

## SUMMER 2012

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By: Maissa Azab

Summertime; who does not wait for it impatiently and excitedly? As is the nature of mankind, on long hot summer days, we long for the coolness of winter; many, if not all of us, whether we have experienced it before or not, hope to get the chance to play in the snow, if only once in a lifetime. Nevertheless, the universal fact remains that no time tops summertime in our heads and hearts.

Despite the heat and humidity, summertime remains the time we all associate with fun, good times and happy memories. When we were children, summertime was when we had no school to wake up early to go to, no homework to consume our evenings or exams to worry about. Summertime was when we would throw all worries out the window to spend the days playing in the sand and swimming at the beach with family and friends.

Having grown up, we do not have the luxury of spending our whole summer at the beach as our obligations are no longer limited to wintertime. Yet, summertime remains the preferred timing for taking long vacations and travelling with family and friends, more often than not to seaside locations. In all cases, during summer, we spend long hours in the Sun; whether for fun or for work.

Unfortunately, the invasion of global warming is putting a damper on our summertime enthusiasm; and, with so much talk about the dangers of sunrays exposure, one is left torn between the longing for leaving all worries behind and running to the seaside, and the fear of excruciating heat and dangerous sunrays.

To shed some light on these bewildering topics, in this issue we have tried to explore the nature of the Sun, the source of all life on Earth; its vital role vs. its sometimes fatal impact. Naturally, we touch on climate change and global warming; or is it global cooling as some are wondering?

We also take a look at the hidden facet of global warming, which lurks silently, yet lethally, underneath the surface of the world's oceans. Speaking of the ocean, we have dived deep into it to explore an entirely obscure world we seldom think about; the sunless abyss. Closer to home, we have snorkeled into the waters of the Red Sea to explore some of its amazing and unique wonders; we also investigate the mystery of shark attacks, the memory of which is still fresh in the heads of many.

To put our readers' minds at ease and help them enjoy the summertime with the same old enthusiasm, we have delved extensively into the chemistry of summer and safety measures that will allow us all to enjoy the summer without worrying about perilous sunrays, severe heat, annoying summer bugs, or even fasting during summer.

**We wish you all a Super and Safe Summer!**

## THE CHALLENGE OF CLIMATE CHANGE

By: **Mostafa K. Tolba**

President of the International Center for Environment and Development and ECOPAST;  
 Former Executive Director of the United Nations Environment Programme (UNEP)

This is an outstanding Journal issued by a distinguished Science Center. It is not a traditional journal; it addresses issues out of the normal. I was asked to contribute a short article and I am happy to do so.

I have opted to write about the Challenge of Climate Change because, currently, it is the most pressing global environmental problem. Climate change is a natural problem; however, over the past few decades, a human induced accelerated change has been taking place. These human interventions essentially occur through activities such as power generation, industry, agriculture, transport and waste, all of which increase the production of greenhouse gases that have the potential to increase the average global temperature.

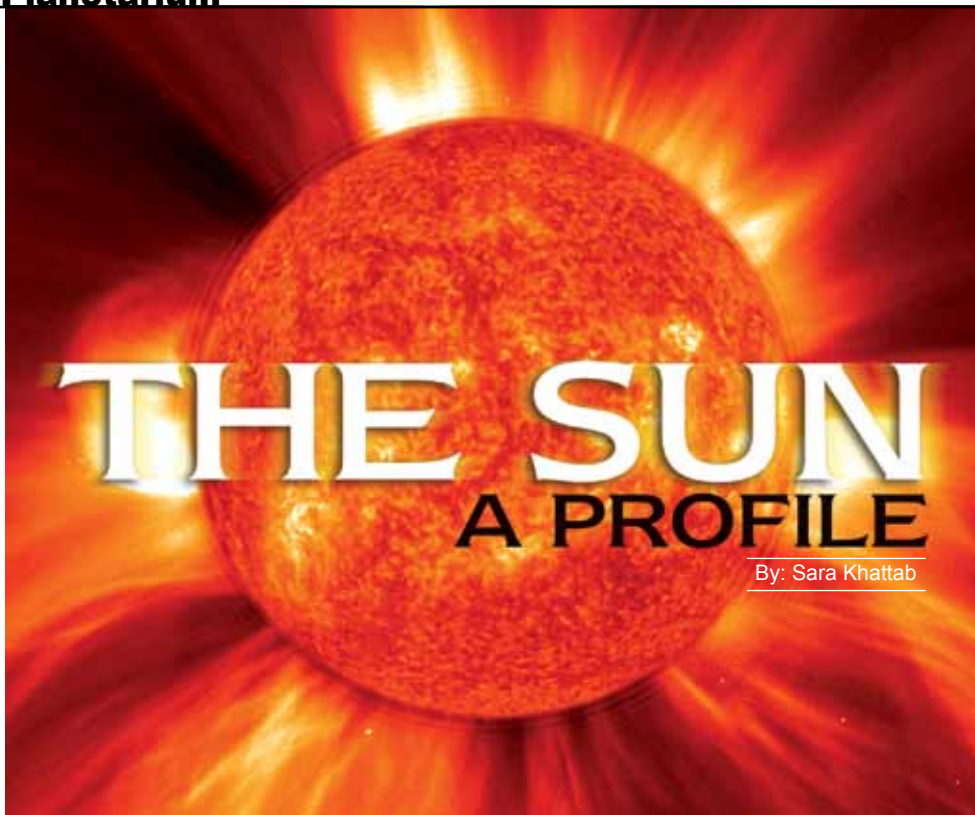
There are still arguments that climate change is a natural problem that depends on the movement of the Sun. It is true that we need to develop more scientific evidence; but, we certainly know enough. The latest Intergovernmental Panel on Climate Change (IPCC) report of 2007 emphasized that climate change is already upon us.

The IPCC based its emphatic conclusions on a number of facts: CO<sub>2</sub> atmospheric concentration, the main greenhouse gas causing global warming, increased from 280 ppm (parts per million) in 1750 to 379 ppm in 2005; the average concentration for the last 365,000 years was 300 ppm. We noted this in Egypt over the past several years; eleven out of the previous twelve years (1994–2005) were the hottest on record. The number of cold days and nights, hot days and nights, as well as heat waves, increased in the past fifty years. The average sea level rise was 3.1 mm/year between 1993 and 2003, compared to an average of 1.8 mm/year during the period 1961–2003.

There is up to 97% confidence within the IPCC that the average global temperature will increase by 2 degrees Celsius by 2050, though this could happen as early as the year 2035. Moreover, the IPCC had more than 50% confidence that the average global temperature would increase in the twenty-first century by 5°–6°C, a development never before faced by human beings.

These disturbing facts were further stressed and accentuated by the United Nations Environmental Programme's State of the Environment Report (SoE), the United Nations Development Programme's Human Development Report and other reports by the World Bank, the European Union (EU), the Organisation for Economic Co-operation and Development (OECD), the U.S. National Science Foundation, and others.

Yet, the outcome of the United Nations Climate Change Conferences at Copenhagen (2009), Cancun (2010) and Durban (2011) proved that governments are not serious enough about the issue. If human beings want to survive, non-stop consultations between developed and developing countries must take place now, and they should achieve tangible and effective compromises before the next Climate Change Conference at the end of 2012.



**A**lthough there are billions of stars in the Milky Way that have their own systems of planets, moons, asteroids, and comets, the Sun is the most prominent star for us. Our Sun is a common middle-sized yellow star, though; it appears larger than the other stars because of its nearness to Earth.

The Sun lies at the heart of the Solar System; it is the largest object in the System, comprising about 99.86% of its total mass with almost 700 times the total mass of all the bodies in the Solar System. Being so large, its gravity, 28 times that of Earth, is strong enough to hold all of the planets and comets in orbit.

### Happy Birthday Sun

According to scientists and astronomers, billions of years ago, there was just a huge cloud of dust and gas known as the solar nebula. As the nebula collapsed because of its gravity, it spun faster and flattened into a disk. Most of the material was pulled toward the center to form the Sun 4.6 billion years ago. With the Sun at the center, our Solar System formed; over millions of years, leftover gas and dust formed the planets, and a variety of moons, asteroids, comets, and meteors.

The Sun is a ball of plasma composed of about 70% hydrogen and helium, and less than 2% of heavier elements; including oxygen, carbon, neon, and iron, among others. The density of the material composing the Sun is about one fourth that of the Earth. At its center, the Sun has a density of over 100 times that of water, a temperature of 10 to 20 million degrees Celsius, and a pressure of over 1 billion atmospheres. The Sun orbits the center of the Milky Way at a distance of approximately 24,000-26,000 light years from the galactic center, completing one orbit once every 250 million years or so.

### The Sun from the Inside Out

The solar interior is made up of the core, the radiative zone and the convective zone. The Sun's core, the innermost layer of the Sun, which extends from the center to about a quarter of the way towards the surface, is made of plasma; a type of gas that is sensitive to magnetism. The core is like a giant furnace from which the Sun's energy is derived. The Sun does not get its energy from burning fuels; instead, it comes from nuclear fusion, which releases extreme amounts of heat and

energy in the form of gamma rays and neutrinos.

Surrounding the core is a huge spherical shell known as the radiation zone or radiative zone, which is located in the intermediate zone between the solar core at 20% of the Sun's radius and the outer convection zone at 71% of the Sun's radius. This zone gets its name from the fact that energy travels through it by electromagnetic radiation in the form of photons. These photons, which emerge from the core, are scattered in this zone; thus, a single photon may take a million years to pass through.

The convection zone reaches up to the Sun's surface, making up 66% of its volume, but only a little more than 2% of its mass. This zone consists of "boiling" convection cells, which "boil" to the surface as they get heated by photons spreading outward from the radiative zone.

### Solar Atmosphere

Only the Sun's outer layers, collectively referred to as the solar atmosphere, can be observed directly. The solar atmosphere consists of three distinct regions: the photosphere, the chromosphere, and the corona.

There is not really a "surface" to the Sun; but rather a group of gases that gets denser as you move from space toward the solar core. The photosphere represents the depth at which we can see no deeper toward the core. It is a luminous opaque layer of gases that forms the visible surface of the Sun, lying between the dense interior gases and the more attenuated gases of the chromosphere. When we speak of the size of the Sun, we usually mean the size of the region surrounded by the photosphere.

The gases that extend away from the photosphere make up the chromosphere, which is about 2500 km thick. The density of these gases decreases as you move away from the photosphere into the chromosphere, but the temperature increases. From the bottom to the top of the chromosphere, the average temperature goes from 4227 to 9727 degrees Celsius. Needless to say, this rise was not anticipated by scientists when they first measured it; throughout the rest of the Sun, temperature decreases as you move further away from the core.

The chromosphere merges into the outermost region of the Sun's atmosphere, the corona, which extends for millions of miles into space above the photosphere. Usually, the corona cannot be seen because of the brightness of the photosphere; however, during a total solar eclipse, the corona shines beautifully against the dark sky. The corona has a density about 0.000000001 times that of the Earth's atmosphere. It is very hot, millions of Celsius degrees; because of this high temperature, the bulk of radiation from the corona is emitted at ultraviolet and X-ray wavelengths.

### Solar Features

Active regions of the Sun come in a number of varieties; such as sunspots, flares, and prominences. All active regions have large magnetic fields. The strength of the Sun's magnetic field is typically only about twice as strong as that of the Earth; however, it becomes highly concentrated in small areas, reaching up to 3,000 times stronger than usual. These kinks and twists in the magnetic field develop



because the Sun spins more rapidly at the equator than at the higher latitudes and because the inner parts of the Sun rotate more quickly than the surface.

These distortions create features ranging from sunspots to spectacular eruptions, known as flares, and coronal mass ejections. Flares are the most violent eruptions in the Solar System, while coronal mass ejections are less violent but involve extraordinary amounts of matter—a single ejection can spout roughly 20 billion tons of matter into space.

Solar activity is thought to have played a large role in the formation and evolution of the Solar System. It has also affected the Earth, generating some solar phenomena; such as the auroras and rainbows.

### Sunspots

Sunspots are relatively cool areas on the Sun's photosphere; they appear to be darker than the photosphere. The temperature of a sunspot is about 3927 degrees Celsius compared to a temperature of about 5227 degrees Celsius in the rest of the Sun. If we could see the spots in isolation, they would appear bright red.

A sunspot can have a lifetime ranging from a few hours to a few months. It consists of two parts: the dark inside region called the umbra, and the surrounding less dark region called the penumbra. Their sizes vary over a wide range, with a few having been measured to be 50,000 km in diameter.

### Solar Flares

A solar flare is a sudden, rapid, and intense variation in brightness; it occurs when a magnetic energy that has built up in the solar atmosphere is suddenly released. Flares occur in active regions around sunspots, where intense magnetic fields penetrate the photosphere to link the corona to the solar interior. No one can view a solar flare by simply staring at the Sun; they are in fact difficult to see against the bright emission from the photosphere.

Solar flares affect all layers of the solar atmosphere; when the medium plasma is heated to tens of millions of Celsius degrees and electrons, protons and heavier ions are accelerated to near the speed of light. Solar

flares produce radiation across the electromagnetic spectrum at all wavelengths, from radio waves to gamma rays; although most of the energy goes to frequencies outside the visual range, which is why the majority of the flares are not visible to the naked eye and must be observed with special instruments.

### Solar Winds

Solar wind is a stream of charged particles ejected from the upper atmosphere of the Sun. It mostly consists of electrons and protons flowing outward from the Sun through the Solar System at a speed of 900 km/s and a temperature of one million degrees Celsius.

The solar wind is caused by the hot solar corona; the temperature of the corona is so high that the Sun's gravity cannot hold on to it. The interplanetary magnetic field, the Sun's magnetic field, is carried by the solar wind to the planets and beyond. The solar wind is responsible for deflecting the tails of passing comets away from the Sun.

### Sunshine

Sunlight is the total frequency spectrum of electromagnetic radiation given off by the Sun. Sunlight consists of three types of waves: visible light, ultraviolet rays, and infrared rays, all having different ranges of wavelength. On Earth, sunlight is filtered through the Earth's atmosphere, and solar radiation is obvious as daylight when the Sun is above the horizon.

Sunlight takes about 8.3 minutes to reach Earth.

Visible light, commonly referred to as light, is electromagnetic radiation that is visible to the human eye; it is responsible for the sense of light. Our eyes perceive different wavelengths of light as the rainbow hues of colors; each color having a different wavelength. The visible light range is located between the invisible infrared and the invisible ultraviolet.

Much of the energy from the Sun arrives on Earth in the form of infrared radiation, which is electromagnetic radiation with longer wavelengths than those of visible light. Astronomers have found that infrared radiation is especially useful when trying to probe areas of our universe that are surrounded by clouds of gas and dust. Because of the infrared longer wavelength, it can pass right through these clouds and reveal details invisible by observing other types of radiation.

Ultraviolet light, on the other hand, is electromagnetic radiation with a wavelength shorter than that of visible light. Ultraviolet rays are divided into three regions: near ultraviolet, far ultraviolet, and extreme ultraviolet. The three regions are distinguished by how energetic the ultraviolet radiation is, and by the wavelength of the ultraviolet light, which is related to energy.

