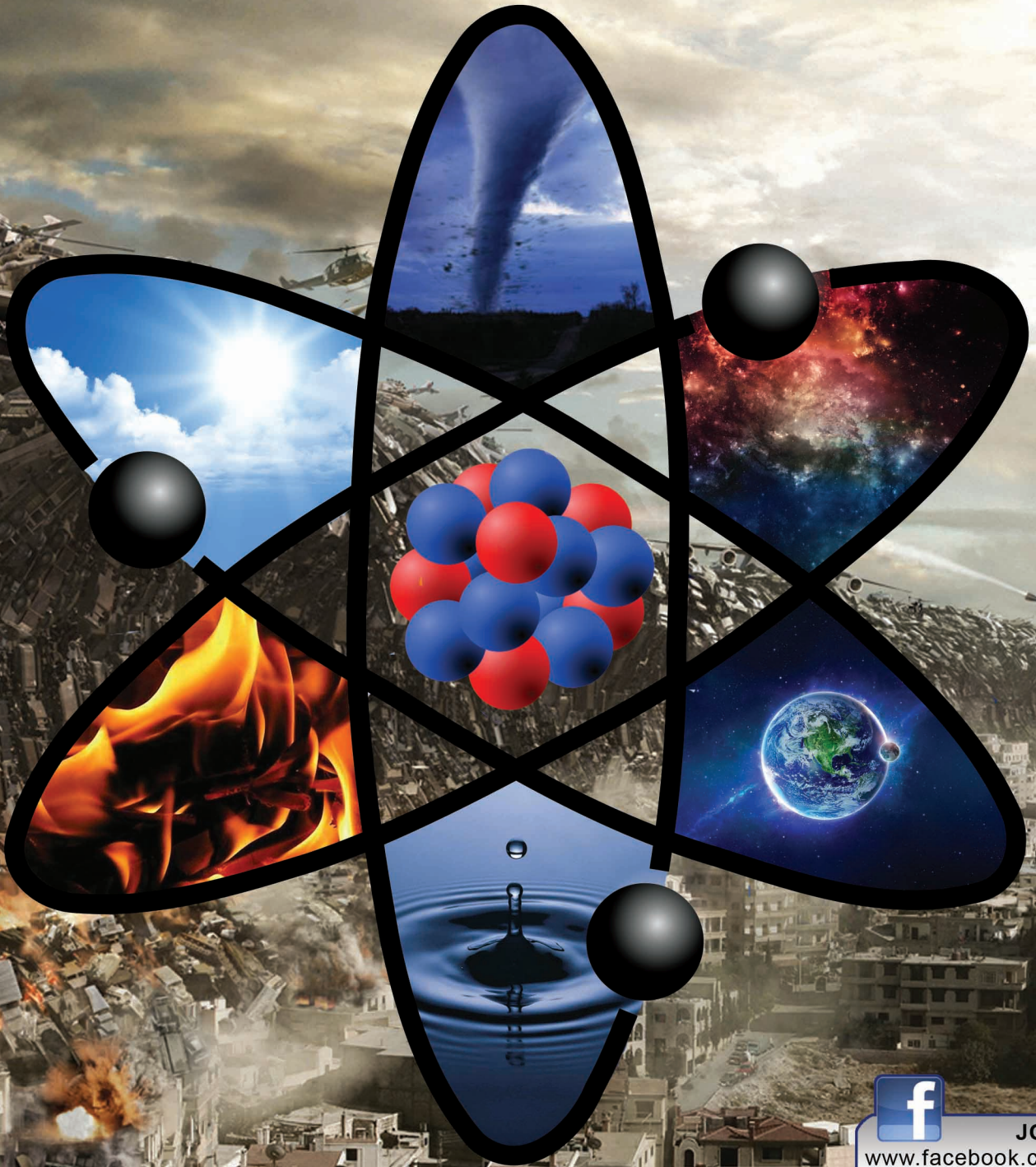


ISSUE NO 3

SCIENCE XPRESS



JOIN US AT
www.facebook.com/IntSP
Subscribe
<http://goo.gl/esGbv>

TSUNAMI-FURY OF THE NATURE

Vol. No 1

October 2013

Meet The Crew...



CHIEF EDITOR
Mr. SUJIT KUMAR KAR



EDITOR
Mr. PRACHURYA MAYA BEHERA



EDITOR
Mr. SANDEEP KUMAR MOHANTY



EDITOR
Mr. SIDHARTH MAHARANA



EDITOR
Mr. SWORAJ MOHANTY

SPECIAL THANKS TO

Alexandra Taylor
Anjan Kumar Tripathy
Budiman Cahyadi W.
Deepak Kumar Nath

Elynne Foong
George Papadopoulos
Prof. Paul May
Poh Kia Jin

© The Scientific People, 2013. All rights reserved.

