Astronomy

1.Discovery of Uranus

March 13, 1781. The seventh planet – Uranus – was discovered on this date, completely by accident. British astronomer William Herschel was performing a survey of all stars of at least magnitude 8 – stars slightly too faint to be seen with the eye alone, in other words. That’s when he noticed a very faint object – only barely above the limit for viewing with the eye – that that moved in front of the fixed stars. This movement clearly demonstrated the object was closer to us than the stars. At first he thought he had found a comet. Later, he and others realized it was a new planet in orbit around our sun, the first new planet discovered since ancient times.Astronomers later learned they had observed Uranus as far back as 1690. They’d just never really noticed it before. It was Herschel who first realized the true nature of this distant light in our sky. In 1977, astronomers using the Kuiper Airborne Observatory made another serendipitous discovery – of rings around the planet Uranus. That discovery made Uranus the second known ringed planet in our solar system.The closest we humans have come to Uranus was in 1986, when the Voyager 2 spacecraft swung by the planet.

2. Halley’s Comet

For much of history, comets were thought to be divine omens, atmospheric anomalies or celestial wanderers that flashed through the solar system before vanishing into interstellar space. All that started to change in 1705, when the English astronomer Edmond Halley published his “Synopsis Astronomia Cometicae.” By using Sir Isaac Newton’s gravitational theories to chart the paths of two dozen comets, Halley hit on a provocative new theory: three comets seen in 1531, 1607 and 1682 were actually the same object. Halley argued that the comet orbited the sun and whizzed by the Earth roughly once every 76 years, and he predicted that it would reappear sometime in late 1758 or early 1759. “If it should return, according to our predictions,” he vowed, “impartial posterity will not refuse to acknowledge that this was first discovered by an Englishman.” Halley was eventually proved correct on all counts. Although he died in 1742, his comet appeared in the sky on Christmas night of 1758, right on schedule. Its discovery was hailed as a triumph of scientific reasoning and Newtonian physics.

3. Liquid-fueled rocket

The first man to give hope to dreams of space travel is American Robert H. Goddard, who successfully launches the world’s first liquid-fueled rocket at Auburn, [Massachusetts](https://www.history.com/topics/us-states/massachusetts), on March 16, 1926. The rocket traveled for 2.5 seconds at a speed of about 60 mph, reaching an altitude of 41 feet and landing 184 feet away. The rocket was 10 feet tall, constructed out of thin pipes, and was fueled by liquid oxygen and gasoline. Goddard, born in Worcester, Massachusetts, in 1882, became fascinated with the idea of space travel after reading the H.G. Wells’ science fiction novel War of the Worlds in 1898. He began building gunpowder rockets in 1907 while a student at the Worcester Polytechnic Institute and continued his rocket experiments as a physics doctoral student and then physics professor at Clark University. He was the first to prove that rockets can propel in an airless vacuum-like space and was also the first to explore mathematically the energy and thrust potential of various fuels, including liquid oxygen and liquid hydrogen. He received U.S. patents for his concepts of a multistage rocket and a liquid-fueled rocket, and secured grants from the Smithsonian Institute to continue his research.

4. World's first Ballistic missile(V-2)

On October 3, 1942, German rocket scientist Wernher von Braun’s brainchild, the V-2 missile, is fired successfully from Peenemunde, as island off Germany’s Baltic coast. It traveled 118 miles. It proved extraordinarily deadly in the war and was the precursor to the Intercontinental Ballistic Missiles (ICBMs) of the postwar era. The V-2 was unique in several ways. First, it was virtually impossible to intercept. Upon launching, the missile rises six miles vertically; it then proceeds on an arced course, cutting off its own fuel according to the range desired. The missile then tips over and falls on its target-at a speed of almost 4,000 mph. It hits with such force that the missile burrows itself into the ground several feet before exploding. It had the potential of flying a distance of 200 miles, and the launch pads were portable, making them impossible to detect before firing.