### The Sun's Fate

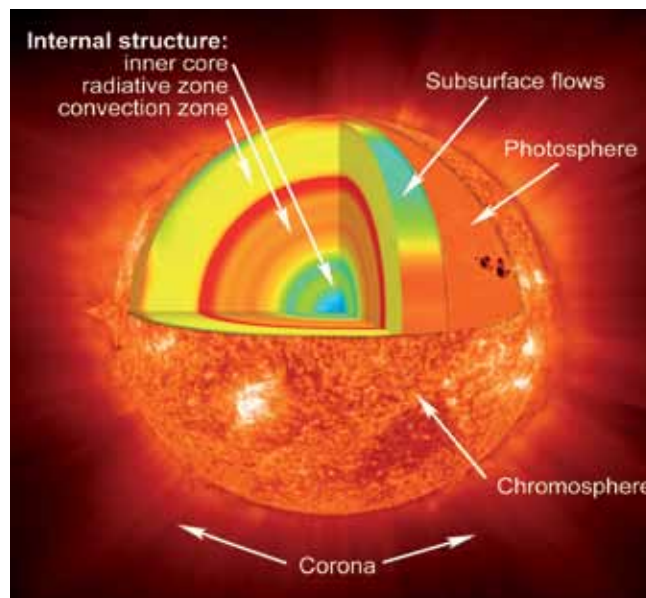
In about 5 billion years, the Sun will enter a red giant phase; the hydrogen in its center will start to run out so its outer layers will expand and the core will contract and heat up. As the outer layers expand, the radius of the Sun will increase and it will become a red giant; an elderly star.

The radius of the red giant Sun will be 100 times what it is now, lying just beyond the Earth's orbit, so the Earth will plunge into the core of the red giant and become vaporized. When the helium fuel has exhausted, the core will expand and cool; the upper layers will expand and eject material. Finally, the core will cool into a white dwarf.

Eventually, the Sun will cool down into a nearly invisible black dwarf; the entire process will take a few billion years. So, for the next several billion years, humanity is safe, in terms of the Sun's existence, at least.

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- [http://www.windows2universe.org/sun/sun\\_magnetic\\_field.html](http://www.windows2universe.org/sun/sun_magnetic_field.html)



## 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
- Oasis in Space**  
25 Min. Full-dome Show
- Mystery of the Nile**  
45 Min. IMAX Show
- Cosmic Voyage**  
35 Min. IMAX 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](http://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.



By: Jailane Salem

During winter, all we can think of are the warm rays of the summer Sun, then comes the summer and we daydream about the cool breeze of winter! Nevertheless, it is during the summer that we get to relax and travel around. But, when exactly does summertime start?

That would be the day of the summer solstice; the day the Sun is farthest North from the Equator, and the North Pole is tilted directly facing the Sun at about 23.5 degrees. This generally occurs on the same day every year, 20/21 June; the longest day of the year in the northern hemisphere. However, the date can change from year to year because of the human calendar, usually counted as 365 days, when the astronomical year is actually 365.24 days long. Hence, according to the leap year system, which adds an extra day to the calendar every four years, the day of summer solstice flops around.

Despite being the longest day of the year, the first day in summer is not the hottest. Earth's oceans and atmosphere act like heat sinks, absorbing and radiating sunrays over time. So, even though the planet is absorbing lots of sunlight on the summer solstice, it takes several weeks to release it; as a result, the hottest days of summer usually occur in July or August.

It is to be noted that the June solstice marks the beginning of summer in the northern hemisphere, simultaneously heralding the beginning of winter in the southern hemisphere because the South Pole is tilted away from the Sun, making it the shortest day there. So, if you ever have enough of the summer heat, all you have to do is pack your bags and head south.

# STARTS

Not only do the people who live north of the Equator experience the longest hours of daylight during that season, but the Sun does not set at all in the Arctic circle, remaining visible even during the night, hence dubbed "Midnight Sun". On the other hand, the Sun remains unseen during this time of year in the Antarctic Circle. These two extremes do not apply to places on or near the equator.

The word solstice is from the Latin word *solstitium*, meaning "sun-stopping"; the Sun stands still in declination so that its apparent movement north or south comes to a standstill.

### Summertime in the Ancient World

The beginning of summer has long held importance since ancient times. Our very own ancestors, the Ancient Egyptians, marked the summer solstice as a time for celebrations and ceremonies. It was a time marked for its fertility since it was when the flooding season of the Nile commenced, leaving the soil fertile with its healthy deposit of

silt, allowing the Ancient Egyptians to plant their harvest.

Ancient Egyptians believed that the tears of Isis, mourning her deceased husband Osiris, were what made the river rise and flood the Nile valley so they held special ceremonies to honor her during that time of the year. Accurately predicting the floods was of great importance; the appearance of Sirius, the brightest star in the night sky, which occurs around the time of the summer solstice, was recognized as the beginning of the Egyptian New Year.

The summer solstice also marked the time Horus, the solar deity, defeated his uncle Set, the deity of darkness and evil. When balance and order were restored, and Horus became victorious, the Nile would flood and bring the Nile valley back to life.

The Ancient Chinese also found the time of the June solstice to be of great significance. During that time, they held ceremonies to celebrate and honor the Earth and the feminine force known as

Yin; they also marked the day by honoring Li, the Chinese goddess of Light. This time was connected with femininity because the lands would be fertile and ready for harvesting; temperatures would be on the rise, sunshine and rain were in abundance, providing the best condition for growing crops.

The Ancient Chinese were able to determine the time of the summer solstice by reading the measurements of the shadow cast by a pole. They observed the Sun's cycle and the length of the shadows; they determined that when the shadow was at its shortest, it was because the Sun was at its highest point in the sky, which marked the beginning of summer, while the longest shadow marked the beginning of winter.

For the Ancient Greeks, the summer solstice was a time for several festivals; one of these was the festival of Kronia, which celebrated the agriculture god Cronus. It is obvious that the beginning of summer marked the beginning of the farming season,

a time where seeds would come to fruition and provide for the rest of the year. The summer solstice also marked the one-month countdown to the opening of the Olympic Games.

Many monuments built in ancient times were aligned in relationship to the Sun; Stonehenge in Britain being one of those. This circular stone formation was built thousands of years ago and has withstood the test of time. It is firmly associated with the solstice because, when the Sun rises on the day of the summer solstice, it is in line with one of the stones called the "Heel Stone"; the first sunrays shine through a stone archway into the centre circle.

Until this day, Stonehenge is an enigma, its purpose has never been fully discovered and there are various interpretations as to the reason of its existence. Some people believe that it was used as some sort of calendar, and that by seeing how the Sun aligned with the stones one could tell what time of year it is.



It is believed that the Druids of Ancient Britain would perform rituals during the summer solstice at Stonehenge. To this day, just like in the days gone past, people still come to Stonehenge every year to witness the summer solstice. Thousands of people go, each for their own purpose; some come to have a spiritual experience like the modern Druids, others come to silently watch the Sun rise and bathe Stonehenge in its golden rays, while others are there to join in the festival, where dance, food and music are all readily available. All are united in their celebrations of the coming summer.

### Summer Traditions that Live On

Stonehenge is not the only place in the world that witnesses celebrations to welcome the coming of summer. The Swedes have quite a fondness to celebrating the summer solstice; it is of such importance that it is a national holiday, which they call *Midsommardagen*.

One of the traditions upheld by the Swedes that dates back to their ancestors, the Vikings, is the decoration of a big maypole with greens and flowers; making sure it covers the whole pole. It is then raised and secured, and people commence dancing around the ornamented maypole. Besides dancing, people enjoy listening to traditional music, wearing traditional costumes, and making crowns out of flowers and wild sprigs to adorn their heads. Food is also present, especially the new potatoes of the season, which would be used in making traditional Swedish dishes.

In Estonia, *Jaanipäev* (John's Day) is celebrated on the eve of the summer solstice; it was celebrated long before the arrival of the Christian religion in Estonia, which is why remnants from the ancient festivities can still be seen today. One of the best-known rituals is the lighting of a bonfire; it symbolizes prosperity and avoidance of bad luck, scaring off any evil spirits who happen to be lurking around.

*Santos Populares* festival (Saints' days) in Portugal is a time to be merry and enjoy oneself; the summer solstice is celebrated as part of the festival. The celebrations

are like one big street party where streets are decorated with balloons and brightly colored paper. There are *Marchas*, which are big parades of folklore and costumes of the inhabitant's from the different traditional quarters in the city. The audience lining the streets would cheer on the huge numbers of dancers and singers. People also celebrate by dancing in the city's squares and eating good food like *Caldo Verde* (cabbage and potato soup) and *Sardinha Assada* (grilled sardines).

One of the saints celebrated is Saint Anthony who is known as the matchmaker saint, so it is a tradition to hold multiple marriages of perhaps 200 people or more. However, if you are still not yet ready to tie the knot, you can simply declare your feelings for someone by giving them a flower pot with a sweet basil plant, and hope the other person will appreciate the smell of that basil!

In the Far East, the scene changes somewhat. In Japan, *Hangeshou* is a custom related to the summer solstice, falling on the 11<sup>th</sup> day after it. The day marks the end of the rice planting days; people pray that the rice plants take hold of the Earth and grow well and strong.

In some countries, elaborate celebrations has long been held to celebrate the commencement of summer; rituals are upheld, special foods are cooked and eaten, and music is played. To all, it is a time to be happy and merry. But, nowadays, in many modern cultures, the occasion goes uncelebrated and unremarked. Yet, after the cold winds of winter, we all still anticipate the coming of the warmth of summer in eagerness. The universal fact remains that we all cannot wait for the summertime to start because it is the time for fun!

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## The PSC also celebrates the Summer Solstice

Every year, on the 21<sup>st</sup> of June, the day of summer solstice, the PSC celebrates Eratosthenes, the 3<sup>rd</sup> Librarian of the Ancient Library of Alexandria, commemorating the great achievements of this Libyan scientist and his ingenious 2000-year old method of measuring the Earth's circumference.

Eratosthenes had heard that if you looked into a well in the city of Syene (Aswan) at noon on midsummer's day, you could see the Sun reflected in the water at the bottom and that objects had no shadow. As the water surface in the well is horizontal, he realized that this must mean the Sun was exactly overhead, deducing that sunrays were perpendicular, centering the shadow of objects around themselves, making it seem as if they had no shadow at all. On the other hand, at the same time in Alexandria, the sunrays were not perpendicular and the same objects had short shadows.

In 205 BCE, Eratosthenes proposed a rather simple and precise method of measuring the circumference of the Earth applying his observations of shadows. First, he measured the shadow of an obelisk in Alexandria and then estimated the angle between the sunrays and the obelisk to be 7.2°. Meanwhile, in Syene, there was no shadow for any vertical objects, such as the well, which means that the angle of the shadow equals 0°. Eratosthenes concluded that the Earth is not flat and its surface is curved; maybe even completely spherical.

If the Earth is spherical, then if we extend the vertical line of the obelisk in Alexandria and that of the well in Syene, the two lines will meet exactly at the center of the Earth. Knowing that Alexandria

and Syene are located almost on the same meridian, he assumed sunrays are parallel, making the angle formed by the two verticals at the center of the Earth identical to the one of the obelisk shadow; 7.2°.

He concluded that the ratio of this angle, 7.2°, to the 360° of the circle is the same ratio of the distance between Alexandria and Syene, 800 Km, to the circumference of the circle, the Earth, which he calculated to be 40,000 km.

Among Eratosthenes's many other achievements are some significant geometric and arithmetic definitions; he also wrote the first treaty on mathematical geography, including a map of the world. It is, therefore, the PSC's duty and honor to organize an annual festivity celebrating Eratosthenes, where school students, in both Alexandria and Aswan, work together to apply his method of measuring the Earth's circumference at noon on 21 June of every year.

## Visitors INFO

### Opening Hours

Saturday to Thursday  
[from 10:00 to 15:00]

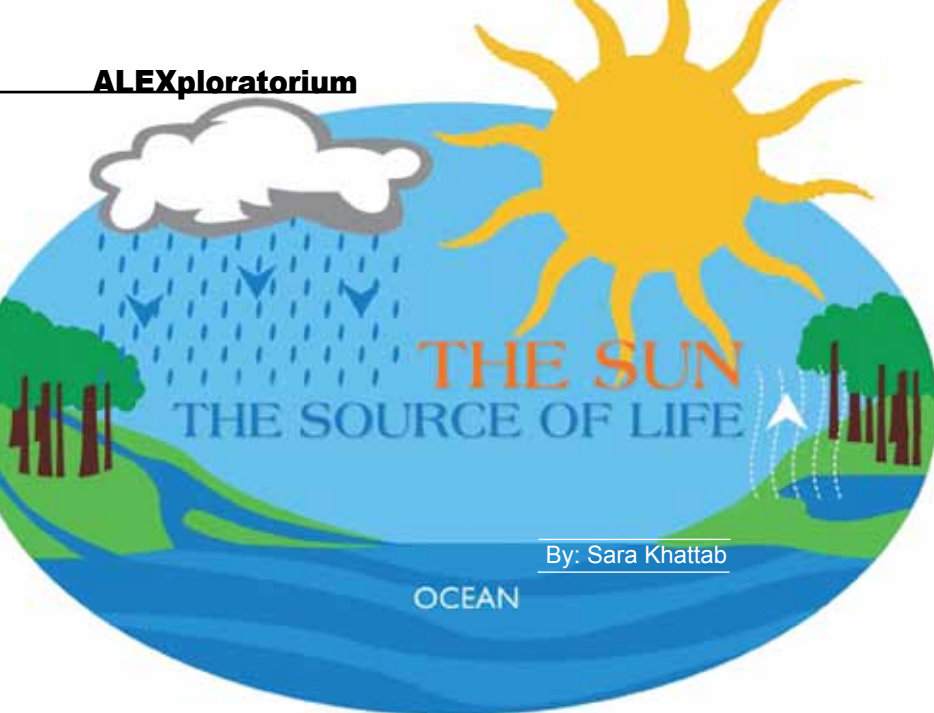
### Guided Tours Schedule

Saturday to Thursday  
[10:30 + 11:30 + 12:30 + 13:30 + 14:30]

- Museum entry fees are included in all Planetarium show tickets.

- For non-audience of the Planetarium, Museum entry fees are 0.50 EGP.

- Museum Tours are free for ticket holders.



The Sun is a powerful force; yet, some take it for granted without fully comprehending the extent of its magnitude. In summer, we always complain of the Sun's heat, sometimes wishing it would just disappear! However, can we live or even imagine life without a Sun?

Energy from the Sun's core, in the form of sunlight, is responsible for supporting almost all life on Earth via photosynthesis, as well as regulating Earth's temperature and weather.

Today's industrial world is supported by the energy sources of oil, coal and natural gas, all of which are essentially derived from solar energy; these non-renewable energy sources will all disappear one day. Until that day arrives, fossil fuels mining, drilling, processing, production and usage continue to have a devastating environmental impact on Earth and life on it.

Free and renewable, solar energy, on the other hand, will always represent a viable solution to the world's energy problems. Its minimal, if non-existent, environmental impact constitutes one of its primary selling points in supplanting fossil fuels as our main source of energy.

## The Source of Blowing Winds

The Sun is the ultimate source of wind energy. As it heats the Earth's surface, the air above it warms and rises upwards into the atmosphere. In some places, such as near the Poles, where the heat from the Sun is much less than at the equator, the air remains cold and stays close to the surface.

Land usually heats up faster than do the seas; they also cool faster. As warmer air rises, it creates a partial vacuum and the cooler heavier air flows in to fill the void. This Sun-induced flow of air over the Earth's surface is wind. Eventually all wind energy is converted into diffused heat from the friction with land masses and the atmosphere.

Wind power is the conversion of wind energy into a more useful form of energy; such as the use of wind turbines to create electricity, or wind mills to grind crops or pump water.

By: Sara Khattab

## The Source of Running Waters

The Sun is the engine of the water cycle, which is how water moves through the atmosphere and the Earth's surface. During the process of the water cycle, the Sun provides thermal energy to the Earth's surface water, which evaporates because of it and ends up in the atmosphere as water vapor.

When it cools and rises, it forms clouds, which eventually condense into water droplets. Depending on the temperature of the atmosphere and other conditions, water precipitates as rain, sleet hail or snow; which in turn, ends up in the oceans, seas, lakes, rivers and as groundwater.