No part of this publication may be reproduced and reused in any form, electronic or print, for commercial purposes, without the prior written permission of the publisher, i.e. The Scientific People. However, the publisher encourages the esteemed readers to pass it on for non-commercial uses, intended for gathering information or gaining knowledge.

From The Chief Editor's Desk...

It gives me immense pleasure to bring to you all the third issue of the first volume of our e-magazine TSP SCIENCE XPRESS. Once again, a month has passed, and we are back. Last time we had discussed about the importance of Scientific empowerment for mankind, on an individual as well as global level.

We are advancing pretty fast, utilizing the positive as well as negative vibes emitted by the source we know as Science. Although the light of knowledge is lighting up every dark corner of the universe, still a quite few corners remain under the control of the devil of darkness and ignorance.

The only response to these ignorant cries from the several corners of the Universe is Science, and only Science. Scientific empowerment of common man through the tools of education should be a great start. It is because we have been engulfed by Science from all aspects of our life.

That is the reason we have been trying to change the world, by enriching the society using the tools of Scientific education, making the world aware of the scientific advancements done by us, Homo sapiens!

We rely on a three point programme, i.e.

- Discover, the facts
- Devour them, or get devoured by them, either works while trying to learn
- Disperse, and help others to learn!

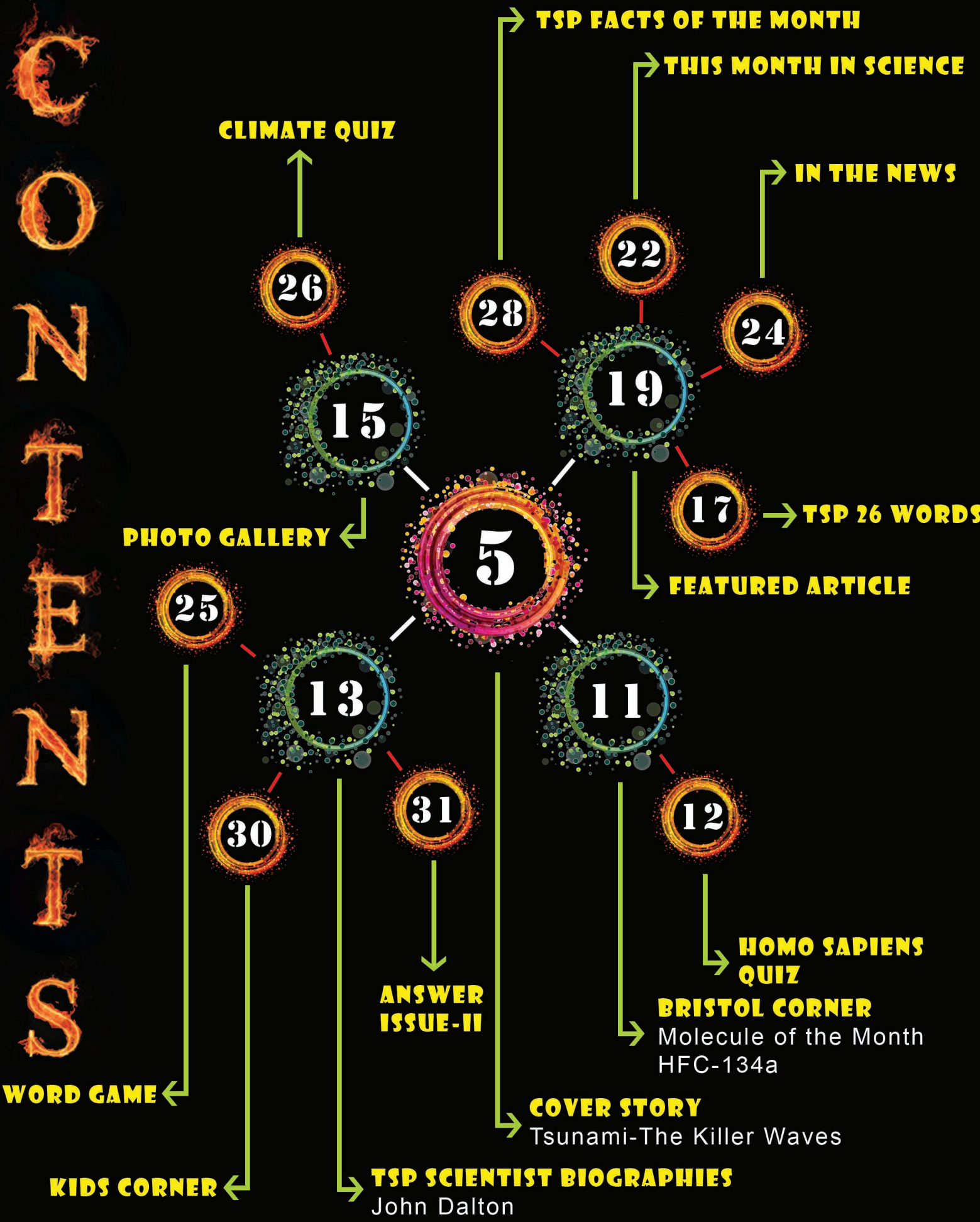
And thus is our venture, TSP SCIENCE XPRESS. This issue has several facts and articles about Meteorology, including fun and quizzes as well as a Kids' corner. We have tried our best to give our readers a great reading experience, and we hope they find the same too!

