

Sense N' Science

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Editor's Note

*While the seagulls glimpse at their reflections,
the fishes look back and smile.
The deep secrets of the oceans,
engulf more than life.*

The mighty oceans hold within themselves an estimate of 50-80% of all life on earth. 85 % of the area and 90 % of the volume constitutes the dark and cold environment called the deep sea.

Humans have always been interested in unfolding the mysteries of this unexplored world. But less than 10% of it has been actually studied. Our constant intervention has now become a serious threat to these mighty natural resources.

Oil spills are a major source of water pollution. Other pollutants include debris and fertilizers which wash out into the sea from farmlands. These constantly change the composition of the sea and are consumed by marine animals who mistake them for food. Further, global fish populations are collapsing due to destructive fishing practices.

The need of the hour is to change the way we treat our oceans. And it is not just about the flora and fauna, but also about the people whose livelihoods depend on them.

Teacher in charge: Meenu Gupta

Student editors: Manini Majithia, Anokhi Shah, Muskaan Shah

Life Under the Ocean

Ocean Science

By Dhvani Patel, Grade 9A
IGCSE



The ocean is a continuous body of salt water that covers more than 70 percent of the Earth's surface. Ocean currents govern the world's weather and churn a kaleidoscope of life. Humans depend on these teeming waters for comfort and survival, but global warming and overfishing threaten Earth's largest ecosystem.

The oceans are home to millions of Earth's plants and animals—from tiny single-celled organisms to the gargantuan blue whale, the planet's largest living animal. Fish, octopuses, squid, eels, dolphins, and whales swim the open waters while crabs, octopuses, starfish, oysters, and snails crawl and scoot

along the ocean bottom. Life in the ocean depends on phytoplankton, mostly microscopic organisms that float at the surface and, through photosynthesis, produce about half of the world's oxygen. Other fodder for sea dwellers includes seaweed and kelp, which are types of algae, and seagrasses, which grow in shallower areas where they can catch sunlight.

There are basically two categories of plants living in our ocean's waters: those that float freely through the water, and those that are directly rooted into the ocean floor. Floating plants can be spotted near the surface of the water. Rooted plants, on the other hand, must acquire sunlight to survive, so they are often found in shallow waters near the shore.

Most life forms evolved initially in marine habitats. By volume, oceans provide about 90 percent of the living space on the planet. The earliest vertebrates appeared in the form of fish, which live exclusively in water. Some of these evolved into amphibians which spend portions of their lives in water and portions on land. Other fish evolved into land mammals and subsequently returned to the ocean as seals, dolphins or whales.

Tiny But Dangerous! The Chinorex

By Krishang Worah, Grade 9A IGCSE

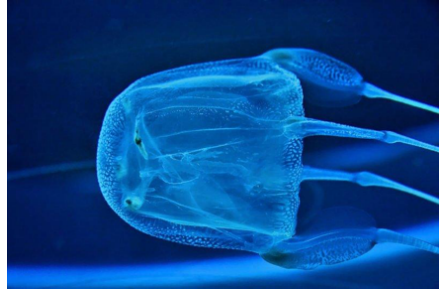
The chironex, also known as the box jellyfish, is perhaps the most dangerous animal that prowls the oceans. What makes these small creatures so feared is that they are transparent and pale blue, making them impossible to view in the ocean.

The chironex has enough venom to kill 60 people, but it is the speed of the venom's acting time which is so fascinating. It can kill a human in less than 5 minutes. The chironex is found in Australia and South East Asia.

Their body is box-shaped with eyes on each side, so they don't wait for any prey to bump into them, but they hunt. Fortunately for us, they only eat shrimps!

A hydroskin suit is suggested for diving in areas with chironex as these suits are sting-proof.

Fun fact about the chironex: it has caused more human deaths in Australia than snakes, sharks and saltwater crocodiles combined!



Riddles! *(Answers On Page 14)*

1. What is black when you buy it, red when you use it and grey when you throw it away?
2. What do clouds do when they become rich?
3. Why can't you trust an atom?
4. How do astronomers organize a party?
5. I am a god, a planet and I can measure heat. What am I?

Whale Sharks in the Dark!

By Dhyana Shah, Grade
IBDP 1A



The whale shark is the world's largest fish shark. They can grow up to 12 metres long and their average size is from around 5.5 metres to 9 metres. They can weigh as much as a bus.

