PSC
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4th year | 2nd edition
Planetarium Science Center
Science For All!

2nd School Semester 2010/2011

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LIFE AS WE KNOW IT

By Maissa Azab

"***If I have seen further than others, it is by standing upon the shoulders of giants.***"—Isaac Newton

This issue of the PSC Newsletter marks the beginning of 2011, which has been declared the **International Year of Chemistry (IYC 2011)**, under the overarching theme: *Chemistry—Our Life, Our Future.*

Chemistry is one of the fundamental sciences that is part of everything in life, and there is not a single field of science that is not intertwined with it. It is the undeniable truth that scientists of all fields and inventors of all kinds are credited for the quality of life we lead today and take for granted. In fact, if we take a thoughtful look around us, we will see that every single item we use is the product of a long chain of inventions and discoveries made by men and women along the years and across the world.

We rarely dwell on this but if we do, we will realize how much we are indebted to them and we might also be inspired to follow in their footsteps. These men and women have been first and above all observers of the World. They watched, listened, marveled and wondered; then they set to work to search for clues and answers to the questions the wonders they observed posed, and to find solutions for the problems or weaknesses they detected.

In this issue, we pay humble tribute to those great men and women who have shaped our lives. We discuss a kaleidoscope of topics that revolve around scientists; their discoveries and inventions; thus, showcasing their unequivocal role in shaping the life we live and will continue to live.

Among many features and articles, we cover the history of capturing and projecting life in still, as well as motion, pictures, the development of which is the foundation of Planetarium and IMAX technologies. We also tackle the significance of "Women in Science", with special emphasis on one of the greatest women scientists of all time; Marie Curie. Moreover, we talk about a great man who, overcoming and transcending his own impairity, changed the life of the visually impaired by applying one of their other heightened senses, touch.

That is all in addition to a myriad of articles and features in the PSC Dossier, as well as the PSC highlights, not to mention an intriguing PSC Interview with one of today's most renowned scientists; Prof. Mostafa Elsayed. As always, we hope you enjoy our new issue and look forward to your feedback at: PSCeditors@bibalex.org.

Inventions & the Culture of Creativity

By Dr. Fekri A. Hassan

Creativity is the capacity for producing a novel product on the basis of cognitive processes that use methodical thinking to reconstitute, reassemble, synthesize, and modify pre-existing ideas in an unprecedented innovative manner. Inventions, based on scientific creativity, laid the foundation for the progress of humanity in several domains, especially that of technology; beginning with the tools used for making fire, hunting, food storage, and grinding.

The introduction of cultivation, *c.* 10,000 years ago, led to a series of innovations to take advantage of the new opportunities and to overcome difficulties embedded in an agricultural economy. Among the most important inventions were those related to irrigation, such as the waterwheel (Saqqyia), with its use of gears and water energy, which led to further inventions such as water mills and turbines that were of great importance in the advent and development of industry in modern times.

One of the key factors in the enhancement of inventions over the past 200 years in society was Industrialization, which, similar to what commerce did before, stimulated the acquisition and promotion of scientific knowledge and its applications. One of the best examples in Classical Antiquity was the role of the Bibliotheca Alexandrina where theoretical scientific thinking was linked to inventions such as the "Egyptian" screw (tambour).

Inventors who changed the world by linking scientific discoveries to technological applications as in the steam engine, the generation of electric power, industrial machinery, and more recently nuclear power and electronic devices were not isolated or eccentric individuals. Their inventions have been inseparable from a system of knowledge production and a culture of creativity that encouraged critical thinking; sponsored research and development; disseminated scientific knowledge to the public; funded technical universities and scientific high learning institutions; connected scientists in interactive communities through scientific societies and publications; as well as set measures for scientific ethics and methodology, in addition to rewarding excellence on the basis of strict measures of criteria.

The beginnings of this knowledge system were already present in Baghdad in the 9th century. The relative rarity and minor inventions in many "developing" countries today have been primarily due to a lack of effective industrialization and hence the prevalence of a culture that retreats into traditional "un-scientific" thought and learning and eschews rational reasoning.

Capturing

Provided by Mohamed Aly, Yasser Hussein and Magui Elshirawi
Edited by Maissa Azab

Both Planetarium and IMAX technologies find their origins in the inventions of the camera and the projector. These technologies, as we know them today, have come a long way from their very early beginnings dating back to the Golden Age of Islam when Ibn al-Haytham had his breakthroughs in the fields of light and optics.

The Camera Obscura

As early as the 11th century, the idea of the camera was already being developed. Ibn al-Haytham made notes about a *camera obscura* that used a lens to focus light inside a dark box. An image of whatever the lens was pointed at appeared on a paper surface inside the box. The optical property behind this phenomenon is the same for any type of camera.

The earliest cameras were essentially optical toys, as the simple reflection of an image was something most people had never seen before. The development of modern photography, however, had to wait for other advancements in the fields of chemistry and optics.

Early Camera Evolution

In the 13th century, English scholar Roger Bacon adapted the camera obscura to produce the first pinhole camera, which admitted light through a tiny hole rather than a glass lens. Bacon's version introduced the optical principle to Europe, where photography would eventually be born.

Throughout the 17th and 18th centuries, European scientists continued to work on developing the camera obscura into something more useful. Experiments were conducted using photosensitive materials to produce photographic images that would soon fade into nothing but indicated that capturing an image was, in fact, possible.

The Birth of Photography

The recording of a negative image on a light-sensitive material was first achieved by Joseph Nicéphore Niépce in 1826. He obtained a camera picture on a polished pewter plate, sensitized with Bitumen, which has the property of hardening in light, not blackening like silver salts; however, its light sensitivity is so low, that he needed 8-10 hours of exposure to sunlight.

He named his invention "heliography" which means "sun drawing", for after dissolving the unexposed parts of the picture in turpentine oil and rinsing the plate, remained a permanent bitumen image of the light drawing; shadows indicated by the bare pewter plate.

Jacques Daguerre, developed a process that used copper plates to record an image. Other processes that used different chemical elements to produce an image, including some that could be tinted or record a partial color spectrum, were also used; the cameras themselves remained largely the same.

From Photography to Cinematography

In the late 19th century, the development of roll film revolutionized cameras. Introduced by George Eastman through his company, *Eastman Kodak*, roll film allowed for the development of small, inexpensive cameras that were affordable for the masses and simple to operate. Photography became a middle-class hobby rather than a luxury reserved for the elite, and practiced by trained professionals.

Roll film spawned the development of a host of camera types, including movie cameras. By mid-century, electronic components were added to most cameras to allow for light metering, automatic exposure control, and even automatic focusing on some models. Point-and-shoot cameras, with fully automatic modes, first appeared in the 1980s.

Although various kinds of devices for producing pictures in rapid succession had been employed as early as the 1860s, the first practical motion picture camera made feasible by the invention of the first flexible, paper-base films was built in 1887 by E.J. Marey. Two years later, Thomas Edison invented the first commercially successful camera.

However, cinematography was not accessible to amateurs until 1923, when Eastman Kodak produced the first 16-mm reversal safety film, and Bell & Howell introduced cameras and projectors with which to use it.

The Dawn of the Digital Age

A prototype of the digital camera was developed in 1975 by Eastman Kodak; but digital cameras were not commercialized until the 1990s. Since then, they have gradually superseded many film-based cameras, for both consumers and professionals, leading many manufacturers to eliminate or reduce the number of the film cameras they produce.

Digital photography is similar to film photography where an electronic sensor replaces film. The light from a subject enters the lens and is projected onto the digital sensor, then recorded either in the camera's internal memory or to a removable device. Digital photography provides instant results and cuts out the step of film development. The memory card size of the camera allows a photographer to take numerous photos without stopping to change film, allowing a better flow of action on a shoot.

Projecting Life

Adapted from *The History of Projectors–The Battle for Brightness* by Gareth Marples; published 09/11/2008

The Vision of a Projector

The first idea of projecting an image on a surface was envisioned in a drawing by Johannes de Fontana in 1420. The image, probably drawn on a thin sheet of bone, was projected onto a wall by the flame in the lantern. Without a lens, the image on the wall would have been very blurry.

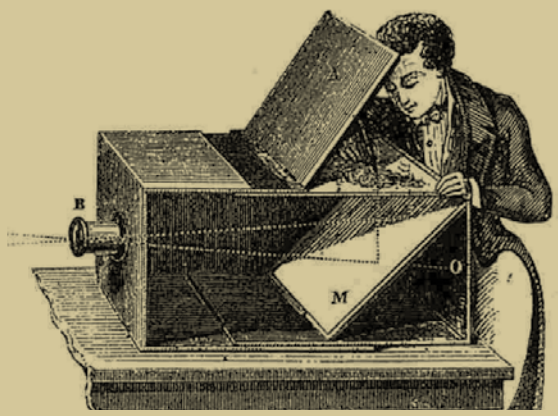
Several people were inspired, and any one of them could have been the actual inventor of the projector; historical records are unclear. What is clear, is that in 1645, a highly-educated Jesuit scholar, Athansius Kircher, described and illustrated a device to reflect sunlight from a mirror, through a lens and onto a screen.

In 1671, he attempted to describe his invention, which he called a *magic lantern*; however, he did not do a very good job of the description. What he did do though was record his ideas in a book; hence, receiving credit for the invention; but not by everybody. In fact, some say that the first inventor was, according to records, Christiaan Huygens, who had used a practical magic lantern since 1659.

The Development of the Projector

The magic lantern of those days resembled a kerosene-fired slide projector. The lantern slides were large, bulky, complex objects; made of glass, wood and metal. Some had built-in mechanical features, such as pulleys and winches, so the lantern's projected images could be given a very crude version of animation. Some slides could even project complex, constantly-moving screen displays.

Life



Light and seeing were the principal focus of scientists in the first half of the 19th century, resulting in much progress in dioramas, magic lanterns, photography, the first electric lighting, and public gas lighting. Michael Faraday was one of those scientists; his work resulted in the development of the "limelight", which became the principal source of illumination for all but the domestic lantern.

By 1837, limelight systems had become streamlined enough to be moved into the theater. On the stage, it gave the look of high noon, so lenses and filters were used to create the desired effects. That was the standard in light projection until the late 1800s, when electric lighting systems was introduced.

Motion Pictures

The first machine that showed animated pictures was patented in the United States by William Lincoln in 1867. It was a device called the "wheel of life" or "zoopraxiscope". However, this was a far cry from modern motion pictures, the making of which began with the invention of the motion picture camera.

The Frenchman Louis Lumière is often credited as inventing the first motion picture camera in 1895. In truth, several others had made similar inventions around the same time. However, what Lumière invented was a portable motion-picture camera, film processing unit and projector called the Cinematographe; three functions covered in one invention.

The Cinematographe made motion pictures very popular, and it could be better said that Lumière's invention began the motion picture era. In 1895, Lumière and his brother were the first to present projected, moving, photographic, pictures to a paying audience of more than one person.

Recording and Emitting Sound

A speaker is a device that converts electrical signals to sound waves. It is a transducer; that is, a device that converts one form of energy to another. For a speaker to give the highest possible degree of quality sound, we must incorporate more than one transducer to output a wide range of frequencies.

The first electrical speaker device was constructed and patented by Alexander Graham Bell in 1876 for the purpose of making the telephone. Later, Ernst Siemens and Nicola Tesla improved Bell's invention in 1877 and 1881 respectively.

The Phonograph was developed as a result of Thomas Edison's work on two other inventions, the telegraph and the telephone. In 1877, he was working on a machine that would transcribe telegraphic messages through indentations on paper tape, which could later be sent over the telegraph repeatedly.

He experimented with a diaphragm that had an embossing point and was held against rapidly-moving paraffin paper. The speaking vibrations made indentations in the paper. Edison later changed the paper to a metal cylinder with tin foil wrapped around it. The machine had two diaphragm-and-needle units, one for recording, and one for playback. When one would speak into a mouthpiece, the sound vibrations would be indented onto the cylinder by the recording needle in a vertical groove pattern.

The invention was original, and it was reported in newspapers and magazines. The Edison Speaking Phonograph Company was established in 1878 to exploit the new machine. As a novelty, the machine was an instant success, but it was difficult to operate except by experts, and the tin foil would last for only a few playings.

Ever practical and visionary, Edison offered possible future uses for the phonograph; among them, the reproduction of music, teaching of elocution, and other educational purposes, such as preserving the explanantions made by a teacher, so that pupils can refer to them any time.

In the void left by Edison who was busy with his electric lamp invention, others moved forward to improve the phonograph. In 1880, Alexander Graham Bell worked with his cousin, a chemical engineer, and Charles Sumner Tainter, a scientist and instrument maker. They made some improvements on Edison's invention, mainly by using wax to replace tin foil, and a floating stylus instead of a rigid needle which would incise, rather than indent, the cylinder. The machine was exhibited to the public as the Graphophone.

Edison introduced the Improved Phonograph by 1888, shortly followed by the Perfected Phonograph. The Edison Concert Phonograph, which had a louder sound and a larger cylinder was introduced in 1899.

It was only in the 1930s that filters were used in speakers to increase the level of sound pressure, frequency response and overall quality of the device output. The Shearer Horn System for Theatres was the first speaker system of industry standard; it was installed in 1937. This speaker system was installed by Metro-Goldwyn-Mayer, an American media company that is in production and distribution of TV programs and movie.