Happy reading and all the best!


(SUJIT KUMAR KAR)



CONTENTS



Tsunami - Fury of the Nature

1944-1945, World War II. Tests for a programme code named Project Seal was being experimented off the coasts of Auckland. The programme had an intensity to cause destruction of as much as an atom bomb. 3,700 tests were conducted, and certain conclusions came into the picture.

26 December 2004, 00:58:53 UTC. Quakes rocked Indian Ocean, killed about 230,000 people from about 14 countries. With a magnitude of 9.1-9.3, it was the third most powerful earthquake ever recorded by a seismograph. This earthquake caused the entire planet to vibrate to as much as 1 cm.

11 March, 2011, 1446 hours, Japan Standard Time. Waves of high intensity started to hit the coastal areas and almost destroyed some of the vulnerable islands of the country. An undersea megathrust earthquake of magnitude 9.0 with an epicenter of about 70 kilometres had originated near the Oshika Peninsula of Tōhoku. This earthquake, reportedly the fifth most powerful earthquake in the world created havoc and destroyed about a million buildings, and took thousands of lives.

All these happenings had one word common in them, a word that scares billions of people in the world, and reflects the fury of nature on mankind. What is Tsunami? Why is it so furious? We'll know more in the following pages...



Tsunami – The Killer Waves

Tsunami is a Japanese word, composed of two words, “tsu” meaning harbour and “nami” meaning wave, meaning harbour waves. These are a series of water waves caused by the displacement of a large volume of water. These waves do not resemble normal tidal waves since their wavelengths are much longer than normal sea waves. These waves initially resemble a rapidly rising tide, and thus are known as tidal waves. These consist of a series of waves with periods ranging from minutes to hours, called a wave train. Their impact is limited to coastal areas, however the waves can wipe out the entire ocean basins, and thus have quite enormous destructive power.



Characteristics :

These killer waves are caused due to several reasons, however they cause damage by two mechanisms, such as :