## The Source of All Life

Sunlight is the fuel that maintains plant life; it is made up of electromagnetic radiation, which penetrates the Earth's atmosphere and is the key ingredient in the process of photosynthesis.

Photosynthesis occurs in two main stages; the light-dependent stage and the light-independent stage. During the first stage, light reacts with a green chemical known as chlorophyll within the plants' leaves to make high-energy molecules called Adenosine Triphosphate (ATP). In the second stage, which happens in the dark, the stored ATP from the previous stage is combined with CO<sub>2</sub> to form glucose. As a byproduct of this process, oxygen is released.

Plant life's dependence on the Sun makes it the catalyst for all life in the food chain; which begins with plants, also known as producers, which are then consumed by primary consumers, or herbivores; animals that only eat plants, such as rabbits or squirrels. Primary consumers are eaten by meat-eating animals known as secondary and tertiary consumers, which can be carnivores or omnivores. Without sunlight, the food chain would not be sustainable.

## The Source of Health

Sunlight is the battery-charger of life; a daily dose of sunlight will do wonders to your feeling

of well-being, and to your health in general. It is nearly impossible to get adequate amounts of vitamin D from your diet; sunlight exposure is the only reliable way to generate vitamin D. Moreover, sunlight helps the body produce nutrients to maintain bone mass and lessen the risk of osteoporosis.

Some studies also suggest that moderate sunlight can lower blood pressure and increase oxygen capacity and blood circulation. It can also boost white blood cell production, a function that is needed for the immune system, as well as stimulate the pineal and pituitary glands, two light sensitive organs located behind our eyes that help regulate hormones.

Besides maintaining health, the Sun also regulates our biological clocks, helping us maintain a regular schedule of sleep and wakefulness that we need to function at our best.

## What if the Sun disappeared?

If the Sun did not exist, there would be no Earth or life to begin with. If, for some obscure reason, the Sun one day disappeared, the whole Earth would fall into complete darkness; something that would damage human beings both physically and mentally.

Without sunlight there would be no green plants because photosynthesis would stop; animals that depend on green plants for food would also disappear, so will carnivores and, naturally, omnivores, including Man.

Temperatures normally drop between sunrise and sunset; if the Sun vanishes, it will simply keep dropping at the same rate, or an even higher rate as the water freezes out of the atmosphere and Earth loses its cloud cover. At high elevations and Arctic areas, this means that, within days, the temperature would be several hundred degrees below zero. In the tropics, it might take a week or longer, but it is safe to say that, in two weeks at most, the entire globe would have cooled to hundreds of degrees below zero, and all surface life as we know it would be impossible. Most humans, as well as most life on the planet, would have frozen to death.

Fortunately, we still have billions of years until the Sun disappears. Still, just in case, astronomers are on a mission to find an Earth-like planet; but, can they find a Sun-like star?

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**E**arlier this year, bundled up in my warmest clothes, my furry boots and my heavy blanket; sitting closely next to my trusty old radiator while sipping a cup of hot cocoa, global warming seemed like a crazy, whimsical idea.

Although I have always been a firm believer of the “Global Warming/Climate Change” phenomena, and have constantly argued for the reality of climate change and the severity of its dire consequences, the unusually chilly winter we recently experienced has made it hard for me to remain so firm in my convictions.

For the first time in my lifetime, I witnessed snow in Alexandria, snowflakes not mere hail, and felt the kind of cold that makes you lose feeling in your nose and fear it might fall off! Growing numb with cold as the winter days stretched by, I became skeptic of the notion that Earth is heating up; if anything, it felt more like global cooling rather than global warming.

Then comes the searing hot summer, with scorching heat that makes it hard to even breathe, and temperatures that rise to unprecedented levels, taking me back to my years in the Arab Gulf region; I then start believing in global warming all over again. However, anticipating another chilly winter might once again switch me to the other side, I needed to find a scientific explanation for the peculiar coldness of the previous winter, and how it fits in with global warming.

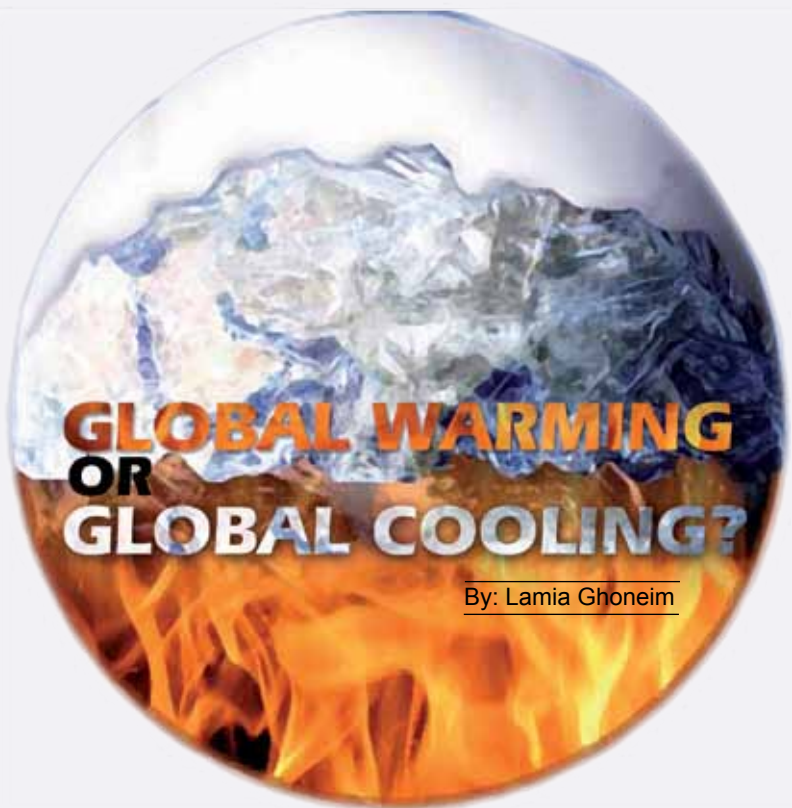
### **The Conflict**

For years, skeptics have tried to deny or undermine the authenticity of global warming, sparking heated debates that confused public opinion. Most of the debates took place in the popular media rather than in the scientific community, where there is a strong consensus that global surface temperatures have increased in recent decades.

Always a supporter of science and numbers, I refused to accept that the current warming trend is just normal climatic variation as some skeptics claim, for the numbers and the reports state otherwise. Evidence of warming has long been scientifically reported, including observed increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.

Logically, if scientific claims and reports of climate scientists were true, and Earth temperature is increasing, it would mean that not only should summer become hotter, but also winter should become warmer, and cold spells should decrease. However, for the past decade or so, and contrary to what I expected, many countries have experienced colder than normal winters, including Egypt and many countries in the Middle East.

The winter of 2010/2011 in Morocco was reported as the coldest winter the country had seen in 30 years; with temperatures dropping more than 4 degrees lower than previous years. Moreover, in the winters of 2009/2010 and 2010/2011, the Northern Hemisphere measured its second and third largest snow cover levels on record, with



places like Britain and Northern United States experiencing much harsher than normal winters.

This flurry of frostiness seems completely at odds with standard climate change scenarios in which Earth's temperature steadily rises. Climate skeptics who question the gravity of global warming are certainly pointing to the deep chills as confirmation of their doubts. Shouldn't these colder than normal winters dispel the phenomena of global warming? Climate scientists claim it should not.

They explain that while the past winters were very cold in some places, in others they were warm, peculiarly so in Canada and Greenland, and the average global temperature recorded was still rising. They also maintain that climate is the average condition observed over time, and a few winters cannot be considered an indication for a climate turn.

While this explanation might be satisfactory for me in the warmth of summer, come another chilly winter and snow on my window, I might not be so persuaded, neither will the climate change skeptics. Climate scientists, thus, took it upon themselves to find a link between the unusually cold winters and global warming, and they did.

### **The Argument**

A new study has successfully managed to establish a link between the cold, snowy winters in the Northern Hemisphere and the melting of sea ice in the Arctic, where global warming is the main culprit. The scientists' convincing explanation is that increasing temperatures lead to the melting of ice in the Arctic regions, creating more snowfall in the autumn months at lower latitudes.

An analysis of the ice-free regions of the Arctic Ocean has found that higher temperatures due to global warming, which have melted the sea ice in the summer months, have paradoxically increased the chances of colder winters in Britain

and the rest of northern Europe. Their results showed strong warming throughout July, August and September in the Arctic, continuing through the autumn, which according to their observational data appeared to enhance the melting of sea ice.

This warmer atmosphere, combined with melting sea ice, allows the Arctic atmosphere to hold more moisture and increases the likelihood of precipitation over more southern areas such as Siberia, where it is still within freezing temperatures and cold enough for snow fall instead of rain. Indeed, the researchers' observations showed that average snow coverage in Siberia has increased over the past two decades.

They believe the increased snow cover has an intricate effect on the Arctic Oscillation—an atmospheric pressure pattern in the mid- to high-latitudes—causing it to remain in the “negative phase”, where high pressure resides over the Arctic region, pushing colder air into mid-latitude regions, resulting in the observed colder winters. In turn, the cold waves coming to Egypt and the Middle East from Europe and East Siberia have resulted in the unusually cold winter we experienced.

The study warns that long periods of freezing weather are likely to become more frequent in years to come, which means we can expect to see more snow in Alexandria in the future.

Adequately convinced by this explanation, I am back to believing wholeheartedly in global warming, even during the harshest of winter days. The next time we experience an unusually cold winter, instead of sparking skepticism, it should serve as a reminder that global warming is indeed happening, and even a bit faster than we might like to think.

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# A SINKING WORLD!

By: Sara Khattab and Noha Rahhal

In Egypt, we have to admit that when it comes to climate change, we know very little; not for lack of information though, but, with political, social and economic problems consuming our days, environmental issues seem like a luxury we have no time to think about. However, despite, and maybe because of, our negligence, climate change is as urgent a matter, if not more so, as many of the topics occupying our media, and our minds, nowadays.

To name one serious, potentially tragic, consequence of climate change that we cannot afford to ignore anymore, coastal cities, such as Alexandria and many other Egyptian cities located on the Mediterranean coast, are currently facing the threat of inundation. To explore this critical situation, in this article, we will try to highlight some cities around the world that might one day in the near future vanish under water. But first, let us pinpoint the main causes of such a life-threatening situation.

It is a well known fact that greenhouse effects, primarily caused by mankind and our invasive activities, are leading to warming seas and oceans, which in turn, lead to a gradual rise in global sea levels as ice sheets and glaciers continue to melt. With an increasing population, it will become much harder for people to move away from the coasts when there is a flood.

Some countries have foreseen that issue and tried to avoid it. Since ancient times, governments have tried to prepare for such challenges. Nevertheless, not all countries can afford such tremendous and expensive projects.

Surprisingly though, not all the cities that are sinking around the world are in this position because of climate change and the rise of sea level; nevertheless, all the different reasons for this sinking world are directly or indirectly linked to Man's actions. Here is a countdown of the top five cities around the world in danger of sinking and the reasons they are:

## FIFTH: HOUSTON, TEXAS, USA

America's fourth largest city, Houston was built originally on a foundation of sand, and its population has always relied on groundwater for their daily needs. With the increase of people's demands, excessive extraction of groundwater water has caused parts of Houston to subside as much as 3 m over the past century.

The main problem in Houston is caused by the unconsolidated sediments upon which the city was built. The basin, once submerged in the ocean, has dried up over geological time spans, leaving a thick layer of salt covered by naturally-deposited sediments. These loose sediments and salt layers are prone to faults; when a force acts upon them, there is a reaction. Urban wells had infiltrated the water table and created residual stress within the unconsolidated bedding; the reaction was the development of faults, salt domes and subsiding land masses.

Groundwater, however, is not the only liquid in Houston's foundation; there is also oil, the source of Houston's riches. Oil extraction was also damaging to the city's foundation, as was the city's continuous sprawl, not to mention the 300 or so active fault lines beneath Houston's streets and skyscrapers.

Geologists realize that pumping water from Houston aquifer<sup>(1)</sup> increases the rate at which the land subsides. One of the solutions is, thus, to stop excessive water and oil extraction; this, however, cannot be a permanent solution. Despite many attempts to save the city, including putting a stop to groundwater extraction, more efforts are still needed. Experts note that such endeavors have slowed down the risk, but have not eliminated it yet.

## FOURTH: SHANGHAI, CHINA

Shanghai is not only known for its mind-blowing skyscrapers and modern architecture; it is also known as the most densely populated city in the world. Shanghai was originally a small fishing village, but it gradually attracted more and more residents, housing over 20 million people by 2001.

Shanghai's location might be rather scenic, but the swamplands surrounding the mouth of the Yangze River upon which the city was built are not too stable. Although the wet ground was good for a small fishing village, it is not doing very well when it comes to supporting Shanghai's skyscrapers. Land subsidence is not the only threat to Shanghai, the pumping of groundwater to support its rapid growth has always been a headache for the city as well.

Shanghai sank at the rapid rate of about 5 cm per year during the period from 1921 to 1965; as a result, the city sank roughly 2.5 meters. The city continues to sink at a rate of about 1.5 cm per year, which is highly attributed to the fact that the city is too heavy for its foundation.

According to experts, not much can be done to keep Shanghai above ground; however, to slow down the sinking process, skyscrapers are now built with deep concrete piles to help support their weight. Moreover, the city has further tightened its restrictions on groundwater use, banning its use entirely for non-drinking purposes; as a result, Shanghai sank only 6.8 millimeters in 2007, 0.5 millimeter less than a year earlier.

## THIRD: NEW ORLEANS, LOUISIANA, USA

After Hurricane Katrina, the deadliest and most destructive Atlantic hurricane in 2005, a lot of attention was drawn to New Orleans, Louisiana; many studies and researches have aimed to avoid such catastrophes in the future. Findings were somewhat alarming; between 10,000 and 13,500 km<sup>2</sup> of New Orleans coastal lands are predicted to be underwater by 2100 due to rising sea levels caused by climate change.

*National Geographic* reported in 2006 that the city sank about 0.5 cm per year in the years leading up to Hurricane Katrina, while the levees<sup>(2)</sup> designed to protect the city from the Gulf sank at four or five times that rate. Sea level rise and warmer water temperatures due to climate change could potentially cause unprecedented hurricanes to pound New Orleans and other coastal cities. During hurricanes, storm surges often occur; they are temporary rises in the sea level associated with offshore cyclones and winds. A storm surge during Hurricane Katrina put parts of the city under 4 m of water.

Experts claim that not much can be done to save the city; solutions are still to be found to save the city that has faced a lot in the past decade. According to a report issued in 2009 by the National Academy of Engineering and the National Research Council: "If relocation is not feasible, an alternative would be to elevate the first floor of buildings to at least the 100-year flood level".

## SECOND: VENICE, ITALY

Venice has long been famous for being the only city in the world that is literally built in the middle of the sea, with water canals running between its buildings rather than streets and allies, where boats are the main mode of local transportation.





During high spring and autumn tides, more water than usual is driven into the lagoon, and the high tide washes over the canal sides and across the sidewalks; sea level rise associated with global warming would have the city underwater. According to *The Christian Science Monitor*, Venice has sunk almost 30 cm over the past 100 years. Since Venice is one of the most popular touristic hotspots of the world, the Italian Government has enlisted saving it from being submerged as a top priority.

The Government has taken the initiative about 30 years ago. Several billion Euros have been dedicated to a flood defense system, known as the MOSE project, which is intended to protect Italy from floods and solve the problems of high waters that affect Venice and other coastal cities and villages in Italy. The MOSE system includes mobile flood barriers built at the three inlets through which water from the sea surges into Venice's lagoon; this is to isolate the lagoon from the sea during high tides. Hopefully, by 2014, a total of 78 large gates will be installed in four rows at the inlets of the Venetian lagoon. Despite such a great initiative, some experts claim that the only way to save Venice is by moving the city altogether.