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Do Not Miss

For a limited time

AVAILABLE SHOWS

The Zula Patrol
23 Min. Full-dome Show

Stars of the Pharaohs
35 Min. Full-dome Show

Seven Wonders
30 Min. Full-dome Show

Cosmic Voyage
35 Min. IMAX Show

Mystery of the Nile
45 Min. IMAX Show

Oasis in Space
25 Min. Full-dome Show

Stars Show
45 Min. Live Show by the PSC resident astronomer

VISITORS INFO

- For the Planetarium daily schedule and fees, please consult the Center's official website: www.bibalex.org/psc.
- Kindly note that, for technical reasons, the Planetarium maintains the right to cancel or change shows at any time without prior notification.

Women Scientists in History

Provided by Reda Kandil
Edited by Jailane Salem

Women give and sustain life. They are the cornerstones of families, homes and nations. Not only do they have a crucial role in maintaining life, but they have also undeniably and consistently contributed grealty to the progress of humanity and the development of civilization. To list all the great women who have excelled in all the fields of the arts, politics and sciences is impossible. However, here we will try to highlight a handful of the scientific achievements of women in history.

In Ancient Egypt, there were many great women scientists. This is attributed to the fact that women were respected individuals who enjoyed the privilege and freedom to receive good education and pursue careers outside their homes, unlike women in Ancient Greece and Rome.

In our last issue, we talked about how medicine was of great importance in Ancient Egypt. As a matter of fact, there are more than one-hundred known female doctors (physicians) during that era, the first of whom is **Merit Ptah** (c. 2700 BCE), the first woman scientist in history.

Another famous scientist of the Ancient World was **Hypatia**, who lived in Alexandria during the Hellinistic Period. Not only was she the first notable woman mathematician, she was also the Head of the Neoplatonist School of Philosophy in Alexandria and taught in the fields of astronomy and astrology.

Another great mathematician was **Sutayta Al-Mahamli** who lived in the second half of the 10th century and who became an expert witness in the courts of Baghdad applying mathematical methods to analyse and solve intricate inheritance and commercial problems. It is said that she was an expert in arithmetic and successoral calculations, both being practical branches of mathematics which were well developed in her time. It is also said that she invented solutions to equations that have been cited by other mathematicians, thus showing her mastery in algebra.

Women also contributed to the establishment of universities; hence, contributing to the advancement of civilization. **Fatima al Fihri** was such a woman; she came from a wealthy family and used her money to build Al Qarawiyyin College-Mosque complex in Fez, Morocco, in 841 CE. Al Qarawiyyin became an important center for education and was the oldest academic degree-granting university in the world, as well as one of the most prestigious.

In the 18th Century, the Scientific Revolution was important in setting the stage for modern science and marked a new way for scientific thought and analysis. Various women contributed to this new scientific outlook, one of which was **Émilie du Châtelet** who was a French mathematician, physicist and author. She translated Newton's celebrated *Principia Mathematica* into French, with her own commentary. Her work of translation and commentary contributed significantly to the development of Newtonian science in Europe.

Another great scientist of that era was **Maria Gaetana Agnesi**; an Italian mathematician and philosopher, who is considered to be the first woman in the Western world to have gained a reputation in mathematics. Agnesi's best-known work, *Instituzioni analitiche ad uso della gioventù italiana* (Analytical Institutions for the Use of Italian Youth), in 1748, provided a remarkably comprehensive and systematic treatment of algebra and analysis, including such relatively new developments as integral and differential calculus. In its review of the Instituzioni, the French Academy of Sciences stated "We regard it as the most complete and best made treatise". Pope Benedict XIV was similarly impressed and appointed Agnesi professor of mathematics at the University of Bologna in 1750.

Astronomers survey the heavens in the hopes of making new discoveries and better acquainting themselves with the old ones. **Caroline Herschel** was able to discover by telescope three nebulae in 1783 and eight comets from 1786 to 1797; she was the first woman to receive full recognition in the field of astronomy. A German-born British astronomer, she was noted for her contributions to the astronomical researches of her brother, Sir William Herschel, for she executed many of the calculations connected with his studies. None of the comets she discovered were named after her, but one of the moon's craters was.

More recently, and after a long time spent in practicing and training, in 1983, **Sally Kristen Ride** became the first woman astronaut to orbit Earth in space. Her accumulative hours of space flight are more than 343 hours. Ride retired from NASA to follow other pursuits such as encouraging young women to study science and math, a project that is very close to her heart and one she works hard on. Her most recent enterprise is "Sally Ride Science", an organization founded to provide support for all the girls who are, or might become, interested in science, math and technology.

The most famous of all, the one name we always think of when we hear the phrase "women in science", is the woman who was bestowed the honorable title of "Mother of Modern Physics": **Marie Curie**. Well-known for her ground-breaking work in the field of radioactivity, Marie Curie was the first woman awarded a PhD in research science in Europe, and also the first woman professor at the Sorbonne. She won the Nobel Prize in 1903 for her work in Physics, and in 1911 for her work in Chemistry.

The year 2011 has been declared the **International Year of Chemistry – IYC 2011** (www.chemistry2011.org), under the unifying theme Chemistry—Our life, Our future, as a worldwide celebration of the achievements of chemistry and its contributions to the well-being of mankind. It also commemorates the centennial celebration of Marie Curie's 1911 Nobel Prize in Chemistry and her contribution to the sciences; hence, to humanity and civilization as we know it.

We too at the Bibliotheca Alexandrina honor and celebrate Marie Curie by organizing a conference on "Women in Science" in her name in November 2011. The PSC Newsletter Editorial Team is honored and delighted to dedicate a special article to Marie Curie so please read on.

The truth is there are numerous women, whether from the East or the West, who have devoted their lives to science and have found great satisfaction in following a scientific career path. They have been able to achieve great discoveries that contributed to the advancement of science. In the world we live in, science and technology have come a long way and have become an integral part of our daily life. Still, there are many unconquered territories in the fields of science. Following in the footsteps of all these great women scientists, let us be proud to put on our lab coats and forge forward with Bunsen burners held high to light the way to new discoveries.

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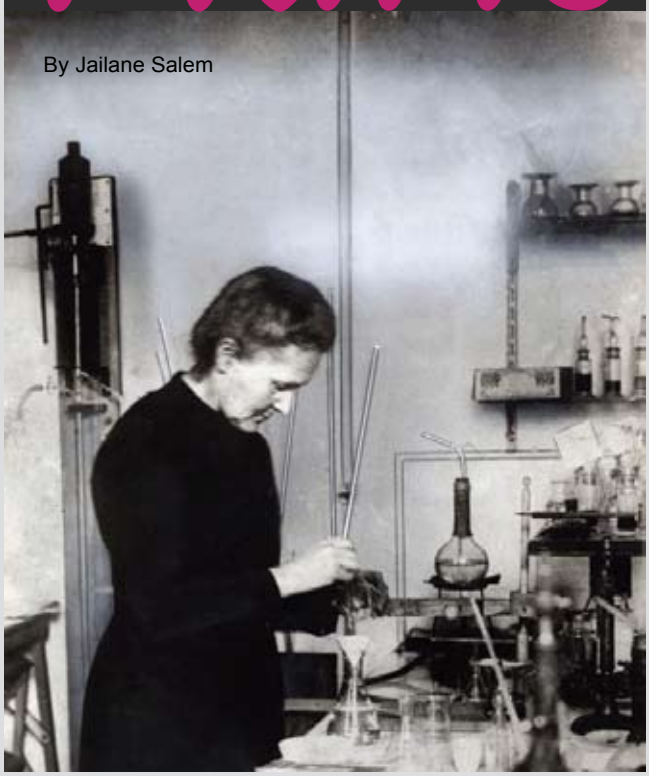
The Magnificent Marie

By Jailane Salem



The name Marie Curie (1867-1934) is synonymous with greatness, not only because of the scientific discoveries she made, but also for the exemplary way she led her life. It is a name known worldwide whether by people in the fields of science or outside it. In Marie Curie we find the persevering scientist, the hardworking mother and the compassionate humanitarian. Her pioneering work in the field of radioactivity led to the development of a new and important discipline in science; it also ushered in a new era in medical research and treatment.

Marie Curie lived at a time when women were not seen as equal to men. However, she did not let that stand in her way. She was one for setting many firsts; she was the first woman to receive a doctorate in France in 1903, to be appointed Professor at the Sorbonne, and to win a Nobel Prize; she was also the first person to win it twice. In reverence of her great achievements in science and her dedication to bettering human life, she was buried in France's National Mausoleum, the Panthéon in Paris; thus becoming the first woman whose accomplishments earned her the right to rest alongside France's most renowned dignitaries.

In 1903, Marie Curie along with her husband, Pierre Curie, and the physicist Henri Becquerel, won the prestigious Nobel Prize in Physics for their joint work in radioactivity. Marie Curie was first interested in radiation, when in 1895, Wilhelm Conrad Roentgen discovered X-rays; and in 1896, Becquerel discovered that the element uranium gives off similar invisible radiations.

Marie's journey began with studying uranium radiation applying piezoelectric techniques invented by her husband. She carefully measured the radiations in pitchblende, an ore containing uranium. When she discovered that the radiations from the ore were more intense than those from uranium itself, she realized that unknown elements, even more radioactive than uranium, were present.

Marie and Pierre worked long and hard until they were finally able to isolate the radioactive sources in the pitchblende, which they named polonium and radium. Marie Curie won her second Nobel Prize in Chemistry in 1911, "In recognition of her services to the advancement of chemistry by the discovery of the elements radium and polonium, through the isolation of radium and the study of the nature and compounds of this remarkable element."

Only an extraordinary woman could have had such patience and determination to enable her to make the discoveries she made. These attributes were nurtured in her since childhood by her parents who were both aware of the importance of a good education and a diligent work ethic. Even though Marie came from an occupied Poland where intellectuals were oppressed and education discouraged in order to subdue the people, her parents did not give up on their children's rights to a wholesome education and did all they could to ensure they had a good intellectual foundation and sound analytical minds.

Marie Curie left Poland, her homeland, and journeyed to France to quench her thirst for knowledge, but she never forgot her roots and it is in honour of her homeland that she named the first element she discovered polonium.

When World War I broke out, a patriotic Marie Curie took a stance. "*I am resolved to put all my strength at the service of my adopted country, since I cannot do anything for my unfortunate native country just now*," she said. Realizing that by using X-rays on wounded soldiers, doctors would be able to locate bullets, shrapnel and broken bones more easily, which would alleviate soldiers' pain more rapidly, she convinced the Government to help her set up France's first military radiology centres. By late 1914, she had 20 vans outfitted with X-ray apparatus ready to offer help on the battle front. Moreover, she drove one of the vans herself with her daughter; together they trained other women in working transportable radiological units.

Not only did Marie Curie display how scientific discoveries can be implemented for the benefit of humanity, she also thrived to share her knowledge of radioactivity so as to impact as many people as possible. "*Radioactivity is the natural process by which the heavier elements such as uranium, polonium and radium spontaneously break up, or disintegrate. In the process, the atoms of the radioactive elements throw out pieces of themselves and releasing penetrating Gamma radiation so useful in the treatment of many forms of cancer.*"

In 1920, Curie and a number of her colleagues created the Curie Foundation, which over the next two decades became a major international force in the treatment of cancer. Among its first achievements was the construction of a dispensary where innovative treatments were developed, combining surgery and radiotherapy in the treatment of cancer. The Curie Foundation was a model for cancer centers around the world.

Even though Marie Curie was very busy with her research and teaching, she nonetheless made time to run a cooperative school, for the benefit of her daughters, with other professional parents who disapproved of the French school system. She also ensured that they did not forget their Polish roots.

Marie Curie was truly a woman who "had it all", and she was successful at it all. It was the direct result of her exceptional and unconventional upbringing thanks to her parents' unusual focus on the importance of girls' education. It was also because she was the epitome of a hard working individual who strives to be the best without ever losing sight of her ultimate goal; to continue benefiting mankind through research and teaching.

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VISITORS INFO

Opening Hours

Saturday to Thursday	[from 09:00 am to 16:00 pm]
Friday	[from 15:00 pm to 18:00 pm]

Guided Tours Schedule

Saturday to Thursday
[10:30 am + 11:30 am + 12:30 pm + 13:30 pm + 14:30 pm]
Friday [16:45 pm]

- Museum entry fees are included in all Planetarium show tickets.
- For non-audience of the Planetarium, Museum entry fees are EGP 0.50.
- Museum Tours are free for ticket holders.

By Ingy Hafez

Feel The WORDS

"*The senses are complementary powers evolved in complex interdependence with one another. Each sense is a unique modality of this body's existence, yet in the activity of perception these divergent modalities necessarily intercommunicate and overlap.*"— David Abram, The Spell of the Sensuous: Perception and Language in a More-Than-Human World (Vintage), page 56

The number of answers to a never-ending question "Why are we created?" may be infinite. Some might say that we were created to worship God. A scientist would tell you that we were created to discover the amazing secrets of our world, while a philosopher might say that we were created to think. No matter what the answer might be, we have to fully use the senses given to us by our Creator to observe, perceive and interact with our world.

