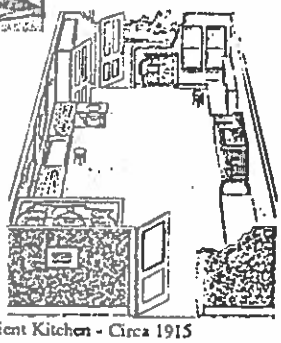
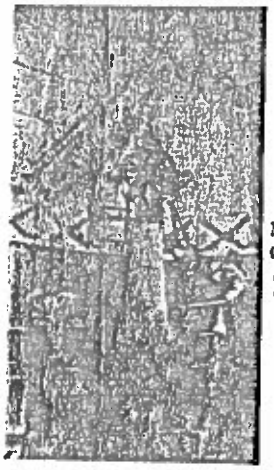
Women of

Catharine Beecher - Circa 1845
Courtesy of the Schlesniger Library, Radcliffe College



Perspective of an Efficient Kitchen - Circa 1915
Courtesy of Eli Whitney Museum

Catharine Beecher's plans for opening a finishing school for young women sparked her interest in the home as an efficient workplace. She was one of the first to design kitchens with cabinets & shelves and cross ventilation.



Maria Mitchell in her Observatory - Circa 1847
Courtesy of the Vassar College Library

Women Working in a Textile (Silk) Mill at Paterson, N.J. - Circa 1914
Courtesy of the U.S. Library of Congress

After the Industrial Revolution women began to break into the work force for the first time in American history.

Editors Note: *Physical characteristics are sometimes important to how well a person performs a job. A large strong person could work well as a forester cutting down trees for a living. A smaller person might be better suited for repairing modern vehicles because of the many tight areas common in todays carefully-designed automobiles. An aircraft pilot requires good eyesight. While a surgeon may need long thin fingers to more easily handle delicate surgery. In the same respect, in many cases physical attributes have very little to do with how well a person can be expected to perform at a specific job task. In the past some people have believed that simply because of their sex, women could not satisfactorily work as scientists, engineers or technologists. That assumption has been proven completely false. Unfortunately, because of those early beliefs, there are few well known females from our technical past.*

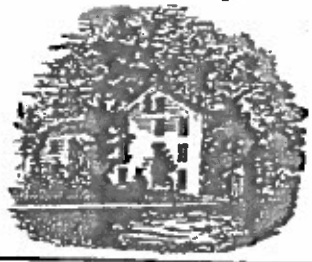
This article, written by Dennis Karwatka of Morehead State University, is intended to introduce to you some of the many outstanding female technologists of our past. You may know Mr. Karwatka for his fine contributions as editor of the "Technology's Past" feature which has appeared in each issue of School Shop Magazine over the past ten years. It's an honor to be able to share his thoughts with you.

For further reading, please write us for a complete list of references or consult the following: Women Scientist in America, by M.W. Rossiter, ©1982 John Hopkins U. Press; A Pictorial History of Women In America, by R. Warren © 1975 Crown Publishers; Perfect in Her Place: Women at Work in Industrial America, by Deborah J. Warner, ©1981 Smithsonian Institution Press.

—D.A.H.

Ellen S. Richards - Circa 1837
Courtesy of the M.I.T. Museum

First Ladies Hall of Higher Education - Circa 1843 (1841?)
Courtesy of the Library Archives, Oberlin College



Oberlin College of Ohio was the first U.S. institution of higher learning ever to award a degree to a woman. They were in fact the first U.S. College to ever award a woman a Bachelors, Master's & a Doctorate degree.

Idea Sparks A Revolution

Eli Whitney invented the cotton gin in 1793 after working on a device thought to be suggested to him by his 'land lady' Catharine Greene. Greene had noticed how the tines of a comb pass through a person's hair and wondered if the idea could be applied to removing seeds from raw cotton. Whitney's invention sparked the Industrial Revolution of the 1700's and early 1800's & provided new technical opportunities for both men and women. Because of this invention, cotton textile manufacture became the first major industry in America. Consequently, New England textile mills were among the first to employ significant numbers of women.

Women of this time also worked as watch makers, gunsmiths, printers, shoe makers and in many other similar vocations. In colonial Boston, one out of every ten merchants or shopkeepers was a woman.