#### FIRST: MEXICO CITY, MEXICO

According to geologists, there are parts of Mexico City that are sinking by as much as 20 cm per year. The city is prone to flooding due to groundwater flowing down the surrounding mountains as a result of insufficient drainage. Over-extraction of groundwater has caused the city's clay foundation to crumble forcing the city to sink deeper into the ground. As the city sinks, so does the drainage system, forcing wastewater to reverse its course and head back into the city.

Several initiatives have been taken by the Mexican Government to put an end to that problem. To prevent future floods, the Government has installed five more pumps to expel water, and the Eastern Drainage Tunnel is one of those initiatives; it is said to be the largest drainage tunnel and is expected to be completed within the next couple of years.

#### THE ARAB WORLD IS ALSO SINKING

According to some studies, many locations in the Arab region are highly vulnerable to the potential impacts of sea level rise and saltwater intrusion. Excessive coastal urbanization, oil and groundwater extraction, especially in high population densities areas and Gulf countries, constitutes serious risk to coasts and coastal properties, particularly in the absence of accurate data and information on coastal subsidence.

The Nile Delta in Egypt, as well as the northern part of Mauritania and many coastal sites in the Arab Gulf countries and North Africa, are found to be highly vulnerable. Egypt, however, will be by far the most impacted country of the Arab world as the Delta's coastal cities are built at a very low elevation; a mere rise in

sea level could plunge cities like Alexandria, Damietta, Rashid, and Port Said underwater, displacing millions of inhabitants from their homes and destroying the region's thriving agriculture.

The Nile Delta aquifer is one of the largest groundwater reservoirs in the world. Over the last century, the Mediterranean Sea has risen by 20 cm, and because sea water is denser than fresh water, saltwater easily migrates into the aquifer. Alexandria's residents might not notice the change, but rural farmers say they are already living with the consequences as salty water from the rising Mediterranean pushes into the fertile Nile Delta, contaminating groundwater used to irrigate crops.

The analysis of satellite images shows that Rosetta lost almost 9.5 km<sup>2</sup> of area due to coastal erosion of the Delta as a result of natural causes and the extraction of groundwater. The coastline retreated 3 km in the last 30 years, meaning that this part of the Delta declines at an alarming rate of about 100 m per year.

Nevertheless, regulations in the Arab region largely ignore basic adaptation requirements to climate change. Arab governments have to adapt land use regulations to the potential rise in sea level; for example, by increasing the minimum clear distance between buildings and shoreline. Arab governments, NGOs, the private sector and academia should take action soon before it is too late; any investment in these efforts now will minimize the eventual cost of mitigation and adaptation after a few years, when some problems will have become irreversible.

#### GLOSSARY

- (1) **Aquifer:** An underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or soil) from which groundwater can be usefully extracted.
- (2) **Levee:** A type of dam that runs along the banks of a river or canal. It reinforces the banks and helps prevent flooding.

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## Visitors INFO

### Discovery Zone

**Opening Hours**  
 Saturday, Sunday, Monday, Wednesday and Thursday:  
 [From 09:30 to 15:30]  
 Tuesday: [From 09:30 to 12:30]

**Guided Tours Schedule**  
 Saturday, Sunday, Monday, Wednesday and Thursday:  
 [09:30 - 11:00 - 12:30 - 14:00]  
 Tuesday: [09:30 - 11:00]

**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](http://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

To anyone standing on its shore, gazing into its crystalline waters, Egypt's Red Sea is beautifully serene. Its waters, although ceaselessly in motion, remain calm and peaceful season after season; underneath its surface, however, a different world exists, a world full of motion and life that dances all around.

Corals sway in perpetual currents, while schools of fish of every possible color crisscross around dotted reefs, nipping at their frilly flowers and swimming together in harmony. It is a vibrant oasis where a myriad of sea creatures live and thrive; from gardens of corals of more than two hundred different species, to sea turtles, spinner dolphins, dugongs, sharks and more than a thousand species of fish and a similar number of invertebrates, many of which not found anywhere else in the world.

Recognized as one of the Seven Wonders of the underwater world, the Red Sea's waters host an amazingly productive ecosystem considered one of the world's most significant repositories of marine biodiversity and an ecological treasure. It is a magnet for divers and tourists from all over the globe who flock to it to experience its supreme snorkeling and diving locations famous for their high level of endemism and breathtaking beauty.

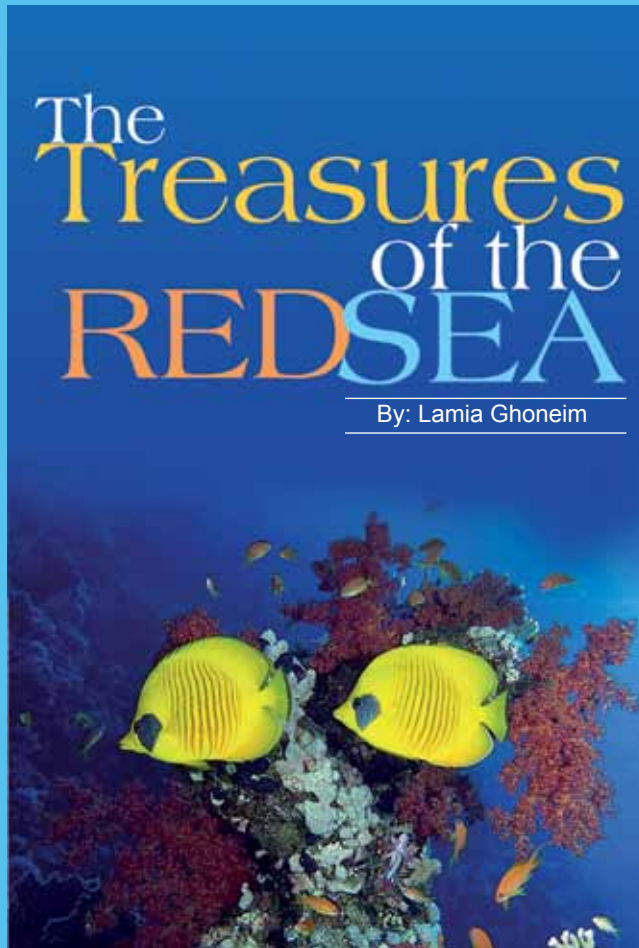
### Endemic Treasures

One of the renowned treasures of the Red Sea is the large number of endemic fish species living in its waters; some experts say as many as 20% of 1200 fish species living here are unique and do not exist anywhere else on Earth.

Thanks to its narrow, shallow mouth, the Red Sea is a partially isolated body of water of higher temperature and average salinity than the neighboring Indian Ocean. These localized conditions have triggered a unique evolutionary process that has led to such a high proportion of endemic species, the likes of.

The **Masked Butterflyfish** is a photogenic, perfectly choreographed bright and yellow beauty often seen in pairs but also in schools. It is found in coral rich areas of lagoons and seaward reefs, feeding on coral polyps<sup>(1)</sup>, tentacles of featherdusters<sup>(2)</sup> and Christmas-tree worms<sup>(3)</sup>.

Living up to its name, the **Arabian Picasso Triggerfish** resembles a picture of the famous painter. Known to be difficult to photograph, they quite often take off in exactly the wrong moment. They inhabit lagoons and seaward reefs from 1 m to 25 m depth, and are usually



very territorial and wary, never straying far from shelter.

The **Red Sea Flasher Wrasse** is a remarkably colored wrasse featuring different hues of yellow, orange and red. The distinguishing feature of this fish is the striking blue lines that run horizontally along the length of the fish. The color of the female is subdued when compared to the "flashy" brilliance of the male, which displays its brilliantly colored fins when courting in an attempt to persuade its mate.

The **Red Sea Anemonefish** is a clownfish known for being monogamous, living in pairs, they inhabit host anemones and have a fascinating symbiotic relationship with them, using the stinging tentacles of the anemone for protection. The fish in turn also protect the anemone by attacking any threats, small or large. Bearing a resemblance to the famous "Nemo", this Red Sea version is a different species.

Jet black with bright blue blazes above and below its eyes, **Springer's Dottyback** is an unusually beautiful and

interesting to observe species. Although shy, it is surprisingly fast; usually found weaving between the branches of stony corals, feeding on planktons and scavenging for tiny shrimps.

Despite the misleading name, the **Spanish Triplefin** is only to be found in the Red Sea. With a maximum size of 2.5 cm and rusty-brown markings, it is quite difficult to spot, but is usually found at Ras Mohammed National Park.

### Distinctive Treasures

The great diversity of the Red Sea is in no way limited to its wide variety of colorful fish; plenty of other distinctive sea creatures can be found within its waters:

#### Sharks

There are about thirty shark species roaming the Red Sea, ranging from the gigantic whale shark with a maximum length of more than 12 m, to the comparatively miniature big-eye hound-shark with its maximum length of about 60 cm. Many of these species exist entirely hidden from human eyes, either

because of their preference for the open ocean or deep-water habitats, or their reluctance to approach humans and their activities.

Commonly encountered Red Sea shark species include: the grey reef shark, the silky shark, the scalloped hammerhead, the pelagic thresher, the oceanic white-tip shark, and the white-tip reef shark.

#### Dolphins and Whales



A common sight all over the Red Sea and a major attraction for tourists, despite their popularity, dolphins and whales are still poorly studied. Eight species are considered regular: the common bottlenose dolphin, the Indopacific bottlenose dolphin, the spinner dolphin, the Pantropical spotted dolphin, the long-beaked common dolphin, Risso's dolphin, the humpback dolphin, and Bryde's whale. There are various sites in the southern Red Sea where dolphins congregate or live; Satayah reef in Marsa Alam is a popular site known as a home for spinner dolphins.

#### Dugongs

The dugong is what inspired the famous mermaid legend; in fact, it is still called "Arosel Elbahr", the Arabic word for "mermaid". Despite lacking a trunk and living in a marine environment, dugongs are actually distant relatives of the elephant. They are coastal marine mammals that rarely exceed 3 m length and may weigh up to 400 kg. Dugongs have flattened faces with bristles and fluked horizontal tails like a dolphin or a whale.

The dugongs of the southern Red Sea represent one of the key marine highlights for tourism. A perfect example is the dugong of Marsa Abu Dabbab, which has gained celebrity status among the diving and water-sport community world-wide. It is estimated that there is less than a dozen dugongs living along the entire stretch of coastline from Quseir to the Egyptian/Sudanese border. Dugong species are currently classified as vulnerable to extinction; in recent years many countries have enacted laws for their protection.





## Turtles



There are seven species of sea turtles in the world; five of those have been reported in the Egyptian Red Sea: the green and the hawksbill turtles that nest and feed on the coast, the leatherback turtle, and the smallest of the sea turtle species, the olive-ridley turtle that is only rarely seen. A fifth species, the loggerhead turtle known for its big head, can usually be spotted in the Gulf of Aden but rarely reaches the Egyptian Red Sea.

At present, the International Union for Nature Conservation lists them as critically endangered (leatherback and hawksbill turtles), endangered (green and loggerhead turtles) and vulnerable (olive-ridley turtle). Sea turtles play an essential role in maintaining the seagrass beds that are a host to many sea creatures and in keeping the Red Sea healthy and full of life.

## Coral Treasures

The rich diversity and high level of endemism in the Red Sea is largely attributed to the 2,000 km of coral reef extending along its coastline. These fringing reefs create an intricate ecosystem that is an essential habitat for thousands of fish and invertebrate species that rely on the corals for their survival. They form an ecological niche in which creatures can live, feed and take refuge from predators.

The Red Sea's reefs epitomize diversity; they are home to more than 200 soft and hard corals. In fact, it has the highest diversity of coral reefs than any other section of the Indian Ocean.

Coral reefs are formed by calcium carbonate produced by tiny coral polyps that populate tropical climates. The environmental conditions of the Red Sea are ideal for the flourishing of coral reefs, while the shallow shelves bordering the sea ensure sufficient light for calcification to occur and for easy photosynthesis in algae.

As breathtaking as the Red Sea corals are, a bleak truth overshadows their spectacular beauty. These primeval ecosystems are succumbing to the multi-pronged assault of climate change, continued polluting of the water, constant oil spillage from offshore rigs, overfishing, heavy tourist development, and other human activities that threaten their survival.

While general information on potential threats is available, detailed sources of mortality and quantitative data are substantially lacking. Despite the fact that most of the coral reefs are in protected areas, mismanagement and disregarding of existing rules and laws pose a serious threat to the diversity of the corals and all the other marine life that depend on it.

Organizations such as The Hurgada Environmental Protection and Conservation Association (HEPCA) and Friends of the Earth Middle East (FoEME) have been hard at work trying to improve the situation. Among their successful projects has been the creation of mooring buoys, which are quasi-permanent anchors fixed to the sea-bed, allowing boats to tie up while at sea without dropping anchors that damage the reefs.

The one major problem these organizations encounter is the lack of overall environmental consciousness and awareness among the public and the industries involved. It is high time that we try and send a message, help raise awareness within the public, and strive to protect our priceless treasures.

## Glossary

- (1) **Coral Polyp** is the individual multicellular organism that forms a corals.
- (2) **Featherduster worms** are sedentary marine tube worms where the head is mostly concealed by feathery brachiata. They build tubes out of parchment, sand, and bits of shell.
- (3) **Christmas tree worms** are small, tube-building marine worms. The worms' most distinct features are two "crowns" shaped like Christmas-trees used as specialized mouth appendages.

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By: Lamia Ghoneim

Back in 2010, a series of bloody shark attacks terrorized the normally serene beaches of Sharm-Elsheikh. In the span of ten days, sharks severely injured four tourists and mauled a fifth to death; all attacks occurring near the shoreline. The attacks were so ferocious that experts were at a loss explaining the unprecedented behavior; particularly why the sharks launched multiple attacks so close to shore.

Although there has been no further bloody attacks reported, to this day, the reason for the horrific attacks remains a mystery that overshadows the reputation of the once idyllic holiday destination. As we recount the events that occurred and attempt to contemplate the attacks retrospectively, can we get closer to finding out why the sharks attacked? More importantly, should we be worried that they might return to attack again?

## THE ATTACKS

In 2010, three foreign snorkelers were attacked on 30 November and 1 December, suffering serious injuries and mutilation. The attacks were first blamed on an Oceanic White Tip<sup>(1)</sup> shark, and then on another of the same type and a Mako shark<sup>(2)</sup>. The Ministries of Environment and Tourism responded by shutting down diving sites in Sharm-Elsheikh and launching a wide shark hunt; the animals believed responsible were caught and the coastline was declared safe. Days later, an elderly German tourist was killed by yet another shark attack.

This scenario sounds like the plot of the 1975 *Jaws*, a film that terrified cinema-goers of the sea for years afterwards. Yet, these events were real, and cannot be attributed to a group of psychotic sharks suddenly turning murderous and developing a taste for human flesh.

Although both species believed responsible for the attacks are categorized as a threat to humans, they rarely attack and are credited with only 16 reported attacks across the world since records began. Richard Pierce,

Chairman of the Shark Trust and the Shark Conservation Society, said: "This spate of attacks is unprecedented. For either of these species to make repeated attacks on humans is unheard of. They simply do not go around attacking people for fun; neither do they seek out humans as food. As the oceanic name suggests, they are not normally found close to shore; they prefer the open ocean".

This means that some kind of trigger must have been responsible for them being attracted inshore and repeatedly attacking humans. With so much influence we humans are imposing on the ecosystem nowadays, the trigger was almost certainly something we had thoughtlessly done.

## BLAME THE SHEEP

The experts and marine biologists who were flown in to assess the situation had many theories as to what may have triggered the attacks. Perhaps the most plausible hypothesis suggested was that they were probably the result of dumping sheep carcasses in the sea.