Since all our senses are key to interacting with the world around us, losing one's ability to use a particular sense may heighten the other senses, so the disabled can compensate by honing their other senses. It was alleged that those who were born blind performed better than those who became blind as young children, while those who lost their vision after the age of ten did no better than the sighted. The theory is that a young brain could be rewired so that visual-processing areas were used for other purposes.

At the age of three, an accident deprived Louis Braille of his sight, and he was sent to a blind school in Paris, where most instruction was oral and he learnt by listening only. Young Braille desperately wanted to read. He realized the vast world of thought and ideas that was locked out to him because of his disability. He was determined to find the key to this door for himself, and for all other blind persons.

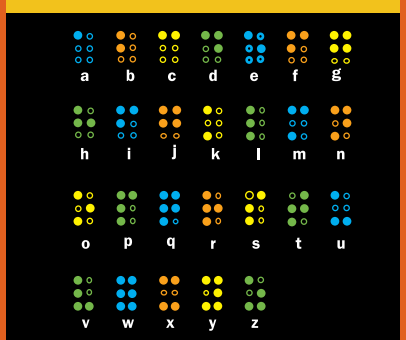
While a student, Louis was very bright and creative; he began to use his creativity to invent an easy and quick way for blind people to read and write. He heard of a system developed by a French army captain, Charles Barbier. Barbier originally created a code of raised dots and dashes as a way to allow soldiers to write and read messages at night without using a light that might give away to their positions. At that time, the raised letters were made by pressing shaped copper wire onto paper, but there was no way for blind people to write for themselves.

Louis was hoping for a better chance for himself and the people like him, so he spent nine years developing and refining the system. He worked with Barbier's basic ideas to develop his own simplified system that we know today as Braille. He based the code on the normal alphabet and reduced the number of dots by half. He published the first Braille book in 1829; and in 1837, he added symbols for math and music as well.

Although Louis Braille went on to become a beloved and respected teacher, and continued to believe during the value of his work, his system of reading and writing was not very widely accepted in his own time. Over time, there has been some modification of the Braille system, particularly the addition of contractions representing groups of letters or whole words that appear frequently in a language, which permits faster Braille reading, and helps reduce the size of Braille books, making them less bulky.

Today, the code named after Louis Braille, the great man who has overcome and transcended his own imparity changing the life of the visually impaired, is the standard form of writing and reading used by blind people in virtually every language around the world. Here at the PSC ALEXploratorium, the invention of Louis Braille is demonstrated in a fascinating interactive exhibit that allows visitors how to ***feel the words***.

Braille Code



Decipher Braille's code to find out who invented the following inventions:

1. The MP3 Technology

2. Aspirin

3. Jeans

4. Wireless Remote Control

The Answer:

1. Karlheinz Brandenburg
2. Felix Hoffmann
3. Levi Strauss
4. Robert Adler

BIZARRE INVENTIONS!

By Marwa Gaber

UNO: THE MOTORBIKE LEANS INTO ACTION!

The "Uno" bike attracted the attention of many people in the 2008 National Motorcycle Show in Toronto, whether because they thought it was smart or to understand it. The common wheel set-up of the motorbike was revolutionized into two wheels sitting side-by-side. The Uno also utilizes rear foot pegs and a considerably smaller chassis. The Uno has no controls except for a simple on/off switch; in order to move, all the rider has to do is lean the body in the desired direction. Speed is managed by how far the rider leans forward or backwards, as it is completely controlled by an Electronic Control Unit (ECU), which is attached to the motor.

THE CAR CAPSULE: STAY AWAY FROM GHOSTS!

The Car Capsule is a clear vinyl bubble that completely seals vehicles against harmful elements that we all fear, such as rust, dust, dirt and even finger prints. It is so strong that if you hit it with a hammer, the hammer will bounce right off. The zipper is made of nylon that is designed to protect your vehicle from scratching. The base material is impervious to oil and gas; it is antifreeze and inflammable. At the heart of the Car Capsule is a high-pressure fan that provides continuous airflow to keep the vehicle dry. Temperature inside the bubble remains constant and consistent with outside air.

THE SIDEWAYS BIKE: A BICYCLE WITH A TWIST!

In an effort to improve the flexibility of cycling on a regular bike, Michael Killian has invented a bicycle with a distinct twist, quite literally. The sideways bike allows the cyclist to travel sideways rather than straightforward with a more flexible and dynamic approach. All that is required by the cyclist is to convert the traditional left-to-right balance, to a front-to-back balance. The bike also exhibits wheels, which work independently allowing more control as to the direction you would like to maneuver in, making it possible to move straight, diagonally, even in circles if you so desire.

THE WOODEN PHONE: TALK GREEN!

The wooden phone proved that cell phones do not need to follow the same trend of plastic products. It exhibits a touch-sensitive keypad and a camera. From an environmental perspective, this invention is considered "green", since wood is a natural source and completely renewable. Perhaps this will pave the way for future wooden products, such as wooden MP3 players, laptops, televisions, etc. Although it does not look particularly appealing, and is no doubt heavier than the traditional plastic, it would be great to have one and help save the environment.

THE POWER SHOES: STAY WIRED-IN!

An energy-saving invention that looks like freakish sandals, these shoes are made to transform walking into energy. They are designed to allow you to charge your gadgets, such as mobile phones or iPods; while you are on the move. However, despite the best of intentions, the visual aesthetics of the shoe leave a lot to be desired. This latest gadget looks like a half-finished prototype more than a revolutionary new product. Therefore, it requires a lot of adjustment to make the shoes fashionable and safe enough to walk with.

THE NECKTIE FAN: STAY COOL UNDER PRESSURE!

USBs are commonly used in the modern world; variations of it continue to emerge, revealing new interesting concepts and means of portable data use. The latest USB accessory comes in the form of a tie, suited for those who feel the heat around their neck while sporting a tie. The USB powers a small fan built into the knot of the tie to keep you cool, in at least one sense of the word. The tie's portability is restricted to the length of the USB cable, which may be only several feet. Although it looks rather odd and is restricted in length, you have to admire the Japanese efforts, as they continue to materialize unusual gadgetry.

PSC Insider

BIODIVERSITY: PLAY AND LEARN!

Celebrating Biodiversity at the Bibliotheca Alexandrina

By Maissa Azab

Biodiversity is the very heart of life; it is the richness and complexity of species and ecosystems all over the planet.

Within the PSC mission to promote science and technology and to show their relevance to everyday life, the Center joins the international community in celebrating the annual scientific themes declared by the United Nations.

This year, being the International Year of Biodiversity (IYB 2010), the PSC has launched a public awareness campaign about biodiversity, to reveal and emphasize its significance and importance, as well as to promote action to ensure its future health. The year-long campaign encompassed a diversity of interactive activities tackling a variety of biodiversity aspects.

One of the most prominent activities conducted throughout the year was the "**Biodiversity: Play and Learn!**" exhibition, which was on display from 9 to 24 November 2010. The first interactive exhibition to be entirely developed and manufactured within the PSC, it showcases and celebrates the outstanding biodiversity of our planet, especially, in Egypt, in a playful manner that has intrigued the public of all age groups.

The exhibition is divided into five zones that explore the **Animal World**, a **Greenhouse**, the **Insect World**, the **Food World**, and the **Marine World**, in addition to **Activity** and **Movie Corners**.

In the first zone, visitors enjoyed playing and learning about animals of different shapes, sizes and roles in the global ecosystem. The zone comprised fun games such as: Your Size Compared to Animals; the Animal Wheel; Connect Four; and Freaks of Nature!, which was one of the exhibition's hits.

In the Greenhouse, visitors learnt about different plants and how important they are to keep the planet's atmosphere balanced for life to continue, in addition to its many other indispensable values. Moving on, visitors explored a wide range of insects and learned how each bug, no matter how annoying it is, is essential to life and its sustainability.

Another zone was dedicated to explaining food systems, showcasing the significance of food chains and webs, and emphasizing the impact geography has on how populations feed. The following zone discussed marine biodiversity, which might have been the most fascinating to visitors simply because we rarely get to explore it firsthand.

The edutaining exhibition finished off with an activity area then a movie corner featuring the official movie of the International Year of Biodiversity 2010; an interesting documentary that raises awareness of the dangers that threaten the richness and sustainability of Earth's biodiversity.

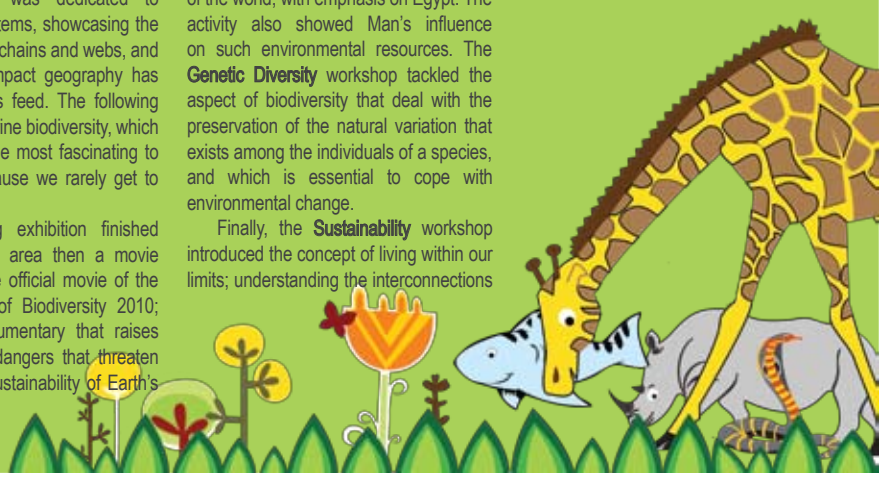
The "Biodiversity: Play and Learn!" exhibition was the crowning success of a year full of stimulating hands-on activities revolving around biodiversity. Among the hands-on workshops organized during the course of the year was **Biodiversity Conservation**, which emphasized biodiversity conservation efforts, acquainting students with nearby protected areas and local management techniques. The workshop also stressed the role that biodiversity and biological resources play in shaping human cultures.

After going through the wide concept of biodiversity, the **Ecosystem Services** workshop focused on different ecosystems of the world, with emphasis on Egypt. The activity also showed Man's influence on such environmental resources. The **Genetic Diversity** workshop tackled the aspect of biodiversity that deal with the preservation of the natural variation that exists among the individuals of a species, and which is essential to cope with environmental change.

Finally, the **Sustainability** workshop introduced the concept of living within our limits; understanding the interconnections among economies, society, and the environment; as well as providing equitable distribution of resources and opportunities.

Among the activities also adopted by the PSC were **Fieldtrips and Camps**. Their main objective was to get the children out of the classroom and into nature to study and get a firsthand experience of the diversity of life.

It has definitely been an exciting and an eye-opening year at the PSC. However, this is just the beginning of the Center's campaign to raise awareness, communicating and supporting biodiversity because biodiversity is definitely synonymous to life; our life.



Le Génie des Pyramides (Pyramids Construction)

By Dr. Reem Sassy

Since the time they were built, nearly 5,000 years ago, the means by which Egyptian Pyramids were constructed remain, till this day, a genuine enigma that contemporary technologies are still unable to solve. Theories that have been put forward up to date by various authors oppose each other and are unsatisfactory to practitioners of the art of building.

Targeting preparatory school students, "***Le Génie des Pyramides***" event was organized by the PSC on 29 October 2010. Students were invited to join the PSC team in building a small replica of a Giza Pyramid on the BA plaza under the supervision of Mr. Pierre Crozat; the French architect who is the author of a theory explaining a possible way of pyramid building.

According to Mr. Crozat, opposed to many previous interpretations, the pyramid stones did not come from "very far away", and the building process was not achieved with the help of "mud ramps to haul the blocks upwards", but by directly excavating the Giza plateau and using a method of construction defined as "pyramidal growth".

Over the course of two days preceding the event, Mr. Crozat conducted five workshops for around 100 school students to explain his theory and help them build small pyramids by using wooden blocks. On the day of the event, he gave a lecture to demonstrate his theory and explain his experience to the different school groups. Students then gathered on the BA plaza where larger blocks (90x60 cm) were used to build a bigger pyramid with a 5x5 m base and a height reaching 1.8 m. The participating school included: Frontiers Language School, El-Ramel Preparatory School for boys, Ali Ibn Abi Taleb School for girls and Saint Marc College.

Following the success of the event, the PSC will launch a series of workshops dedicated to the study of pyramid building and the theory of pyramid growth.

Mid-Year Program 2010 2011

"In the discussion of natural problems we ought to begin not with scriptures, but with experiments and demonstrations."—Galileo Galilei

The Workshop

Dancing with Colors

Colors are all around us, and they make our world beautiful in many ways. It is important though to emphasize colors in our daily lives as they stimulate our children's imagination. In this workshop, we will help children learn some interesting facts about colors and discover more about what they can do with colors on their own in an amusing, and entertaining way.

- Target age group: 4-6 years

Discover the World: Use Your Five Senses!

How do we identify the world? What are the five senses? What is sensory development? In this workshop, children will be involved in activities and experiments on sensory experiences to explore the human five senses. They will be able to identify, compare, classify and investigate the world around them.