5. Extrasolar Planets

An extrasolar planet is one that’s outside of our solar system, and astronomers believed in their existence for a long, long time. Yet, it wasn’t until recently that the tools to actually spot one became available; it was only in 1995 when Swiss astronomers Didier Queloz and Michel Mayor discovered a planet in the constellation Pegasus they dubbed 51 Pegasi b. Yeah, astronomers may be great at discovering things but they’re not great at naming them.Not only did Queloz and Mayor finally prove that extrasolar planets are out there, but the method they used has been repeated to find many more. Nearly 500 extrasolar planets are now known to exist, and that’s just the beginning (right now astronomers can only spot ones that are massive). As more and more planets are found, it’s only a matter of time until the most important astronomical discovery in history is made: a planet full of benevolent and sexy aliens. Hurry it up, science!

6. The Heliocentric Model

Astronomers had speculated about heliocentrism (the idea that the Earth revolves around the sun, not the other way around) since ancient times, but in 1543 Copernicus was the first person to actually demonstrate the math behind the idea to prove it was a viable concept. It took a while for Copernicus’ model to become universally accepted. (Get it? Astronomy puns are so easy.) Once it finally took hold it formed the basis of a scientific revolution. It eliminated many of the problems caused by the old geocentric model (it’s tough to make accurate calculations if you think the Earth isn’t moving), making it the first major shift in the field of astronomy since people realised the sun was a star and not an angry God. Also, his discovery made us feel stupid for once thinking we were the centre of the universe. Thanks a lot, Copernicus.

7. Herschel’s Map

From 1780 to 1834, telescope maker William Herschel and his sister Caroline systematically mapped the heavens, charting thousands of stars and nebulae in the process. He also discovered Uranus, and if astronomers had stuck with his proposed name of Georgium Sidus (George’s Star) we would have been saved centuries of terrible jokes. Making a map barely counts as a discovery; yet Herschel’s was extremely important, because when it was all finished it revealed the shape and size of the Milky Way galaxy. Not only was it much, much larger than had previously been estimated, but it turned out to be disc shaped, and our own sun was located nowhere near the centre. Herschel’s work cleared up a lot of misconceptions about our own little corner of the universe.

8. Accelerating Universe

The accelerating expansion of the universe is the observation that the expansion of the universe is such that the velocity at which a distant galaxy is receding from the observer is continuously increasing with time. The accelerated expansion was discovered during 1998, by two independent projects, the Supernova Cosmology Project and the High-Z Supernova Search Team, which both used distant type Ia supernovae to measure the acceleration. The idea was that as type Ia supernovae have almost the same intrinsic brightness (a standard candle), and since objects that are further away appear dimmer, we can use the observed brightness of these supernovae to measure the distance to them. The distance can then be compared to the supernovae's cosmological redshift, which measures how much the universe has expanded since the supernova occurred. The unexpected result was that objects in the universe are moving away from one another at an accelerated rate. Cosmologists at the time expected that recession velocity would always be decelerating, due to the gravitational attraction of the matter in the universe. Three members of these two groups have subsequently been awarded Nobel Prizes for their discovery. The accelerated expansion of the universe is thought to have begun since the universe entered its dark-energy-dominated era roughly 4 billion years ago .

9. Astronomers Capture First Image of a Black Hole

Astronomers announced that at last they had captured an image of the unobservable: a black hole, a cosmic abyss so deep and dense that not even light can escape it. For years, and for all the mounting scientific evidence, black holes have remained marooned in the imaginations of artists and the algorithms of splashy computer models of the kind used in Christopher Nolan's outer-space epic “Interstellar.” Now they are more real than ever. The image, of a lopsided ring of light surrounding a dark circle deep in the heart of a galaxy known as Messier 87, some 55 million light-years away from Earth, resembled the Eye of Sauron, a reminder yet again of the implacable power of nature. It is a smoke ring framing a one-way portal to eternity. To capture the image, astronomers reached across intergalactic space to Messier 87, or M87, a giant galaxy in the constellation Virgo. There, a black hole several billion times more massive than the sun is unleashing a violent jet of energy some 5,000 light-years into space. The image offered a final, ringing affirmation of an idea so disturbing that even Einstein, from whose equations black holes emerged, was loath to accept it.

