X-CITED

SCIENCE MAGAZINE

Issue No:1

January 2021

Oceanographer Derya Akkaynak Explains Her Algorithm,

Sea-Thru

- Who discovered the real pathogen of ulcer?
- Can Covid-19 Hospitalizations be decreased by Monoclonal Antibodies?

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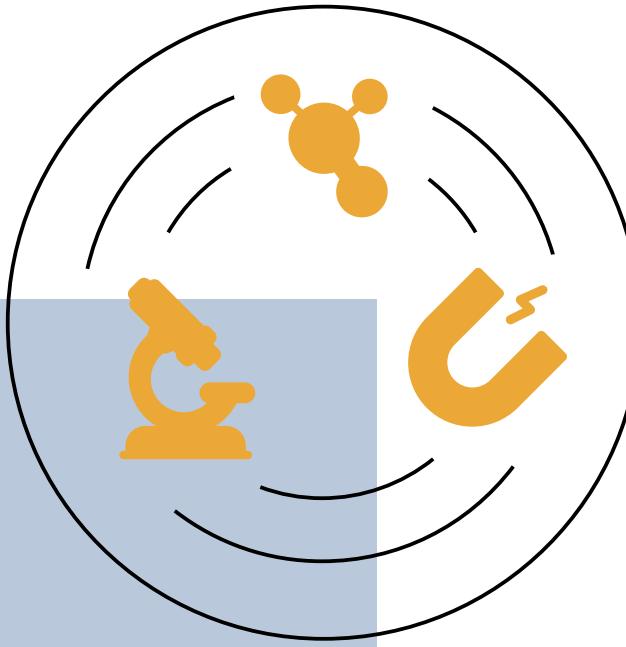


Page of Contents

Editor's Foreword

Hello from our first issue!
Life in 2020 was not easy for any of us. We have been experiencing an extraordinary time. All people around the world have faced the same global problem: Covid-19 pandemic. Everyone's life has changed all of a sudden; we started going to school online, adults' lifestyle turned into home-office, and some work has been delayed to an unknown time. Everybody tries to find their own way to fix it. The way of fixing those breaches of our lives shapes our path to a stronger, safer, healthier, and equitable world. Two of us have chosen a path to gather some science passionates to publish a science magazine. We believed in them as they believed in. As science magazine club students, we have been working for months to create a structure and content for a sustainable, trustable, and inspiring journal from scratch. That tireless work is what this issue is all about.

We wanted to provide you with various parts of the science with the X-cited science magazine. This magazine will be released monthly, and it has different types of categories such as today's news, articles about several topics, and interesting facts that maybe you have never heard of.

We hope our magazine will help you to be full of hope, science, and curiosity!

In our first issue, we gave a place to our conversation with Derya Akkaynak, who has an essential role in finding the exact color of underwater creatures, and she shared how she goes through with her marine studies.

Finally, the light at the end of the tunnel was not so bright when we had started our journey. Now, our light can reach your eyes from your screen. It's been a rough year, but it's also a season for hope.

We hope our magazine will help you to be full of hope, science, and curiosity!

Enjoy your reading,

On behalf of the X-cited Editorial Team,
Aylin D.

Science & Culture

Cosmos: A Spacetime Odyssey

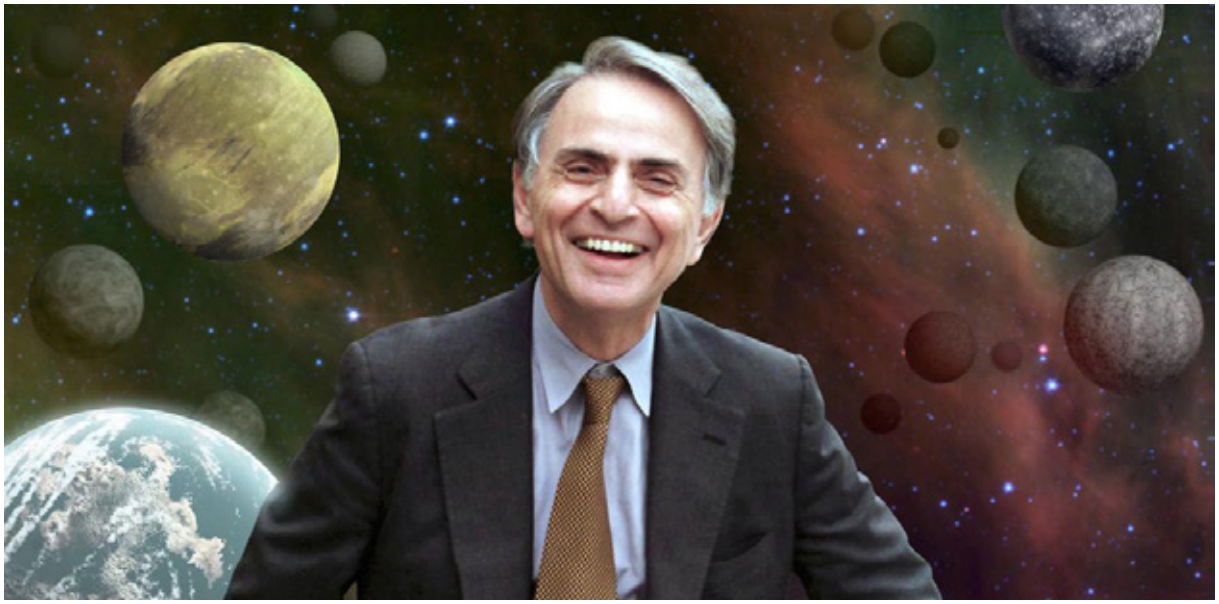
-

By Emre Deniz Y.

"Imagination will often carry us to worlds that never were. But without it, we go nowhere."

Carl Sagan, Cosmos

Have you ever wanted to learn more about the infinite and mysterious space? Well, you are in the right place then. Carl Sagan -an astrophysicist who made lots of generations to love astrobiology, astronomy, and more- published a book called COSMOS. Everybody must have heard about this book because it's not a boring textbook; instead, Sagan tried to explain the Cosmos in a very entertaining way. Then, he decided to make a documentary about Cosmos in the same year he published his book, in 1980. The documentary is called Cosmos: A Personal Voyage; in this passage, we will talk about the follow-up of the documentary Sagan presented and wrote, Cosmos: A Spacetime Odyssey which was presented by Neil deGrasse Tyson. However, you should check out Cosmos: A Personal Voyage.



Publication Date:
March 9, 2014

Seasons, Episodes:
1 season, 13 episodes

Presentor:
Neil deGrasse Tyson

Broadcasted Channels:
National Geographic, FOX Company

Rating:

IMDB 9.3/10
Rotten Tomatoes %95

What is Cosmos?

You may be asking: What is Cosmos? First of all, good question; even if people have heard this cool word, most of them don't know the meaning. The cosmos is basically the universe, but why do we use the word cosmos instead of the universe? Cosmos means seeing the universe as a coherent, complex whole. We know you might not understand it, but that's why we recommend you to watch Cosmos: A SpaceTime Odyssey!

What is good about this documentary? Isn't it a documentary? It must be boring.

Well, if you think like that, please put down the magazine right now. Just kidding, don't! We're here to show why it's good. The first factor is Neil deGrasse Tyson. This man will amaze you with his insight and thoughts about the topics discussed in the documentary. He explains everything in a humorous way. He is kind of your super uncle who tells you very cool stories, but this time the story is about the universe. You might think that the documentary is all about the cosmos. Fair enough because we've been talking about the cosmos. However, in this documentary, you will also see some branches of science and real history. For instance, you will see the cool-haired physicist who discovered gravity, another cool-haired physicist who found the theory of relativity, astronomers like Galileo Galilei, Johannes Kepler, and more.