- Target age group: 4–6 years

Sugar

There is more to sugar than the sweet white substance we add to our food and drinks. During this workshop, students will discover the kinds of sugar, and distinguish the difference between simple unilateral sugar and complicated bilateral sugar. They will also learn some intriguing facts about sugar as a great cleaner that reduces the water surface tension for a short time.

- Target age group: 9–12 years

Everyday Changes

Chemical reactions are all around us, and chemical changes occur all the time in our daily lives although we might not notice. Indulging into the world of chemical reactions, during this workshop, students will experience making an orange soda, and experimenting with cucumbers and pickles, as well as making cheese out of milk, and many other intriguing chemical experiments.

- Target age group: 9–12 years

Forensic Science

During the workshop, students will become detectives for a while. They learn about crime scene investigation through various hands-on activities related to forensics and tackling sciences. Each time, the animator describes a crime to the participants, who are then required to collect and analyze evidence in order to capture a suspect through identifying different fingerprint patterns, tool marks and shoe prints. They will also know the use of hairs and fibers as evidence and examine blood samples.

- Target age group: 12–16 years

Chemistry Magic

Chemistry is magical and full of secrets. This workshop aims at introducing important scientific concepts to the students, through a number of interesting and intriguing hands-on experiments in the form of a magic show. The scientific concepts to be introduced include: surfactants and their effect on surface tension, air pressure, buoyancy, chemical reactions, acidic and basic compounds.

- Target age group: 12–16 years

New Programs

I-Camp

The PSC organizes a variety of camps to a diversity of locations in Egypt. This camp aims at providing educational, yet entertaining activities, through which participants would learn several entrepreneurship skills and develop their team-building skills. Activities are also designed to contribute to supporting the participant's initiative spirit and marketing skills.

- Target age group: 16–20 years

The Marshmallow Challenge

The Marshmallow Challenge is a remarkably entertaining and instructive designing exercise that encourages teams to experience simple yet profound lessons in collaboration, innovation and creativity. During this workshop, students will learn how to acquire those skills and apply them in their real life.

- Target age group: 6–16 years

Photography (Part 2)

Photography is the process and art of creating still or moving pictures by recording radiation on a sensitive medium; such as a photographic film, or an electronic sensor. This program helps students learn the art of photography and its different purposes.

- Target age group: 12–16 years

Available Ongoing Programs include:

Chess Club
Fun with Science
Super Science Show

Outreach Programs include:

The Science Club

Save the Date!

The PSC Science Olympiad

The Science Olympiad is a competition that targets middle school students, aiming to stimulate their enthusiasm and interest in science. The competition is divided into a number of rounds and the winning team will be the one that collects the maximum number of points. Students will gain information from lectures, fieldtrips, planetarium shows and videoconferences in addition to their own self-knowledge.

- Target age group: 12–16 years

Visitors INFO

Discovery Zone

Opening Hours

Saturday, Sunday, Monday, Wednesday and Thursday: [From 09:00 to 16:00]
Tuesday: [From 8:30 to 12:30]
Friday: [From 15:00 to 17:00]

Guided Tours Schedule

Saturday to Thursday
[10:00 + 11:00 + 12:00 + 13:00 + 14:00 + 15:00]
Friday [15:00 + 16:00]

Entry Fees

Students	EGP 2
Non-students	EGP 4

Listen and Discover

- For the list of shows available at the "Listen and Discover" and the schedule, please consult the Center's official website: www.bibalex.org/psc.
- For reservation, please contact the PSC Administrator at least one week before the desired date.

Show fees

DVD shows:	
Students	EGP 1
Non-students	EGP 2
3D shows:	
Students	EGP 2
Non-students	EGP 4

THE WORKSHOP

Creativity is a talent we are born with; yet, it needs practice to blossom and stay vibrant. PSC workshops are meant to provide participants with tools of a lifetime. Through a unique diversity of exercises and hands-on activities, we aim to lead students to explore their creativity and find out how to use it in their life; all the while enriching their knowledge. In our workshops, students are able to interact with each other and with the world around them in an exciting and entertaining manner; they are guaranteed to have a blast!

This season, in celebration of the **International Year of Chemistry 2011,** the PSC offers a variety of enjoyable workshops that tackle several issues related to the theme of the year. To name a few, students will be introduced to some of the secrets of Genetics and the wonders of Chemistry. They will take a peak inside the Animal World, drill deep into the Earth, experience with electronics and so much more.

- Registration opens on 20 February 2011.
- For group reservations, please contact the PSC Administrator at least one week in advance.
- Minimum number of participants per workshop: 15 students.
- Maximum number of participants per workshop: 30 students.
- Workshop fees are EGP 2 per student.

Genetics (6–10 March 2011)

We are born with our full sets of genes that shape our lives. During this workshop, students discover what a gene is, and how it affects characteristics such as hair color, eye color, height, and bone structure. They also learn the difference between recessive and dominant genes, and how each cell in the body contains long strands of DNA known as chromosomes.

- Target age group: 9–12 years

Chemistry Arcade!

Invisible Ink (13–17 March 2011)

Writing secret messages is a challenging experience. What about preparing the invisible or security ink yourself? In this workshop, the students will prepare different types of invisible ink; how to make it visible later on, and learn about the chemistry behind it.

- Target age group: 12–15 years

Volcanoes and Earthquakes (20–24 March 2011)

A volcano is an opening in the planet's surface that allows lava, as well as other hot molten rocks and poisonous gases, to escape from below the surface. They are formed where there is stretching and thinning in the Earth's crust. Earthquakes often occur in volcanic regions due to the movement of magma in volcanoes. During this workshop, students will carry out experiments about the Earth's topology, know the equipment used to measure earthquakes, learn the reasons behind volcanic eruptions and explore the composition of lava.

- Target age group: 9–10 years

Rocks and Minerals (27–31 March 2011)

A mineral is a naturally occurring solid chemical substance that is formed through geological processes and that has a characteristic chemical composition, a highly ordered atomic structure, and specific physical properties. On the contrary, a rock is an aggregate of minerals without a specific chemical composition. During this workshop, students will learn the difference between rocks and minerals.

- Target age group: 12–15 years

Flowing Electrons (3–7 April 2011)

Electronics is a very interesting branch of science and technology that deals with electrical devices and the flow of electrons. Through the "Flowing Electrons" workshop, students will learn what an electric current is and how to build it; in addition to many other intriguing and challenging activities.

- Target age group: 13–14 years

Behind Candy Making (10–14 April 2011)

Eating candy is delicious, but making candy is a science and a fascinating work of art! When you are making candy, you are a chemist, transforming matter from one state to another. In this workshop, the students will learn the chemistry behind making candy, and how sugars and other different components are manipulated to produce different kinds of tasty candy.

- Target age group: 10–12 years

Chemistry Arcade!

Soap Bubble (10–14 April 2011)

Do you enjoy playing with soap bubbles? Have you ever had the chance to experiment with the chemistry behind it? Blowing soap bubbles teaches students some basic science facts, such as making bubble blowers from different common household objects, learning how to mix a bubble solution, observing their shapes and colors and experimenting with them.

- Target age group: 6–12 years

Chemistry (17–21 April 2011)

Chemistry is the science of chance. It looks at all the different kinds of substances and how they interact with each other. People in widely differing walks of life use chemistry on a daily basis. This chemistry workshop encompasses a variety of simple and fun scientific experiments that aim to familiarize children with some chemical secrets, such as chemical reactions, atoms and molecules, acid base reactions, the difference between compounds and mixtures, among many other secrets.

- Target age group: 10–12 years

Animal Adaptations (24–28 April 2011)

There is more to animals survival than just the habitat they live in. They also depend on their physical features, known physical adaptations, to help them obtain food, keep safe, build homes and withstand weather. Physical adaptations do not develop during an animal's life but over many generations. To learn more about what animals physical adaptation means, attend this workshop, where you will experience a number of activities to know the way animals use their physical characteristics to adapt to the different environmental conditions and maintain their lives.

- Target age group: 9–12 years

Programs & Events

Ongoing Programs

Fun with Science

In collaboration with the Young People's and Children's Libraries, this program applies a series of fables containing valuable messages to provide children with a scientific basis and enable them to make use of scientific facts as a creative tool. A major theme of this program is "systems thinking" as children learn how everything is interconnected. The first part of the program is based on storytelling, while the second part focuses on hands-on scientific activities.

- Target age group: 9–12 years
- Number of sessions/week: Twice
- Session duration: 2 hrs
- Maximum number of participants: 25
- PSC workshop fees are EGP 2 per student per session.
- Young People's and Children's Libraries fees are EGP 0.50 per student per visit.
- For additional information and registration, please contact the PSC Administrator.

Chess Club

In cooperation with the Egyptian Chess Federation, this program aims to develop and sharpen children skills. Chess is an exercise for the mind; it develops valuable mental abilities such as concentration, critical thinking, pattern recognition, strategic planning, creativity, analysis, synthesis, and evaluation, to name a few. Chess is a highly effective tool for teaching problem-solving and abstract reasoning through analyzing situations by focusing on important factors and eliminating distractions.

- Target age group: 6–16 years
- Program duration: 3 months
- Number of sessions/week: Twice
- Session duration: 2 hrs
- Maximum number of participants: 25
- Fees (following interview): EGP 150
- For additional information and registration, please contact the PSC Administrator.

Super Science Show

Introducing a new form of science learning that is pure entertainment, this is a dynamic and highly motivational activity that gets children involved in a variety of amusing and exciting hands-on scientific experiments that stimulate enthusiasm.

- Target age group: 6–12 years
- Show duration: 60 min.
- Maximum number of participants: 50
- Show fees inside the BA are EGP 100/group
- Show fees outside the BA are EGP 300/group
- For reservations, please contact the PSC Administrator at least one week before the desired date.

Outreach Programs

Science Club

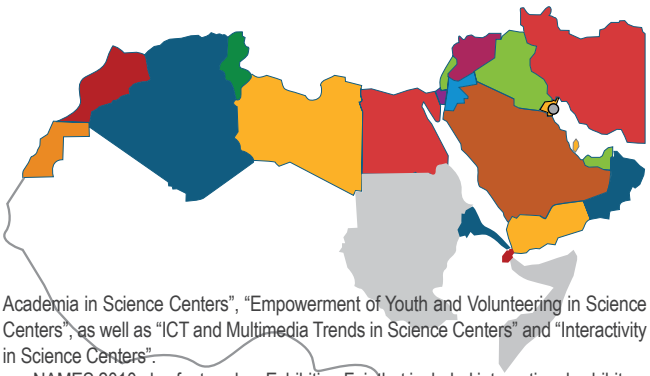
An ambitious outreach project, the Science Club program has been adopted by the PSC to bring the hands-on concept to science learning within the formal education framework. It aims to establish scientific corners in different schools and train teachers to apply innovative communication methods. The program aspires to stimulate curiosity, interest and enjoyment in science, in addition to enhancing experimental abilities and developing investigative skills.

- Target age group: 6–13 years
- Free of charge
- Participation is for schools only.
- For additional information and registration, please contact the PSC Administrator.

NAMES 2010

A Successful NAMES Second General Assembly Meeting reinforces the Network's status on the international arena

By Maissa Azab



The four-year old North Africa and Middle East Science centers network (NAMES) held its Second General Assembly Meeting, NAMES 2010, 16-17 October 2010. The highly successful event was hosted by The Scientific Center of Kuwait (TSCK). The success of the conference solidified the status of the Network on the international arena with the participation of 150 delegates representing more than 22 countries, in addition to speeches of recognition from **Ecsite** (the European Network of Science Centers and Museums) and **ASTC** (the Association of Science-Technology Centers).

The Opening Ceremony was attended by representatives from the Kuwaiti Ministry of Education. The former President of **SAASTEC** (The Southern African Association of Science and Technology Centers) introduced a video about the 6th Science Centers World Congress (**6SCWC**), which will take place in Cape Town, South Africa, 4–8 September 2011, under the overarching theme "Science Across Cultures". NAMES is the co-host of 6SCWC [www.6scwc.org].

The overarching theme of NAMES 2010 was "***Science for Knowledge and Prosperity***" with three sub-themes; New Technologies, Sustainable Development and Life Sciences. The Conference featured keynote speeches by eminent speakers: **Mostafa Elsayed**, Julius Brown Chair and Regents Professor, and Director of Laser Dynamics Laboratory, Georgia Institute of Technology, USA; **Hoda Baraka**, First Deputy to the Egyptian Minister of Communications and Information Technology, Egypt; **Fatma Al-Awadhi**, Research Directorate, The Kuwait Foundation for the Advancement of Sciences, Kuwait; and **Kazem Behbehani**, Director General, Dasman Diabetes Institute, Kuwait.

Parallel sessions covered "Featuring Nanotechnology in Science Centers", "Science Center Management for Sustainable Development", "Involvement of Academia in Science Centers", "Empowerment of Youth and Volunteering in Science Centers", as well as "ICT and Multimedia Trends in Science Centers" and "Interactivity in Science Centers".

NAMES 2010 also featured an Exhibition Fair that included international exhibitors such as: The American Museum of Natural History, The Field Museum and the Liberty Science Center from the USA, as well as Hüttinger from Germany, Bruns from Netherlands, and MTE Studios from the United Arab Emirates.

NAMES was launched on 30 January 2006, during a meeting initiated and organized by the PSC. The goal of NAMES is the popularization of science throughout the region by enhancing the public understanding and involvement in science and scientific culture among an increasingly diverse audience.