10. Lunar Reconnaissance Orbiter

The Lunar Reconnaissance Orbiter (LRO) is a NASA robotic spacecraft currently orbiting the Moon in an eccentric polar mapping orbit. Data collected by LRO have been described as essential for planning NASA's future human and robotic missions to the Moon. Its detailed mapping program is identifying safe landing sites, locating potential resources on the Moon, characterizing the radiation environment, and demonstrating new technologies. Launched on June 18, 2009, in conjunction with the Lunar Crater Observation and Sensing Satellite (LCROSS), as the vanguard of NASA's Lunar Precursor Robotic Program, LRO was the first United States mission to the Moon in over ten years. LRO and LCROSS were launched as part of the United States's Vision for Space Exploration program. The probe has made a 3-D map of the Moon's surface at 100-meter resolution and 98.2% coverage (excluding polar areas in deep shadow), including 0.5-meter resolution images of Apollo landing sites. The first images from LRO were published on July 2, 2009, showing a region in the lunar highlands south of Mare Nubium (Sea of Clouds).

Nano Technology

1. Scientists Develop "Nano Bubble Water" In Japan

The National Institute of Advanced Industrial Science and Technology (AIST) and REO developed the world's first 'nanobubble water' technology that allows both fresh-water fish and saltwater fish to live in the same water. M. Takahashi and K. Chiba developed a patented procedure to produce ozone nano-bubble water. NBW3 retains its oxidation ability for more than six months if protected from exposure to ultraviolet rays. Its high stability allows for the bottling and use of NBW3 as a disinfectant solution. The study, by Shinichi Arakawa and colleagues at Tokyo Medical and Dental University and Japan's National Institute of Advanced Industrial Science and Technology, evaluated the bactericidal activities of ozone nano-bubble water -- also known as NBW3 -- against the two main bacterial agents that cause periodontitis as well as its toxicity to human oral tissue cells. Their results showed that NBW3 can kill periodontal pathogens within 30 seconds of exposure, yet has only a minor impact on the viability of oral tissue cells after 24 hours of exposure.

2. Nanosensor Probe

Nanosensors are nanoscale devices that measure physical quantities and convert these to signals that can be detected and analyzed. There are several ways proposed today to make nanosensors; these include top-down lithography, bottom-up assembly, and molecular self-assembly. A "nano-needle" with a tip about one-thousandth the size of a human hair pokes a living cell, causing it to quiver briefly. Once it is withdrawn from the cell, this ORNL nanosensor detects signs of early DNA damage that can lead to cancer.This nanosensor of high selectivity and sensitivity was developed by a research group led by Tuan Vo-Dinh and his coworkers Guy Griffin and Brian Cullum. The group believes that, by using antibodies targeted to a wide variety of cell chemicals, the nanosensor can monitor in a living cell the presence of proteins and other species of biomedical interest.

3 Themopower- New Energy Source

MIT scientists at MIT have discovered a previously unknown phenomenon that can cause powerful waves of energy to shoot through minuscule wires known as carbon nanotubes. The discovery could lead to a new way of producing electricity.The phenomenon, described as thermopower waves, “opens up a new area of energy research, which is rare,” says Michael Strano, MIT’s Charles and Hilda Roddey Associate Professor of Chemical Engineering.In the new experiments conducted by Michael Strano and his team, nanotubes were coated with a layer of a reactive fuel that can produce heat by decomposing. This fuel was then ignited at one end of the nanotube using either a laser beam or a high-voltage spark, and the result was a fast-moving thermal wave traveling along the length of the carbon nanotube like a flame speeding along the length of a lit fuse. The heat from the fuel goes into the nanotube, where it travels thousands of times faster than in the fuel itself. As the heat feeds back to the fuel coating, a thermal wave is created that is guided along the nanotube. With a temperature of 3,000 kelvins, this ring of heat speeds along the tube 10,000 times faster than the normal spread of this chemical reaction. The heating produced by that combustion, it turns out, also pushes electrons along the tube, creating a substantial electrical current.

