The Department of Special Collections holds the historical records of many of these organizations, in addition to those of Phi Beta Kappa and SAI.

The 33<sup>rd</sup> chapter of the International Society of Sigma Xi was chartered at UND in 1920.

Sigma Xi's motto, "Companions in Zealous Research," reflected its encouragement of faculty original investigation in pure and applied science and student "aptitude for scientific research." Two annual Sigma Xi Prizes honored undergraduate and graduate reports of original research.

The Gridiron, composed of the most active members of the Press Club, organized in 1920 with the explicit intention to petition Sigma Delta Chi, a national journalism honor society for a charter. It did so in 1921 and the eleven Gridiron petitioners became charter members of the North Dakota Chapter. The chapter was instrumental in establishing journalism as a professional University course and separate department and a Board of Control for student publications. It changed the bi-annual publishing schedule of the *Dacotah* to an annual and the weekly publication of the *Dakota Student* to twice a week. In 1925, the chapter conceived the Flickertail Follies. The student variety show, offering auditioned acts, became a spring tradition through the early 1960s.

Also in 1921, eleven members of Matrix and the Press Club,

petitioned Theta Sigma Phi, a national honorary society for women in journalism. Their petition was denied until 1946 when members of Matrix petitioned again for a charter. Their petition was accepted and the Beta Alpha Chapter was installed in 1947. Matrix published a humor magazine, *The Lily*, distributed at the Carney Song Contest, and sponsored the spring Shadow Ball, to which 100 outstanding women students were invited.

Another local honorary society reorganized in the 1940s. Nu Delta Pi, established in 1926, became the Alpha Epsilon Chapter of Phi Upsilon Omicron, national home economics honor society in 1944. At that time, the chapter boasted membership of the presidents of the senior class, Y.W.C.A., senior cabinet, Matrix, Mortar Board, and Sigma Alpha Iota, among others.

Mortar Board, a national honorary and service organization for university seniors was founded expressly for women. Men were not allowed to join until 1976. UND's Quo Vadis local chapter was installed in 1932 with the financial assistance of many other campus organizations, ten years after it had established itself. Mortar Board's 1933 annual report reflected the times, indicating that dues were its only means of financial support. Fund-raising benefits were discouraged because of "a very difficult year, financially in North Dakota." In fact, "the introduction of 'free' informal dances was necessary if any University social life was to be maintained."

Thirteen men met in 1926 to petition the Blue Key National Honor Fraternity for a charter. The UND local chapter, however, was not formally installed until 1952 and women were initiated beginning in 1975. Besides sponsoring a variety of activities for the student body, the service group assisted in procuring and arranging for the display of Carl Ben Eielson's parka. Eielson, 1921 UND grad and famous aviator, is remembered for his 1928 flight over the North Pole. Eielson died in 1929 on a rescue mission in the Bering Strait. His parka is exhibited still in Merrill Hall.

Padeia was the predecessor of the Alpha Theta Chapter of the national educational fraternity, Phi Delta Kappa, whose purpose was to promote the scientific study of education and the welfare of men in education. As with other chapters, Padeia was formed on the local level specifically to join its national society. After two years of existence, it was installed in 1924.



Delta Phi Delta, 1924 *Dacotah*

Delta Phi Delta is the oldest national honorary art fraternity. The Kappa Chapter was organized at UND in 1922. The society sponsored art exhibits and talks concerning art and architecture. Paul Barr, Art Department Head from 1928 to 1953, served as the first vice-president of the national society for two years. One early chapter project illustrated a 41-page

publication entitled *Indian Legends* in 1929. Interestingly, it was dedicated to Barr's father-in-law, Dr. Orin G. Libby, Chair of the History Department and editor of the *Collections of the State Historical Society of North Dakota*, from which much of the text was taken.

Today we realize the contributions of these honorary societies to UND scholarship, research, leadership and campus life in general through their historical records, which are preserved in the University's Archive. Ever mindful of its charge, the Archive continues to seek the records of other UND honorary societies, or additions to existing collections. Special Collections may be contacted at (701) 777-4625.

Sandy Slater, Head, Special Collections



## CHILDREN'S COLLECTION

When the Department of Library Science and Audiovisual Instruction closed in 1995, the departmental library was moved into the Chester Fritz Library, where it quickly became a valued part of the academic book collection.