One of the most important and interesting things that makes this documentary different from any other documentary is the spacecraft that transports you literally everywhere in the universe while you are sitting on the couch. Sounds pretty awesome, don't you think? Be ready for space clusters, colliding galaxies; be ready for the exploration of the universe revealed by science.

Science Talk

An Interview with Derya Akkaynak

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On January 6th, we did an interview with Derya Akkaynak who is a mechanical engineer and marine scientist and lives in Melbourne Beach, Florida. We have seen her through her impressive TEDx talk, so we wanted to learn more about it. She shared with us her knowledge about how marine creatures are captured underwater. It was amazing!

Does Urla have any impact on your interest in oceans?

Actually, I was born in 1981 in Ankara, not in Urla. We are from Urla on my mother's side. My grandmother and grandfather are from Crete. I have spent most of my childhood in Urla. This certainly has an impact on my interest in the sea. When I was a child, about thirty-five years ago, in Urla there was still a durable and balanced ecosystem in the sea. I could see dolphins when I left the house and went to the seaside. There were baby sharks. my grandfather used to throw a basket into the sea to catch fish. Within an hour, the basket would be full of shining fish. Now, thirty-five years later, none of these has left. I became interested in the sea after spending time in a completely healthy ecosystem and observing the animals. Afterward, I went to college and studied aeronautics and space engineering. Then, I earned my master's degree in this field and started working. However, my passion for the sea and the feeling of curiosity have never ended. It is indeed based on Urla.

You have a quite successful education life. You studied aerospace engineering at the Middle East Technical University. After graduating top of your class, you started your master's degree at the Massachusetts Institute of Technology. Both of them are highly selective colleges. While you were studying at MIT, what differences have you noticed?

When I went to MIT, one of the most different and difficult things for me was the learning system. When I was studying in Turkey, we were solving a question and looking if our answer was the same as the one which the book has. The most important thing was finding the result. However, when I got into MIT, I understood that the essential thing is your perspective on the problem. No one cares if you have the same answer as the book because in the real world, there is not only one answer. When you're solving a problem or having a problem, you need to somehow find the variables you don't have. How do you do that? How do you think? Which sources are you using for research? When you find a result that is not making sense for you, how do you change your perspective? We don't have this. Maybe we have, but we are not realizing its importance.

Secondly, there are some differences in professor-student relationships. I've always felt like those two cannot be equal in any way. When I started to study at MIT, I understood that they can. It doesn't mean that

students are not respectful to their teachers, or they speak with their teachers disrespectfully, but the teachers have respect for the students. They clearly know that students are not going to achieve something by themselves. I liked this kind of relationship between teachers and students much more than ours.

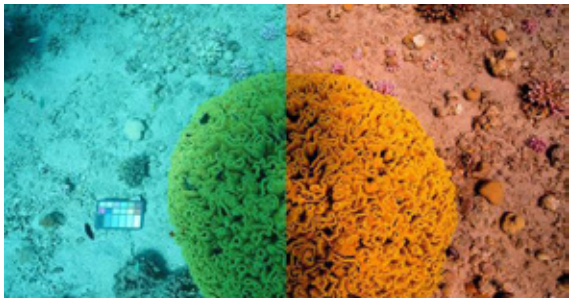
In your TEDx talk, you talked about your father's worries about you becoming a marine biologist. These worries were about financial issues. So, how can the obstacles to science be cleared? How did you go after your dreams without any fear?

After all these years, I can tell you that the university exam is not the most significant moment of life because there is a long time to live. At that point, saying "I wanted to study biology, but now I am an engineer" is not the end of the world. Here is the thing; keep asking yourself what you want to be and even though your dream seems to be far away from what you are doing right now, keep your mind open. During the period, you can be informed about the subject you like and please don't forget that your past knowledge will help you. Nothing has ended because I studied aeronautics, instead, I've had a different perspective. Today, if someone tells you, "Do you want to study insects? Being an entomologist, that's ridiculous!" This shows that the person has less vision. My advice is, never give up your dreams and always go after them. Nowadays, there are electronic devices we can access easily, and everyone can turn their path into the subject they're interested in. If the economic situations have been considered, sometimes it is hard to do what we really want. So, if a person questions the area you are interested in, smile at them, and keep doing what makes you truly happy.

"…If a person questions the area you are interested in, smile at them, and keep doing what makes you truly happy."

We all know Derya Akkaynak for her successful life. But have you ever been unsuccessful? How did you turn your failures, difficult times into successes or new discoveries?

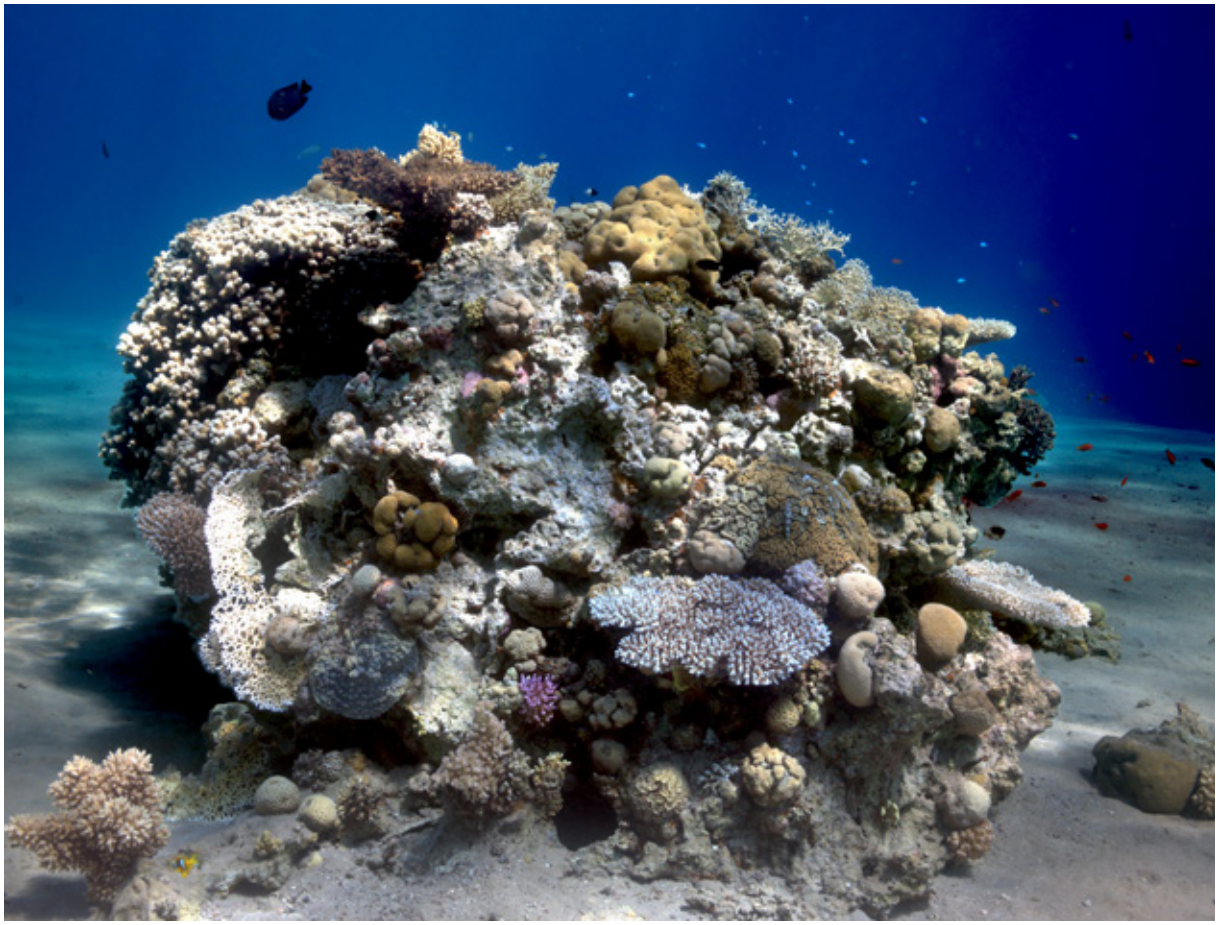
The things you hear, so the news that is released when something is successful, but until I get to that point there are lots of things that I am not successful at. It might be a code that did not work in a project or fund I wanted which I could not get. I do not know if it is a failure or not, but when I applied to MIT and Woods Hole Oceanography Program for my doctorate, I was on the waiting list, so I was not one of the bunch of people who got accepted first, I was a substitute. Then, there was an opportunity, a drop out happened that I was able to start that program. for some people, this is a failure, but if you look at the results, I was ready for all the possibilities, so failure is a part of success. If someone tells you "I always do everything right, I always get all the scholarships, I am always accepted everywhere." it is definitely a lie. There is no such thing and there is no such life for anyone in the world. Let me tell you how to view failure, in order to observe it better we should see it as a game. We were not accepted this year and if we are going to apply for the same thing next year, we have to analyze what we can improve, how we can improve, and how the ones who got accepted did it. Of course, these things that I am mentioning are achieved through effort, so if someone is assigning someone else that might not work. It might not matter how much you have worked, but if we put the effort into something, we will get what we deserve in the end. Therefore, do not ever be scared of failure and no one should get depressed or feel bad. Failure is something that happens to everyone all the time.