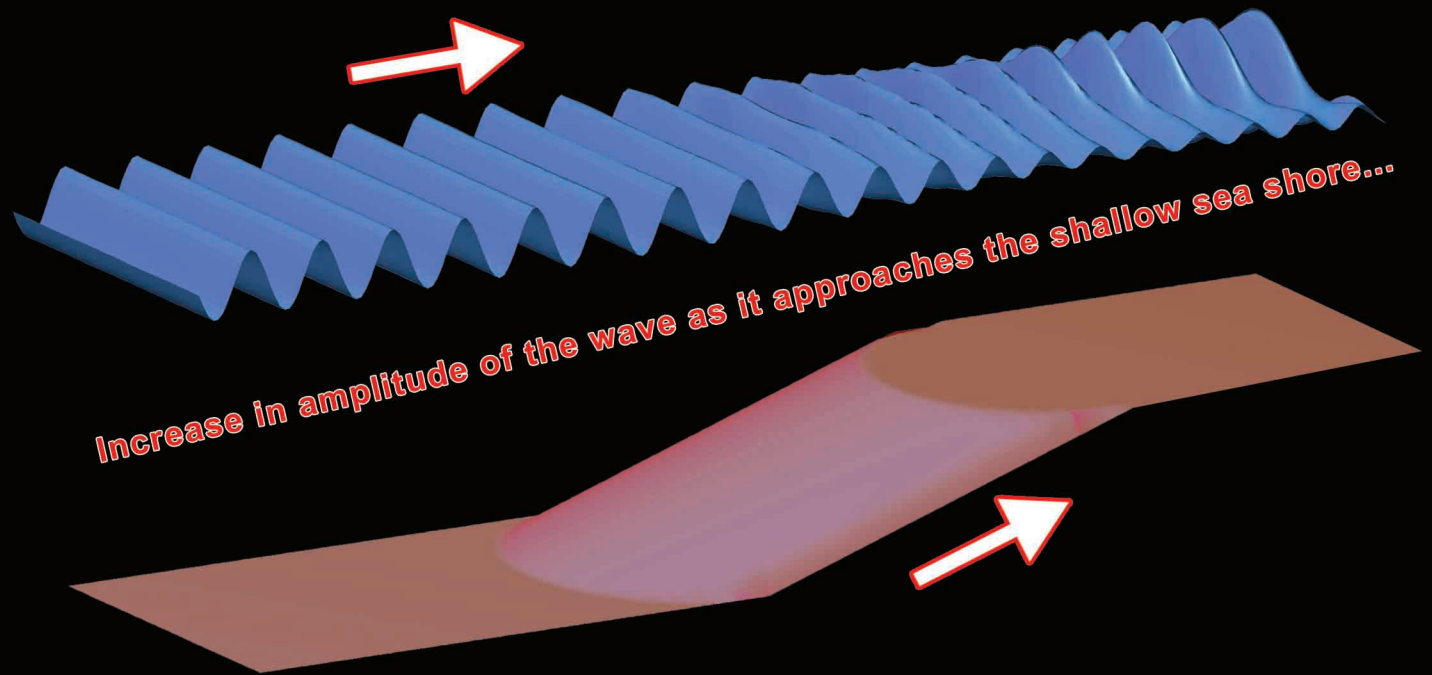
- The smashing force of a wall of water travelling at an enormous speed, and
- The destructive power of a large volume of water that drains off the land, and carries away a lot of debris with it.

Tsunami waves have a wavelength of up to 200 kilometres and travel at a speed of about 800 kilometres per hour. However, the large wavelengths make the cycle of oscillations to complete in 20-30 minutes, with a wave amplitude of about 1 metre. This phenomenon makes the detection of tsunamis quite difficult.



Mechanism :

When tsunami approaches the shallow seashore, the waves are compressed by a phenomenon known as wave shoaling; resulting in the decrease of the wavelength up to about 20 kilometres. However, the amplitude ,i.e. height of the wave increases enormously. When the tsunami waves reach the shore, it is usually succeeded by a temporary rise in the sea level, which is known as a Run up. This Run up is measured in terms of its height above a reference sea level. A large tsunami is known to feature multiple waves arriving over a period of some hours, with significant time variations between wave crests. Also, the first wave of tsunami to hit the coastline doesn't necessarily have the highest Run up.

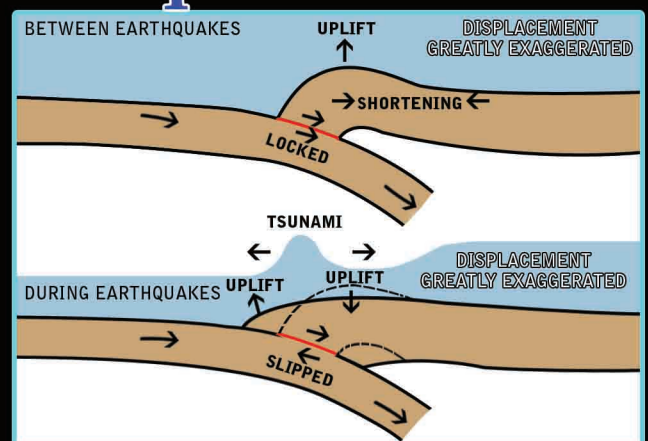


Generation :

Tsunami, known as “tidal waves” in layman’s language, has actually nothing to do with tides. The principal generation mechanism is attributed to the displacement of a huge volume of water in the sea. The displacement is known to be caused by earthquakes, landslides, volcanic eruptions, glacier calvings, even sometimes by meteorite impacts and nuclear tests.

Seismic Activity/Earthquakes :

Sudden deformation of the sea floor is one of the seismic activities that results in the displacement of water from its equilibrium position. Tectonic earthquakes that occur beneath the sea are known to deform the crust, thus displacing the water. Movement of normal faults are also known to cause the displacement of water in the sea, whereas it is quite unlikely for such events to be reason behind a tsunami.