There were allegations about large cargoes of dead sheep being dumped in the sea after dying on route to Egypt from Australia. Although Australia's livestock export manager attested that, to his knowledge, there had been no Australian livestock vessels passing through there in that 10-14 day period, there were witnesses who claimed they saw the carcasses being dumped in the sea. The theory is that the carcasses acted as bait to the sharks, driving them close to shore, where they came into contact with the victims.

## BLAME THE TOURISTS

Even though the practice is illegal, tour guides have been known to throw bait into the water to lure sharks closer to boats so tourists can get a glimpse of the creatures, especially during glass-bottom boat rides that take tourists out fish-spotting. Moreover, according to locals, dive schools sometimes bait sharks during diving lessons to impress clients and outcompete with other dive schools for customers.



The practice, known as “chumming”, is said to disrupt marine ecology and associate man with food in the minds of sharks, which might have led to the attacks.

**BLAME THE HUNGER**

Some local environmentalists support a different theory; they claim the sharks were simply hungry. The theory is that overfishing in the open ocean led to the depletion of fish stock that sharks depend on for survival, which forced them to venture further ashore and seek an alternative food source.

Ian Fergusson, a Shark Biologist involved with the UK Conservation Group ‘Shark Trust’, supports this theory: “While any degradation to the ecosystem of the local reef would not necessarily affect the Oceanic White Tip shark because it is outside its natural habitat, this could point to a larger issue of general offshore fishing of tuna and other big fish, whittling down and influencing the food chain; thus, disrupting the sharks’ ecosystem”.

**BLAME THE MAN**

The experts were unable to pin down the reason for the attacks to a single one, and unfortunately, neither can we; but, we can conclude that the attacks were not a random case of sharks gone wild, and that they were the result of a combination of Man-induced factors. Overfishing, illegal dumping and chumming, combined with unusually high temperatures resulting from global warming, and a large number of tourists increasing the odds of an encounter, have all contributed to the unprecedented attacks.

Killing the sharks is certainly not an option, not least because they are a national treasure, but also because they are an essential part of the marine ecosystem. According to the International Union for the Conservation of Nature (IUCN), 30 million to 70 million sharks are killed in fisheries per year, and one-third of open-water shark species are facing extinction.

The team of experts suggested some recommendations in hopes of preventing further attacks. These included an immediate stop to the culling<sup>(3)</sup> of sharks;

enforcement of bans on feeding marine life; environmental and emergency education for all diving personnel, crew and beach staff; environmental awareness for tourists and the public; and enforcement of existing laws against illegal fishing.

With the government putting into effect these recommendations, it is highly unlikely that such ferocious attacks will be repeated. However, even with strict marine regulations, the number of unprovoked shark attacks has grown at a steady pace over the past century, with each decade having more attacks than the previous, as recorded by the International Shark Attack File (ISAF).

This should be a reminder that the seas are the shark’s natural habitat and that we are visitors there. We can never make the sea completely safe for us, but we can certainly decrease the odds of such terrifying attacks, starting by not messing with the shark’s natural environment.

For all of you out there, heading for the Red Sea for your holidays, we can set our minds at ease by reading the next column.

**WHAT TO DO IF YOU ENCOUNTER A HUNGRY SHARK**

Adapted from the writings of Ian Fergusson, Shark Biologist and Patron of the Shark Trust

Your first aim is not to encounter a shark at all:

- STEER CLEAR of river mouths and estuaries, areas populated by seabirds, as well as dolphins or seals. Swimming in these areas is like entering a lion cage and wandering over to his food, then wondering why the lion attacked you.
- STAY on the beach side of the reefs, close to shore; the depth can plummet from 10 to 500 meters very quickly on the seaward side. Remember to snorkel in groups to deter sharks.
- AVOID swimming in waters with poor visibility, and do not go in before dawn or after dusk because sharks are most active in the dark. It does not matter what color you are wearing; you appear as a silhouette to a shark.

- AVOID bright-colored clothing, such as orange and yellow or shiny jewelry, which may appear to be like fish scales; sharks see contrast very well.
- NEVER snorkel or swim if you have an open wound, and leave the sea immediately if you cut your feet on the reef.  
If you find yourself in the company of a shark:
- KEEP IT IN SIGHT, while moving swiftly and smoothly towards the shore without making a big splash or commotion.
- NOTICE ITS BEHAVIOR. If its posture is stiff and its mouth is opening and closing as it swims towards you, change tactics; this could be because it thinks you are a dolphin, or because you are in its territory, or because it is curious.
- BE AGGRESSIVE; ‘playing dead’ does not work here. Defend yourself with whatever weapons you can, and avoid using your bare hands or feet if possible. If not, aim for the gills and eyes, which are the most sensitive spots; punch and kick with all your might.
- NEVER SURRENDER; keep pummeling the shark’s eyes and gills until you either die or the shark goes away. If you create enough trouble for the shark, it will eventually give up and find something easier to eat.

**GLOSSARY**

- (1) **Oceanic White-Tip Shark** is a large pelagic shark inhabiting tropical and warm temperate seas. Its stocky body is most notable for its long, white-tipped, rounded fins.
- (2) **Mako Shark** is a genus of mackerel sharks which includes two living species inhabiting offshore temperate and tropical seas worldwide; the common short-fin Mako shark and the rare longfin Mako shark. They range in length from 2.7 to 4.5 m, and have an approximate maximum weight of 64 kg. The Mako shark is capable of swimming up to 40 mph and jumping up to 7.3 m. in the air.
- (3) **Shark Culling** is reducing the population of sharks in a certain area by selective slaughter, usually done in areas where shark attacks have become a problem.

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By: Shahenda Ayman

# ACIDIFICATION ATTACK



For tens of millions of years, Earth's oceans have maintained a relatively stable acidity level. It is within this steady environment that the rich and varied web of life in today's seas has flourished. However, research shows that this ancient balance is being undone by a recent and rapid drop in surface pH that could have devastating global consequences.

Since the beginning of the industrial revolution in the early 1800s, fossil fuel-powered machines have driven an unprecedented burst of human industry and advancement. The unfortunate consequence, however, has been the emission of billions of tons of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases into Earth's atmosphere.

About half of this anthropogenic or man-made CO<sub>2</sub> has been absorbed by the oceans over time, which has benefited us by slowing the climate change. Nevertheless, the introduction of massive amounts of CO<sub>2</sub> into the seas is altering water chemistry and affecting the life cycles of many marine organisms, particularly those at the lower end of the food chain.

When CO<sub>2</sub> dissolves in the ocean, carbonic acid is formed, leading to higher acidity, mainly near the surface, which has been proven to inhibit shell growth in marine animals and is suspected as a cause of reproductive disorders in some fish.

On the pH scale, which runs from 0 to 14, solutions with low numbers are considered acidic and those with higher numbers are basic, seven is neutral. Over the past 300 million years, ocean pH has been slightly basic, averaging about 8.2; today, it is around 8.1, a drop of 0.1 pH units, representing a 25% increase in acidity over the past two centuries.

The oceans currently absorb about a third of human-created CO<sub>2</sub> emissions, roughly 22 million tons a day. Projections based on these numbers show that by the end of this century, continued emissions could reduce ocean pH by another 0.5 units. Shell-forming animals including corals, oysters, shrimp, lobsters, many planktonic organisms and even some fish species could be gravely affected.

Scientific awareness of ocean acidification is relatively recent, and researchers are just beginning to study its effects on marine ecosystems; however, all signs indicate that, unless humans are able to control and eventually eliminate fossil fuel emissions, ocean organisms will find themselves under increasing pressure to adapt to their habitat's changing chemistry or perish.

The new chemical composition of our oceans is expected to harm a wide range of ocean life, particularly creatures with shells as increased acidity reduces carbonate; the mineral used to form the shells and skeletons of many shellfish and corals. The effect is similar to osteoporosis, slowing growth and making shells weaker. If pH levels drop enough, the shells will literally dissolve; the resulting disruption to the ocean ecosystem could have a widespread ripple effect and further deplete already struggling fisheries worldwide.

Delicate corals may face an even greater risk than shellfish because they require very high levels of carbonate to build their skeletons. Acidity slows reef-building, which could lower the resiliency of corals and lead to their erosion and eventual extinction. The tipping point for coral reefs could happen as soon as 2050.

Coral reefs serve as the home for many other forms of ocean life; their disappearance would be akin to rainforests being wiped out worldwide. Such losses would reverberate throughout the marine environment and have profound social impacts, as well, especially on the fishing and tourism industries. The loss of coral reefs would also reduce the protection that they offer to coastal communities against storms surges and hurricanes, which might become more severe with warmer air and sea surface temperatures due to global warming.

Combating acidification requires reducing CO<sub>2</sub> emissions and improving the health of the oceans. Creating marine protected areas and stopping destructive fishing practices would increase the resiliency of marine ecosystems and help them withstand acidification. Evidence suggests that coral reefs in protected ocean reserves are less affected by global threats, such as global warming and ocean acidification, demonstrating the power of ecosystem protection.

Ultimately, though, reducing the amount of CO<sub>2</sub> absorbed into the oceans may be the only way to halt acidification. The same strategies needed to fight global warming on land can also help in seas. This problem is an international one and although we do not have oceans in the Arab region, it affects our Mediterranean Sea.

The Mediterranean is considered a small-scale ocean with high environmental variability and steep physicochemical gradients within a relatively restricted region. Its circulation is characterized by zonal gradients of physicochemical variables, with salinity, temperature, stratification and alkalinity all increasing towards the East. The generally low-nutrient (from oligotrophic<sup>(1)</sup> to ultraoligotrophic<sup>(2)</sup>) waters offshore stand in

contrast to many near-shore regions, often containing coral and sea grass ecosystems, which are affected by human-induced eutrophication<sup>(3)</sup>.

Containing only 1% of Earth's vast ocean water, the Mediterranean hosts 8% of the world's biodiversity that is currently under threat. Acidification is an additional anthropogenic pressure on Mediterranean ecosystems already suffering from overfishing, increasing sea surface temperatures and alien species invasion.

Creating more marine protected areas in the Mediterranean is a good short-term solution to reduce adverse impacts from fishing, shipping and tourism on its biodiversity hot spots. However, the Mediterranean is already vulnerable because it is a semi-enclosed sea; with all of its sociopolitical complexity, one wonders how the Mediterranean will be able to meet these grand environmental challenges. Scientists can talk all they want; but, the action will actually be carried out by policymakers, governments and the public.

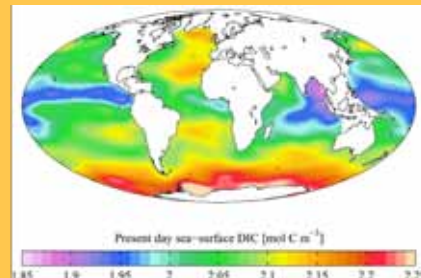
We are harming our Earth in many ways that we are fully aware of; but, when it comes to marine life, we, the general public, are tragically unaware of the hidden and indispensable treasures that our oblivious actions are destroying. The inevitable reality is that ocean acidification is the hidden side of the world's carbon emission crisis caused and perpetuated by us. We are thus required to reinforce drastic changes on how we fuel our world, and we need to do it quickly.

## Glossary

- (1) **Oligotrophic**: a term used to refer to environments that offer little to sustain life, organisms that survive in such environments, or the adaptations that support survival.
- (2) **Ultraoligotrophic**: a term used to refer to environments that nutrient concentrations in both the water column and lake sediments are extremely low.
- (3) **Eutrophication**: is the ecosystem response to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilizers or sewage, to an aquatic system.

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Miles beneath the surface, where sunlight can no longer penetrate, exists an eerie world of cold darkness; this is the abyss. It is a world where a myriad of fascinating, albeit scary, creatures live and thrive despite being totally cut off from sunlight, the source of all life.

Some of the animals here have evolved the ability to create their own light with a technique known as bioluminescence<sup>(1)</sup>; they use their lights to attract prey and ward off predators. There are also animals here that obtain all of their nutrients from chemicals in the ocean through a process known as chemosynthesis. Here are also creatures of gigantic proportions. This is where the elusive giant squid hunts; it is also where the great sperm whale<sup>(2)</sup> comes to feed on the giant squid. Here, within the waters of our own planet, lies an alien world of wonders.

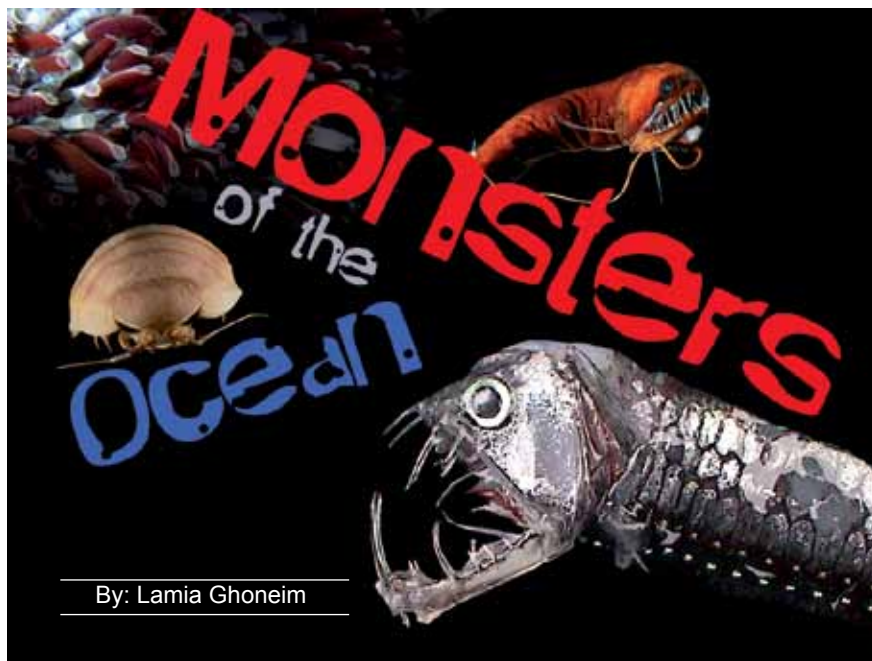
### The Elusive Giant Squid

The elusive giant squid, known to science as *Architeuthis dux*, is a true sea monster. Growing up to 16 meters long with ten arms and eyes almost half a meter in diameter, it is one of the world's largest animals and the largest known invertebrate. However, because they live at such great ocean depths, very little is known about this mysterious species as they have never been studied in the wild. Expeditions spend years searching for these elusive creatures, but they have only been spotted very rarely. Most of what we know about these creatures comes from the bodies of dead squids that have washed ashore or been pulled up in fishermen's nets.

One thing we know for certain is that these animals are carnivores, and will eat just about anything they can catch. During World War II, stories from the survivors of sunken ships tell of shipmates being eaten by these creatures in the dark of the night; there have even been reports of giant squid reaching out of the water and pulling men off small boats. None of these reports have been officially verified, but they paint a daunting picture of a powerful predator.

The squid's eight long tentacles have strong suction cups, which they use to hold on to their prey; a sharp, powerful beak finishes off their helpless victim with uncanny efficiency. The giant squid appears to be a favorite meal for the sperm whale; they have been found in the stomachs of dead whales, many of which bore scars from the squid's suction-cupped tentacles.

While scientists are certain that the giant squid lives at a great depth in the ocean, the accurate depth of the water it habituates is unknown; however, data from trawled specimens and sperm whale diving behavior suggest it spans a large range of depths, possibly between 300 and 1000 meters.



### Below the Photic Zone<sup>(3)</sup>

The dark world below the "Photic Zone", named the "Aphotic Zone", is where the deep sea creatures live. It begins from roughly 200 meters below the surface and extends to the ocean floor; it is divided into additional zones: the bathyal zone, the abyssal zone, and the hadal zone.