The purpose of creating NAMES is to foster cooperation between existing science centers and museums in North Africa and the Middle East with the aim of gaining from all available resources and experiences within the region to further enhance the role of all member establishments. The Network also aims to help establish new science centers and museums in all countries of the region.

The purpose and goal of NAMES are to be achieved through excellence and innovation in informal education, and by offering hands-on activities where the audience can indulge in participatory learning.

So far, the Network comprises six full members from Egypt, Kuwait, Saudi Arabia, Tunisia and Turkey. New members are soon to join from Bahrain, Lebanon, Qatar, Syrian Arab Republic, Yemen and United Arab Emirates. NAMES Third General Assembly Meeting will be hosted by Tunis Science City, Tunisia, in November 2012.

PSC Interview

Prof. Mostafa Elsayed

Julius Brown Chair and Regents Professor
Director of Laser Dynamics Laboratory,
Georgia Institute of Technology, USA

What made you choose to study science?

I had a very good high school chemistry teacher who did some demonstrations that were exciting to me.

What directed you to nanotechnology?

It came at the right time. I was doing cluster research and I received an offer from my present university with all the instruments needed to do nanotechnology research so I moved into it.

Why do you think nanotechnology is at the center of attention these days?

It is a new science that will open up a lot of industries thus many jobs will be created which should help the economy of the country whose government is wise enough to invest in nanoscience research. Furthermore, it will find new medicine thus help sick people. It is these two important factors that encourage smart governments to invest in nanotechnology research.

What are the latest discoveries and/or inventions in nanotechnology?

It has new things in every field that I cannot list them or even know them. It leads to billion-dollar industries annually. Please go to the Internet (Google) and write down "nanotechnology".

How do you expect nanotechnology to change the world?

For the better. How did research in the last hundred years affect us today; flying, conquering disease, TV, computers, the Internet,….Nanotechnology will impact all these industries and bring new discoveries of its own.

What, in your opinion, would be a good method of communicating nanotechnology to the public?

Every material we presently use will change its property if we reduce its size to the small size of nanometer (the thickness of one hair is 50,000 nano-meter). Every industry we have or medicine we take is based on a property of a certain material. By discovering many new materials with different properties on the nanosize, nanotechnology will give us many new materials with new properties, we can make many new things with new properties. Some of these properties can be new medicine, things that make much faster computers, more efficient cars, things that can give us efficient energy, new medicine that will cure sick people and new things we do not even imagine yet. This will open many new jobs with good salaries, thus making the countries that do nanotechnology research richer with better standards of living and health for its people.

Save The Date!

13-15 March 2011

30-31 March 2011 at the BA
1 April 2011 at Antoniadis Gardens

DISCOVERED BY Accident!

Provided by Dr. Rasha Hassan
Edited by Lamia Ghoneim

Do you know what X-rays, the Post-it note and chocolate chip cookies have in common? They were all fortunate accidents!

"***I have not failed; I have just found 10,000 ways that will not work***", said Thomas A. Edison. These simple, yet deep, words wittily sum up the truth of the spirit and genius behind discovery and invention. The truth is that perseverance is the only way science and technology happen; coincidentally, while researching, scientists are often able to see magic in a mistake or a coincidence.

Serendipity is what they call it, meaning the ability to make fortunate discoveries while looking for something unrelated. A surprising number of discoveries owe a lot to chance; the most famous accidental discovery was by **Alexander Fleming**, namely penicillin. It took place in 1928 when he left a culture plate smeared with Staphylococcus bacteria on his lab bench while he went on a two-week holiday. He returned home to see that the culture had been contaminated by a fungus, which stopped the bacteria growing. He had discovered **antibiotic**!

This was by no means the first or last accidental discovery. Throughout the centuries, such discoveries have led to some of the world's greatest breakthroughs in all areas of life. Here are a few examples of discoveries uncovered by chance while scientists were looking for something totally different!

Eureka!

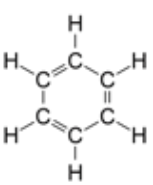
The most widely known anecdote about **Archimedes** tells of how he invented a method for determining the volume of an object with an irregular shape. According to Vitruvius, a votive crown for a temple had been made for King Hiero II, who had supplied the pure gold to be used, and Archimedes was asked to determine whether some silver had been substituted by the dishonest goldsmith. Archimedes had to solve the problem without damaging the crown, so he could not melt it down into a regularly shaped body in order to calculate its density.

While taking a bath, he noticed that the level of the water in the tub rose as he got in, and realized that this effect could be used to determine the volume of the crown. Water is incompressible, so the submerged crown would displace an amount of water equal to its own volume. By dividing the mass of the crown by the volume of water displaced, the density of the crown could be obtained. This density would be lower than that of gold if cheaper and less dense metals had been added.

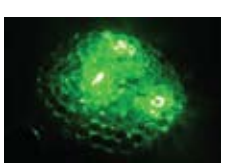
Legend has it that Archimedes then took to the streets, so excited by his discovery that he had forgotten to dress, crying *Eureka!*

Dream Ring

German chemist **Friedrich August Kekulé** made a major accidental discovery, the **benzene ring** (C_6H_6). For some time he was puzzled over its structure. Until then it had been assumed that all organic compounds had an open chain of carbon atoms as a backbone. Then, while dozing in his study, Kekulé had a vision of chains of carbon atoms twisting and curling like serpents; suddenly one gripped its own tail to make the closed ring. This made him realize that carbon atoms did not have to be arranged in open chains. In fact, the ring structure for benzene accounted for several of its properties.



Rain-check



In 1896, physicist **Henri Becquerel** ran a series of experiments to see if naturally fluorescent minerals produced X-rays after they had been left out in the Sun. As it happens, he carried out these experiments during winter, and there was one week with a long stretch of overcast skies. So, he left his equipment wrapped up together in a drawer and waited for a sunny day.

When he returned to work, Becquerel realized that the uranium rock he had left in the drawer had imprinted itself on a photographic plate without being exposed to sunlight first. He realized there was something very special about that rock. Working with Marie and Pierre Curie, he discovered that that something was **radioactivity**.

The Color Mauve!

Eighteen-year-old chemist **William Perkin** wanted to cure malaria; instead his scientific endeavors changed the face of fashion and helped fight cancer!

In 1856, Perkin was trying to produce artificial quinine, the natural source of which is the Cinchona tree, and the first effective treatment for malaria. Instead, his experiments produced a thick murky mess. The more he looked at it, the more Perkin saw a beautiful color in his mess. Turns out he had made the first-ever **synthetic dye**.

One of the people inspired by Perkin's work was German bacteriologist **Paul Ehrlich**, who used Perkin's dyes to pioneer in **immunology** and **chemotherapy**.

Ghost

In 1895, German scientist **Wilhelm Conrad Röntgen** was investigating the possibility of cathode rays penetrating a glass tube completely covered with black cardboard, when he noticed a glow appearing in his laboratory, many feet away from the covered glass tube. He discovered that the fluorescent glow had come from a small cardboard screen painted with barium platinocyanide. With some more investigation, he found that the rays which were escaping the tube were very different from cathode rays and have unique penetrating powers. He happened to stumble upon **X-rays**.

While investigating the ability of various materials to stop the rays, Röntgen placed a small piece of lead into position while a discharge was occurring. That is when he saw the first radiographic image appear, his own flickering ghostly skeleton on the barium platinocyanide screen. He later won a Nobel Prize in Physics for his accidental discovery.

Rustless

Harry Brearley was working to prevent corrosion in rifle barrels when he accidentally invented something that would revolutionize the world of cutlery!

With an extensive background and expertise in steel, he was assigned the job of producing a type of steel that would not erode away, to be used in rifle barrels. Brearley made history on 13 August 1913, when his mix 0.24% carbon and 12.8% chromium with steel created the first ever stainless steel.

Although Brearley did not realize then what he had created; the resistance of the metal to acids such as vinegar and lemon juice soon directed him in the right direction. At that time cutlery was made from silver or carbon steel, none of which were resistant to rust, so Brearley launched his "rustless steel".

Cooking Made Easy

Cooks and housewives owe a lot to the American **Percy LeBaron Spencer** who invented the **microwave**. It started in 1945, when Percy was testing a magnetron for radar sets. Crossed electron and magnetic fields are used in the magnetron to produce the high-power output required in radar equipment.

While standing by a functioning magnetron, Spencer noticed that the chocolate bar in his pocket had melted. His keen mind soon figured out that it was the microwaves that had caused it, so he placed a small bowl of popcorn in front of the tube and it quickly popped all over the room; and eventually, an egg, which exploded.

The Beat

American Engineer **Wilson Greatbatch** was working on a circuit to help record fast heart beats. He reached into a box for a resistor in order to complete the circuit and pulled out a 1-megaohm, instead of a 10,000-ohm, resistor. The circuit pulsed for 1.8 milliseconds and then stopped for one second, then was repeated. The sound was a perfect heartbeat; Greatbatch accidently invented the **pacemaker**.

The pacemaker is a small device that is placed in the chest or abdomen to help control abnormal heart rhythms. It uses electrical pulses to prompt the heart to beat at a normal rate.

Anti-sticking

Young DuPont Chemist **Roy Plunkett** was working to produce a new Chlorofluorocarbon (CFC) refrigerant. His theory was that if he could get a compound called Polytetrafluoroethylene (TFE or PTFE), which is one of three fluorocarbon resins composed wholly of fluorine and carbon, to react with hydrochloric acid, he could produce the refrigerant he wanted.

He started out by cooling the TFE gas, then pressurizing it in canisters for storage. When it was time to open the canister, nothing came out. He thought that the gas had disappeared; but it had not. Frustrated and angry, Plunkett took off the top of the canister and shook it; out came some fine white flakes.

Luckily for everyone who has ever made an omelet, he was intrigued by the flakes and handed them to other scientists at DuPont, who discovered a use for it as a non-stick coating for surfaces. That is how **Teflon** appeared.

Guiltless Sugar

Did you know that saccharin, the artificial sweetener or sugar substitute, was discovered because Chemist **Constantin Fahlberg** did not wash his hands after a day at the office.

In 1879, Fahlberg was trying to come up with new and interesting uses for coal tar. After a productive day at the office, he went home for dinner and while eating, he noticed that his food tasted a bit sweet. He realized that the taste was coming from his hands. The next day he returned to the lab and started tasting his work until he found the sweet spot.

Saccharin has been the subject of controversy almost since it was discovered, but now it is one of the most thoroughly tested food ingredients. Its safety is supported by 30 human studies, a century of use and the approval of the World Health Organization.

These were only a few of the countless "serendipitous" discoveries made by chance. Yet, chance is not enough to make such key discoveries. Scientists and inventors must keep an open-mind, and be receptive enough to detect and understand the importance of the unforeseen incident and to use it constructively.

We must learn to trust our instincts, to heighten our senses, to notice new things and see connections. First and foremost, we must learn to study and prepare. Who knows, perhaps then an unexpected chance would lead us to a new and fascinating discovery, our own "Eureka" moment.

As Louis Pasteur once said, ***"In the field of observation, chance favors only the prepared mind."***

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Inventions

From the moment you wake up on the sound of your alarm clock, going through washing your face, drinking your morning coffee, and driving your car to work, all the way through the day till you go to bed at night; do you ever stop to think about all the inventions you used during the day, and will continue to use every day?

Alarm clocks, running water, coffee and automobiles; these are all inventions that we use on a daily basis. Yet, most of us never think about the stories behind them, nor are we familiar with the inventors who came up with them. From the simplest gadget to the most sophisticated contraption, they all have a history behind them, and a line of inventors who created them.

Ring Ring! Wake Up!
Alarm clocks

The earliest alarm clock dates back to around 250 BCE, and was invented by the Greeks. It was nothing like the alarm clocks we use today; its mechanism was basically that of a water clock where rising water would keep time and eventually hit a mechanical bird that triggered an alarming whistle.

Closer to our modern-day alarm clocks was the mechanical alarm clock invented by **Levi Hutchins** of Concord, New Hampshire, in 1787. He was a clock-maker, who was the figure of punctuality and promptness. His firm routine was to awaken at 4:00 am in order to be at his job on time, but he sometimes slept past that hour, which distraught him deeply.

He was determined to solve this problem and soon he came up with the idea of a clock that could sound an alarm. He constructed a pine cabinet of 29"x14", transferred the inner mechanism of one of his large brass clocks into it and inserted a pinion inside. "*When the minute hand of the clock reached and tripped the pinion at 4:00 o'clock, the movement of the pinion set a bell in motion, and the bell made sufficient noise to awaken me almost instantly,*" he wrote.

The alarm clock he invented would only ring at 4:00 am, and it was not adjustable. He also never bothered to patent it or mass produce it as he clearly was not interested in money; only in being on time.

Years later, in 1847, the French inventor **Antoine Redier** invented and patented the first adjustable mechanical alarm clock that bears much resemblance to the alarm clocks we use today.

The One Invention No One Can Do Without
The Toilet

The idea that **Mr. Thomas Crapper** invented the first toilet in the 18th century is a common misconception. The fact is, simple toilets have been used since Babylonian times. However, in 1596, Sir John Harrington, the poet and godson of Queen Elizabeth I, invented an indoor water closet that apparently had most of the basic features of today's restroom, even a flush toilet. However, the invention was largely ignored by the rest of society.