The Worlds First Efficient Homes

During the early 1800's many men & women alike professed the belief that a womans place was in the kitchen. Proving them all correct, *Catherine Beecher*, sister to Harriet Beecher Stow author of Uncle Tom's Cabin, was the first to design 19th century houses to be efficient work places with proper ventilation & air tight stoves. Beecher's houses contained kitchens designed with single surface work areas & many cabinets.

Higher Education

Women in early America were afforded few educational opportunities, but by the middle 1800's, the U.S. led the world in education available to females. Oberlin College in Oberlin, Ohio was the first to award degrees to women in 1841. Technical Education opportunities for women however were virtually non-existent and were usually available only at home from relatives. To further better themselves women often attended public lectures, visited museums and read books aimed specifically at them.

America's First Woman Scientist

Women interested in technical fields usually chose a science to study like Chemistry, Physics or Botany. The astronomer *Maria Mitchell* became America's first important woman scientist when her discovery of a comet in 1847, catapulted her to international fame. The first female member of the American Academy of Arts and Sciences, Mitchell later became director of the Observatory at Vassar College where she was

NEWSLETTER

FOCUS

Technology

among the first to study sun spots & satellites of planets.

The Establishment Of Home Economics
A student of Mitchell's at Vassar, *Ellen Swallow Richards* was the first female to graduate from a Technical College when she received a degree from the Massachusetts Institute of Technology (MIT) in 1837. Investigating the concepts of nutritious meals and the careful use of domestic energy (wood fuel, natural gas & electricity), Richards established the field of Domestic Science, often referred to as Home Economics. She became the first woman member of an engineering society when, in 1879, she was accepted into the American Institute of Mining Engineers.

Caring For Workers In The Workplace
Often referred to as the "First Lady of Engineering", *Lillian Moller Gilbreth* worked together with her husband to improve factory methods. She was one of the first to suggest rest periods for factory workers, design factories accessible to the handicapped, and was an early advocate of day care centers in the work place. Analyzing motion pictures during the 1920's, she recommended changes to such activities as stacking boxes, assembling vehicles, and even sitting in chairs.

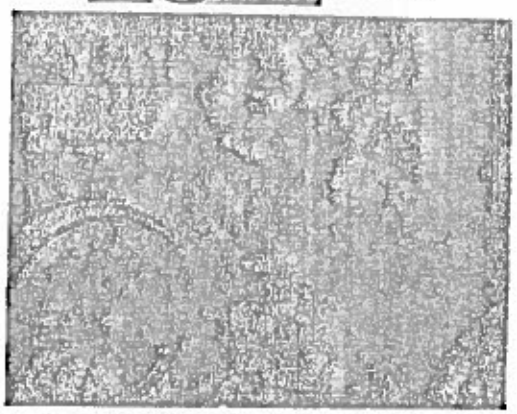
Industrial Medicine Emerges
Another crusader against unsafe factory conditions was *Alice Hamilton*. Ms. Hamilton earned a college degree in medicine that gave her the insight to investigate manufacturing related health problems in Chicago. The diplomatic Hamilton persuaded many company leaders to add safety procedures to their operations & later established the field of Industrial Medicine.

The Birth Of Nuclear Energy
Though some people continued to believe women could not work as well in technical subjects as men, this idea was shattered in the early 1900's by the Warsaw native, *Marie Sklodowska Curie*. She and her husband coined the term "radiation" & discovered the new chemical elements of radium and polonium, (named for her native country of Poland). Because of this work, Madam Curie became the first woman to receive a Nobel Prize in 1903 when she and her husband shared the award in Physics. She later became the first person to ever receive two such awards, when in 1911, she was the sole recipient of the Nobel Prize in Chemistry.

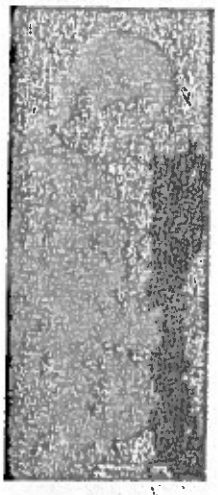
Beauty Behind Factory Walls
Many female milestones have not been recorded with the zest as the endeavors of the male technologist. *Margaret Bourke-White* was the first to use the camera to create a record of the "world of beauty behind factory walls". With her critical mind, perceptive eye and darkroom skill, she used a camera to record the beauty of flowing molten steel and the symmetry of stacked airplane wings. Her photo of the Ft. Peck Dam in Montana appeared as the first ever cover of Life Magazine in 1936.