Landslides :

It has been discovered that landslides can be one of the reasons behind a tsunami. They are known to displace huge volumes of water over a short time period. One such event had led to the highest wave recorded, with a height of 524 metres. These waves have been named megatsunami by scientists.



Meteotsunamis :

Certain meteorological conditions such as deep depressions that cause tropical cyclones can give rise to conditions known as meteotsunamis. This phenomenon can cause tides to rise several metres above the normal sea level. These are also known to cause devastation in huge landmasses.



Apart from these, some of the above stated conditions such as meteorite impacts or high yield nuclear tests might disturb the equilibrium and cause tsunamis.



Down the memory lane...

The first discussion and writings about tsunamis had started by 426 BC, when the Greek historian Thucydides wrote about the causes behind this natural disaster. Even, it is also known that Alexandria, the city of modern Egypt was once devastated by Tsunami in 365 AD. Japan is the country in the world that has the longest history of tsunamis, however the Indian Ocean Earthquake and Tsunami of 2004 has been known to be the most devastating of its kind in the modern times. Two of the major tsunamis in the recent history of the world are given in the next page.



Lisbon earthquake & tsunami
in 1755
(Artist's impression)

2004 Indian Ocean Earthquake and Tsunami :

Statistics

Time of occurrence	00: 58 : 53 UTC, 26.12.2004
Epicentre	Off the coast of Sumatra, Indonesia
Magnitude	9.1-9.3
Depth	30 Kilometres
Death toll	230,000+ human lives



2011 Tōhoku Earthquake and Tsunami :

Statistics

Time of occurrence	05:46: UTC, March 11, 2011
Epicentre	70 kms East of Oshika Peninsula of Tōhoku
Magnitude	9.0
Depth	30 Kilometres
Death toll	15000+ human lives
Devastation caused	Wiped out entire seashore, destruction of about 1 million buildings, Fukushima meltdown



The Dark Side- Project Seal :

There have been studies, and an attempt to create tsunami and use it as a weapon. It was the time of World War II, when it was attempted to create tsunami bomb; by United States and New Zealand in a project codenamed Project Seal. However, this project was never carried out on a full scale, rather with about 3,700 small test explosions over a seven month time period. However, the test revealed that a line of about 2,000,000 kilograms of explosives about 8 kilometres off the coast had the caliber to create a destructive wave.

Prevention is better than cure :

There is a well known proverb, “Prevention is better than cure”. Although getting information about Tsunami before it hits the shore can be a challenge, certain countries have detection systems installed. Warnings and knowledge about a Tsunami can be of help. Drawbacks, when observed can act as a sign, and help save some lives if they run for high grounds immediately. Precise prediction of a tsunami is not easy, however certain automated systems such as bottom pressure sensors, attached to buoys which monitor the pressure of the overlying water column give information about these killer waves. Regions with high Tsunami risk use warning systems to warn people before waves reach land. Several signs in several tsunami prone countries indicate warnings and excavation routes. Different monitoring and warning systems have been set up to monitor seismic activity.

Even, certain earthquake prone countries have taken measures dealing with earthquake engineering, to reduce the damage caused onshore. In Japan, walls with height of up to 12 metres have been erected to protect coastal areas. However, these walls have been able to tone down the effects by a small fraction. Effective or not, Prevention has always been better than cure. Tsunami is a major disaster, and hopefully mankind will find out a countermeasure to prevent the ill effects of it!



A seawall at Tsu, Japan



Tsunami Memorial at
Kanyakumari, India



Tsunami Evacuation Route Symbol



Bristol Corner – Molecule Of The Month

September 2013 : HFC-134a

Writer : Simon Cotton, Birmingham University, UK

HFC-134a is a Hydrofluorocarbon (HFC) with a structure that looks like CFC. Unlike CFC's (chlorofluorocarbons), it does not contain any chlorine.

It is the most widely used HFC, because of its low toxicity. It doesn't contain Chlorine, thus cannot form Ozone depleting Cl[•] radicals. However, it is known to have a high global warming potential of 1430.

This chemical compound has been banned by the European Union for use in new vehicle air conditioners, since 1st of January, 2011.

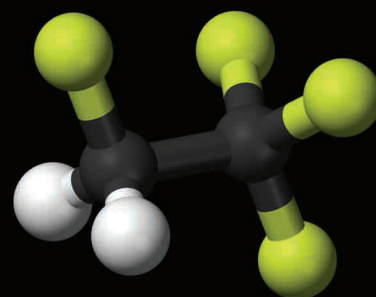
It is volatile and chemically inert, and a quite useful solvent. It has also been used by synthetic organic chemists in the synthesis of α -fluoroenones.