In 1775, London watchmaker **Alexander Cummings** patented the forerunner of today's toilet, the standard flush toilet. Mr. Crapper, on the other hand, did hold nine plumbing related patents that improved the toilet. The Crapper name most likely became synonymous with the toilet because "Crapper" was marked proudly on the tanks and toilet bowls that he made and installed for princes and kings!

A Sharp Idea
Disposable Razors

It is estimated that men spend an average of five months of their lives shaving, so it is no surprise that one man, **King Camp Gillette**, took it upon himself to make the job easier!

One morning, Gillette dreamed up an entirely new razor that could be used several times and discarded. In 1901, he enlisted the help of MIT-graduate, **William Nickerson**, to create a metal blade that was sturdy yet inexpensive. The disposable razor enjoyed a great boost when the US Government issued "safety razors" to the entire armed forces. In later years, razors with two, three, four and even five blades were introduced to the public.

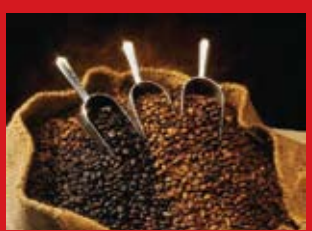
While Gillette pioneered the invention of disposable razors, his competitor, **Lieutenant Colonel Jacob Schick**, beat him by a "hair" when he patented the first electric razor in 1925.

Bittersweet Invention
Coffee

Statistics show that over 400 million cups of coffee are consumed every year. Very few of those who consume coffee are aware of the perplexing history behind it.

Around the 15th century, wild coffee plants from Ethiopia were taken to southern Arabia and cultivated as food for animals. Legend states that the effect of the plant was first discovered, when an Arab goatherd named **Kaldi** noticed that his goats got friskier when they consumed a berry from the coffee shrub. Kaldi was intrigued so he sampled the berries himself and upon experiencing a sense of exhilaration, he proclaimed his discovery to the world.

The stimulating effect of coffee quickly made it very popular, even though it was met with much controversy. In 1908, housewife **Melitta Bentz** from Germany got tired of drinking her coffee with leftover coffee grounds and hence invented the first coffee filter, using blotting filter papers. Thirty years later, the **Nestlé** Company invented instant coffee. Coffee production has since become a lucrative industry and has risen in rating to one of the world's greatest commodities. It is second only to oil.



Keeping It Together
The Zipper

Some great ideas take a long time to take off. In case of the zipper, it took 80 years!

Elias Howe, who also invented the sewing machine, received a patent in 1851 for an "automatic, continuous clothing closure" but the runaway success of the sewing machine left him with little time to develop this invention.

Forty-four years later, the idea of a slide fastener was exhibited by **Whitcomb L. Judson** at the World's Columbian Exposition of 1893 in Chicago. Judson's fastener, called a clasp locker, was an arrangement of hooks and eyes with a slide clasp for closing and opening.

Gideon Sundback, a Swedish engineer working in the United States, substituted spring clips in place of hooks and eyes, and on 29 April 1913, he received a patent for his hook-less fastener. In 1923, **B.G. Work** of the B.F. Goodrich Company gave the name "zipper" to the slide fastener that had just been adopted for closing boots.

That Make Our Day

By Lamia Ghoneim

Aside from boots, it took another 20 years for the zipper to catch on in the fashion world. Eventually, over the years, zippers made their way onto clothing, luggage and countless other objects.

Going Up? Going Down?
The Elevator

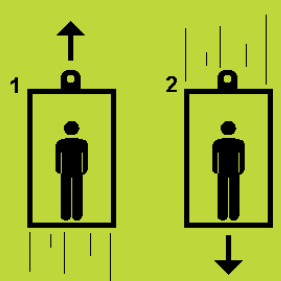
If you have ever been atop the Empire State Building, the Tour Eiffel or even the roof of your building, you may have been in awe at architects' abilities to design buildings that stretch toward the sky. Few realize that without one man's invention, generations would have never dreamed of building them.

Elisha Otis was born in Halifax, Vermont. He was inspired to design what was then called the "safety elevator" when he was asked to move equipment into the warehouse of his employer, a New York bed factory. Most elevators of the time were extremely dangerous; Otis' employer needed an elevator that could carry people and equipment safely to the upper floors of its new building.

At the Crystal Palace Exposition in New York in 1853, Otis demonstrated his solution. A large crowd watched breathlessly from the floor far below as Otis ascended in his new elevator. Stopping at a dizzying height, Otis told his assistant to cut the elevator's cord!

The crowd let out a gasp of relief when the elevator platform did not come crashing to the floor. The key to Otis' invention was a toothed guiderail located on each side of the elevator shaft that caught the elevator car. If the cable failed, the teeth would engage, locking the car in place.

The next time you ride an elevator, take a look around; there is a good chance you will spot the "Otis" name.



It is a Small World After All
Cars

The idea of a self-propelled vehicle can be traced back to the 15th century, during the days of the great **Leonardo da Vinci**. The first actual automobile though, was invented by **Nicolas-Joseph Cugnot** in 1769, France. It was nothing like the cars we use today, it was a huge, heavy and steam powered tricycle! Nevertheless, it did its purpose and ran for 20 minutes at 3.6 km per hour while carrying four people.

Obviously, steam-powered automobiles never had much success. The success of the automobile industry began with inventors **Karl Benz** and **Gottlieb Daimler** of Germany who ran gasoline-engine automobiles. Benz ran his first car in 1885, Daimler in 1886. Even though they may have been preceded by others, they were the only ones who persisted. Their successor firm of Daimler Chrysler AG can trace its origins back to 1895 and claim, with the Peugeot SA firm of France, to be the oldest automobile-manufacturing firms in the world.

No More Ink Spills
The Ballpoint Pen

This homely little invention is used on a daily basis, even more than computers and the Internet. We received it courtesy of two Hungarian brothers, **Georg** and **Ladislao Biro**. Even though they did not perfect the technology, they did indeed succeed in creating what would still be recognized as a ballpoint pen today.

Before the ballpoint pen was invented, people used quill pens dipped in ink or fountain pens, which had to be refilled. In addition to being impractical, these pens were also messy.

Working with a narrow shaft, the Biro brothers inserted a tiny steel ball at the end that was connected to an interior tube filled with ink. This tube worked in much the same way that veins send blood through the body; by constantly keeping the ball at the end moist with ink, thereby allowing the writing to flow unabated.

There was only one major flaw in the original Biro ballpoint pen that needed work. While the ink was distributed evenly, it tended to be a little too moist resulting in smearing. Solving this problem was taken up by a chemist from Austria, **Fran Seech**. His mission was to ensure that the ink actually dried on contact with the paper, thereby eliminating smearing. Once that was taken care of, it merely became a matter of properly marketing this most useful invention.

If you think you have never written with a Biro pen yourself, you are mistaken. For much of its early history, Biro had made high quality pens, but eventually they were bought out by a French company that realized the wisdom in producing lower quality pens that could be disposed of once the ink dried up. The name of the company that bought Biro was, of course, **Bic**.

Ah-Choo!
The Kleenex®

Before the invention of disposable tissues, whenever you had a cold, you would simply blow your nose into your handkerchief, place it back into your pocket, and repeat when necessary; not exactly the best way to get rid of a bug.

In the 1920s, Kleenex® Brand invented the facial tissue category, which was publicized by screen legends Helen Hayes and Jean Harlow.

By 1928, Kleenex® offered cartons with perforated tops for easy access to tissues. Over the following several decades, more varieties, colors and decorative boxes found their way into the Kleenex® line. Undoubtedly, the invention of the Kleenex® has helped countless people with a cold or a runny nose.

Staying Connected
Mobile Phones

We all know that **Alexander Graham Bell** invented the telephone, but few of us are aware of the inventor of the mobile phone. His name is **Dr. Martin Cooper**. He may not be a household name, but his invention is well-known to more than half the globe's population who own mobile phones.

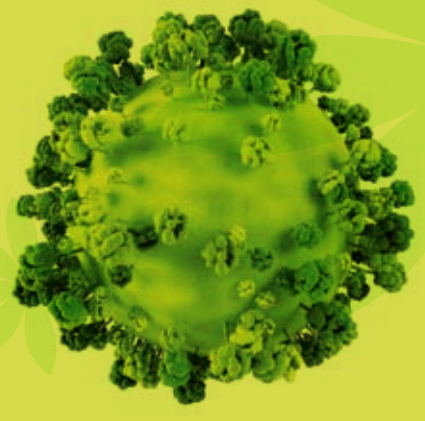
The notion of a handheld phone was his brainchild, and with the help of his Motorola team, the first handset was born in 1973, weighing five pounds. Although Dr. Cooper invented the modern cell phone, the history of this device dates back to 1947. The basic technology that made the eventual development possible was actually when a joint venture between AT&T and Bell came up with the technology for hexagonal cells for use in mobile phone stations.

The first cell phone was so expensive that at first only businesses and the military had access to them. It took ten years or so before cell phones began to trickle down to the public; after that, the industry took off. Thanks to Dr. Cooper's invention, other companies began developing their own cellular phone prototypes, and cell phones developed all the way to light, palm-size multitasking tools.

Without these inventors and others' creative spirit, their quest for answers and their desire to question what is known; our world would be a much different place. It would be a world void of the daily life comforts, and what we use every day without a moment's, thought as to how or who figured them out and made our lives so much better.

So the next time you send an SMS, take your coffee break or ride an elevator, remember to pay tribute to the pioneers who created all those things that we now take for granted. Remember the everyday inventors who made our life easier and our world happier, while also teaching us success.

Green Inventions



By Marwa Gaber

A green invention is one that has a "green" purpose. Naturally, we do not mean the color green; but because Mother Nature is quite green, the long- and short-term impact an invention has on the environment is what we are talking about. We mean environmentally-friendly inventions that often involve energy efficiency, renewable resources, recycling, safety and health concerns.

One of the best known examples of a green invention would be the solar cell, which directly converts energy in light into electrical energy through the process of photovoltaics. Generating electricity from solar energy means less consumption of fossil fuels, reducing pollution and greenhouse gas emissions.

Why Should Inventors Think Green?

The world has a fixed amount of natural resources, some of which are already depleted or ruined. Inventors should know that green inventions and clean technologies are also good business. These are fast growing markets with growing profits. Consumers should be aware that buying green inventions can reduce energy bills and that green inventions are often safer and healthier products.

Blue Energy

We have known water to be a source of energy for a long time. The conventional way of getting energy from water is with a dam and a turbine; but there are other ways.

A research institute has found a way to generate electricity from bringing seawater and river water together. A difference in salt concentration exists between seawater and river water; this gradient can be utilized to generate electricity by separating positive and negative ions by ion-specific membranes. Mixing seawater and river water in this advanced way has huge advantages; no fuel costs and no emissions but brackish water!

Water-based Fuels

Rudolf W. Gunnerman of Reno, Nevada, has invented a safe, inexpensive, environment-friendly fuel that could revolutionize transportation and counteract the world's most prevalent source of pollution; 3 billion gallons of petroleum burned every day worldworide.

Though it is proverbial that oil and water do not mix, Gunnerman invented a special emulsifier additive that overcomes that problem. He has created workable mixtures of alcohol and water, gasoline and water, diesel fuel and water, and most recently water and naphtha, an even cleaner-burning petroleum derivative. These are known collectively as A-55 Clean Fuels.

Gunnerman's fuels could reduce pollutant emissions an average of 50%, while improving efficiency in vehicles over 25%. The fuels are safer than gasoline, being flame-resistant outside the engine. A-55 Fuels can even reduce water pollution, since contaminated water produced by crude-oil refineries can be used as their water base. Gunnerman's fuels can be manufactured and distributed using current facilities, and can be used in any open-flame or internal combustion engine; in fact, they can be used in most existing cars following cheap mechanical adjustments.

Aerial Reforestation

Moshe Alamaro, a graduate student in Mechanical Engineering at MIT, has developed a revolutionary method of battling global warming by planting new trees from the air!

As most people are aware, millions of acres of forest have been destroyed in the past century, due not only to humans, most notably the lumber industry, but also to climatic change and forest fires. Traditional reforestation methods, tedious and time-consuming, can replace only a small percentage of these trees.

Alamaro invented an incredibly efficient system designing conical canisters, of a starchy biodegradable material, each containing a seedling packed in soil and nutrients. The canisters are dropped from a low-flying plane, so that they hit the ground at 200 mph, and imbed themselves in the soil. The canisters decompose and the young trees take root. A large aircraft could drop as many as 100,000 saplings in a single flight; Alamaro's system could plant as many as one million trees in one day.

Alamaro made the process practicable using a combination of ballistics and navigation technology to place the saplings accurately. His canisters are strong enough to withstand the impact but still decompose quickly. Moreover, Alamaro's system is overseen by an airborne surveillance system, which guarantees safety and also monitors the early growth of the trees.

Large-scale reforestation significantly reduces the carbon dioxide in the atmosphere, thus counteracting global warming. In addition, new trees fight erosion, promote biodiversity, and protect the habitat of local wildlife.