A Motivation For Future Generations
An inspiration and role model for American women interested in science, engineering or technology careers, these early female professionals literally "blazed trails" and opened new opportunities for the modern, technically minded women of today.

Alice Hamilton - Circa 1968
Courtesy of the National Women's Hall of Fame



Women Went to Work During World War I - Circa 1917
Courtesy of the U.S. National Archives
At the outset of World War I women found war jobs in fields usually denied to them, at wages they were unaccustomed to receiving.



Marie Curie - Circa 1930
Courtesy of the Mansell Collection
Madam Curie, shown here losing her hair due to her work, died in 1934 of leukemia, almost certainly as a result of her lifelong exposure to excessive amounts of radium and x-rays.

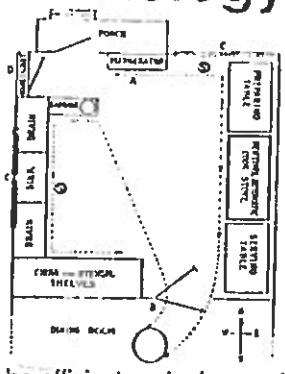
Lillian M. Gilbreth - Circa 1965
Courtesy of the Society of Women Engineers

Shirtwaist Workers Strike - Circa 1910
Courtesy of the Byron Collection, Museum of the city of New York
One of the first major working womens strikes in America took place when the National Women's Trade Union League struck over unfair factory conditions in New York City.

Margaret Bourke-White - Circa 1930
Courtesy of the George Arents Research Library, Syracuse University
Margaret Bourke-White photographing the construction of the Chrysler Building, outside her studio 800 feet over Manhattan.

Women of Technology

CATHARINE BEECHER (1800-1878)



Catharine Beecher began her career by opening a finishing school for young women in 1823. The plans for the building sparked her interest in the home as a working place.A sister to Harriet Beecher Stowe, author of Uncle Tom's Cabin, she became an architect-educator who designed 19th century houses to be efficient work places with kitchens that extended into the house that had single-surface work areas and many cabinets. Both liked and disliked for her work during a time of great change for American women, Catharine Beecher expressed ideas about proper ventilation, *heating fuels*, air-tight stoves and efficient ways to complete domestic tasks.

MARIA MITCHELL (1818-1889)

Believed to be America's first important woman scientist, Maria Mitchell's keen interest in Astronomy was fostered in her youth when her father, taught her to use a precision telescope he owned. After leaving home and becoming a librarian, she gained her fame in 1847, when she observed a new comet & calculated its position. The discovery earned her international recognition when the King of Denmark gave her a gold medal for her achievement.

Mitchell later accepted a teaching position at Vassar College for Women and became director of their observatory. Over the next 20 years, she became well known for her studies of sunspots and of satellites of the planets and became the first female member of the American Academy of Arts & Sciences.

ELLEN SWALLOW RICHARDS (1842-1911)

A student of Maria Mitchell's *at Vassar College*, Ellen Swallow Richards became the first female graduate of any technical college, when in 1837 she received a degree from MIT- the Massachusetts Institute of Technology. While later working at MIT, she investigated nutritious meals, and the careful use of electricity, natural gas, and wood fuel for domestic energy. Richards established the field of Domestic Science, or Home Economics, and became the first woman member of an Engineering Society in 1879, when she was accepted into the American Institute of Mining Engineers.

MARIE SKLODOWSKA CURIE (1867-1934)

Born in Warsaw, Poland in 1867, Marie Sklodowska Curie left her native land after a brilliant high school career, because women in her country could not attend college. She followed an older sister to the University of Paris, where she earned *two degrees and married Pierre Curie*, a professor there. Together they discovered two new elements, radium & polonium. Madame Curie herself coined the word "radioactivity" to describe them. After her husband died in a traffic accident she raised two small daughters and supervised the radiation labratory herself. In 1903, Madame Curie became the first woman to receive a Nobel Prize and in 1911, the *first person* ever to be awarded two of them. Because she never took advantage of her world-wide fame, the famous scientist, Albert Einstein once said of her, "she was of all celebrated beings, the only one whom fame has not corrupted."