4. Nanoengineers Invent New Biomaterial

Catherine Hockmuth of UC San Diego reports that a new biomaterial designed for repairing damaged human tissue doesn't wrinkle when it is stretched. The invention of nano engineers at the University of California, San Diego marks a significant breakthrough in tissue engineering because it more closely mimics the properties of native human tissue. Shaochen Chen, a professor in the Department of NanoEngineering at the UC San Diego Jacobs School of Engineering, hopes future tissue patches, which are used to repair damaged heart walls, blood vessels, and skin, for example, will be more compatible than the patches available today. This biofabrication technique uses light, precisely controlled mirrors and a computer projection system to build three-dimensional scaffolds with well-defined patterns of any shape for tissue engineering. Shape turned out to be essential to the new material's mechanical property. While most engineered tissue is layered in scaffolds that take the shape of circular or square holes, Chen's team created two new shapes called "reentrant honeycomb" and "cut missing rib." Both shapes exhibit the property of negative Poisson's ratio (i.e. not wrinkling when stretched) and maintain this property whether the tissue patch has one or multiple layers.

5. Silver Germ-Killers

Silver kills germs when it oxidizes and releases silver ions, which are lethal to bacteria and yeast. Ancient civilizations used the metal to treat open wounds, and American pioneers tossed silver coins into water storage barrels to keep water fresh. Nanoparticles of silver, which can occur naturally, are more powerful than bigger particles because their large surface area relative to their mass increases the number of ions released. Silver nanoparticles are increasingly being used in everything from self-sanitizing toothbrushes to clothes. It may eventually be used in toothpaste. The ability of tiny particles of silver to kill bacteria has been known for some time, though the research appears to be light on whether the silver also carries health risks.

6. A Final Coating

Nano-structured coatings are a great way of adding new surface properties to a product without changing the base materials. Nanocoatings can be applied to an object to dramatically improve functionality – for example, hydrophobic glass upon which raindrops bounce straight off; slippery, hydrophilic medical devices that can be inserted with minimal discomfort; or coatings with highly-antibacterial properties. These specialised coatings are often applied through harsh processes during manufacturing, making it difficult to reapply them to finished products, also limiting what materials can be used in the process. To overcome these limitations, a team of academics from Australia have developed several new methods to apply nanocoating films. In one of these techniques, flexible, multi-layered nano-films can be built and then transferred using a high-strength adhesive layer. Another technique from the same researchers allows a nanocoating to be applied to any surface in a series of two quick spray-on coats. These new coatings enable greater flexibility, easy removal and reapplication.

Robotics

1. Aeolus Bot

Unveiled at the Consumer Electronics Show in Las Vegas, Aeolus Bot is the in-home android programmed to pick up the toys, deliver a cold beverage, and vacuum the floors while the user sits back and watches. According to the manufacturer, Aeolus Robot (pronounced “ay-oh-lus”) comes with multifunctional arms that are powered by machine learning and AI; to recognize and adapt to changing environments. The robot also learns, completes tasks, and navigates to redefine the way housework is done and frees valuable time in the busy lives of today’s families. Aeolus Bot is integrated with Amazon Alexa and Google Home, which makes it easy to communicate with an electronic servant maid. Aeolus Bot is made to understand thousands of terms, using built-in cameras, to identify faces and remembers where it last saw items, and adapts to home layouts and routines.

2. Kuri

Kuri looks bright for a massive adoption with its pre-orders already starting to ship. The robot is full of features, including its ability to answer questions and monitor the user’s home which works on an array of sensors. Simple in design and useful around the house, it seems likely that Kuri is the first robot that may soon become a reality in everyday life. These are just a handful of exciting innovations that 2018 has seen so far. With some months more to go, further eye-catching development in the robotics inventions will be soon witnessed. With new developments and inventions in place, it looks like 2018 will be a milestone in the field of robotics development.

3. Backflipping Mini Cheetah

In 2017, we saw Boston Dynamics’ humanoid robot Atlas backflipping off a box, stick the landing, and raise its arms in triumph. Not to be outdone, MIT has developed a mini version of its Cheetah robot, and this tiny quadruped can backflip too. In fact, Mini Cheetah is the first four-legged robot to perform a backflip. Backflipping might not be the most useful skill for a robot to have, but it does display Mini Cheetah’s extraordinary ability to react to its environment. It can land on its feet when dropped, recover from a knock without falling over, and right itself when it does end up the wrong way up. It can also display a range of movements, including a forwards-facing trot-run, spinning whilst moving, and an antelope-like bounce called ‘pronking’.