Each whale shark has its own unique pattern of spots, much like human fingerprints. Underneath, their bellies are white. Whale sharks like warmer areas and are thus found in tropical waters. A whale shark's mouth is about 1.5m wide. Inside, they have rows of over 300 teeth, but they don't use these teeth to eat because they're filter feeders.

While they give birth to their live young, they are not mammals like whales. The whale shark is oviparous, meaning the female produces eggs that hatch inside

her. When the young are fully developed, the female gives birth to around 300 live young.

Whale sharks can live around 100 years. As apex predators, sharks play an important role in the ecosystem by maintaining the population of the species below them in the food chain and serving as an indicator of ocean health. They help remove the weak and the sick and in helping to ensure species diversity.

Preferring warm waters, whale sharks populate all tropical seas. They are known to migrate every spring to the continental shelf off the central west coast of Australia. The coral spawning of the area's Ningaloo Reef provides the whale shark with an abundant supply of plankton.

Although massive, whale sharks are docile fish and sometimes allow swimmers to hitch a ride. They are currently listed as a vulnerable species; however, they continue to be hunted in parts of Asia, such as the Philippines.

There is currently no robust estimate of the global whale shark population. The species is considered endangered by the IUCN (International Union for Conservation of Nature and Natural Resources) due to the impacts of fisheries and vessel

Ahmedabad International School strikes, combined with its long lifespan and late maturation.

In 1998, the Philippines banned all fishing, selling, importing, and exporting of whale sharks for commercial purposes, followed by India in May 2001, and Taiwan in May 2007.

This species was also added to Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 2003 to regulate the international trade of live specimens and its parts. Despite all this, hundreds of whale sharks are illegally killed every year in China for their fins, skins, and oil.

By taking sharks out of the coral reef ecosystem, the larger predatory fish, such as groupers, increase in abundance and feed on the herbivores. With less herbivores, macro algae expands and coral can no longer compete, shifting the ecosystem to one of algae dominance, affecting the survival of the reef system.

The state of our collective ignorance about the Whale Shark is disconcerting because this species is still commercially fished at several locations around the world. As more people come to appreciate the value of Whale Sharks as a living resource, the movement for their protection

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would grow and our prospects for learning more about their natural history will increase dramatically.

Laysan Albatross: One More Taking the Hit

By Pranshi Shah, Grade IBDP 2A



Laysan albatross is a large seabird, with very long and narrow wings. They are often known for their confiding and unafraid attitude towards humans. They breed near the Hawaiian Islands on land.

These birds form strong pair bonds and generally mate for life, with only a small percentage of cheating. Most birds return to breed as part of the colonies where

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they hatched. When feeding, Laysan albatrosses range across most of the north Pacific Ocean. They primarily eat pelagic squids but also take fish and other pelagic invertebrates. Adult Laysan albatrosses have no natural predators, but invasive cats and dogs kill both juveniles and adults in nesting colonies.

As they have their nest on land, they are having a problem, they are constantly finding themselves eating plastics. This occurs because of the way these birds catch their prey; this is done by skimming the surface of the water with their beaks. Along the way, they accidentally pick up a lot of floating plastic, which they then feed to their chicks. Adults can regurgitate plastic they've swallowed, but chicks are unable too, so it fills up their stomachs.

The effects of plastic on the chicks hasn't been scientifically proven. It's probable that it injures or kills the birds by cutting their stomachs or taking up space , making them feel "full" when they are starving. On Midway Atoll, many albatross chicks are killed by lead poisoning , making it hard to separate the effects of the plastic from that of the lead.

So the Laysan albatross will probably be eating mostly plastic about 30 years from now. A piece of plastic isn't nutritious. When

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they pick up a lighter thinking it's a squid, that's not nutritious. It's another strike against a bird imperilled by so many other things man has done.

You can help: pay attention to how much plastic you throw away—grocery bags, Styrofoam cups, water bottles, packaging—and try to use less. Also, Constraining plastics to tightly managed landfills can also prevent them from reaching the sea. Recycling, can also help trim down the overall waste stream.



Captivating: the Feather Star

By Vama Shah, Grade 9C
IGCSE

In the depths of a mysterious and alluring ocean lies a creature that

the majority of us are unaware of, and yet it appears and tends to be exceedingly fascinating. Feather star is one such creature.