Read more about Bisphenol A at :

<http://www.chm.bris.ac.uk/motm/hfc134/hfch.htm>

Bristol University - Molecule of The Month page :

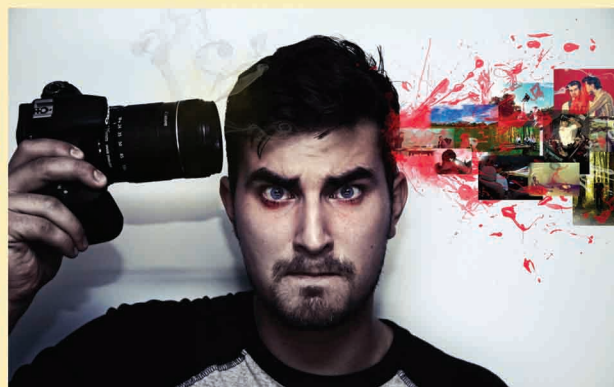
<http://www.chm.bris.ac.uk/motm/motm.htm>



TSP Photospix

Taking talents to a new height...

If you are interested in photography, this is a new home for you and your hobby. Amateur to professional - TSP Photoispix calls up photographers across the globe to enroll themselves in our exposure program, and show off their masterpieces to thousands of people across the globe!



Visit us at : <http://thescientificpeople.wix.com/tspphotospix>



HOMO SAPIENS QUIZ

1. Which of these is a protein?

- (a) Bone marrow
- (b) Cartilage
- (c) Hair
- (d) Muscles

2. Which of these will grow the entire life?

- (a) Leg
- (b) Lips
- (c) Backbone
- (d) Nose

3. How many hairs does an average human head have?

- (a) About 50,000
- (b) About 100,000
- (c) About 200,000
- (d) About 500,000

4. Losing control over the hand after a brain injury is known as:

- (a) Universal syndrome
- (b) Inhuman syndrome
- (c) Alien hand syndrome
- (d) Wild syndrome

5. Which organ in the human body has the highest weight of all?

- (a) Heart
- (b) Brain
- (c) Liver
- (d) Skin

6. At what speed is blood pumped through the aorta, from the heart?

- (a) About 1.3 miles per hour
- (b) About 3 miles per hour
- (c) About 1 miles per hour
- (d) About 35 miles per hour

7. Appendix is a vestigial organ in the modern human body. It was considered to be a part of which body system in our ancestors?

- (a) Circulatory System
- (b) Nervous System
- (c) Excretory System
- (d) Digestive System

8. Which part of the human body doesn't receive blood supply from the heart?

- (a) Fingers
- (b) Retina
- (c) Cornea
- (d) Feet

9. Which of these means "entrance hall" in Latin?

- (a) Aorta
- (b) Atrium
- (c) Vena cava
- (d) Bicuspid Valve

10. Who invented Stethoscope?

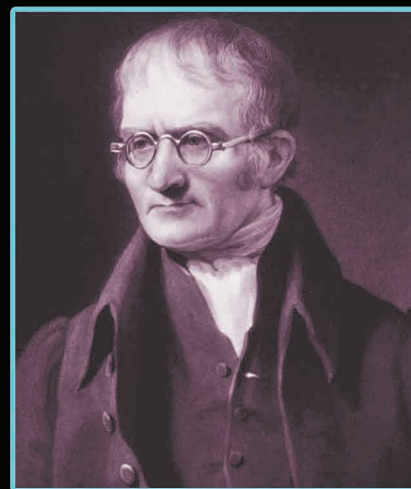
- (a) René Laennec
- (b) Daniel Gabriel Fahrenheit
- (c) Anders Celsius
- (d) Alexander Graham Bell

TSP Scientist Biographies

Sir John Dalton

(6 September 1766 – 27 July 1844)

Sir John Dalton was an English chemist, meteorologist and physicist. He is best known for his works in the field of development of modern Atomic theory, as well as for his research in the field of meteorology. He was one of the earliest weather forecasters, who used several homemade instruments to take weather observations. Through the instruments created by him, he was able to study humidity, temperature, atmospheric pressure as well as wind. He is also known for his research work about colour blindness, which is occasionally referred to as Daltonism in his honor.