How would you explain your algorithm Sea-Thru in the most basic form? How do colors under the water become clearer? What are the benefits of Sea-Thru to the science world?

I would most basically explain it like this; it takes away the water factor underwater. Why is that needed? It is needed because once the light hits the water, it refracts and forms a greenish-blue hue, a haze, just like a fog we would get on land. This haze disturbs the quality of the images taken; thus, we cannot obtain pictures good enough to do a great analysis. It can be said that what I invented cancels out this fog. So, what kind of benefit does it provide for the science community? Well, it has a great effect actually. Let's say that you're a marine biology student working in a laboratory, you most

probably use an underwater camera and dive underwater to take photographs of coral reefs to use in your research. Then, you come out of the water, and now you have to analyze those pictures you took. You have to compare it to other pictures of the same place taken at different times, for example, last year, so that you can make a comparison between now and then, and what has changed. However, you cannot finish this analysis in a short time. It might have taken you half an hour to take those pictures, but it would take you months or even years to fully understand and analyze them all because it has to be all done by hand. There are no automatic systems to work on the pictures. The reason why there is no AI or any other automated system to analyze the photos is because of the disruption that water puts on the pictures. In other words, the fog I just talked about. Now, once you take that haze out all of sudden, the pictures get so much clearer, they look as if they were taken on land. After you get past that disturbance of the fog, usage of AI or any other method gets easy and very fast. In conclusion, it helps to speed up the process, especially the photograph-based research projects, and reach results a lot faster.



"…it helps to speed up the process, especially the photograph-based research projects, and reach results a lot faster."

As you said in your previous interviews, your next research topic will be about the sea creatures' sight of underwater life. But, as you said, this can be affected by their types of eyes, reflected color by the sea (blue-green), and the fog factor. Which types of technologies can be used to find out how sea creatures see the world or how can this research problem be solved?

It's true, let us start with the technology that can't be used. The cameras that we use in our daily lives can't be utilized, because these cameras are made to see as the human eye, but human eye didn't develop underwater. It isn't exposed to underwater conditions and underwater light. Also, animal eyes, for example, turtle eyes include more pigment than human eyes. They can see the ultraviolet waves. Birds can see it, turtles can see it, but we can't see it. For this reason, we can't do research with a machine that is focused on human beings. We have to design and manufacture cameras from scratch. It is both expensive and time-consuming, but only in this way, we can get a little closer to how animals see the animal world. So, we don't buy cameras that are made, we buy sensors, take lenses, and logically work and design new cameras from scratch.

People wonder when this algorithm would become accessible to everyone. Are you going to use this algorithm only for scientific purposes or will you also share it with the public?

Of course, the algorithm will be accessible to the public, a professor who I worked with has an affiliated company, and he and his engineering team try to advance this algorithm at the company. I believe this development process will take at least one more year because We don't have software that can adapt to every situation. instead of publishing an insufficient product and making people have a poor experience, we would rather wait until we have the product that works consistently.

In 2019, you received the Blavatnik Young Scientist award. Who can get this award? Which of your work is related to this?

Well, let me clarify the two categories that this award is given. The first is the postdoctoral researcher category, which is the one I received. The second is given to professors. I state this difference because the prestige of the professor-level award and the prize money given is a lot higher. Who can get this post-doctoral award? Anyone who has at least 4 publications in their field, If the university nominates, can be a candidate for this award. My project that turned into "Sea-Thru" software and has 3 articles behind it, also my work in the field of animal vision. Overall, my general underwater imaging studies. As I said, if you

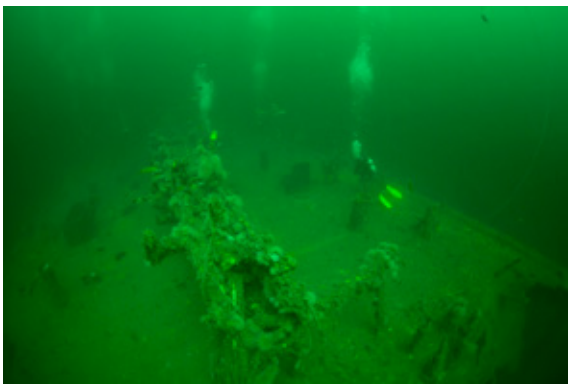
have 4 publications on the same subject, anyone can be a candidate if the university nominates you.

After being granted this award, why did you say: "The only feeling that I had was hope."?

Because these kinds of awards are generally not given to marine scientists, but to those who work in nanotechnology or medicine, or who work with cancer, which directly affect the human body. As a marine scientist, I was very pleased when the school nominated me; but I never thought I would be elected. So, I was astonished and said that I hope this means that now everyone and the science world will take the field more seriously. In other words, I was hoping that the situation that was worsening with the constant warming and pollution of the sea would attract more attention.

Can you tell us about your project called Divers4Oceanography? How does the process continue during covid-19? Do divers earn profit from this project?

The project is made up of volunteers, so it isn't a source of income neither for me nor the volunteers. It works like this: when people go diving, their equipment already takes some measurements. Let's say you are diving in Antalya in some type of location, and date, you record data as "I dived thirty meters, I saw three fish, the location is ..." In these detailed notes there is also data of temperature that your computer already measures. The thing I want most is the temperature data. When people deliver their notes to me, I put those data into a database. This way, this project gives a general picture of the data who dived in Antalya at that point in time, what year, what season, what temperatures they measured. But it has some difficulties, for example, let's say that you didn't set your computer's time on that day or it is still in wintertime, so there is an hour of difference. Or you dived, but you don't want to make an effort by sending it to me, and I will never receive that data. This is called citizen science, data that we are trying to collect with people is actually a difficult thing, but if we can do it right, there is an incredible amount of data. We can collect the data from divers or people that just dive with snorkels, but it is necessary to collect qualified data and to collect data without being a burden to the divers and that is hard too because only the motivated people give their data.



"…I was hoping that the situation that was worsening with the constant warming and pollution of the sea would attract more attention."

So, what do you aim with this project, what do you aim to find?