An extremely unique starfish, the feather star moves by waving its feathery arms. It is a crinoid marine invertebrate and belongs to the phylum of echinoderms. Their arms bear feathery fringes which assist in enabling them to swim.

These crazy looking marine animals prefer remaining in shallow water, which is ironic considering that they can sometimes be found on ocean floors (mostly the Indian Ocean) 9 km below the surface of water! Some feather stars may grow up to 20 cm in length. They possess ten long arms with ciliated side branches that taper to a point.

If displaced, they may swim using their arms. Feather stars are typically characterised by a narrow cup or tube shaped body. Their arms, known as pinnules, are coated with a sticky substance that helps them catch food. Having feet comprising of a disc like sucker, the mouth of the feather star is centrally located at its top and food is passed down to its mouth using the feathery arms.

There are approximately 625 different species of feather stars and they are found in almost all

oceans at all depths. They are found in the tropics, temperate and polar zones, sheltering by day under coral ledges or overhangs with their feathery arms rolled up. When night falls, these filter feeders migrate to the top of the reef and extend their arms into the currents where they trap fine particles and planktonic food using their net-like arms.



Some of them are known to have stalk like bodies that can grow up to 1 meter or 3.3 feet in length. There are no known predators of the feather star however it is believed that certain fish may occasionally prey on them.

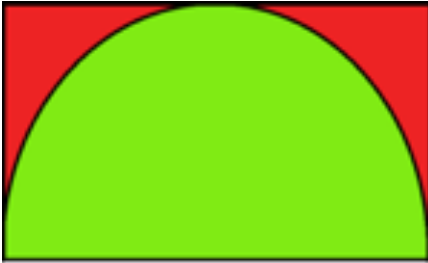
These creatures come in a great range of colours including some bright yellows and reds perhaps to ward off predators mistaking them to be poisonous.

Since there are so many species of feather stars, and in so many different colours and forms, they make a prize subject for underwater photographers and underwater naturalists alike.

Scientist of The Month

C-Swipe

By Pulkit Gupta IBDP 1,
Savya Patel IBDP 1,
Naman Patel IBDP 1



We had noticed that with the current bathroom wipers, the shower area was not cleaned properly and a lot of time and effort was put into cleaning the bathrooms. This caused it to be unhygienic as well. For this reason, people, especially in India, would hire maids and pay them thousands of rupees to clean bathrooms.

Therefore, what we wanted to do was make a product that would take minimum time and effort to clean the bathroom. A few aims were kept in mind while deciding on the product. They were that the product must be: user friendly and child friendly, having durable joints as well as rust free materials, manual, aesthetically appealing,

and compact. Satisfying all these aims, we created a product, that would reach every corner of the bathroom, making it easy to clean the area.

So we created a product that could reduce your precious time input in bathroom from estimated 10 minutes to 1 minute tops. The product was named **C-Swipe**. The product consists of a rubber cup, that gets attached to the bathroom wall. A hinge is attached to it that allow 180 degrees movement, allowing the wiper to move in an arc. Attached to the hinge is the wiper, which will be used to clean the floor. A ball and socket joint attaches the wiper to the handle, allowing free movement to the user, without any difficulty or effort. An extending wiper is inserted along, which can be removed and used to manually clean any corners left out. The extender also helps in making the wiper usable in all size of bathrooms.

If bathroom shape is a polygon then, two corners will still be wet (red area). To cover the red area you don't need to buy a wiper from market. Move the crank of gear to extend the extender to full extent, it will come out. Now use it as a wiper to swipe the corners manually.

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Keeping in mind the moisture present in the bathroom, materials such as rubber, stainless steel, and MDF. this allows more durability to the product. Also, no electric resources or parts have been used to avoid getting a shock, since the product will be used in an area of water.

We used physics in making the product, by applying our

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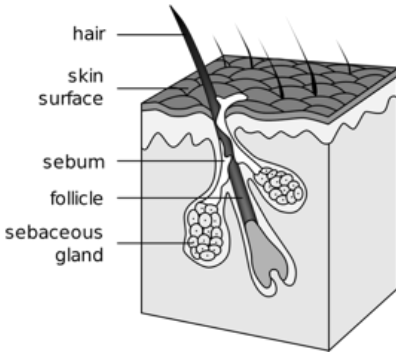
knowledge of torque in placing the handle at an appropriate location to reduce the effort put in.