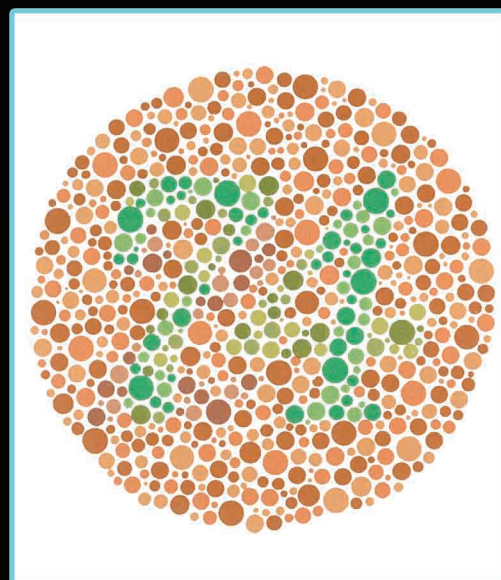


Early Life

John Dalton was born on 6th of September, 1766, in Eaglesfield, near Cockermouth, Cumberland in England ; to a Quaker family. His father was a weaver, and thus he joined his elder brother Jonathan in a Quaker school at the age of 15. In 1793, he moved to Manchester, and later on he became a teacher in Mathematics and Natural Philosophy. His early life was influenced by a Quaker from Eaglesfield, namely Elihu Robinson, who got him interested in the fields of Mathematics and Meteorology. He started to maintain a meteorological diary , in which he recorded about 200,000 observations in the succeeding 57 years.

At a Later Stage...

After getting influenced by Elihu Robinson, Dalton started maintaining the weather records, which are being referred to as the oldest weather records as of now. His instruments were primitive, however, they could measure temperature, pressure, humidity and wind. His interest in weather led him to be more interested in the study of gases, leading to the formulation of Dalton's gas law. He also rediscovered George Hadley's theory of atmospheric circulation which is also known as Hadley's cell. In 1794, he also recognized that Color blindness is hereditary.

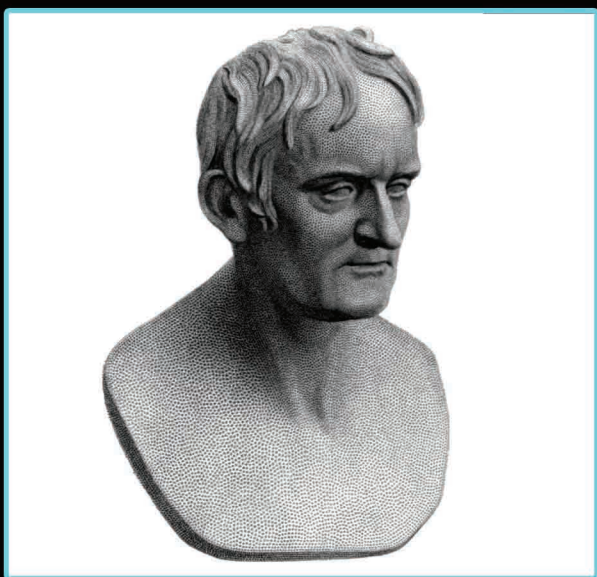


Contributions :

- Recorded about 200,000 weather observations
- Formulated Dalton's Gas Law
- Formulated Atomic Theory
- Recognized that color blindness is hereditary
- Rediscovered George Hadley's Theory of Atmospheric Circulation
- Published "Meteorological Observations and Essays"

Awards and Honours :

Dalton led his life as a Quaker, and never married. His mortal remains were laid to rest in the Manchester Ardwick Cemetery. About 40,000 people filed by his coffin in the Manchester Town Hall. A bust of Dalton was placed in the entrance hall in the Royal Manchester Institution. In honor of his work, many chemists and biochemists use the term Dalton to denote one atomic mass unit. The Dalton township in Ontario has also been named after him. A lunar crater has been named after him. In his honor, colour blindness is sometimes referred to as Daltonism.



Bust of Dalton by Chantrey



Dalton Hall in
Manchester University

"Why does not water admit its bulk of every kind of gas alike? This question I have duly considered, and though I am not able to satisfy myself completely I am nearly persuaded that the circumstance depends on the weight and number of the ultimate particles of the several gases."

