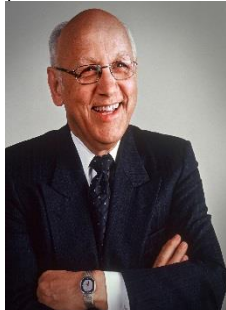




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Scientific Discoveries



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Wise leaders make it a point to know what is going on in the world. While business leaders may or may not have a scientific background or interest, there is no denying that science and engineering affects every leader, every day. For that reason, I am drawn to inform my readers, from Discover magazine's 100 significant scientific discoveries of 2017, those which I believe have great importance.

Human evolution: The more we are able to understand and interpret fossils, the more we learn about the human's early existence. Discoveries in Greece point to a humanoid about 5.7 million years ago, three times as far back as commonly assumed.

New science field: 130 million years ago, two collapsing stars collided. The light waves and other aspects of this exploding supernova reached Earth in August 2017, being observed worldwide. One year ago, gravitational waves were first detected (as predicted by Albert Einstein in 1905), this super nova thrusting even more gravitational waves. The supernova displayed new scientific feats: related to the expansion of our universe, that gravitons have no mass, the early existence of gold & heavy elements. This event created an entirely new field of astronomy from which much future science will be gleaned.

Trump versus science: Two full pages of Donald Trump's various attempts to muzzle scientific discoveries during the year were listed. The President's attitude prompted a March for Science in Washington DC at which 100,000 demonstrators made their feelings known.

Adjusting genes: It has been nearly a decade since the first gene-editing tools were developed (called CRISPR). In this past year, CRISPR was used in a human embryo to remove a heart-condition (passed down from the father). A laboratory experiment only, the repaired embryo was destroyed; further work awaits FDA (U.S. Food and Drug Administration body) approval.

Fighting leukemia: The FDA approved a living drug to fight a form of leukemia in children. Human T-cells (white blood cells that attack disease) are removed from the patient and bred with certain controlled viruses to create stronger T-cells. Then they are re-inserted into the children where the new T-cells are strong enough to attack and defeat the cancerous invaders.

A fake womb: The work to successfully remove lamb fetuses from their mother's womb and raise them externally in a fake womb into healthy sheep, opens the door to keeping alive and nurturing prematurely born human babies who would otherwise likely die.

Rising seas: Greenhouse gases warm the oceans which causes the seas to rise, affecting current cities located at sea level. Even if we could stop greenhouse gas pollution today, sea levels would continue to rise for centuries because carbon dioxide can take 1,000 years to transfer its heat to the oceans, raising the sea level. It takes the oceans yet further centuries to dissipate its heat back into the atmosphere.

Pigs to the rescue: In the U.S., 20 humans die each day, waiting for organ transplants. A retrovirus in pigs makes their organs quickly rejected by our human immune system. Now, gene editing with CRISPR kills the pig's retrovirus, making the pig organs suitable for human implanting.

A start to controlling aging: Stem cells in the hypothalamus (a low brain region that regulates basics of hunger, sleep, and body temperature) affect the aging of mice. Since mice have 22,700 genes similar to the human total of about 23,000 genes, hope now exists for treating human's age-related maladies.

Artificial blood cells: Scientists have taken a major step towards making artificial blood by creating blood stem cells in the laboratory with key components of platelets, white blood cells, and red blood cells. These have the potential to treat leukemia, sickle cell disease and other blood disorders.

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Using probiotics: Clinical proof has shown that probiotics (products that contain beneficial bacteria) will fortify our immune system. Tests with 4,500 new-born human infants showed that the treated infants had a significantly lower risk of developing sepsis, a disease that kills 600,000 infants globally each year.

Atlas of cells: The human genome project of 15 years ago mapped out the entire human gene expression (what leads to blue eyes or red hair). Using the same techniques, scientists are aiming towards an atlas of cell expression, leading to an ability to spot diseases tailored to individual needs.

First life on earth: Microfossils, discovered locked in rocks of the Canadian Shield of 3.8 to 4.3 billion years ago, indicate that primitive creatures, each less than half the width of a human hair, were thriving around volcanic vents as the sun shone on our newly formed Earth about 4 billion years ago.

Sleep: Jellyfish, brainless creatures with clusters of neurons in their bodies, tested positively for sleep characteristics. It appears that sleep characteristics have survived the hundreds of millions of years since we evolved from jellyfish. Thus, sleep may be an intrinsic property of neurons, not the brain per se.

Eruptions: Carleton U. provided a list of 15 major volcanic eruptions over the eons (spreading lava out 100,000+ sq. miles), events that released sufficient toxic gas to kill all life. For example, “Deccan Traps” eruption in India helped kill off dinosaurs 66 million years ago. Conclusion: our planet doesn’t care too much about the biology on it. *Note: Dinosaurs lasted about 100 million years, compared with sea trilobites of 270 million years, & humans’ 5.7 million years. ‘Modern’ humans’ 30,000 years is but a wisp.*

Zika benefit: The Zika virus specifically attacks still-developing cells, hence the effect on human babies (microcephaly), especially in 2015. Since the Zika virus leave mature cells unharmed, medical science has shown that it can direct Zika to attack evolving cancer cells without harming the healthy human cells.

Water for everyone: A device with a material, “metal-organic framework” can suck drinking water out of thin air, no power required. The mesh contains tiny spaces, perfect for grabbing and holding onto water molecules even in the driest desert. And, just the sun’s heat retrieves the water for drinking.

Dust makes you fat: Two thirds of the chemicals tested in household dust, leached out of every-day products in the home, drove fat cells in mice to develop and proliferate. More tests will continue.

Tubular robots: A plastic tube connected to an air pump moves along in complex mazes, adapting as it meets new obstacles. It turns itself inside out, drawing more material from inside to extend its length so that a compressed 11” (30 cm) tube moves to over 200’ (60 meters) carrying a micro-camera or probe.

Bird’s eggs: Mary Caswell-Stoddard at Berkley California has ascertained that the shape of birds’ eggs is related to their flying ability. The sharper the egg, the better the flight. Ostriches, for example, have rounder eggs than eagles. Alright, alright, it was the scientist’s name that had me include this one! Have a great spring!

Bill

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