Biotechnology

1. Grow yourself a mushroom lamp

Grow-it-yourself is the new do-it-yourself. Mycelia are the vegetative underground parts of mushrooms (their roots). Made mostly of chitin and cellulose, both light-weight and robust, mycelia make for a surprisingly versatile bio-material. Thanks to advances in mycelium technology, mushrooms are now coming to your living room. Bioengineers have created the world’s first mushroom lamp that you can order online and grow yourself. These eco-lamps make for a sustainable and well-designed addition to decorate your home — and they’re biodegradable.

2. Good morning, cow-free cow milk

We’re entering the post-animal economy, and the dawn of synthetic dairy is here. A new industry has emerged over the past years: cellular agriculture is a scientific field that uses biotechnology to produce proteins and biomolecules typically derived from animals — it’s like brewing beer. These distributed cellular factories let us brew food and beverages more locally and sustainably. At the same time, the technique could alleviate the environmental impact of livestock farming and improve food security (more about this in the next section). For instance, Perfect Day’s cow-free milk contains the same proteins as if produced by an actual cow, minus the cow. And minus lactose. There’s another difference: it has a shelf life of six months, so you can stock it.

3. Hacking biology with a liquid biocomputer

The “Raspberry Pi” for biology is here, and it’s a personal liquid biohacking factory. By miniaturizing biology, we can put sophisticated science into easy-to-use kits. Cell-Free is breaking a billion-year-old processor out of the cell to let anyone, anywhere build biomolecules with this machinery, only without the actual cells. This renders biology more user-friendly, as it eliminates the need for microbial culturing, training, and equipment. They’ve been around in research labs for a while. Making cell-free systems available to all could kick off a new era of “decellularized” do-it-yourself biology. How does it work? You’ll get plasmids carrying the genetic software instructions, like an app. They program the ribosome, essentially a 3D protein printer, to produce different proteins. They could be custom fluorescent colors, vanilla smells, or glow-in-the-dark ink to begin with.

4 . Portable Dialysis

More than 15 million adult Americans suffer from diseases of the kidneys, which often impair the ability of the organs to remove toxins from the blood. Standard dialysis involves three long sessions at a hospital per week. But an artificial kidney developed by Los Angeles-based Xcorporeal can clean blood around the clock. The machine is fully automated, battery-operated, waterproof and, at less than 5 pounds, portable. Wearable and portable dialysis devices could potentially improve patient quality of life by allowing patients to continue with their daily activities of life while undergoing dialysis, as well as by loosening—or removing entirely—dietary and fluid restrictions and reducing pill burden. We are therefore potentially at a new dawn in the treatment of dialysis patients with the first generation of wearable and portable dialysis devices, which may well revolutionise the treatment and quality of life for patients with end-stage kidney disease.

5. The “MicrobeMiner” to crowd-source antibiotic discovery

We’re at the cusp of the post-antibiotic era, and the discovery of novel antibiotics is becoming a pressing issue. In tech we mine bitcoins, but in biology we mine microbes for novel antibiotics! Streptomyces are bacteria that live in the soil, where they produce a variety of antibiotics. The problem is, about 90 percent of biomolecules remain hidden in an inactive part of the microbe’s DNA, so-called silent operons. That is, unless the biosynthesis is activated. And you guessed it, this is where the MicrobeMiner of startup Prospective Research comes into play: it mimics the stimuli present in the soil matrix to launch this machinery. The MicrobeMiner is, at least in part, crowd-sourced. You can order a crowd-sourced drug discovery collection kit, dig around for a sample, and send it in. Your sample microbes are screened to identify these inactive gene clusters. Afterwards, the platform launches a variety of chemical inducers to unlock these pathways. Et voila, here come the novel antibiotics. The team has already identified molecules that turn this “dirt microbe” into a powerful factory. So there is hope that we can collectively fight rising antibiotic resistance.