Many of the reference books were absorbed into the general book collection, but the substantial children's collection was kept separate and is currently housed on the third floor of the Library. The books are all catalogued using the Dewey Decimal system, rather than the Library of Congress classification system used by academic libraries, because children's books in public and school libraries are catalogued using the Dewey Decimal system.

The children's collection is purposely planned to mimic the kinds of collections that both school and public libraries hold. You might find a Sweet Valley High paperback next to a Newbery winning hardcover book. This variety represents the world of young readers, who appreciate a thought-provoking novel as well as a television tie-in.

The non-fiction section includes books written for children, as well as some curriculum material that relates to children's literature. These items encourage potential teachers to integrate children's books into the classroom experience. A few young adult books are also in the collection, from classics such as Maureen Daly's *Seventeenth Summer* to Louis Sachar's innovative and award-winning *Holes*.

New books are added annually, selected by a librarian with a specialty in children's books, with input from the education departments on campus. Factors such as artistic and literary merit are weighed in selecting books that illustrate the variety and excellence of children's books today. Multiple copies of Newbery and Caldecott winners guarantee a continuing presence in the collection, and other award winners are carefully evaluated, too. Also considered is the importance of a given book as a cultural artifact: does it display some characteristic that makes it important within its time? Will it tell teachers-to-be about the society that promoted this book? What does it say to those future teachers?

An effort is made, too, to keep the classics readily available, so multiple copies of well-loved and frequently read books such as *Charlotte's Web* by E. B. White and Laura Ingalls Wilder's *Little House* series are kept on the shelves.

Children's books are frequently controversial, and it is important for education students to have access to these books. Students can have their first introduction to such books and the experience of a book challenge in the controlled environment of the classroom. These books allow students to evaluate the controversial material themselves, determine how to establish a basis of a collection policy, and learn the standards of intellectual freedom as defined by the American Library Association. For these reasons, the collection includes books that have had challenges.

Some of the books have been purchased through memorial funds, celebrating the lives of those who have had an interest in children's books. Such books are plated with the honoree's name. Particularly near to the Library's heart are those selected and plated with the name of Mayumi MacGregor, who worked in the Access Services Department. "Moni," as we knew her, truly enjoyed children's books. She was a much beloved employee and, when she passed away, employees of the Library collected funds to purchase many books in her memory. Others have similarly been honored by

family members or friends.

Most of the collection's users are students in Children's Literature classes, although other classes have utilized it in the past. Anyone with a valid UND library card is welcome to check out books from this collection, and many students have found this a convenient way to find reading materials for their own children while they're selecting books for their research.

The presence of the children's collection in the Chester Fritz Library supports the curriculum of the education departments at UND and is an indication of the Library's support of the learning programs across the campus.

Janet Spaeth, Reference and Research Services

### Schjeldahl continued from Page 2

computers to control the systems. As a complement to Gil-Tech Shelly created the Plastic Netting Machine Company in 1970, which developed and produced devices for filling Gil-Tech's rigid plastic containers.

In 1974, G.T. Schjeldahl Company changed its name to Sheldahl, Inc. to simplify the spelling. This had not been the first spelling name change. Shelly's immigrant grandfather changed Skjeldahl to Schjeldahl for easier pronunciation. In 1975, Sheldahl built the bioshield containers for the two *Viking* landers sent to Mars.

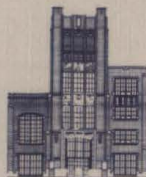
After a heart attack in 1978, Shelly founded his fifth company, the Cathedyn Corporation. Always inquiring, he collaborated with his physician to improve coronary angioplasty catheters. Cathedyn was bought by Angiomedics, Inc., a subsidiary of Pfizer, Inc. in 1983.

Gilmore T. Schjeldahl died on March 10, 2002, in Lenox, Massachusetts. His contributions to the country's space program and our everyday life have been enormous, whether they be thermal control materials for the space shuttle, or automobile air bags and antilock brakes, window shades for airplanes, or flexible circuitry for children's toys, to list but a few. The wealth and diversity of the Schjeldahl records document these contributions, and more. They document the creativity, curiosity, and the life of the inventor.

Sandy Slater, Head, Special Collections

*Lux et Lex*

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