For this reason, the handle has been placed at the opposite end of the hinge, close to the end of the wiper. The knowledge of joints also helped us place hinges, and ball and socket joints in fitting places.



Did You Know...

Why It Doesn't Hurt When We Cut Our Hair



Hair is made out of a protein called keratin. This means that your hair is actually not alive and the cells inside your hair are dead. The only part of your hair that is alive is the root- the part that grows inside the skin on your head from tiny holes called follicles. This is why it hurts when you pluck out a hair by the roots.

When we cut our hair, we cut it from above the root, the place where there are no nerves and the hair is made out of keratin, which is why it doesn't hurt us when we cut our hair.

By Arya Soni, Grade 8D-IGCSE

Whenever we cut any part of our body, we feel some pain. However it never hurts when we cut our hair. Why is it so?

Mostly all of our body has nerves. Nerves send messages to our brain about how we feel pain. They help us sense temperature like hot or cold and recognize textures like rough or soft. Hairs do not have nerves which means that there are no messages sent to the brain indicating pain.

Why Are Yawns Contagious

By Saamyaa Nihar Desai, Grade 8C IGCSE

What is known is that the behaviour is contagious. The likelihood of yawning increases six-fold, according to one study, after seeing someone else yawn.

As for yawn contagion, Giordano said it may be related to a phenomenon called social mirroring, where organisms

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imitate the actions of others. Other behaviours fall into this category, such as scratching, leg crossing and laughing.

Giordano said this behaviour could be linked to mirror neurones in the brain. Indeed, when the researchers applied electrical currents to the area, the urge to yawn increased. The findings may have implications for certain neurological disorders, such as Tourette syndrome, that make it difficult for a person to resist certain actions, the researchers wrote in the study.

You Can Be Around 13.5 Billion Years Old

By Bhisma Pandya, Grade
8C IGCSE

Yes, this is true. Everyone of us is made up of atoms. The first element in the periodic table, hydrogen is the first atom to be formed. When the universe was born, about 13.5 billion years ago, the first particles came into existence and joined together to form the very first element

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hydrogen.

It has 1 proton and 1 electron that form its simple structure. About 73- 74% of the universe is hydrogen, 25% helium and the rest is formed by 1% of the other elements. Helium also comprises a large percentage because when the temperatures in space rose after the Big Bang, the hydrogen atoms fused together to form helium. This fusion made other elements too.

Now it is pretty obvious that you are made up of hydrogen. There can be atoms that were formed this long back (13.5 billion years ago) in your body which tells that you have stuff which is so old that you can't even imagine. After the Big Bang occurred, a single point structure just exploded to form a vast 4 dimensional structure of space and time. This explosion created vast amounts of energy which is playing the key role in expansion of the universe till date. Now, as the vast energy spread to a small space, temperature and pressure rose. This immense force caused the nuclei of atoms to join to each other. As the positive charge increased, the electrons rotated around and new atoms were formed.

As this process took time, hydrogen atoms increased and took much of the space of the visible universe. As there are many

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hydrogen atoms, there are chances
that the hydrogen atoms formed
will be present in your body.

Bonus fact: Chess is said to be
more complicated than the
universe. You know that the visible
is very very huge. This is only the
visible universe. The number of
atoms predicted in the entire
universe is about 10^{81} and the
maximum number of possible
combinations computed in the
game of chess is 10^{121} . It is so
amazing to know that the game
you play is so huge.

Answers to Riddles!

1. Charcoal
 2. They make it rain
 3. They make everything up
 4. They planet - Mercury
-



The Eiffel Tower Can Be 15cm Taller in Summer

By Aryaa Kothari, Grade
8D IG

When a substance is heated up, its
particles move more and it takes
up a larger volume – this is
known as thermal expansion.

Conversely, a drop in temperature
causes it to contract again. For
example, the mercury level inside
a thermometer rises and falls as its
volume changes with the ambient
temperature.

This effect is most dramatic in
gases but occurs in liquids and
solids such as iron too. For this
reason, large structures such as
bridges are built with expansion
joints which allow them some
leeway to expand and contract
without causing any damage.