We as scientists, get funds and with this fund we buy precision tools that measure the temperature, we place these tools into seas, oceans various places. We do this to get the temperature of those places every second, but why? As you know, we are in the middle of a climate crisis, and because of climate change ocean temperature rises constantly. When it increases, the creatures living in the sea get extremely stressed, all their balances get disturbed. Some die, some of their species disappear and some of their populations explode. Then, an imbalance begins to occur. Scientists like us, are limited in the number of measurements we are taking, but as a diver, there are at least ten million people who go all across the world to dive. In addition, someone may pay thousands of dollars to be able to dive in Indonesia. They all have computers in their hands, each computer measures the temperature. But as a scientist, unlike all those divers I can't place ten million precision temperature measuring instruments, because we don't have funds. Let's say that we have funds, but there are many places on earth that we can't go. After all, a person or a hundred people can't be compared to ten million people. Therefore, I want to collect the temperatures in places that we can't go and measure from these divers. How was the sea temperature there that day, how was it when another diver went the next day? This data gives us information about the state of climate change.

Do you think that there are enough opportunities related to marine sciences in our country?

No, I don't think so. My field is a narrow area named underwater screening. In Turkey, there are only a few people who manage to do research related to it. It is hard to sail, dive, buy the camera that is needed to take photos of underwater life, and all that is very expensive. Even the cheapest and simplest camera with the equipment for going diving costs between 9-10 thousand dollars. The high dollar exchange rate is an important problem when we consider that all of the equipment that we need should be imported from foreign countries. Not only the prices of the equipment but also sailing by boat is also pricey. Because of the lack of funds and high exchange rate, unfortunately, we overlook the underwater field. This should change and funds and support of the government should increase. We may take advantage of having a long coast and take a step to improve the field and do more research related to it.

Science Talk

An Interview with Derya Akkaynak

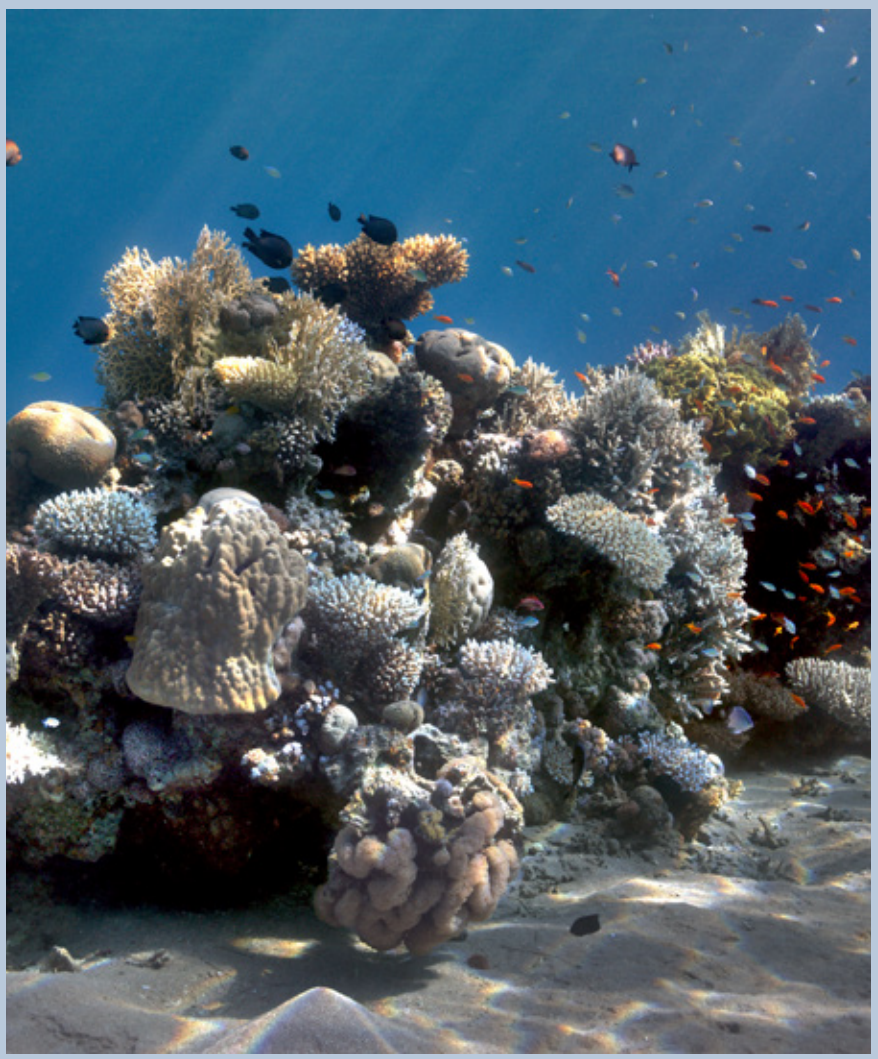
If nature continues to be abused as it is now, how bad will the situation get in the next 20 years and how can we protect nature?

If nature continues to be abused, our future is going to be horrifying. Even now, humanity is in a risky position. However, I'm not sure people understand the seriousness of climate change. the developed countries which harm nature for financial gains. are not the only ones to be blamed. the rest of the developing world also increases the rate of climate change by establishing hydroelectric power plants, cutting down their forests, and polluting their own natural sources. What can we do? First, we need to be aware of the causes of climate change. The main reason for climate change is that humanity emits carbon dioxide into the air as a result of its production and consumption. When we go somewhere with our private vehicle instead of going by public transport, or when we use single-use plastics in our daily life we emit extra carbon into the atmosphere. Subsequently, carbon passes from the atmosphere to water resources. This increases the temperature and Ph values in water resources harm the creatures in those resources. What we can do to prevent this is to be aware of the severity of the crisis and reshape our habits to be eco-friendly. For instance, demanding the use of single-use plastic to be restricted or removed, preferring cycling, or walking to our destinations as much as possible. But of course, the people who can take more effective actions against climate change are politicians. For this, be sure to support politicians who are highly aware of climate change and will actually take action against it. We should not forget that although this is a global crisis, it is also a crisis with massive local effects. As I said before, don't believe anyone who lays all the blame for climate change on powerful nations such as India, China, or the US. Finally, when everything turns back to normal, at the end of each day ask yourself "How much carbon emissions have I caused today?"

Do you have any advice for us to stay productive during the pandemic?

Like everyone, it was quite a difficult time for me. First of all, try to protect your mental health as much as you can. Being deprived of social life by staying at home constantly and trying to continue our education at the same time are not easy things for any of us, above all, it is against human nature.
My advice to all of you is to know that these days will pass and try to protect your mental health. I hope that due to the pandemic, people become aware of the value of nature. I want the quarantine to end as soon as possible so you will be able to take long walks in the parks, watch the birds, take pictures and enjoy the beauty of nature. After

the quarantine is over, you should do your best to enhance the natural beauty of the city life as much as you can. Because if there is no nature, life becomes really tedious.