Solar Airplane

After spending six long years in stealthy development of this amazing invention, the prototype of a new aircraft exclusively designed to run on solar power was unveiled by Dr. Bertrand Piccard and André Borschberg. After revealing the prototype of the solar powered airplane, Dr. Piccard explained his plans to cross the Atlantic in 2012 before attempting to circle the globe in a solar plane.

The airplane is designed to fly both day and night without the need for fuel. Despite a wingspan equal to that of a Boeing 747, the Solar Impulse weighs only around 1.7 tons, about the same as an average car. More than 12,000 solar cells mounted on the wing supply renewable solar energy to the four 10-horsepower electric motors. During the day, the solar panels charge the plane's lithium polymer batteries, allowing it to fly at night.

Solar Cooling

Using the Sun for cooling buildings can be an excellent application for solar energy. The Southern California Gas Company is now testing the possibility. They have chosen two solar concentrators for measuring the effectiveness of a solar air conditioner in cooling buildings. Both products reflect and concentrate incoming sunlight onto a pipe to heat water. The heated water replaces electricity or gas to power an industrial absorption chiller that creates cold air through a compressor.

New Age Water Clock

Another green product that attracted attention is the Bedol water-powered clock. This amazing clock runs on a water system and requires only water. Its system is special and uses a special tank with tap water and small amount of table salt. The clock does not need any battery or solar power charger. It is a simple example of water-powering generator in a mini size.

Bamboo Laptop

Green technologies are heading to a brand new level that surely can impress anyone interested in a green-life style. One of the surprises is the release of the Asus U-series bamboo laptop. This is not the brand's first bamboo notebook, but it is surely the most environmental-friendly one. The bamboo laptop is powered by an entirely new system that helps to reduce e-waste.

Green Cell Phones

Very few of us can live without a mobile device that keeps us connected while on the go, but our cell phones and PDAs contribute to toxic waste and lost resources, especially at the rate with which we upgrade. You can participate by choosing a greener cell phone the next time you are looking to trade-up.

The Sticky Phone

A concept design by Liu Hsiang-Ling integrates solar cells into mobile phones in a simple, elegant design.

Though many are concerned that they cannot leave their phones charging in the Sun for several hours, this new design tries to work through that problem by incorporating a suction system for easy charging by simply peeling back the protective cover from a sticky surface and sticking the phone to a nearby window receiving full Sun.

The Blue Earth Phone

This is another take on the solar-powered mobile phone. It is a touch screen smart phone that can generate its own power with a built-in solar panel on the back. It is even made from Post-Consumer recycled Material (PCM), which is plastic made from recycled water bottles.

Green Heart

Part of their GreenHeart project which aims to integrate environmental advances across Sony Ericsson's entire product lines, these phones are loaded with eco-friendly features. With some of the greenest features of any cell phone on the market, two new options, the Elm and the Hazel, are being billed as devices that are above most other green phones.

Both are constructed, in part, of recycled plastic and are produced without toxic chemicals commonly found in electronics. They also come with energy-efficient chargers and are packaged in minimal packaging and use eco-friendly paints.

The two phones also feature the Walk Mate, which helps the user find a walking route to where they need to go so that they can leave the car behind. The aim is to encourage phone users to walk more than they drive. The Walk Mate even calculates how much carbon dioxide is saved by using this more eco-friendly method of transportation.

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	ß				μ		π	Ω
		π			Ω	μ		
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Δ	Ø		Ω			Σ		
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Arithmetic SUDOKU

β- Δ -Ø-λ-θ-Ω-μ-π-Σ

Solve the Sudoku puzzle by filling each blank square with the correct Greek symbol. Note that every row and column must include all the symbols in any order, and every 3x3 box of the 9x9 square must include all the symbols.

Do you know that:

β = Beta (2)
Δ = Delta (4)
Ø = Phi (500)
λ = Lambda (30)
θ = Theta (9)
Ω = Omega (800)
μ = Mu (40)
π = Pi (80)
Σ = Sigma (200)

The Golden Age of ISLAM

A Map of Scientific Discovery and Invention

By Maissa Azab and Reda Kandil

KHWARIZM

The Birth of Algebra

c. 780-850: ***Muhammad ibn Musa al-Khwarizmi,*** "The Father of Algebra", was mathematician, astronomer and geographer. He was a scholar of the House of Wisdom in Baghdad; he introduced the basics of Algebra and Algorithm still used to this day. He explained the use of zero, a numeral of fundamental importance developed by the Arabs, and he developed the decimal system.

His development of astronomical tables was a significant contribution to astronomy. Likewise, his contribution to geography is also outstanding, in that, not only did he revise Ptolemy's views on geography, but also corrected them in detail. His other contributions include original works related to clocks, sundials and astrolabes.

Al-Khwarizmi's approach was systematic and logical; not only did he bring together the prevailing knowledge at the time on various branches of science, but he also enriched it through his original contribution.

A Science Prodigy

973-1048: ***Abu Rayhan Muhammad ibn Ahmad al-Biruni***, known as ***Alberonius*** in Latin, was a polymath[1] with an interest in various practical and scholarly fields. He was one of the first promoters of an experimental method of investigation, introducing this method into mechanics and what is now known as mineralogy, psychology and astronomy.

Al-Biruni began studies at a very early age, under the famous astronomer and mathematician Abu Nasr Mansur. By the age of 17, he was engaged in serious scientific work; by the age of 22, he was well read and had studied a wide selection of map projections discussing them in a treatise.

It is estimated that al-Biruni wrote around 146 works with a total of about 13,000 folios; the range of his work covers essentially all the science of his time.

BAGHDAD

Practical Alchemy

c. 721-815: ***Abu Musa Jabir ibn Hayyan*** was a prominent polymath; considered the "Father of Chemistry", he was the first practical alchemist. His major contribution is introducing experimental investigation into alchemy, rapidly changing its character into modern chemistry.

Ibn Hayyan's contribution of fundamental importance to chemistry includes perfection of scientific techniques such as crystalization, distillation, calcination, sublimation and evaporation, as well as development of several instruments. His major practical achievement was the discovery of minerals and other acids, which he prepared for the first time in his alembic (al-inbiq)[2].

Ibn Hayyan also emphasized that, in chemical reactions, definite quantities of various substances are involved; thus, paving the way for the law of constant proportions. Based on their properties, he described three distinct types of substances: spirits, which are those that vaporise on heating; metals; and compounds that can be polverized. He thus made way for later classification of metals, non-metals and volatile substances.

The Banu Musa Brothers

c. 803-873: ***Abu Ja'far Muhammad, Ahmad*** and ***al-Hassan Banu Musa*** were great mathematicians and translators of the Greek treatises; they invented mechanical devices and published their most renowned engineering treatise ***Kitab al-Hiyal*** (Book of Ingenious Devices).

The Banu Musa brothers were among the first group of mathematicians to carry forward the mathematical developments initiated by the ancient Greeks. ***Ja'far Muhammad*** worked mainly on geometry and astronomy, while ***Ahmad*** worked on mechanics, and ***al Hasan*** on geometry.

The House of Wisdom

Al-Ma'mun continued the patronage of learning started by his father and founded an academy called the House of Wisdom where Greek philosophical and scientific works were translated. He also built up a library of manuscripts, the first major library to be set up since that in Alexandria, collecting important works from Byzantium. In addition to the House of Wisdom, al-Ma'mun set up observatories, in which Muslim astronomers could build on the knowledge acquired by earlier peoples.

KUFA

An Arab Philosopher

c. 801-873: *Abu Yusuf Ya'qub Ibn Ishaq Al-Kindi*, known to the West by the name ***Alkindus***, was another Arab polymath. Born and educated in Kufa, he pursued his studies in Baghdad becoming a prominent figure in the House of Wisdom.

His contact with "the philosophy of the ancients" had a profound effect on al-Kindi's intellectual development, leading him to write original treatises on subjects ranging from Islamic ethics and metaphysics to mathematics and pharmacology.

Al-Kindi was a pioneer in cryptanalysis and cryptology, and devised new methods of breaking ciphers, including the frequency analysis method. Using his mathematical and medical expertise, he developed a scale to allow doctors to quantify the potency of their medication.

Despite the fact that his philosophical output was largely overshadowed by that of Al-Farabi, he is still considered one of the greatest philosophers of Arab descent, and for this reason is known simply as "The Arab Philosopher".

CAIRO

In the Eye of the Beholder

c. 965-1039: *Abu Ali al-Hasan Ibn al-Hasan Ibn al-Haytham*, known in the West as ***Alhazen***, was the first person to test hypotheses with verifiable experiments, developing the scientific method more than 200 years before European scholars learned of it—by reading his books.

Ibn al-Haytham was the first person to apply algebra to geometry, founding the branch of mathematics known as analytic geometry. He seems to have written around 92 works of which, remarkably, over 55 have survived. The main topics on which he wrote were optics, including a theory of light and a theory of vision, astronomy, and mathematics; including geometry and number theory.

A seven-volume work on optics, ***Kitâb al-Manâdhir*** (Book of Optics), is considered by many to be his most important contribution. The previous major work on optics had been Ptolemy's ***Almagest***.

In Book I, Ibn al-Haytham makes it clear that his investigation of light will be based on experimental evidence rather than on abstract theory. He notes that light is the same irrespective of the source and gives the first correct explanation of vision, showing that light is reflected from an object into the eye.

His studies of optics led him to test his hypothesis that "lights and colors do not blend in the air;" devising the world's first camera obscura; observed what happened when light rays intersected at its aperture; and recorded the results.

Book II discusses visual perception, while Book III examines conditions necessary for good vision and how errors in vision are caused. Book IV is one of the most important as it discusses the theory of reflection; in Book V, he considers cylindrical and conical mirrors. Book VI of the Optics examines errors in vision due to reflection while the final book, Book VII, examines refraction.

A Modern Zij

c. 950-1009: *Abul-Hasan Ali Ibn Abd al-Rahman Ibn Ahmad Ibn Yunus Al Sadafi*, witnessed the Fatimid conquest of Egypt and the foundation of Cairo in 969. He served two Caliphs of the dynasty, making astronomical observations for them between 977 and 1003.

Ibn Yunus' importance in the history of astronomy stems mainly from his work, ***al-Zij al-Hakimi al-Kabir*** (a zij is an astronomical handbook with tables), which is a particularly fine example of this class of astronomical handbooks. This work is distinguished from other surviving Zijes in that it begins with a list of observations, made by both Ibn Yunus and some of his predecessors.

In many respects his astronomical works have a modern appearance; many of the parameters which he used in his Zij are much superior to those of his predecessors and he is also known for his meticulous calculations and attention to detail.

SICILY

The delight of him who desires to journey through the climates

1099-1166: *Abu Abdullah Muhammad Ibn Muhammad Ibn Abdullah Ibn Idris al-Qurtubi al-Hasani*, was born in Ceuta, Spain, and educated in Cordova. He travelled far and wide for his studies, ending up at the Norman court in Palermo.

His major contribution lies in medicinal plants as presented in his several books, especially ***Kitab al-Jami-li-Sifat Ashtat al-Nabatat***. He studied and reviewed all literature on the subject of medicinal plants, collecting plants and data not reported earlier and adding them to the subject of botany, with special reference to medicinal plants.

Moreover, he made original contributions to geography, especially as related to economics, physical factors and cultural aspects. He described the world in ***Al Kitab al-Rujari,*** also entitled *Nuzhat al-Mushtaq fi Ikhtiraq al-Afaq* (The delight of him who desires to journey through the climates); practically a geographical encyclopedia of the time, containing information not only on Asia and Africa, but also Western countries.

Al-Idrisi, later on, also compiled another geographical encyclopedia, larger than the former entitled ***Rawd-Unnas wa-Nuzhat al-Nafs*** (Pleasure of men and delight of souls).

Glossary

(1) Polymath: a person whose expertise spans a significant number of different subject areas. In less formal terms, a polymath may simply be someone who is very knowledgeable. Most ancient scientists were polymaths by today's standards.

(2) Alembic (from Arabic al-inbīq, from Greek ambix (ambikon) possibly from Semitic): it is an alchemical still consisting of two vessels connected by a tube. The word "alembic" has taken on a metaphorical meaning; anything that refines or transmutes, as if by distillation. The word, as does most alchemical terminology, comes from the Arabic: al-inbīq, meaning "still".

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Ancient Egyptian Technology

By Nihal Soliman

The Egyptian empires of the first through the third millennia BCE eclipsed the accomplishments of other civilizations with extensive learning, creativity and power that have influenced civilizations for centuries to come. While ancient Egypt is usually associated with pharaohs, mummies and pyramids; a great number of ancient Egyptian inventions are still used in our everyday lives.

Ancient Egyptian inventions in some cases revolutionized the way the world lived; and in other cases, they were merely the forerunner to the technologies we enjoy today. In all cases, however, ancient Egyptian inventions were truly a marvel of ancient ingenuity. Best remembered today for towering monuments and the vast wealth of the pharaohs, Egyptians invented everyday items that are still in use; including combs, toothpaste and wigs.

Some of the inventions of ancient Egypt are quite well known, while other ancient Egyptian inventions are hardly known at all, or at the very least, often credited to other peoples.

Communication

One of the many ancient Egyptian inventions was an early system of writing, now recognized around the world, known as hieroglyphics. Not only did the ancient Egyptians invent a system of writing, but they also invented the paper on which to place it.