Oceans and Pollution

Global Water Pollution

By Smayan Khanna, IBDP
2B



Degraded water quality equates directly into environmental, social and economic problems. The availability of the world's scarce water resources is increasingly limited due to the worsening pollution of freshwater resources caused by the disposal of large quantities of untreated wastewater into rivers, lakes, aquifers and coastal waters. Ripple effects of



consuming pollutants include childhood stunting, infant mortality, lowered economic activity and food production. Half of China's population cannot access water that is safe for human consumption and two-thirds of China's rural population relies on polluted water. Water pollution in China is such a problem that there could be "catastrophic consequences for future generations," according to the World Bank.



It is easy to understand how this problem arose. China, a country for decades focusing on a single goal of industrialisation to achieve economic growth at the expense of water quality. On the part of the west, corporations were happy to outsource production to Chinese firms that paid low wages and were unimpeded by environmental controls. For their part, Western consumers are content to turn a

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blind eye, so long as it meant
lower prices of products.

The problem is that the environmental legacy of China's industrialisation affects everyone, not just Chinese people. The dirty water discharges into the world oceans. Hence water borne pollutants are rooted in the food products that the country distributes and if polluted water cannot be used for irrigation, then Chinese agricultural production falls and global food prices rise.

To ensure safe water haven for China's future water generations the country has proposed a grand plan to fight water pollution. The plan proposes that in two years from now the country will have 70% of its seven main rivers in good conditions. One of the main

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tactics used by China is safeguarding its water sources through protection schemes by setting up protection zones in water bodies where no industrial action can be carried out.

The government has also shut down small to medium sized companies that operated in the production of pesticide, tanning and other small pollutants, while the big industries are being fined heavily for their intensive production. Moreover, to raise awareness the government has made all data public and have promised on releasing a quarterly data every year. Furthermore, the law also stipulates that water production firms that don't meet the higher quality standards must suck up to a fine.



Coral and Water Pollution

By Hardwan Vyas, Grade IBDP 2

Corals reefs are one of the most diverse and beautiful marine ecosystems. Coral reefs have been a very important part of the environment as it acts a biological hotspot, helps maintain biodiversity and can also act as a source of natural income through means of tourism. Corals are marine invertebrates within the class Anthozoa of the phylum

However due to the rise in water pollutions the lives of corals and

coral reefs are in danger. Water pollution has many negative impacts on corals and if water pollution continues to rise, many of us may not witness coral reefs again !

Corals need clean, clear water to survive. When sediment and other pollutants enter the water they smother coral reefs and then there is a sharp increase in the growth of algae which leads to poor water quality. Pollution can also disrupt the coral ecosystem as the ecosystem is now more fragile and susceptible to diseases. Pollution also impedes coral growth and reproductive potential.

There can also be adverse effects in the food structures of the reef.

THREATS TO CORAL REEFS LAND-BASED SOURCES OF POLLUTION

Coastal development & impervious surface
sedimentation and toxicants

Stormwater runoff
sedimentation, toxins, nutrients, and pathogens

Deforestation
sedimentation

Oil and chemical spills
toxicants

Some chemicals from sunscreens
toxicants

Failed septic systems
nutrients and pathogens

Road construction
sedimentation

Agriculture
nutrients and sedimentation

POLLUTION
sedimentation
toxicants
pathogens
increased nutrients

causes disease and mortality
disrupts ecological functions
changes dynamics and feeding behaviors
prevents coral growth and reproduction

As human population & development expands in coastal areas, the landscape is altered, increasing land-based sources of pollution & THREATENING CORAL REEF HEALTH.

HOW YOU CAN HELP

- Apply fertilizers and pesticides sparingly.
- Pick up after your pets.
- Wash your car on your lawn.
- Dispose of lawn clippings in a compost pile.
- Harvest runoff rain water through rain barrels or rain gardens.
- DO NOT dump paint, oil, antifreeze, debris, or other household chemicals into street gutters or storm drains.
- Clean up spilled brake fluid, oil, grease, and antifreeze.
- Maintain proper septic system function with inspections and pumpouts every 3-5 years.
- Seek shade between 10 a.m. and 2 p.m., use Ultraviolet Protection Factor (UPF) swimwear, and choose sunscreens with chemicals that don't harm marine life. For more information, visit seasensible.com/governments.