Portraits

Stephen Hawking

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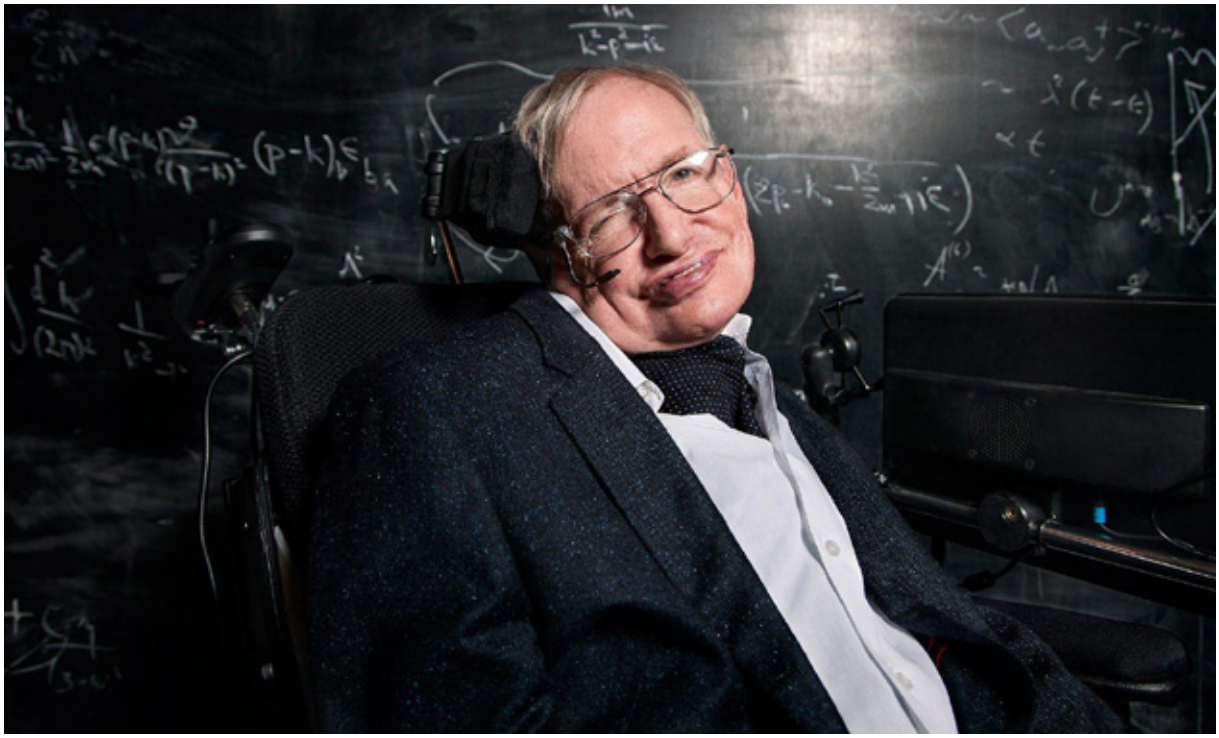
By Burak K.

In this issue of the magazine, we have decided to write about the genius name of the physics world loved and heard by everyone, Stephen Hawking to celebrate his birthday, 8 January 1942. Stephen William Hawking, with his full name, has become a revolutionary name with his work on the origins and structure of the universe, from the Big Bang to black holes.

In this article, his childhood, life, his perspective of life, and what he has done of this genius personality, whose name is engraved in our memory.



Childhood
His parents, who escaped from the Second World War and settled in England, were an extremely curious couple. Hawking, whose parents were Oxford graduates, was lucky in a way. He was born to a family devoted to science. Everyone, even his siblings, would quietly read a book at the dinner table whenever they found the chance.

Besides, being a good reader he was also a talented engineer at a very young age. Indeed, together with their young friends, they created a computer out of gadgets such as a watch and a phone. Therefore, his friends started to call him “Einstein”. He had an overly curious, excited, and restless personality.

At that time, Hawking’s father was hired to lead the Parasitology Department at the National Medical Research Institute. He wanted his eldest child to be interested in medicine, but Stephen Hawking had already had his passion for science and the sky from an early age. His other passion was mathematics. Although he wasn’t very interested in lessons, math was his favorite subject. While thinking about studying math, As the department of mathematics had not yet been opened at Oxford University, his path crossed with physics. This is how Hawking, with his curiosity about the stars, chose to study astronomy, and that was how his paths collided with physics.

Youth Life
Naturally, at first, most people thought that he was fond of classes when he entered Oxford University, but it is a common misprediction about him. He was a true party freak. He loved to dance, he often hung out with new events with his friends. His childhood joy was still on. Of course, this did not mean that he did not attend classes. The more he attended the lectures, the more he became interested in physics.

Some changes had started to emerge in his body around this time. Unconsciously, he was slipping, losing his balance. He did not tell it to anybody, even his girlfriend, though it was getting more frequent. He wanted nobody to be concerned about his balance problem. While he did not want to worry, the place where he opened his eyes was the hospital when he lost his balance one day and fell down the stairwell. The doctors ran extensive tests on it and it turned out Hawking had ALS. (Losing the nerves that control the muscle systems) When he was just 21 years old, doctors said he had a life expectancy of at most two years. His whole life will come to an end at the peak of his life, at the beginning of everything, that’s what the doctors thought.

He had to leave the hospital, according to Hawking. For his life, he had goals. In fact, he said, “I had a very boring life, I didn’t even see

anything worth doing." before he was diagnosed with the disease. He didn't really want to be interested in his lessons. However, right after he learned about the disease, he focused his attention only on research, now he was working much more to answer all the questions he was curious about. Consequently, he began his master's degree in Cosmology at Cambridge University right after graduating from the physics department with a first degree.

Stephen Hawking's Family
Hawking found love at a New Year's Eve party in 1963. Jane Wilde. The couple fell in love quickly, and their relationship soon turned into a marriage. Desiring to start a family, the two had three children: Robert, Lucy, and Timothy. Nevertheless, their relationship continued until 1995, and the deteriorating relationship between Wilde and Hawking ended in divorce. As the two agreed to go their separate ways, Hawking decided to marry Elaine Mason, his nurse.

This marriage was not well welcomed, especially by her kids. His children said that a communication problem was created between them and their father by Mason. Besides that, other nurses were rumored to have abused Mason's husband sexually. Although these events were reported to the police, Hawking refuted these possibilities. Still, their relationship didn't work, and they chose to divorce. After the divorce, he chose to spend the rest of his life with his ex-wife, Wilde.

Scientific Achievements
Theoretical physicist Stephen Hawking pioneered new comprehensions of the cosmos, black holes, and the Big Bang. However, since he was a theoretical physicist, he couldn't win the Nobel Prize in Physics because their theories were impossible to be proven. Nevertheless, throughout his career, he has been awarded lots of awards.

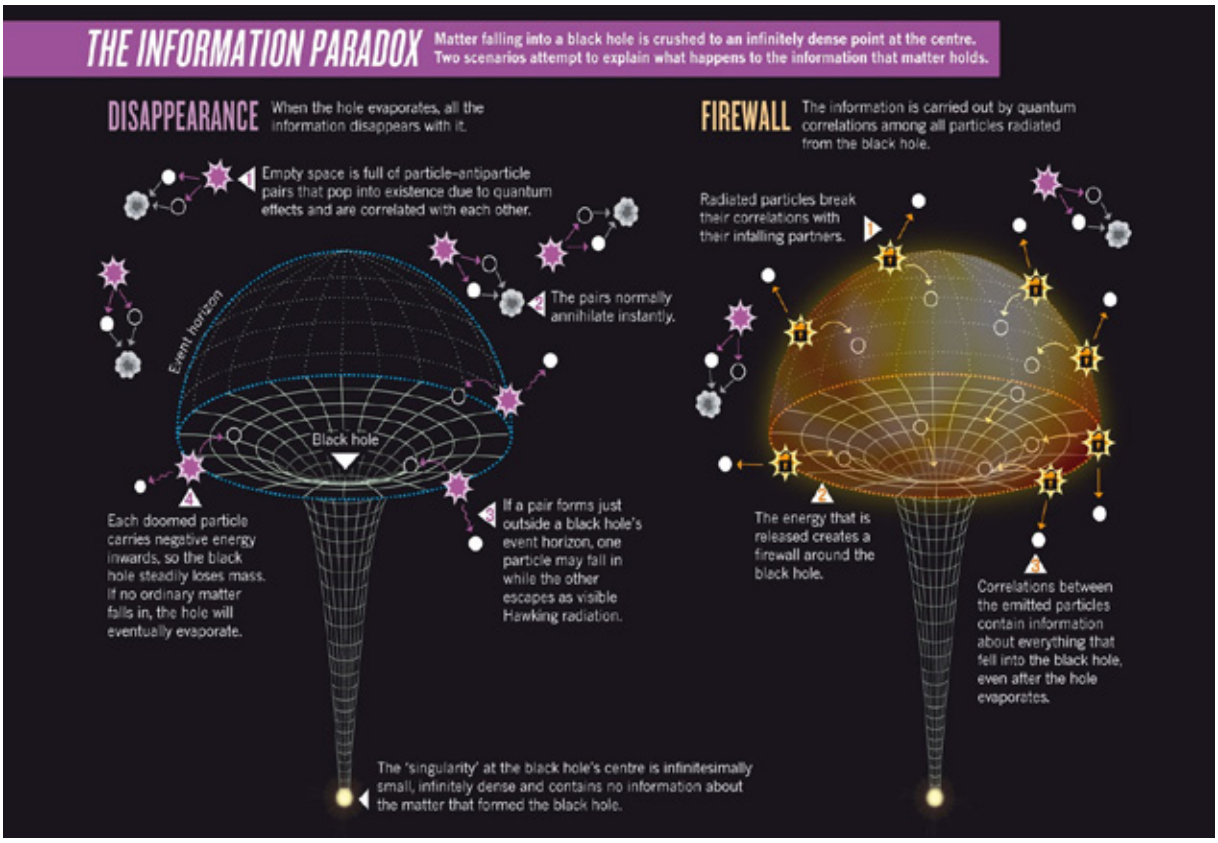
The most significant awards he has been honored with are the Albert Einstein Medal (1979), Wolf Prize in Physics (1988), Prince of Asturias Award(1989), Copley Medal (2006), Breakthrough Prize in Fundamental Physics(2012).