These zones are characterized by extremely harsh conditions; such as hundreds of atmospheres of pressure, small amounts of oxygen, very little food, no sunlight, and constant extreme cold. Most of the creatures living here have adapted to diets based on meager droppings from the sunlit layer above, while others live on sulfur and methane, or bacteria that break down oil, or the sunken bones of dead whales and other implausible foods.

Scientists have inventoried about 17,650 species living in the aphotic zone. This number includes some 5,722 species recorded deeper than the black abyss of 1,000 meters.

### The Grotesque Pacific Viperfish

The pacific viperfish, *Chauliodus sloani*, is one of the most grotesque-looking deep ocean fish in existence; the kind of fish that could be featured in a horror movie. These deep-sea demons reach only about 25 centimeters long and have long, thin, dark silver-blue bodies, vaguely resembling that of a snake. They have proportionately enormous head and jaws, with large eyes and extremely long, needle-like teeth that angle back from the lower jaw. The teeth of the viperfish are so long that they do not fit in its mouth; in fact, they extend far enough back that it can poke its own eyes out if it closes its mouth fully.



The Pacific viperfish troll the depths up to 4,400 meter below, though they have been known to swim up to within a few hundred meters of the surface at night. Like many deep sea creatures, they have a varied diet, feeding mainly on shrimp, plankton and other small fish, but occasionally catching a larger fish, which they are able to overpower and swallow with the help of their large, hinged jaws and strong jaw muscles.

Pacific viperfish are heavily equipped with photophores, which are patches of bioluminescent bacteria that help it lure its prey. Two rows of photophores extend along the back of its body, and it has a high concentration of photophores in its mouth. It also has a long, thin lure that extends from its dorsal fin.

### The Gigantic Isopod

The giant isopod, known scientifically as *Bathynomus giganteus*, is the largest known member of the isopod family, exhibiting deep-sea gigantism<sup>(4)</sup>. Although essentially small, measuring 19-36 cm, compared to most isopods, measuring around 1-5 cm, they are quite gigantic. They are considered daunting-looking creatures that resemble crawly earth bugs magnified by ten folds.

Giant isopods are carnivorous crustaceans found at the gloomy depth of 170 meters to the pitch darkness at 2,140 meters, scavenging for food in complete darkness. Food is extremely scarce at these great depths, so it has adapted to eat whatever falls to the ocean floor from above; it will also feed on some of the small invertebrates that live at these depths.



Interestingly, giant isopods are considered living fossils because they have remained virtually the same for the past 130 million years.



### The Vampire Squid

The vampire squid is an apt name for a creature that lurks in the lightless depths of the ocean. Comfortable at 3,000 meters below the surface, these diminutive cephalopods navigate the blackness with eyes that are proportionately the largest of any animal on Earth.

The vampire squid's body is very gelatinous in form, resembling a jellyfish more than the common squid, and is covered with light-producing photophores, giving it the unique ability to make its own light, and to "turn itself on or off" at will. When the photophores are off, the squid is completely invisible in the dark waters where it lives.

The species gets its name from its dark, webbed arms, which it can draw over itself like a cloak. One pair of arms has been modified into retractile filaments that can extend to twice the body length of the animal, and is used to capture its prey. When threatened, it can draw its arms up over itself and form a cloak that covers its body. Unlike other squid and octopi, the vampire squid has no ink sack. It can swim extremely fast for a gelatinous animal, with the speed of 2 body lengths per second needing only 2 seconds to accelerate to this speed.



### Giant Tube Worms

The giant tube worm, also known as *Riftia pachyptila*, was totally unknown to science until researchers exploring the deep Pacific Ocean floor discovered strange, hydrothermal vents. Powered by volcanic heat, these vents re-circulate water that seeps down through cracks or faults in the rock; when the water emerges from the vent, it is rich in chemicals and minerals.

This toxic soup of chemicals would be lethal to most animals, so scientists were shocked to find entire ecosystems of animals living around these vents.

Despite the near boiling temperature of the water, these animals thrive in the complete absence of light. The organisms that live near these vents are unique because, unlike all other living species on Earth, they do not depend on sunlight for their source of energy; instead, they feed on tiny bacteria that get their energy directly from the chemicals in the water through a process known as chemosynthesis.

These hydrothermal vents are known as "black smokers"<sup>(6)</sup> because of the dark color of the material they eject. Giant tube worms grow in size to over two meters in length and are eyeless, mouth-less and have bright red plumes. They have been found throughout the Pacific Ocean where deep sea hydrothermal vents have been discovered; the average depth of these vents is 1,500 meters. Entire communities of shrimps and crabs have been found living around these giants; it is believed that these invertebrates feed by nibbling off bits of the tube worms' red plumes.

As amazing as these vent ecosystems are, they are also extremely fragile. As the Earth's crust shifts due to geothermal activity, the supply of chemicals through the vents can be cut off. When this happens, all of the incredible creatures that depend on these chemicals will wither and die; scientists have returned to once thriving vent sites only to find them completely cold and dead. The cycle begins again, with new hydrothermal vents growing elsewhere on the deep ocean floor.



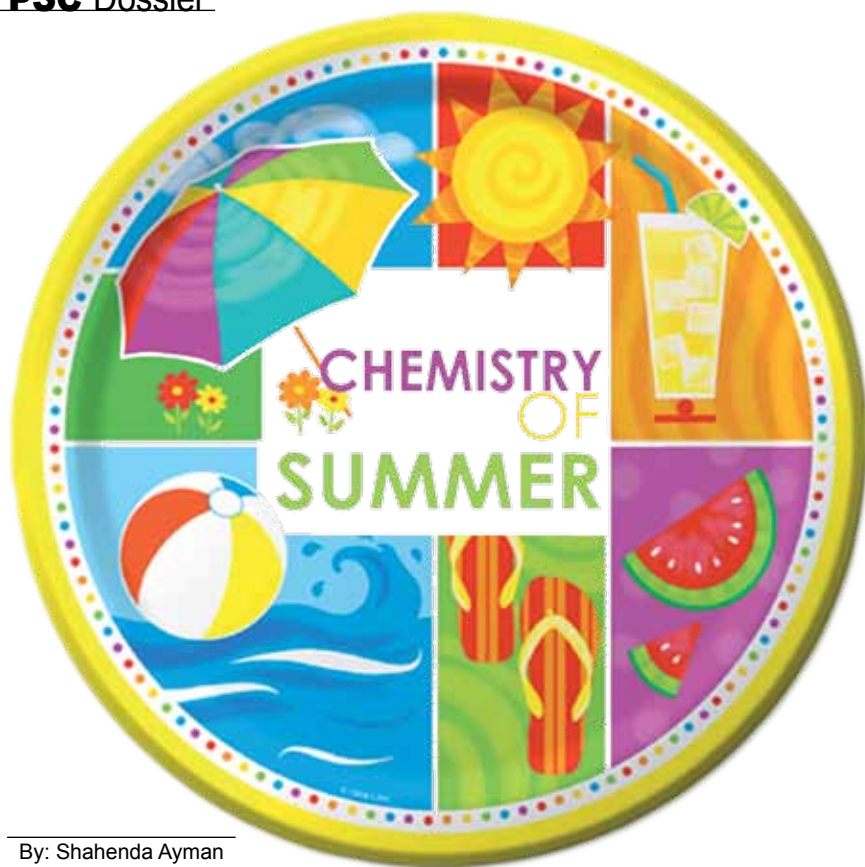
### Glossary

- (1) **Bioluminescence** is the production and emission of light by a living organism. It is a naturally occurring form of chemiluminescence where energy is released by a chemical reaction in the form of light emission.
- (2) **The Great Sperm Whale**, or *Physeter macrocephalus*, is a marine mammal species. It is a large-toothed whale that has the largest brain of any animal. Its name comes from the milky-white waxy substance, spermaceti, found in the animal's head.
- (3) **The Photic Zone** is the depth of the water in a lake or ocean that is exposed to sufficient sunlight for photosynthesis to occur. It extends from the atmosphere-water interface downwards to a depth where light intensity falls to one percent of that at the surface, usually at around 200 m in the open ocean.
- (4) **Deep-sea Gigantism**, also known as abyssal gigantism, is the tendency for species of invertebrates and other deep-sea-dwelling animals to display a larger size than their shallow-water counterparts.
- (5) **A Black Smoker** is a type of hydrothermal vent found on the seabed, typically in the abyssal and hadal zones. They appear as black chimney-like structures that emit a cloud of black material. The black smokers typically emit particles with high levels of sulfur-bearing minerals, or sulfides.

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By: Shahenda Ayman

The word “summer” reminds us all of specific things; beach, Sun, and fun. When I was a child, I used to wait for the summer to pick up my beach toys and my float, go to the beach, build sand castles and swim until sunset; I was never annoyed by the Sun or getting tanned. However, now that I am a young woman, I have become obsessed with the effect of sunrays on my skin; I try to find places where I am not exposed to them directly so that I would not harm my skin, despite my fondness of having a summer tan.

Becoming a science communicator has changed my way of thinking and made me curious about the chemistry behind everything I use. As a result, and as we approach the summer, I found myself compelled to search and share with you some useful information about surviving the summer Sun; how to enjoy it while staying healthy.

### The Downside of a Sunny Day

Soaking up the Sun’s rays is one of life’s greatest pleasures. Not only does a warm, sunny day perk up our spirits, it also provides us with the ideal setting to pursue many activities, including outdoor sports, leisurely walks, gardening, picnicking, among many others. Sunlight can also provide therapeutic and psychological benefits to persons with asthma, arthritis and some skin diseases, relieving some of the discomforts of these conditions. On the other hand, Sun fans stretch out on the beach or at swimming pools for hours, seeking bronzed bodies they believe to symbolize youth, fitness and attractiveness; but, is it?

Suntans, and sunburns, are caused by invisible ultraviolet (UV) rays that the Sun emits besides light rays that we can see. Ultraviolet radiation constitutes about 6% of all solar radiation that reaches Earth; 48% is visible light and 46% is infrared light. It is easier to burn more severely on a hot day because the heat increases the effects of UV radiation; it is also easier to burn at high altitudes because there is less atmosphere to block UV rays.

On the beach, you might think an umbrella would protect you. Do not be deceived; beach umbrellas do not provide full protection because UV rays can still bounce off sand, water and decks to the person lounging underneath. As a matter of fact, some people use sun reflectors to increase exposure to the Sun and thereby increase their tans. This is a dangerous practice because delicate areas, such as the eyelids, ears and under the chin, can be burned severely.

Moreover, most people discount the risk of getting Sun-burnt on a cloudy or overcast day when the Sun is not shining brightly; however, up to 80% of UV rays can “penetrate” through clouds. Ironically though, by absorbing harmful rays, atmosphere pollutants such as dust, smoke and dirt offer partial protection against the risk of sunburn.

As scientists continue to discover more about how Sun exposure affects the skin, it has become painfully clear that UV rays have nasty repercussions that last much longer than the mere discomfort and embarrassment of a sunburn. The links to skin cancer, advanced aging, and skin deterioration are undeniable;

consequently, more and more people are realizing the importance of protecting themselves from both Ultraviolet A (UVA) and Ultraviolet B (UVB) sunrays. The question is: What are the differences between UVA and UVB rays?

The UVB ray, often referred to as the “tanning ray”, is long-known for its role in leading to both sunburns and skin cancer. It gets its nickname because it stimulates the production of the brown pigment, melanin, by stimulating the melanocyte cell, which happens as a means of protection against UV radiation.

However, UVB exposure has undesirable side-effects; these rays are partially responsible for causing all three main types of skin cancer: basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. Nevertheless, despite their serious impact, UVB rays are only capable of penetrating the silk scarf thick outer layer of the skin, or the epidermis, which contains little besides skin cells.

Unlike UVB rays, UVA rays are longer, more powerful, and are capable of penetrating through the epidermis all the way to the dermis, which contains all the “good stuff”; including collagen, elastin, and blood vessels that are responsible for showing, or hiding, age.

By ruining the dermis, cracking and shrinking collagen and elastin, and damaging blood vessels, UVA rays age the skin. Instead of having youthful skin, those who have had extended, unprotected exposure to UVA rays often have many wrinkles, age spots, and a more leathery skin texture. It is advised that preventative measures are taken because UVA rays have non-aesthetic side-effects; moreover, studies have shown links to between exposure and skin cancer.

If you do not apply sunscreen or sunblock, and spend much time in the Sun without protection, you will be exposed to one of the following situations:

### Tanning

A sunbather views a tan as a symbol of good health and looks. However, physicians consider tanning a response to injury because the Sun kills some cells on contact and injures others. Tanning occurs when UV rays penetrate the skin’s inner layer to produce more melanin, which then moves toward the outer layers and becomes visible as a tan. Melanin production usually occurs 48 hours after the initial Sun exposure, peaking about two weeks later.

### Sunburn

If you are exposed to the Sun too long, you may develop a mild redness within a few hours; this usually peaks within 24 hours. A severe reaction that is marked by extreme tenderness, pain, swelling, and blistering, may be accompanied by fever, chills, nausea, and delirium within 12 hours of the overexposure.

Unfortunately, despite claims of some sun cream manufacturers, there is no quick cure for the discomforts of an acute sunburn. Home remedies, such as wet compresses, tub baths, and soothing lotions, usually provide partial relief. If you develop a severe burn, consult your dermatologist.





### Allergies

Some people develop allergic reactions to sun exposure, which occur after only short periods of exposure. Bumps, hives, blisters, or red blotchy areas may occur repeatedly in the same place after each exposure. Researchers say these reactions are due to a person's previous sensitization to sunlight or to contact with certain cosmetics, perfumes, plants, or topical medications.

Some drugs, including birth control pills, antibiotics, antibacterial ingredients in medicated soaps and creams, and tranquilizers can make some individuals more sensitive to the Sun, causing a skin eruption. The allergic reaction is called a photosensitivity reaction; if this occurs, see a dermatologist and avoid the offending product in the future.

### Aging

People who work or bask in the Sun for years without sunscreen protection usually develop a tough, leathery skin that may make them look 15-20 years older. Chronic exposure, starting in childhood, typically results in a change in the skin's texture, leading to excessive wrinkles and variable degrees of skin thickening and thinning. After years of excessive exposure, the Sun weakens the skin's elasticity, leaving the appearance of sagging cheeks and deeper than normal facial wrinkles.

In addition to other harmful effects on the skin, the Sun can cause discoloration—red, yellow, gray, or brown blotches—formation of "liver spots",

and gray scaly growths called actinic keratoses, which may develop into cancer. It should be emphasized that these changes are not just due to recent exposure, but to cumulative effects throughout life. Attention should be paid to the protection of children who tend to have longer outdoor exposure and may not show the effects of sun damage until later in life.

### Cancer

According to scientific studies, skin cancer is a disease caused by excessive and long-term exposure to the Sun; it rarely occurs in the occasional sunbather. More than 90% of all skin cancers occur on parts of the body exposed to the Sun's radiation; the face, neck, ears, forearms, and hands are the most common locations.

The three main types of skin cancer are basal cell, squamous cell, and melanoma. Basal cell carcinoma usually occurs in persons who have light hair and fair complexions, who sunburn easily, and who do not tan. Appearing as a small, shiny, fleshy nodule on exposed parts of the body, basal cell carcinoma grows slowly. When diagnosed and treated promptly, it has a high cure rate.

Squamous cell carcinoma, which typically develops on the face, ears, lips, and mouth of fair-skinned persons, usually starts out as a red, scaly, plate-like patch or nodule. Though it can spread to other parts of the body, it also carries a high cure rate when detected and treated early.

Melanoma, the most dangerous form of skin cancer, usually shows up as a dark brown or black mole-like lesion with irregular edges. Sometimes, the growths may turn red, blue, and white. The most common sites are the upper back in men and women and the chest and lower legs of women.