These food structures involve complex food webs and food chains.

and government organisations alongside NGOs are raising awareness and taking keen interest in saving corals as they believe not everything is lost.

People have now shown concern



Just For Laughs



1. A photon walks into a hotel. The desk clerk says, "Welcome to our hotel. Can we help you with your luggage?". The photon says, "No thanks, I'm traveling light."
2. Molecule 1: I just lost an electron.
Molecule 2: Are you sure?
Molecule 1: I'm positive.
3. If Silver Surfer and Iron Man team up, they'd be alloys.
4. I could tell a science joke... But all the good ones Argon.

The Impact of One Plastic Bag on the Ocean

By Jash Kankariya, Grade 8C IGCSE



Did you ever wonder what happens to the plastic/polythene bag you throw in a gutter, stream, river, or any other place that is connected to a water body that is a home to marine animals. Yes, I am talking about those plastic bags that you probably use in your day to day life.

“No one goes for 10 minutes in their daily life without having touched something that is made of

plastic,” said Professor Andrew Holmes, an emeritus professor at the University of Melbourne and a polymer chemist who has developed plastics for flat screen TVs and solar cells. Could you ever imagine that a plastic bag, almost as small as a plate in which you eat, could kill a number of marine animals you haven’t heard about. This works the same as any other single-use plastics.

According to a survey of 2018 by www.pewtrust.org fish, sea birds, sea turtles, and marine mammals can become entangled in or ingest plastic debris, causing suffocation, starvation, and drowning. This is not only applicable for polythene bags but also for other non-biodegradable products such as plastic bottles, synthetic ropes etc.

Tell me why can't -we use the principle of the 3 Rs – reuse, recycle, and reduce the usage of non-biodegradable materials and instead save these for the upcoming generations.

Now let's pledge to make the world a better place to live in for the sake of humanity and the upcoming generations.

The Impact of Water Pollution on Sea Turtles

By Aaryana Shah, Grade IBDP-2



Sea turtles are exposed to pollution at all stages of their life, from the very second the egg shell cracks open to the very end when the mature amphibian suffocates in the boundaries of plastic.

Marine Pollution can have a serious impact on both sea turtles and the food they eat. When pollution contaminates and kills aquatic plant and animal life, it also destroys feeding habitats for sea turtles. Oil spills and urban runoff of chemicals and fertilisers all contribute to water pollution. An estimated 36% of all marine pollution from oil comes through drains and rivers from cities.

Fertilisers are major contributor to marine pollution causing eutrophication. Eutrophication is an explosion of algal blooms that can deplete the water's oxygen and suffocate marine life.

Eutrophication has created enormous dead zones in many parts of the world, including the Gulf of Mexico.

Improper sewage disposal is another factor that causes eutrophication. It is believed that because the ocean is so large, pollutants will be dispersed to safe levels, but in reality they create havoc on the ocean's natural balance. Some toxins actually become more concentrated as they breakdown the food chain.

The Solution:

- Creating awareness about the adverse effects of marine pollution.
- Enforcing fertilizer bans near waterways.
- Buying organically produced food and products.
- Speaking out against off shore drilling.

“You see the difference. A turtle does not.”

Moreover, in Science

Dreams

By Haimi Kothari, Grade
8D IGCSE

Psychologists have stated that there is no fixed meaning to what a dream is or a reason to why one dreams.

A dream in general terms is a succession of thoughts, images, ideas, emotions and sensations that usually occur involuntarily during different stages of sleep.

Many psychologists say that dreams exist to:

- Help solve problems in our daily life.
- Process our emotions.
- Help us get to know about our unconscious desires
- Incorporate memories
- Help us know about our ongoing thoughts and motivations.
- Let us know about our fears and concerns.

Dreams can tell us a lot about our lives, as they show us a glimpse of the knowledge that is hidden in our subconscious mind. Many suggest that dreams are nothing but pieces of fantasy. However, they convey real emotions and feelings, and are very much connected to current situations in our real life.

Hence, Dreams don't always come true but they have some hidden details, truths and messages that should be worked upon and examined. There are certain dreams that come to us in different parts or are repetitive so many people believe that they might turn out to be true but they happen because of either coincidence or faulty memory.