The word "paper" comes from papyrus, a reed plant that grows along the banks of the Nile River; unlike our modern paper, papyrus was not made from trees. The Egyptians cut it into strips, soaked it to remove the sugar, and then pounded it dry before weaving the pieces together to make paper. Papyrus is actually white; most people think it is a more tan, browner color, but that is just due to aging.

They primarily wrote on papyrus sheets using black ink, although documents were frequently decorated using dyes of many other colors. The process and depth of color utilized in the Egyptian invention of ink and dye was so marvelous that these brilliant hued colors can still be seen today, thousands of years later.

All this was a way for records and stories to be recorded on scrolls, which was the job of scribes who recorded and documented history. The Egyptians were also the first to use carrier pigeons to send messages across great distances.

Time

Famous for the sundial, the Egyptians also invented the first water clock. These were small clay pots that dripped water at a constant rate, making it easy to keep track of time. Water clocks remained the predominant timekeepers until mechanical clocks were invented in the 13th century.

Ancient civilizations recorded and marked time through a lunar calendar system. A solar-system-established calendar, based on twelve months of 30 days each, with five extra days, was first invented by the ancient Egyptians. Priests knew that one year is 365 ¼ days; but, they kept this secret from the people, adjusting the calendar as needed after "communicating with the gods", thus ensuring their power.

Construction

Not surprising among the people who built the pyramids, the Sphinx, and massive irrigation projects, the Egyptians excelled at inventing construction materials. They created cement from clay and gypsum, and bronze from tin and copper. They invented copper pipes, similar to modern plumbing, to transport water. The ancient Egyptians also made use of the surrounding desert sand to create glass, though this was primarily used for jewelry and decorative trinkets.

While there remains speculation regarding how the ancient pyramids were constructed, it is obvious the Egyptians were the first to invent and employ organized labor on a massive scale in order to construct these magnificent stone structures. When one takes into consideration that the construction of just one pyramid often lasted several decades, the magnitude of the organized labor required becomes enormous.

Agriculture

The Egyptians built the first ox-drawn plow, which was hooked to the animal's horns and eventually to the shoulders. Skilled metal techniques were required in order to form a workable plow, as well as animal husbandry. Ox-drawn plows are still in use in parts where fuel-powered tractors are not readily available.

One might wonder why the ancient Egyptians would have even needed ox-drawn plows. While there certainly is a great amount of sweeping desert land in Egypt, it is also the home of extremely fertile black soil along the banks of the Nile River. This soil makes a very hospitable environment for growing crops such as wheat, in addition to a multitude of vegetables. Inventions, such as the ox-drawn plow, would have made farming much easier and more profitable.

The shaduf is another most helpful agricultural invention. It lifts water from canals, the shaduf consists of a large pole balanced on a crossbeam, a rope and bucket on one end, and a heavy counter weight at the other. By pulling the rope it lowers the bucket into the canal. The farmer then raised the bucket of water by pulling down on the weight; he then swung the pole around and emptied the bucket onto the field.

Medicine

Mummification provided Egyptian physicians with in-depth knowledge of the human body, allowing them to name and describe the functions of many internal organs. They invented simple surgical tools, including pincers, forceps and various saws.

One surprising advance that developed from mummification was the curing of meat, which Egyptians did using natron, or sodium bicarbonate. They also treated diabetes with a very contemporary-style low-carbohydrate diet.

So, How Did They Do It?

Some of the makings of the inventions were more complicated than they appear. Just think how we would have to live if we had to make everything from nature! Every day things that we take for granted would be made a lot more difficult!

It was not like ancient Egyptians had the tools, electricity, solar satellites, or the Internet to help them. All they had was nature and how they could benefit from it.

The solar calendar developed through studying astronomy. They studied the star Sirius and its position and appearances in relevance to farming seasons, and based their calendar on that one star! It is amazing that people with nowhere near our resources and technology could put together an accurate 365-day calendar, just by their floods each year and the stars.

Although we are in a totally different time and lifestyle than that of the ancient Egyptians, some of the needs we have and that they had are similar. So it is no surprise that we have inventions and technology to perform the same type of jobs that the ancient Egyptians did.

Further Reading

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Spread the Word!

By Maha Sherin

Throughout history, people have invented many machines that forever changed the world. The Gutenberg Printing Press is one of these revolutionary machines. A major element of the Renaissance, it led to the establishment of a community of scientists, putting an end to the Dark Ages, and eventually leading to the Industrial Revolution.

From Script to Print

To understand the importance of the printing press, it is necessary to understand that, before its invention, virtually every book and every document was a manuscript. Written by hand, the production of even a single page was an arduous and time-consuming task. Books were expensive, and only very popular texts of universal appeal were likely to be reproduced.

Later, books were produced by and for the Church through the process of wood engraving. This required the craftsman to cut away the background, leaving the area to be printed in high-relief. This process applied to both text and illustrations, and was extremely time-consuming. When a page was complete, often comprising a number of blocks joined together, it would be inked and a sheet of paper was then pressed over it for an imprint. The susceptibility of wood to the elements gave such blocks a limited lifespan.

In 1440, **Johannes Gutenberg** invented a printing press process that, with refinements and increased mechanization, remained the principal means of printing until the late 20th century. The inventor's method of printing from movable type, including the use of metal molds and alloys, a special press, and oil-based inks, allowed for the first time the mass production of printed books.

The genius of Gutenberg's invention was to split the text into its individual components, such as lower and upper case letters, punctuation marks and abbreviations, drawing on the traditions of medieval scribes. These individual items were then cast in quantity as mirror images and assembled to form words, lines and pages.

Developed from the technology of the screw-type wine presses of the Rhine Valley, the Gutenberg Printing Press was a screw-hand press, in which ink was rolled over the raised surfaces of movable hand-set block letters, held within a wooden form; the form was then pressed against a sheet of paper. During the centuries, many newer printing technologies were developed based on Gutenberg's printing machine, such as offset printing.

Gutenberg's Printing Press is also credited for fostering rapid development in the sciences, arts and religion through the transmission of texts. Because of the printing press, authorship became more meaningful; it was suddenly important who said or wrote what, and what the precise formulation and time of composition was.

Einstein claims another way in which printing affected scientific thought was through the "process of feedback". Before printing, there was no way to make observations public. After printing, observations were published and the author received feedback, as well as the scientific community. Thus, information was shared and developed to the advancement of all.

It is clear that the printing press certainly initiated an information revolution on par with the Internet today.

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PSC Profile

Reality vs. Fantasy!

Name: Islam Elhamshary
Education: BSc Engineering, Communication and Electronics Section, Alexandria University
Graduation Year: 2007
Current Occupation: Interactive Scientific Experiments Designing Engineer, PSC Design and Fabrication Unit

When I was a university student, I had a certain vision of my future; I dreamt of the opportunity of becoming part of a successful company or a highly regarded organization. As my graduation date came closer, my dream became to join the Library of Alexandria; but it was just a dream and I did not know whether or not it would come true.

My journey after graduation started by volunteering at a project, the goal of which was developing graduation projects and improving engineers' performance to cope with the labor market. As the road to achieving a dream starts with a step that determines the path of one's future, choosing volunteer work had a great impact in shaping my personality and developing my ability to take responsibility in the most difficult circumstances and under any type of pressure, in addition to giving me the flexibility to deal with difficult situations.

Then came the moment I had been waiting for; after four months of graduation, a friend informed me of an 'Electronics Engineer' post vacancy at one of the Library's departments. At the beginning, I had mixed feelings; feelings of joy and surprise. I was happy because I was so close to fulfilling my dream, and I was surprised to know that the department in need of an electronics engineer was the Planetarium Science Center (PSC). I had no idea about the nature of the Center's work back then.

When I came for the interview at the PSC, I started by exploring the place. I stopped at the ALEXploratorium, where I found different scientific exhibits introduced in a simple way that seemed suitable and fun for everyone. It was then and there that it all became clear to me; I could see the exceptional purpose and the extraordinary message of this unique facility, the ultimate goal of which was to shift the educational methodology in Egypt, hopefully elevating it so that we can finally take our place in the developed world.

Then, I started my career at the PSC and my dreams grew as I began to envision the development of the Center to compete with the other science centers around the world. The Center became a pioneer in developing the rare specialty of designing and manufacturing interactive scientific exhibits in the Arab World. The objective of our job is to enable visitors to easily interact with the exhibits in such a way that makes understanding the scientific concepts behind them a simple and fun experience that does not require any prior specific knowledge.

Now, after three years of working in the field, I am a member of a team that plans, develops and executes science exhibits, exhibitions and entire facilities in Egypt that can compete with other science centers in the world. But after all the hard work, a question still lingers in my mind: will we be able to take science education in Egypt to a higher level? Or will this remain a precious dream…a vision that wavers between reality and fantasy?

At the end, and may it be the beginning, I say: let's move on from the world of fantasies and into the real world; let's start with ourselves.

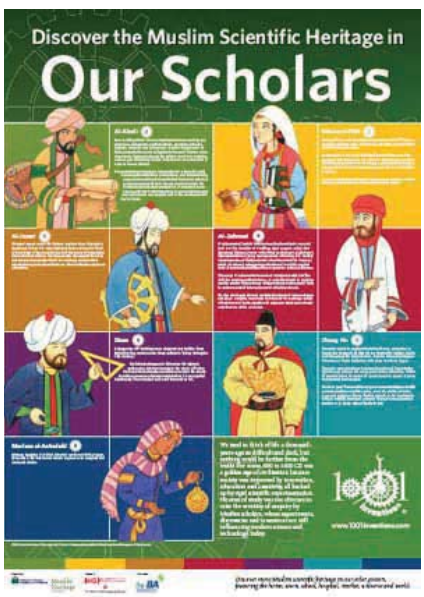
Check This Out!

Chief Editor: Salim Al-Hassani
Published by: The Foundation for Science Technology and Civilization (FSTC)
PSC Review by: Ingy Hafez

1001 Inventions:

Muslim Heritage in Our World

2nd Edition



What do coffee beans, torpedoes, surgical scalpels and observatories all have in common? Were Leonardo da Vinci's flight ideas originals? What is the secret behind the way we write numbers? When did scientists first discover how we see? Who drew the oldest surviving map showing America? What is the hidden meaning of the Elephant Clock?

The answers are in "1001 Inventions: Muslim Heritage in Our World".

The Muslim civilization stretched from southern Spain to as far as China. The discoveries made by men and women in Muslim civilization have left their mark on the way we live today. "1001 Inventions" uncovers one-thousand years of science and technology that had a huge, but hidden, impact on the modern world.

A golden age of civilization, 600-1600 CE, is unraveled in the book; medieval Muslims were leaders in fields as diverse as medicine and mechanics, cartography and chemistry, education and engineering, architecture and astronomy.

The book is based on an exhibition, a British-based project produced in association with the Jameel Foundation (a British charity foundation) featuring over 60 interactive, sensory and static displays and dramatization. It shows how many modern inventions can trace their roots back to Muslim civilization.

The book takes you on a discovery voyage through one-thousand years of science and technology into the lives of medieval pioneers, whose ingenious inventions have helped create our world today. It is divided into seven areas we can all relate to:

Home: featuring the thousand-year-old inventions that still shape everyday life. You will discover where coffee originated, who used deodorant one-thousand years ago; seven-meter-high clocks; medieval home entertainment; the origins of three-course meals and music.

School: features learning, libraries and their links with the past. You will explore the foundations of universities, unearth the intellectual powerhouse of Baghdad, and marvel at how all nationalities and religions worked together to assist everyone.

Hospital: tells you how ancient approaches to health have influenced today's medicine. It will open your eyes to sophisticated surgical practices, such as cataract operations using cutting-edge surgical instruments a millennium ago.

Market: demonstrates how influential ideas spread through travel and trade. You will follow the booming international trade based on renewable energy sources and advanced agriculture and farming techniques of medieval Muslims.

Town: answers the question "Why do East and West share so much architectural heritage?". You will walk through thousand-year-old Muslim towns with their lit, paved streets.

World: introduces you to thousand-year-old explorers. You will discover who explained rainbows and tide, studied minerals, oceans and mountains, and travelled vast distances with state-of-the-art maps and navigational devices.

Universe: enlightens you on how ancient astronomers expanded our view of the universe. You will experience a twelve hundred-year-old successful manned flight. You will also have the opportunity to study the heavens, which were being precisely mapped with sophisticated astronomical instruments in state-of-the-art observatories one-thousand years ago.

"This book is a welcome reminder that Muslims have made many important and far-reaching contributions to the development of our shared scientific knowledge and technologies. It demonstrates the ways in which science helps reveal the wonders of the natural world and through which technology makes such a contribution to the ways in which we can work together with each other." Sir Roland Jackson; Chief Executive, the British Association for the Advancement of Science

"This glorious book overflows with the great ideas of the Muslim Middle Ages. From al-Jazari and his elegant clocks, and al-Kindi and Ibn al-Haytham with their revolutionary optical theories, experiments, and books; to the astronomers who navigated across the desert by the stars; and the map-makers who put north at the bottom, every page is a mine of joyous information. There are even recipes to try out, and everything is beautifully illustrated. I wish I had had this book fifty years ago." Adam Hart-Davis; Photographer, Writer and TV Science Presenter of BBC Series "What the Ancients Did for Us".

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