### Enjoying the Sun Safely

There are several small things you can do to avoid the negative effects of UV rays. First of all, make sure to apply sunscreen on a daily basis, and choose a sunscreen that is appropriate for your activity. Remember that harmful UV rays can affect you regardless of how cloudy it is outside, and that UVA rays are even capable of penetrating most clothes, windows, and windshields. It is, thus, important to protect yourself from them by applying broad spectrum sunscreen and wearing protective clothing every day, not just when spending a day in the Sun.

The Skin Cancer Foundation advises that you seek the shade, particularly during the Sun's peak hours, 10:00-16:00 hr; do not let yourself burn, and avoid UV tanning booths, which provide direct exposure to the especially damaging UVA rays. Most importantly, use your discretion about how much sun exposure is enough. Moreover, the American Academy of Dermatology recommends that at least one ounce of broad-spectrum sunscreen SPF 15 or higher be applied 15-30 minutes before spending time in the Sun, and be reapplied every 2 hours.

There are several different sunscreen options that are appropriate for preventing sunburns, and other sun damage in specific situations. It is important to first realize that any type of sunscreen is always better than none, but also that no sunscreen can block all UV rays; likewise, do not select a sunblock with the assumption that it will grant you unlimited hours of harmless fun in the Sun. Sunscreen complements good judgment during summertime; it does not excuse it.

There are several factors that determine which types of sunscreen might be best for you. When choosing your sunscreen, you should consider the following:



**Sun Protection Factor**

The Sun Protection Factor (SPF) is a measure of the protection from UVB rays that a sunscreen provides; it should be considered carefully when choosing a sunscreen. Generally, any sunscreen SPF 15 or higher offers great protection against UVB rays. To get a better idea of how effective it is, SPF 15 basically means that if your skin reddens in 10 minutes with no sunscreen, it will redden in 150 minutes (15 times longer) when applying sunscreen.

Since it is always advised to reapply sunscreen every 2 hours, another way of looking at SPF is by percentage of UVB rays blocked: SPF 15 blocks 93% of UVB rays, SPF 30 blocks 97% of UVB rays, and SPF 50 blocks 98% of UVB rays. Although the differences in percentage are small, it can be worth the difference if you have sensitive skin or a history of skin cancer in your family to opt for a high SPF sunblock.

Remember, too, that SPF does not measure protection against UVA rays. However, despite the fact that there is no established system for measuring UVA ray protection, broad-spectrum sunscreen that offers both UVA and UVB protection is widely available and always recommended.

**Water Resistance**

Depending on how much time you will be spending in the water, or how sweaty you are likely to get, you should consider choosing a sunscreen that is water resistant or even water proof. Water-resistant sunscreen protects against harmful rays for up to 40 minutes when fully emerged in water; waterproof sunscreen protects for 80 minutes. You should choose your sunscreen accordingly, realizing that sunscreen with no water resistance washes off quickly with sweat or water.

**Type of Activity**

Different occasions often call for different types of sunscreen. For day-to-day activities including an indoor job, school, or other activities that require little time in the Sun, a moisturizer or aftershave product with built-in SPF is sufficient.

These are readily available, but it is recommended that you choose one with an SPF of 15 or higher, because UV rays can penetrate most windows and clothes. These are also ideal because they do not need to be reapplied as often and do not leave your skin feeling greasy.

If you plan on spending the day in the Sun, a more substantial sunscreen is suggested. Choose a high SPF, broad-spectrum sunscreen that is waterproof or water resistant. These sunscreens tend to hold together on the skin better and are less likely to drip into your eyes. They may, however, be slightly sticky, and not pair well with makeup. As mentioned earlier, any sunscreen will need to be reapplied every 2 hours, or immediately after swimming, excessive sweating, or toweling off.

**Skin Type**

For your face, or to keep skin from getting greasy, there are oil-free and non-greasy sunscreens meant specifically for those purposes. These tend to not irritate skin as much, and also go on with a dryer touch. If you have especially sensitive skin, there are hypoallergenic sunscreens that will not hurt your skin. For people who burn extremely easily, there are high SPF sunscreens that will help avoid sunburn.

**Sun Screen vs Sun Block**

Many people confuse sunscreen and sunblock as being exactly the same product; but, they are not! Sunscreen is responsible for absorbing sunrays so as not to reach the skin, whereas sunblock is used to physically block the Sun's UV rays.

Sunscreen is typically a pure white, visible cream that is very messy. Although sunscreens do protect against both UVA and UVB rays, they break down after exposure to sunlight, so it will need to be reapplied every few hours to fully protect your skin. Sunblock, on the other hand, is invisible once properly applied, and blocks the majority of the Sun's UVA and UVB rays. Unlike sunscreen, a good sunblock does not need to be reapplied every few hours.

So, which of these should you use? Depending on your age and amount of time in the Sun, the answer could be either or both. However, for most people the answer should be a sunblock.

Basking in the Sun for up to 15 minutes each day without sunblock is encouraged to absorb the necessary Vitamin D needed for



healthy, strong bones and teeth. However, being outside in the Sun for prolonged periods of time without protecting your skin can lead to wrinkles, sunburns, and skin cancers. Most people turn to sunblock to protect their skin from harmful sunrays. However, not all sunblock are created equal, and if not used properly can be completely ineffective.

Unfortunately, there is no rating system to determine how good a sunblock is at protecting your skin from UVA rays; this is why it is extremely important to read the ingredient list. Sunblocks that contain titanium dioxide, zinc oxide, avobenzone, and oxybenzone with an SPF of 30 or higher are considered broad-spectrum sunblocks and are the best at protecting your skin.

Regardless of the type of sunscreen or sunblock you choose, remember that preventing skin damage before it happens will save you hardship in the future. Be smart about the amount of time you spend in the Sun and apply the suitable protection daily to ensure healthy, beautiful skin for years to come.

**Glossary**

**\*Liver spots:** they are flat, brown-black spots that usually appear on the skin in sun-exposed areas of the body. They have nothing to do with the liver or liver function.

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By: Shahenda Ayman

Throughout this issue, we have written about the Sun: What it is, its importance to our lives, how it affects us, and how to protect ourselves from it, especially during summertime. What about surviving the summer's excruciating heat? With Ramadan falling in mid-summer this year and for the next few years, the question becomes even more pressing: Do we do what we did last summer?

Nowadays, if you do not have an air conditioner at home, you would probably feel like living in hell; likewise, if your car or whatever transportation you use is not air-conditioned, you would probably feel like cooking in an oven. Egypt's already hot summer is becoming hotter every year; even if you have the luxury of leaving everything behind and rushing to the seaside in an attempt to avoid the heat monster, the once glorious summer season soon becomes unbearable. What could we do then to survive? What would we do when, on top of all that, we have to spend the long hot days fasting without a drop of water?

### Surviving the Summer

If you are driving a car and the temperature light comes on, it means that the cooling system of the car is becoming overwhelmed. If you turn off the car and let it cool down, eventually you can start driving again; but, if you continue to drive the car, the problem will go beyond the cooling system to affect the engine, and eventually the car will stop.

Likewise, in order for the body to function properly, it must maintain a core temperature of 36.7°C–37°C. When it is very hot and humid, the body's natural defense is to sweat profusely; when this happens, the body loses not only water, but also sodium. If this goes on for long enough without replenishing the fluids and electrolytes lost during perspiration\*, the body will become dehydrated, and the individual may start having symptoms of heat cramps, heat exhaustion, or heat stroke.

Humidity is a huge factor; in tremendously high temperatures and high humidity, a person will sweat but the sweat will not dry on the skin. The problem with high humidity making us feel hotter is not just that it makes us more uncomfortable, but that we are actually hotter. Our bodies compensate by working harder and harder to cool us down; when sweating does not work to cool us down and we continue to heat up, it leads to overheating and loss of water and chemicals the body needs, leading to heat exhaustion, dehydration and chemical imbalances within the body.

Dehydration depletes the body of water needed for sweating and thickens the blood, requiring more pressure to pump it through the body, thus straining the heart and blood vessels. As blood goes to the external surface of the body, less goes to the muscles, the brain, and other organs. Physical strength declines,

and fatigue occurs more quickly than under normal conditions; mental faculties, such as alertness, may also be adversely affected.

Such effects are more pronounced, and more dangerous, depending on age and overall physical condition; however, young people who are not aware that their physical activity or exercise could be dangerous in humid conditions, are also at risk. Overheating is a serious condition, and can result in the following:

- **Heat cramps:** Exercising in hot weather can lead to muscle cramps, especially in the legs, because of brief imbalances in body salts. Cramps become less frequent as a person becomes used to the heat.
- **Heat syncope or fainting:** Anyone not used to exercising in the heat can experience a quick drop in blood pressure that can lead to fainting. As with heat cramps, the cure is to take it easy.
- **Heat exhaustion:** Losing fluid and salt through perspiration or replacing them in an imbalanced way can lead to dizziness and weakness. Body temperature might rise, but not above 38.8°C; in some cases, victims, especially the elderly, should be hospitalized. Heat exhaustion is more likely to occur after a few days of a heat wave than when one is just beginning. The best defense is to take it easy and drink plenty of water.
- **Heatstroke:** In some cases, extreme heat can upset the body's thermostat, causing body temperature to rise to 40.5°C or higher. Symptoms are lethargy, confusion and unconsciousness; even a suspicion that someone might be suffering from heatstroke requires immediate medical aid because heatstroke can kill.





In order to avoid the previous mentioned problems, here are some tips to keep you cool in the summer:

- 1) Alter your pattern of outdoor exercise to take advantage of cooler times; early morning or late evening. If you cannot change the time of your workout, scale it down by doing fewer minutes, walking instead of running, or decreasing your level of exertion.
- 2) Wear loose-fitting clothing, preferably of a light color; cotton clothing will keep you cooler than many synthetics.
- 3) Fill a spray bottle with water and keep it in the refrigerator for a quick refreshing spray to your face after being outdoors.
- 4) Try storing lotions or cosmetic toners in the refrigerator to use on hot, overtired feet.
- 5) Keep plastic bottles of water in the freezer; grab one when you are ready to go outside. As the ice melts, you will have a supply of cold water with you.
- 6) Take frequent baths or showers with cool or tepid water.
- 7) Combat dehydration by drinking plenty of water along with sports drinks or other sources of electrolytes.
- 8) If you are wearing a cap or hat, remove it and pour a bit of ice cold water into the hat, then quickly invert it and place it back on your head.
- 9) Avoid caffeine as it promotes dehydration.
- 10) Instead of hot foods, try frequent small meals or snacks containing cold fruit or low fat dairy products. As an added benefit, you will not have to cook next to a hot stove.
- 11) If you do not have air-conditioning, arrange to spend at least parts of the day in a shopping mall, public library, movie theater, or other public areas that are cool.
- 12) Finally, use common sense; if the heat is intolerable, stay indoors when you can and avoid activities in direct sunlight or on hot asphalt surfaces. Pay special attention to the elderly, infants, and anyone with a chronic illness, as they may dehydrate easily and be more susceptible to heat-related illnesses. Do not forget that pets also need protection from dehydration and heat-related illnesses too.

### Alternative Air-Conditioning

In addition to the previously mentioned solutions, there are other environmentally friendly ways to keep cool in summer, and save the environment at the same time. Remember that we are somehow a reason in the high temperature we face year after year.

Obviously, the best way to keep your home cool during the summer is to use an air conditioner to keep the temperature down, but there are other options that do not raise your electricity bill quite significantly. Moreover, though air conditioners may offer tempting temporary relief from summer heat, they are a huge environmental foe; you may be cooling your home, but the fossil fuels you are burning in the process are only making your summers hotter.

If you are looking for ways to beat the heat, a ceiling fan can be a great investment for your home. This one appliance can make a room feel 6 or 7 degrees cooler, and even the most power-hungry fan will not raise your electricity bill that much if you keep it on for 12 hours a day. Good fans make it possible for you to raise your thermostat setting and save on air-conditioning costs. Fans do not use much energy, but when air is circulating, it feels much cooler. Ceiling fans are best, but a good portable fan can be very effective as well.

Another way is installing white window shades, drapes, or blinds to reflect heat away from the house. Close blinds, shades and draperies facing the Sun—East-facing windows in the morning and West-facing windows in the afternoon—to keep the Sun's heat out and help fans or air conditioners cool more efficiently. Always remember that the best way to keep your home cool is to keep the heat out.

### Surviving Ramadan

It seems that the days of Ramadan will be getting hotter and longer in the coming years. This presents a challenge for pious Muslims, who have to fast from dawn to dusk, nearly 15 hours, in

the summer's scorching heat, though religious leaders say that this challenge will lead to greater faith among those fasting.

Like it or not, Ramadan is during summer now; so, be mindful of the heat and humidity. If you are tired during the day, do not hesitate to take a nap and rest. After sunset, make sure you drink plenty of fluids and stay well hydrated during the night. Try to avoid very salty foods so as not to be excessively thirsty during the next day. It is recommended to avoid strenuous physical activity while fasting.

For nutritionists and dietitians, maintaining a balanced diet during Ramadan is all the more important in summer; otherwise, the body can be deprived of the required nutrients. Eating too much outside the fast, or eating unhealthily, can also affect how people feel while fasting. According to nutritionist Osama Rafik, people should avoid gorging themselves at breakfast; they should follow the *sunna*, breaking the fast with dates and either milk, water or fruit juice.

"After fasting, you need to bring your fluids and blood sugar level up without overdoing it," Rafik says. The *iftar* meal, properly prepared, contains a lot of energy, and dates are an excellent source of fiber, carbohydrates and essential minerals that help keep energy levels up. After performing *al-maghreb* prayer, Rafik recommends eating a light starter, such as soup or crackers. This will replenish the body's electrolytes, which are vital for brain and nerve function; it can also help kick-start the stomach and prepare it for *iftar*.

Many people feel lethargic during Ramadan, something that can be due to skipping *sohour*, the pre-dawn meal. However, according to Rafik this is especially important for fasters; "*sohour* provides fasters with energy throughout the day of fasting," he says, "but be careful not to overeat".

"Focus on eating foods that are slow to digest and rich in complex carbohydrates and protein, such as fruits

or vegetables, and drink plenty of water," Rafik adds, "an egg or white cheese on a piece of whole-grain toast, a slice of watermelon, yoghurt, and two glasses of water are an excellent *sohour*. Foods like barley, wheat, oats, beans and lentils can provide your body with nutrients for up to eight hours, almost twice as long as sugary foods".

Staying hydrated should be at the top of any faster's list this year. In summer it is important to drink more fluids than during the rest of the year, and with Ramadan hitting at such a hot time of the year, one loses even more water. However, Rafik recommends not giving in to the temptation to drink too much water during *iftar* in order not to overload the system; "drink a healthy amount of water and juice throughout the night instead," he says.

### Useful Tips

Even if you are in good health, you should know that Ramadan during the summer may have an effect on your health. Rafik has some tips to avoid dehydration or exhaustion during the holy month:

- During the hottest part of the day, between 12:00 noon and 3:00 pm, stay in cool areas (indoors or in the shade) and limit physical activity. Rest if possible.
- Avoid fried and spicy foods, as they may lead to acidity or indigestion.
- During the evening hours, resist the temptation to drink tea, coffee or soda. When visiting friends or family, ask for water.
- Between *iftar* and *sohour*, oriental sweets should be consumed with moderation. Serve yourself, your family and your guests a "dessert" of fresh fruit instead and a reasonable amount of nuts.
- Eat the *sohour* meal just before dawn to gain the most benefits.
- Avoid fatty dishes during *sohour* and drink lots of milk.
- Reduce your intake of salt and pickled food in the *sohour*, since these will rob your body of moisture.
- Try to steer clear from sweets at *sohour*, as they can cause a rise in blood sugar, which will make you thirsty later in the day.
- Sip water throughout the evening; aim for eight glasses by bedtime. To help you keep track, fill and refill a water bottle with a measured amount of water, and be sure to finish it.
- Eat enough fiber to avoid constipation.
- Eat juicy fruits, such as watermelon, grapes and tomatoes, as these will provide your body with much-needed water.
- Light exercise, such as walking for 15-20 minutes, is best in the evening hours.