Dreams are hard to remember as they take place during the time when all our body systems are shut (REM). Hence we remember the dreams that we see in the morning better than the ones we have had at night. For more information about what each of your dreams mean, you could read books or watch videos.

Does Music Change Our Perception?

By Kavyaa Shah, 8D
IGCSE

Music is not only able to affect your mood -- listening to particularly happy or sad music can even change the way we perceive the world, according to researchers from the University of Groningen.

Music and mood are closely interrelated -- listening to a sad or happy song on the radio can make you feel more sad or happy. However, such mood changes not only affect how you feel, they also change your perception. For example, people will recognise

happy faces if they are feeling happy themselves.

A new study by researcher Jacob Jolij and student Maaïke Meurs of the Psychology department of the University of Groningen shows that music has an even more dramatic effect on perception: even if there is nothing to see, people sometimes still see happy faces when they are listening to happy music and sad faces when they are listening to sad music.

Last year researchers in the Netherlands found that the music one listens to can temporarily change a person's visual perception and affect what they think they see.

In this study, 43 young adults were asked to look at a computer screen and perform a visual detection task. Multiple faint, visual stimuli of either happy or sad faces were presented one at a time in a



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visually noisy, gray background.
Experimenters told the participants
to indicate whether they saw a
happy or a sad face and to not
respond if they were not absolutely
Each subject came prepared with
30 minutes of their own music, 15
minutes of tunes that they found
to be happy and 15 minutes that
they found to be sad.

Since they were given the freedom
to pick their own favourite tunes,
the diversity of music in the study
varied greatly with everything
from Mozart to the Red Hot Chilli
Peppers' song 'Under the Bridge'.
The moods of the participants
were assessed before and after

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certain of what they saw. They also
had the subjects listen to either
happy or sad music while doing
this visual detection task.

each trial using a standard non-
verbal assessment method.

Researchers found that people
were best at detecting the mood of
the face congruent with the mood
of the music they were listening to
at the time. In other words, people
were most accurate at correctly
detecting happy faces when
listening to happy music and most
accurate at detecting sad faces
when listening to sad music.

Teacher's Contribution

Nobel Prize Winner in Chemistry

By Meenakshi Kulkarni

Dr. John Goodenough is a professor in the Department of Electrical & Computer Engineering at the University of Texas at Austin, and holds the Virginia H. Cockrell Centennial Chair in Engineering.

In the 1970s, Goodenough developed a new formula for the positively charged side of a battery, using cobalt oxide, that revolutionised the design - making it much more powerful than early prototypes. The Nobel Committee, in awarding the prize, called this breakthrough a “decisive step towards the wireless revolution”.

John Goodenough truly revolutionised modern life with his chemical insight into lithium batteries. He took the basic battery design invented by Wittingham and invented a new cathode that greatly stabilized the structure and improved its capacity. Combined with an anode developed by Yoshino, the result was a powerful,

safe battery that could be recharged hundreds of times—and in 1991, Sony commercialized the battery.

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By Hemlata Mulay

The United Nations has designated 2019 as the international year of the periodic table of chemical



elements. The IYPT 2019 also commemorates the 150th anniversary of the establishment of the Periodic Table of Chemical Elements, by Dmitry Mendeleev.

(1869 is considered as the year of discovery of the periodic system by the Russian scientist).

- It will also mark a number of other milestones in the history of chemistry, including the discovery of phosphorus 350 years ago, Antoine Lavoisier's

categorisation of 33 elements in 1789 and the formulation of the law of the triads by Johann Wolfgang Döbereiner 190 years ago.

- The International Year aims to recognize the importance of the Periodic Table of Chemical Elements as one of the most important and influential achievements in modern science reflecting the essence not only of chemistry, but also of physics, biology and other basic science disciplines.

- The IYPT 2019 is an opportunity to reflect upon many aspects of the periodic table, including its history, the role of women in research, global trends and perspectives on science for sustainable development, and the social and economic impacts of this field.

Nobel Prize Winners in Physiology or Medicine

By Pankil Bhatt

Their work helps us understand how our bodies absorb and use oxygen.