Portraits

Hawking Radiation
Probably, his most important achievement “Hawking radiation” responds to the question “Are black holes immortal?”. Black holes would be immortal if not considered within the frame of quantum mechanics, and this poses a huge problem. Because cosmic bodies (black holes) that live forever are abundant in space-time. Even though they are not very abundant, it is still a problem that they live forever.

Hawking radiation is black-body radiation that is the thermal electromagnetic radiation within or surrounding a body in thermodynamic equilibrium with its environment, emitted by a black ody , due to quantum effects near the black hole event horizon. (Event horizon is a boundary beyond which events cannot affect an observer.)

Firewall Paradox
Though Hawking radiation resolves a lot about the universe, still it creates a lot of problems about what we know until now. Because of Hawking Radiation, blackholes lose mass and gradually evaporate away. This evaporation causes a paradox: everything that passes through a black hole will appear to be lost forever, breaching “unity,” a core quantum mechanics theory that claims that the present always retains past information. Consequently, paradox leaves us to deal with questions such as “could “Hawking radiation” information be erased? , and if not, where does it go? The destruction of knowledge, if it is true, would make our most basic scientific paradigms to be rewritten.



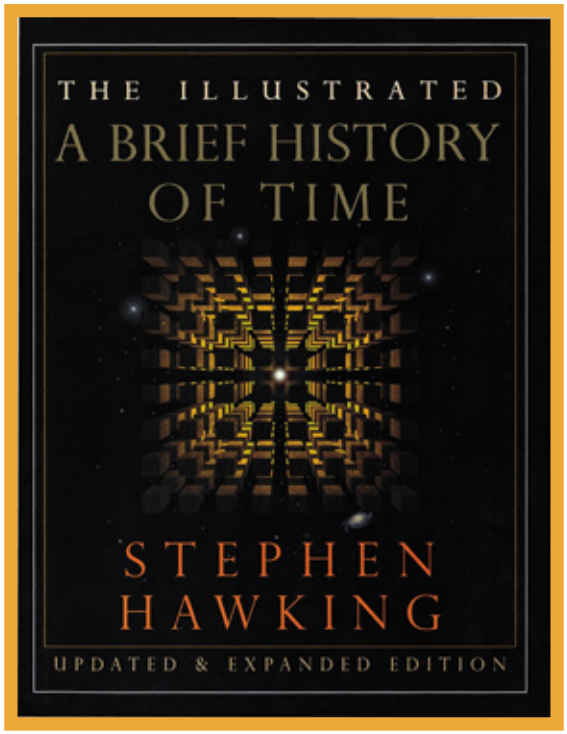
Big Bang Theory

In the 1960s, while Hawking was writing his Ph.D., scientists were still discussing an alternative model called the "Steady State Model" which is an alternative theory of evolution of universe. However, there was a major handicap in the Steady State Model which is attempting to remove the concept of singularity in cosmology, something many claimed was not possible. Back then singularities were regarded as deficiencies of the forecast of general relativity and not approved by the established laws of physics.

The universe is infinite in the Steady State model and does not have a beginning at all. Its natural inflation can be understood by applying Einstein's equations to a "creation field" or C-field, which would mean that matter is constantly produced in the space between galaxies as they go further away from each other.

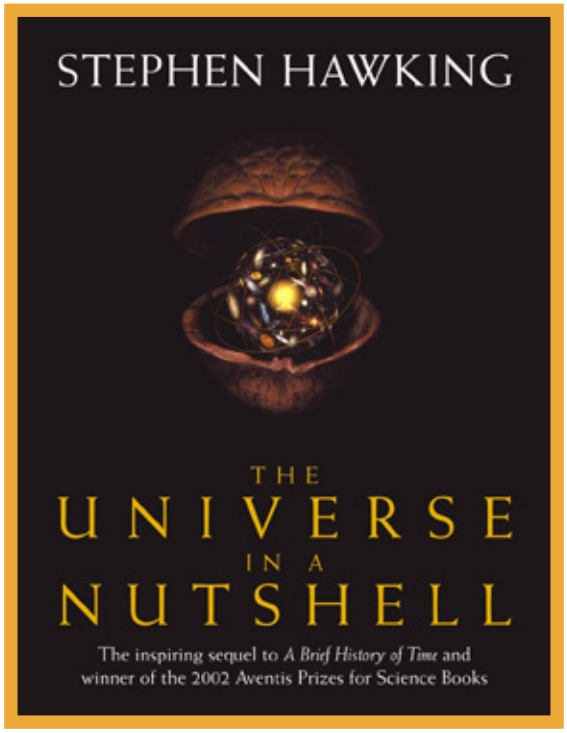
What Hawking accomplished afterward was what is regarded as revolutionary by many. He mathematically demonstrated, based on the works of fellow scientist Roger Penrose, that singularities were not a deficiency of theory, but required characteristics of existence.

Stephen Hawking's Books
Throughout his life, he wrote 15 books. The most popular among them are: "A Brief History Of Time", "The Universe In A Nutshell", "The Grand Design".



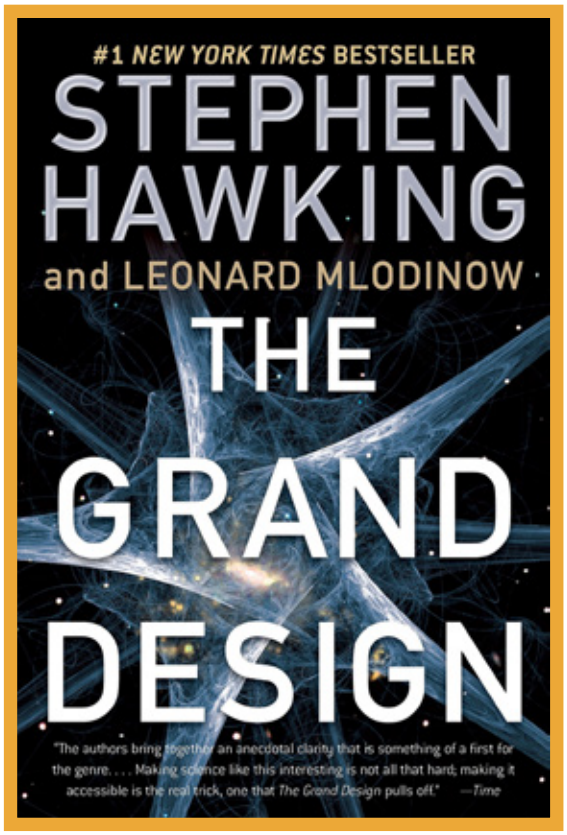
"A Brief History Of Time" was published in 1988 and gave him a worldwide reputation with its simple language and enlightening content. It has been translated into more than 40 languages and sold millions of copies. Even though "A Brief History Of Time" was written in simplistic language, still concepts in the book weren't understood easily as Stephen Hawking imagined.