- John Dalton (Paper on absorption of gases)

PHOTO GALLERY



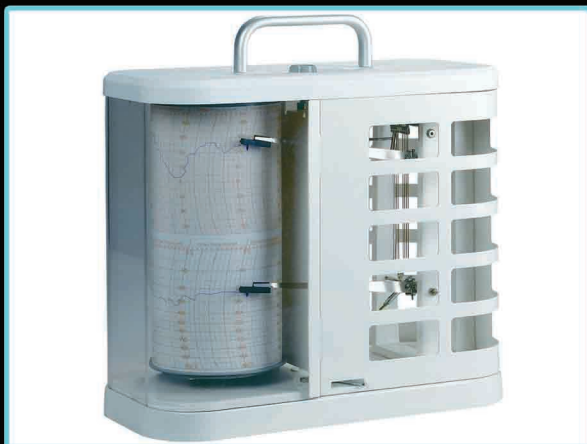
A **WIND PROFILER** is a type of weather observing equipment that detects the wind speed and direction at various elevations above the ground.



A **TRANSMISSOMETER** is an instrument for measuring the extinction coefficient of the atmosphere, and for the determination of visual range.



A **PYRANOMETER** is a type of actinometer used to measure the solar radiation flux density (in watts per metre square) from a field of view of 180°



A **THERMO-HYGROGRAPH** is a chart recorder that measures and records both temperature and humidity (or dew point).



SODAR (Sonic Detection And Ranging), is a meteorological instrument used to measure the scattering of sound waves by atmospheric turbulence.

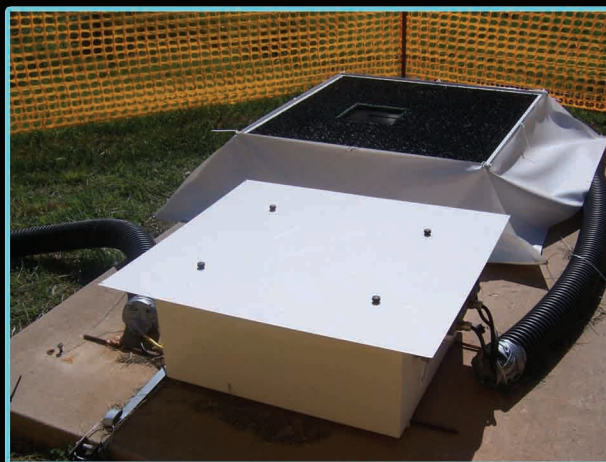
PHOTO GALLERY



A **CEILOMETER** is a device that uses a laser or other light source to determine the height of a cloud base.



A **RADIOSONDE** is a unit for use in things such as weather balloons to measure atmospheric parameters



A **DISDROMETER** is an instrument used to measure the drop size distribution and velocity of falling hydrometeors.



NEPHOSCOPE is an instrument for measuring the altitude, direction, and velocity of clouds.



A **NEPHELOMETER** is a stationary or portable instrument for measuring concentration of suspended particulates in a liquid or gas colloid.

TSP 26 WORDS

A	Advection	The horizontal transport of air, moisture, vorticity or other atmospheric properties; commonly used in describing the transport of moisture and temperature.
B	Beaufort Scale	A scale that indicates the wind speed using the effect wind has on certain familiar objects.
C	Chinook	A strong downslope wind that causes the air to warm rapidly as a result of compressive heating; called a Foehn wind in Europe.
D	Doppler Radar	Radar that determines the intensity of rainfall and velocities of water and air particles.
E	El Nino	A great warming of the equatorial waters in the eastern Pacific Ocean; El Nino events occur every three to seven years and are related to shifts in global weather patterns.
F	Fathom	The common unit used to measure depth in the ocean; it is equivalent of six feet.
G	Gale Warning	A marine weather warning for winds of thirty-four to forty-seven knots (thirty-nine to fifty-four miles per hour).
H	Harmattan	A hot, dry, and dusty northeasterly or easterly wind that occurs in West Africa north of the equator and is caused by the outflow of air from subtropical high pressure areas.
I	Iridescence	Brilliant patches of green or pink sometimes seen near the edges of high- or medium-level clouds.
J	Jet Stream	A zone of strong winds concentrated in a narrow band in the upper atmosphere; these winds are often referred to as the storm track since the jet stream often "steers" atmospheric storms.
K	Knot	The unit used to measure wind speed, equal to 1.15 statute miles per hour.
L	Land Breeze	A coastal breeze that blows from land out to sea, and is the result of temperature differences when the sea is warmer than the adjacent land.
M	Macroburst	A large downburst within a 2.5 mile or larger outflow diameter and damaging winds lasting five to twenty-five minutes.

Thank You for previewing this eBook

You can read the full version of this eBook in different formats:

- HTML (Free /Available to everyone)
- PDF / TXT (Available to V.I.P. members. Free Standard members can access up to 5 PDF/TXT eBooks per month each month)
- Epub & Mobipocket (Exclusive to V.I.P. members)

To download this full book, simply select the format you desire below