The 2019 Nobel Prize in Physiology or Medicine was awarded to a trio of scientists—William G. Kaelin Jr., Sir Peter J. Ratcliffe, and Gregg L. Semenza—who studied a set of proteins that control how cells use oxygen, known as the hypoxia-inducible factor (HIF) system. Their collective discoveries have led to the development of treatments for



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anaemia, cancer, and other blood-
related diseases.

Summary

Animals need oxygen for the conversion of food into useful energy. The fundamental importance of oxygen has been understood for centuries, but how cells adapt to changes in levels of oxygen has long been unknown.

William G. Kaelin Jr., Sir Peter J. Ratcliffe and Gregg L. Semenza discovered how cells can sense and adapt to changing oxygen availability. They identified molecular machinery that regulates the activity of genes in response to varying levels of oxygen.

The seminal discoveries by this year's Nobel Laureates revealed the mechanism for one of life's most essential adaptive processes. They established the basis for our understanding of how oxygen levels affect cellular metabolism and physiological function. Their discoveries have also paved the way for promising new strategies to fight anaemia, cancer and many other diseases.

“Oxygen shapes physiology and pathology”.

Thanks to the groundbreaking work of these Nobel Laureates, we know much more about how different oxygen levels regulate

fundamental physiological processes. Oxygen sensing allows cells to adapt their metabolism to low oxygen levels: for example, in our muscles during intense exercise.

Other examples of adaptive processes controlled by oxygen sensing include the generation of new blood vessels and the production of red blood cells. Our immune system and many other physiological functions are also fine-tuned by the O₂-sensing machinery. Oxygen sensing has even been shown to be essential during foetal development for controlling normal blood vessel formation and placenta development.

Oxygen sensing is central to a large number of diseases (Figure 2). For example, patients with chronic renal failure often suffer from severe anaemia due to decreased hormone erythropoietin (EPO) expression. EPO is produced by cells in the kidney and is essential for controlling the formation of red blood cells, as explained above.

Moreover, the oxygen-regulated machinery has an important role in cancer. In tumours, the oxygen-regulated machinery is utilised to stimulate blood vessel formation and reshape metabolism for effective proliferation of cancer cells. Intense ongoing efforts in

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academic laboratories and
pharmaceutical companies are
now focused on developing drugs
that can interfere with different

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disease states by either activating,
or blocking, the oxygen-sensing
machinery.

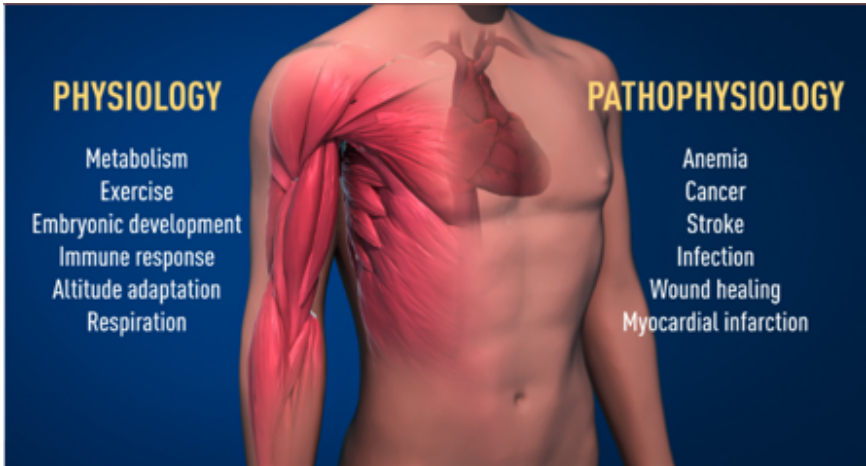


Figure 2. The awarded mechanism for oxygen sensing has fundamental importance in physiology, for example for our metabolism, immune response and ability to adapt to exercise. Many pathological processes are also affected. Intensive efforts are ongoing to develop new drugs that can either inhibit or activate the oxygen-regulated machinery for treatment of anemia, cancer and other diseases.

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Tiny But Dangerous! The Chinorex

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A blue silhouette of a stingray is centered on a light beige background. The silhouette is filled with a fine, dotted texture. Inside the silhouette, the words "SEA YOU" are written in a white, bold, sans-serif font, and "LATER" is written below it in a dark blue, bold, sans-serif font. The entire composition is framed by a thin, hand-drawn teal border.

SEA YOU
LATER