Subsequently, he published another book "The Universe In A Nutshell" to make more people comprehend the important theories of cosmology. This time he Presented the ideas with a nicer guide and with more explanatory images.
"The Grand Design" was published in September 2010. In his book



“The Grand Design”, he opposed the idea that God may have created the universe. Conversely, Hawking previously mentioned that belief in a creator may be compatible with modern scientific theories. But contrary to what he had written until then, in this book he concluded that the universe was an inevitable consequence of the Big Bang physical laws and not God.

On March 14, 2018, he passed away. Rest in peace...



Science Check

Who discovered the real pathogen of the common illness: Ulcer?

A personal sacrifice, medical mystery, and Barry Marshall

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By Selin Z.

By the 1980s, in medical schools, the main cause of gastric ulcers was taught was thought to be stress. However, an altruistic physician named Barry Marshall was skeptical about the bacteria Helicobacter pylori as a cause. Because of the common belief that there are no bacteria with the ability to survive in the strong stomach acid, his hypothesis has drawn reaction from the science community. Regardless of the health risk, Marshall drank the h. pylori culture to prove and find the true cause of ulcers.

His pathologist colleague Robin Warren noticed a group of bacteria in the biopsies of his patients with gastric ulcers. After becoming interested in Warren's discovery of colonies of an unknown bacteria, Marshall and Warren came together to work on the diagnoses of patients and culturing the organisms. Marshall realized that the spiral-shaped bacteria that they saw under the microscope were very similar to the Campylobacter organism which is also known as Helicobacter pylori today. Back in 1875, this type of bacteria was also noted by German scientists. However, their discovery was forgotten since they did not have enough opportunities to grow bacteria in a culture.

These two doctors' study claimed that the existence of the bacteria h. pylori in the stomach leads to the inflammation of gastric mucosa which then causes the ulcers. But, this theory was rejected by scientists. The medical world insisted on considering the stress as a cause rather than recognizing this study conducted by Warren and Marshall.

Because of not having an animal model to prove their hypothesis that h. pylori were the pathogen of ulcers, the desperate Doctor Marshall carried the experiment on himself. After drinking two culture plates of the bacteria, he has shown some symptoms like nausea and vomiting, having difficulties while breathing. Ultimately, after eight days, he caught the ulcer. This personal sacrifice proved that h. pylori, which was able to resist under the stomach acid, was the pathogen. Because the real pathogen behind ulcers was bacteria, Marshall was able to treat himself with antibiotics.

Warren and Marshall found out that the ulcers can be cured with the elimination of h. pylori from the body. The treatment, eliminating the bacteria was possible through the use of antibiotics. Thanks to their discovery, the ulcers were no longer a long-term disease without a cure.

Finally, their remarkable discovery that h. pylori cause gastric ulcers was accepted by the National Institutes of Health in America.

For the study that they conducted, Barry Marshall and Robin Warren were awarded the Nobel Prize in medicine/physiology in 2005. Marshall is now 68 years old and a clinical professor at The University of Western Australia. Moreover, he is the director of The Marshall Centre for Infectious Diseases Research and Training, working on a vaccine for the coronavirus. Warren is now 83 years old and spending time with his hobby, photography.

Spotlight

COVID-19 Hospitalizations Can Be Decreased by Monoclonal Antibodies

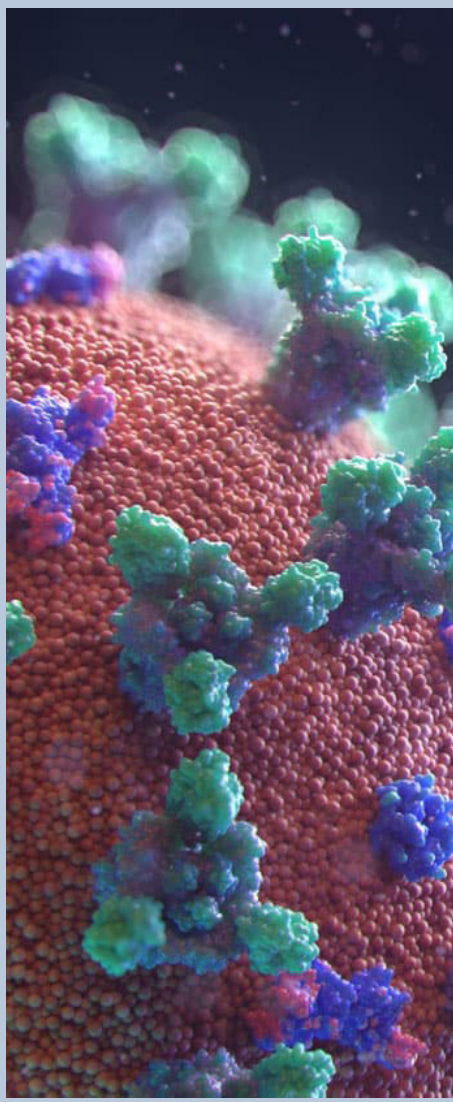
-

By Aylin D.

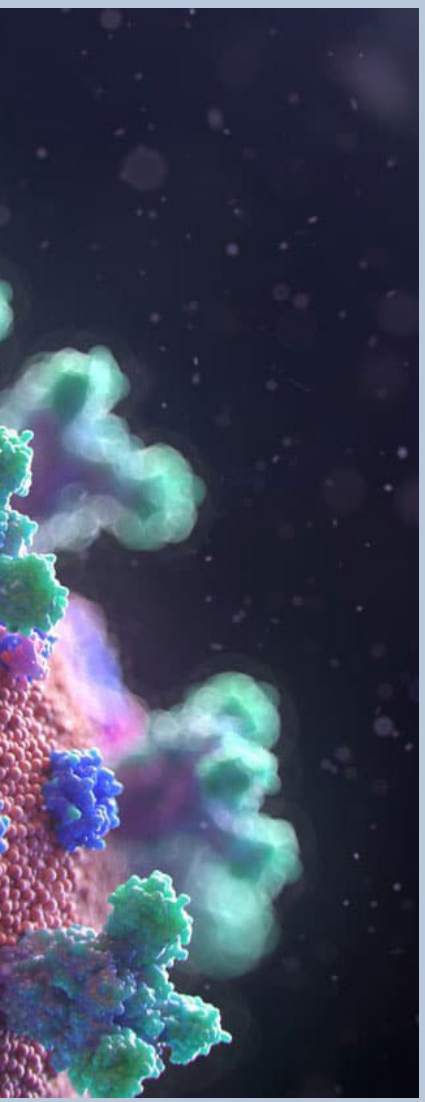
Nowadays, scientists are trying to find a way to cure COVID-19. There are some possible treatments to reduce coronavirus hospitalizations such as monoclonal antibody drugs and a placebo.

A monoclonal antibody is an immune response that concerns only a unique antigen and it is used in treatments or diagnostic tests. These antibodies can be manufactured easily in laboratories. Monoclonal antibodies for humans are produced by the cell culture taken from a person. The results of the first monoclonal antibody medicines are tested on humans. The phase 2 clinical trial shows these drugs can decrease the need for hospitalization rather than a placebo for people who have COVID-19 symptoms.