### Drinks of the Season

During Ramadan, the body loses liquids. In order not to get dehydrated, especially during the hottest time of the year, people should drink more after *iftar*. The following are special kinds of drinks that are popular for this purpose.

To make a cold drink using any of the ingredients below, just soak them, with or without sugar, in cold water. *Tamr hindi* can also be soaked in milk, which combats stomach acid.

**Qamar eldin (apricot juice)**, the most traditional of Ramadan beverages, is made from dried apricot paste. The Medieval physician and philosopher Avicenna, known in the Arab world as Ibn Sina, rightly praised dried apricots for their thirst-quenching properties and as antidotes for diarrhea.

*Qamar eldin* aids indigestion, regulates the metabolism and is packed with vitamins A, B and C, as well as calcium, iron, potassium and phosphorous. A perfect way to start *iftar*, it produces enough of a sugar rush to start the digestive system working without over-stimulating it; go easy on the sugar, though.

*Qamar eldin* soothes jumpy nerves and stress, so it is great after a hard day at work. It also contains folic acid, which is very good for pregnant women.

One cup of **karkade (hibiscus)** contains 17% citric acid and half as much vitamin C as an orange. It helps boost and strengthen the immune system, especially while fasting.

Hibiscus is also widely used to regulate blood pressure, which can fluctuate between low during fasting and high after *iftar*, due to the concentrated sugar intake during the meal.

Known in hot regions of the globe as an effective thirst quencher, hibiscus reduces the buildup of fatty deposits in the arteries and reduces blood cholesterol levels. It is used in treating urinary tract infections and aids in regulating blood flow and helps maintain the blood sugar balance in the body.

**Erq sous (liquorice root)** is a popular drink in Arab countries, especially Egypt and Syria. Although not to everyone's taste, liquorice, better known in the form of candy than as a drink, is one of the most biologically active herbs known. Acting as an anti-inflammatory, it affects the immune, circulatory and respiratory systems.

Liquorice is a chronic fatigue combatant, mimicking the effects of natural hormones. As such, it fights off lethargy by causing fluid retention, which will make you feel less thirsty; raising blood pressure, which usually dips while fasting, due to the lack of sugar intake; and combating potassium loss.



**Kharoub (carob)** is another acquired taste, though it is worth trying as it reduces cholesterol, aids digestion and acts as an antioxidant. Pinitol, an active component of *kharoub*, has been shown to regulate blood glucose and is especially recommended for diabetics.

**Tamr hindi (tamarind)** comes from a tropical African fruit tree, but is now widely grown in India. It has one of the highest levels of carbohydrates and proteins found in any fruit, and is the perfect beverage for diabetics, as it regulates blood sugar and cholesterol. It is also extremely rich in vitamin C, which boosts the immune system, and is high in beta carotene. Other essential minerals found in *Tamr hindi* include potassium, phosphorous and calcium.

**Laban rayeb (a yoghurt drink)** is one of the most popular drinks in the Middle East; it has also found its way to Egypt, where intake is generally restricted to this time of year. It is well known that the friendly bacteria found in live yoghurt can aid digestion, as well as help clean the intestines and digestive tract, all of which can be necessary to treat an upset stomach after a few days of heavy *iftars* and *sohours*. As it requires no added sugar, those watching their waistlines tend to prefer this creamy drink.

Summer is the favorite seasons for many of us, if not all of us. In order to enjoy the summer, try to follow the mentioned tips and avoid bad habits that can lead to really bad consequences. Sweating and dehydration are our worst enemies in the summer, especially with Ramadan approaching in the middle of it. So be ready for this season, fast healthily, and forget what you did last summer!

### Glossary

**\*Perspiration** is the production of a fluid consisting primarily of water as well as various dissolved solids (chiefly chlorides), that is excreted by the sweat glands in the skin of mammals.

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# What to Wear in Summer that is the Question!

By: Riham Elbannan

Regardless of age, culture, background, wealth, or lack of it, what to wear is a question that haunts everyone for one reason or the other, not necessarily fashion-related; sometimes, it is a question of survival!

Being aware of what you should wear in summer is very important to stay cool, comfortable and healthy. There are many factors that you have to bear in mind while selecting your garments in summer; the kind of fabric that you wear, the color of the outfit, as well as its style. Here are some tips to help you enjoy the hot summer days in good health.

Beginning with style, serious health conditions can arise when the body is unable to cool itself during periods of intense heat. In particularly humid climates, sweat evaporates slowly, and the body cannot cool itself as quickly as it should; it can take from four to seven days for the body to adjust to extreme heat. Sweating is the body's natural mechanism for self-cooling; wearing loose-fitting clothes allows the skin to breathe and facilitates sweating; whereas tight clothes restricts air circulation, keeping the body hot.

As for the fabric of the garments, there is a limited range of fabrics that can comfort you. These fabrics should be light and should have the ability to absorb moisture from the body; this is important because pools of sweat can make one feel uncomfortable, and it is unhealthy as well.

It is better to wear natural materials, such as cotton, rayon, silk and linen; they do not stick to your body, allowing your skin to breathe properly, and you to feel comfortable.

There are other fabrics that can be effective in hot climate. For example, although sports fabrics are synthetic, they are good at wicking away sweat; polyester, on the contrary, is completely inappropriate in hot climate.

The ideal fabric to wear in summer is cotton; for one, it allows passage of air, a property that keeps the body cool. It also absorbs sweat and does not allow it to accumulate; after absorbing sweat, cotton allows the moisture to evaporate into the air, keeping the skin dry, allowing it to breathe and preserving body temperature stability.

Furthermore, cotton has the least propensity to induce any allergic reaction, as opposed to certain fabrics that may sensitize the skin and can even result in skin rashes; this is why it is used for swabs and bandages in the medical profession.

Cotton is also known to be a neutral material that remains antistatic. Cotton woven fabric is very comfortable to wear and user-friendly; there is no need for special care and it is easily washed and dried. Thanks to its durability, it can be laundered repeatedly, while maintaining its appearance.

The color of the clothes also has a considerable influence on the human body; the more heat absorbed, the hotter the clothing is and the hotter you feel. It is best to wear fabrics that are light colored, because they tend to reflect heat instead of absorbing it, keeping your body relatively cooler; dark-colored fabrics, on the other hand, absorb light.

There are other good strategies to cope with hot climates; for example, you should cover your skin and not expose it to the climate, thinking that it would be better aerated. On the contrary, this can leave you with a

terrible sunburn; instead, you should cover the skin with fabric that allows air ventilation.

Likewise, you should wear open sandals; your feet will not get sweaty at all. Also, the usage of a wide-brimmed hat is recommended as it will shade your head and face, protect your hair from harmful UVA and UVB rays, and keep you cooler.

To sum up, loose-fitting, lightweight and light-colored clothing are the top choice for hot weather. When the heat index creeps up, choose cotton or linen, and opt for pastels. If you choose dark heavy clothing, expect to get hot and sticky; the darker the color you choose, the more brutally hot and uncomfortable you will get. You have been warned!

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Having my legs and arms covered summer has arrived. With summer's heat, fog, and humidity, buzzing bees, marching ants, and swarming mosquitoes invade our world, thriving from late spring and throughout the entire summer, which is their prime time.

Unhealthy as they are, these insects and a variety of other stinging and biting bugs may not be life-threatening; yet they can certainly spoil our summer fun. Just imagine having barbecues with friends and family, spending time by the pool or at the beach, or simply taking a walk in the open air in the company of flying insects; it is bound to put a damper on your otherwise fun or relaxing time. For both your health, as well as your pleasure, it is important to be able to recognize harmful insects to protect yourself and your family during summertime.

## It is Insects Time

The world has more than a million known species of insects; all of them are beneficial to the environment and to humans one way or the other, but there are some that can inflict harm to humans and animals.

Insects are less plentiful in winter but they do manage to survive through it. They have a variety of methods to survive the effects of cold weather; some insects migrate to warmer places or at least places with better conditions, while others go into a state of hibernation called diapause. During this period, insects become completely metabolically inactive; they do not eat, drink or grow for a period that can extend to months, so they do not have to use their energy in order to survive for long periods.

Summer generally brings about warmer weather, higher rates of humidity, and an abundance of plant and animal life, where the insects are more comfortable, have plenty to eat, and their breeding peaks.

## The Insects Attack

There are dozens of insects whose bites or stings cause problems; they can be split into two categories: venomous and non-venomous. The difference lies in the nature of the bite or sting.

Venomous insects attack as a defense mechanism, injecting venom through their stings, which usually results in a local skin reaction; a reddened, painful area, with the possibility of an itchy sensation that can last up to five days. Scratching can cause infection; moreover, multiple stings can result in a more generalized reaction that includes vomiting, diarrhea, swelling and collapse. In sensitive individuals, a systemic or "whole body" reaction occurs, with redness, hives (itchy raised skin lumps), and swelling far away from the sting site.



# Summer Bites

By: Sara Khattab

Non-venomous insects, on the other hand, bite in order to feed on your blood. These bites are usually less painful than stings, with skin reactions that do not last long. Biting insects themselves are not generally dangerous because allergic reactions are rare. However, transmission of diseases, such as Malaria and yellow fever, is more of a concern with insect bites, but for most of us their bites just cause terrible itching.

## Bees

Bees use a stinger to inject venom into their victims; however, only females have a stinger attached to their abdomens. When bees inject their stinging apparatus into the skin of their victims, it detaches from the rest of the bee, which later dies.

Bee stings are painful and can be deadly, depending on the history of the victim; most people who are stung by bees develop a reaction at the site of the sting that causes pain, swelling, redness, and itching. Others will experience larger areas of swelling, which can last up to a week. If a bee-sting victim has had allergic reactions to bee stings in the past, consider the possibility of anaphylaxis; a life-threatening allergic reaction.

**Treatment:** The best way to reduce any reaction is to remove the bee stinger as quickly as possible. Apply ice to the area to reduce the body's inflammatory response; taking an antihistamine can also provide relief of the symptoms. Although most stings can be treated at home, some will require more medical care, especially if the victim has the signs of anaphylaxis; rash and itching all over, swelling that spread from the site of the sting, and difficulty in breathing.

**Tips:** Avoid hanging out near bee hives or near a flower garden. Do not panic when a bee flies nearby; screaming and swatting at the insect are great ways to ensure a sting. Just stay calm and gently blow a bee that lands on the skin.



## Ants

Most ant species cause minor discomfort to humans through biting, some species can cause severe symptoms. They often inject or spray chemicals, like formic acid, when they bite; this gives rise to symptoms such as itching, pain, swelling, blistering, etc. People with allergy to ant venom can suffer much more severe symptoms that can turn fatal; such people may experience difficulty in breathing, rapid pulse, nausea, vomiting, in addition to excessive swelling.

Some ant species such as fire ants leave a red welt with a whiter center, which can cause much pain and irritation. The pain emanating from a fire ant bite is usually burning, which is why they are called fire ants. The pain can be very strong and intense, but will rarely require any medical attention since the human body can break down the venom quite rapidly; the swelling caused by the bite, however, will usually last longer than the pain.

**Treatment:** Wash the affected area with soap and water, then put ice on the bitten area to relieve the swelling and pain. Do not scratch to avoid inflammation and irritation of the skin. There are natural treatments to ant bites, such as making a thick paste out of baking soda and water then applying it to the ant bite. You could also just pour lemon juice on the bite site; the acidity from the lemon counteracts and neutralizes the acid in the bite.

**Tips:** If you have ants inside your home, use lemon juice to get rid of them; clean your cabinets thoroughly with soap and water to get rid of any sticky residue. Use lemon scented cleaner if possible to

wash the floors; make sure that the floor is always clean of pieces of food so that ants will not accumulate around it.

## Mosquitoes

Found worldwide, they are most commonly seen between late spring and early fall; they are most active at dusk and dawn when it is hard for us to see them. Mosquitoes prefer humid, warm climates and live and breed near moisture because their larvae can only live in water. Only female mosquitoes are capable of biting. Mosquitoes are carriers of many diseases, such as malaria and West Nile virus, which are transmitted to humans and animals.

After getting bitten by a mosquito, people usually get a bump on their skin, which is called a "wheal". The bump is round, with pink or red edges, and the middle is white; if you are highly sensitive to mosquito bites, you may have a much larger area of itching. The itching, swelling, and burning from a mosquito bite are actually caused by the body's autoimmune response to the saliva injected by the mosquito.

The incidence of a severe reaction to a mosquito bite, however, is extremely rare. Those who develop a severe illness will initially experience flu-like symptoms that will develop into severe headache, body aches, nausea, and rash.

**Treatment:** Wash the infected area with mild soap and water; they will provide temporary relief from itch and will also wash away any bacteria on the skin. Try to avoid excessive scratching, which can cause damage to the skin and sometimes bleeding. Anti-itching medications can also be applied.

**Tips:** Scientific research has shown that if you are frequently bitten by

mosquitoes, it is because of the smell you give off; mosquitoes are attracted to particular odors that certain people have. If a person is rarely bitten, then his or her body gives off a smell that masks the scent that attracts mosquitoes; the body's masking odors act like a natural repellent to mosquitoes.

Generally, during summer months, when insects are the most abundant, apply DEET (N,N-diethyl-m-toluamide)\*, to exposed areas of skin any time you are outdoors. It is also preferable to wear protective clothing; pants, long sleeved shirts, hats, and shoes covering the skin whenever you are in places that may have insects. To enjoy your summer vacation, always put these tips in mind; they should protect you from harmful bites or stings for the most part.

## Glossary

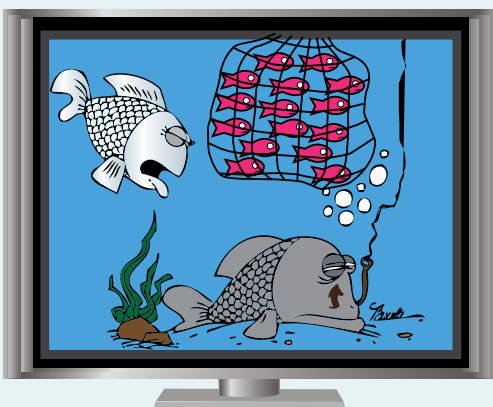
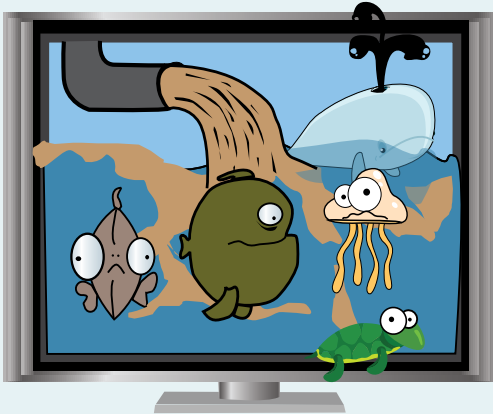
\*DEET (N, n-diethyl-m-toluamide): is slightly yellow oil which is the most common active ingredient in insect repellents. It is intended to be applied to the skin or to clothing, and provides protection against different kinds of insect bites that can transmit disease.

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# SOS



Illustrations: Maha Sherin

Since the Industrial Revolution, marine life has been severely abused by humans. Ocean and Sea life is affected by pollution and overfishing, which disturbs the marine ecological system. Moreover, ocean acidification and global warming result in killing some species, consequently leading to their extinction and disorders in the marine food chain. Sooner or later, this will have an irreversible drastic impact on our life, so let us put a stop to all the bad habits NOW and Save OUR Souls.



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