ALICE HAMILTON (1869-1970)

Alice Hamilton earned a college degree in medicine that gave her the insight to investigate health problems caused by unsafe factory conditions in Chicago. The diplomatic Hamilton persuaded many company leaders to add safety features to their operations. She established the profession of Industrial Medicine & became the first woman professor at Harvard University in 1925. She lived to celebrate her 100th birthday.

LILLIAN MOLLER GILBRETH (1878-1972)

Lillian Gilbreth worked with her husband to improve factory methods & efficiency. She was the first to suggest rest periods for workers, design factory layouts for the handicapped and was an early advocate of day care centers. Frequently introduced as the "First Lady of Engineering", she was the first woman elected to the National Academy of Engineering. She was featured on a 1984 commemorative U.S. Postage stamp, and in her life received 23 honorary college degrees. The mother of 12 children, Gilbreth was immortalized in the 1950 book and movie "Cheaper By The Dozen".

MARGARET BOURKE-WHITE (1904-1971)

With her perceptive eye, critical mind and darkroom skill, Margaret Bourke-White used a camera to show the "world of beauty behind factory walls". She recorded such images as the drama of flowing molten steel and the symmetry of stacked airplane wings. Her photographs appeared on the pages of Fortune & Life Magazines when she was barely out of her teens, and her photo of the Fort Peck Dam in Montana became the cover of Life's first issue, on November 23, 1936.

NAME: _____ DATE: _____

The Women of Technology

Instructions: Match the following questions with the letter of the person who best fits the question. All the letters can be used more than once or not at all.

Catherine Beecher

Ellen S. Richards

Alice Hamilton

A. Catherine Beecher
B. Margaret Bourke-White
C. Marie Curie
D. Lillian M. Gilbreth
E. Alice Hamilton
F. Maria Mitchell
G. Ellen S. Richards

Margaret Bourke-White

_____ 1. Who was the first woman to receive a Nobel Prize and the first person ever to receive two of them?

_____ 2. What woman Architect/Educator was the sister of Harriet B. Stowe, author of Uncle Tom's Cabin?

_____ 3. Which one of these women and her husband discovered the new elements radium & polonium?

_____ 4. Who first designed 19th century kitchens with single surface work areas & many cabinets?

_____ 5. What female concerned with unsafe factory conditions in Chicago, later became the first woman professor at Harvard University, who lived to celebrate her 100th birthday?

_____ 6. Who was the student of Marie Mitchell's at Vassar College that became the first woman member of an engineering Society in 1879?

_____ 7. What woman librarian gained fame after first discovering & tracking a comet in 1847?

_____ 8. Who was the first woman ever to graduate from any technical college, namely MIT?

_____ 9. What woman, involved with factory efficiency, was the mother featured in the book & movie "Cheaper By The Dozen", and on a 1984 U.S. Postage stamp?

_____ 10. What Astronomer is believed to be America's first important woman scientist?

_____ 11. Who first established the field of Domestic Science or Home Economics?

_____ 12. Who used a camera to show "the world of beauty behind factory walls"?

_____ 13. What womans photograph of the Fork Peck Dam in Montana appeared in November of 1963 on the cover of Life Magazines first issue?

_____ 14. Which of these women was the first member of National Academy of Engineering & is referred to as the "First Lady Of Engineering"?

_____ 15. Who investigated factory-caused health problems & persuaded many company leaders to add safety features to their operations?

_____ 16. What woman was an early advocate of rest periods for workers and designed factory layouts for the handicapped?

_____ 17. What woman first expressed ideas about proper ventilation in the home & efficient ways to complete domestic tasks?

_____ 18. Of what woman, who's last name at birth was "Sklodowska", did Albert Einstein say, "fame did not corrupt her"?

_____ 19. Who established the profession of Industrial Medicine?

_____ 20. What woman recieved the 1911 Nobel Prize for Chemistry?

Marie Curie

Lillian M. Gilbreth

Maria Mitchell

SCHOOL:	TITLE:	NAME:
CITY:	SCALE: PERIOD:	DATE:

Select one of the technology pioneers from the article. Use the information from the article and the internet to write a brief biography of the person you choose. Be sure to include information about the pioneers life story and their contributions to the field of technology.