The healing plasma treatments are conducted by giving lots of antibodies from a recovered COVID-19 patient to a normal patient. Even though this treatment seems useful, its authorization has not yet been accepted and advantages are not certain. Eli Lilly's monoclonal antibody which is called LY-CoV555 requires a targeted treatment and it has a regular dose that can be increased. This medicine holds to the SARS-CoV-2 virus that blocks from infecting the cells. The other antibodies also bind to the virus, but they can't prevent the infection.



First Report of Human Monoclonal An
Biopharma, 2020.



tibody That Blocks SARS-CoV-2,

COVID-19 Patients' First Antibody Trial Results

Reports show that 5 people ended up in the hospital out of 302 patients. This number is 1.7 % of the total. However, people who took a placebo ended up in the hospital more. According to the results, 6 out of 150 patients ended up in hospital which corresponds to 9 % of the total.

Enrolled 450 patients are divided into groups in itself; there are three different doses for three different groups. These doses were 700, 2800, 7000 milligrams. Finally, according to the results on Day 29, the dose with 2800 mg seems beneficial and its reactions appeared at the end of Day 11. According to Eric Topol, who is the director of Scripps Research and Translational Institute, even though these monoclonals are expensive, they can make a significant change in the world.

In general, these kinds of programs last for years. However, the CEO of Abcellera, Carl Hensen, told The Scientist that the clinical trials had been carried on by the companies in just only three months.

Moreover, Science informs that most risky patients are the ones with high body mass index and old age. If someone has one of these risk factors, it is highly possible that COVID-19 complications can exist. In the future, the company suggests providing LY-CoV555 to people who have a greater risk of COVID-19 complications in the population.

Light-Bulb Moment

Have You Ever Heard of These?

Why do cartoon characters have four fingers?

By Selin Z.

You might have noticed that most of the cartoon characters have four fingers. Have you ever wondered the reason behind it? Firstly, compared to a five-fingered hand, it is much easier to draw a four-fingered hand. Besides, cartoons are mainly based on rounded geometric shapes which lead to problems in the process of designing hands. Back in the 1900s, animators had to draw generally 12 pictures by hand to produce only one second of the animation. Since drawing and animating a hand was considered a challenge, at that time cartoonists, were even concerned about reducing a finger to save time and money. Today, this animation technique still continues despite developing computer animation. Another reason behind the use of this technique is to prevent the cartoon characters from becoming realistic or looking like humans.

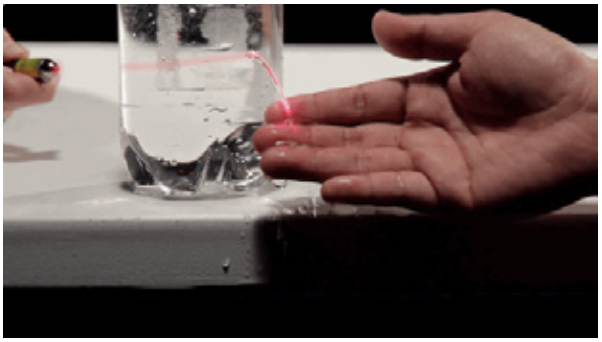
Are birds electricity-proof?

By Mustafa Y. K.

Birds are not affected by electricity, because birds are made of cells and tissues. These cells and tissues do not provide the electricity in the wire with an easier route to travel than the one it is already on. If there are birds on an electric wire that aren't getting shocked, it means that birds are not a good conductor of electricity. This shows that birds don't allow the electricity to flow from the wire into their own body, that's why birds are able to sit on electrical power.

Can you trap lasers?

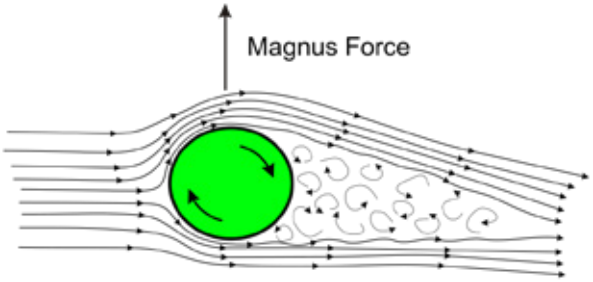
By Duru E. C.



Lasers can get trapped in a waterfall, crazy right? While the laser light linearly passes through the water, when the water flows or when there is a waterfall, it is trapped in the water instead of continuing to run linearly. Because of that, it follows the water's direction. This situation occurs because of total internal reflection. Total internal reflection happens when a ray of light reflects from surrounding surfaces like water or glass, with complete reflection. Also, this phenomenon happens when light travels through a dense material to a material with less density and crashes its border.

Is a ball able to fly?

By Duru E. C.



If you spin a ball as you drop it, it flies. Maybe you have heard of it before, but if not, you can read this explanation and learn it today! Speed of fluid(liquids and gases) molecules is a phenomenon which affects pressure. If you spin the ball while releasing it, the movement of air molecules in front of it creates a difference in pressure on both sides of the ball. Because air molecules in front of the ball move in the same direction as it rotates, the ball will be pushed back by air. Vice versa, on the other side of the ball, the spin direction of the ball and air molecule directions are opposite. The speed of air molecules will be less on this side. Therefore, the situation creates more pressure under the ball than the pressure on it because of the speed of air molecules. And it forces the ball towards upward due to unbalanced forces on it. We call this effect the Magnus effect which is named after Heinrich Gustav Magnus, the German physicist who established it..

Light-Bulb Moments

Did you know that we use the left and right sides of our brain for different purposes?

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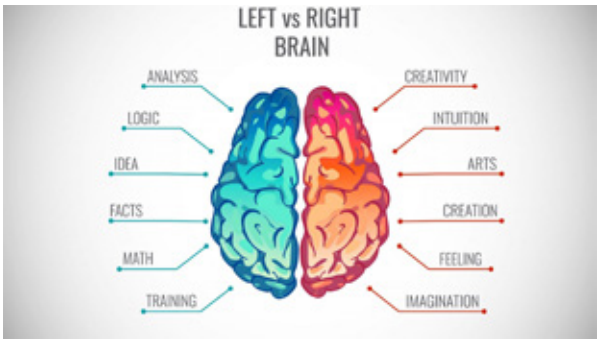
Mustafa Y. K.

We use the left side of our brain for remembering a word or activating a region. However, the process of remembering an unknown face is controlled by the right side of our brain. Additionally, both the left and right sides of our brain become active when we try to remember an object. For example, there is a thief and the police are trying to find him. When the police try to remember the thief's name, the right side of his brain works; when the police try to remember the thief's face, the left side of his brain works.



Who does have more bones: babies or adults?

By Zeynep M.

A normal adult has 206 bones in their body, a lot of people know it. However, the strange thing is a normal baby has around 300 bones. Yes, you heard it right. Babies have nearly 100 bones more than adults. How does that happen?
If we look at a newborn baby's skeleton, we would see that it has more than 300 parts, which are made of cartilage. A skeleton that is made by cartilages helps the body to be more flexible, and that flexibility helps the baby and the mother at birth.
As babies grow, most of the cartilage turns into bones. While that is happening some cartilage come together and fuse to become a bigger bone. So, this is why the number of bones decreases until the end of the children's physical development.

Time-Machine

JANUARY 2021

Monday	Tuesday	Wednesday	Thur
28	29	30	
04	05	06	* Tesla, who design first alternating cur motor, died in 1943
11	*In 1908, a wireless message was sent long-distance for the first time from the Eiffel Tower in Paris. 12	*In 1610, Galileo Galilei discovered the fourth moon of Jupiter. 13	
18	*Birth of James Watt! (1736) He was a Scottish engineer and inventor whose steam engine contributed substantially to the Industrial Revolution. 19	20	
*Birth of Isaac Newton! (1643) 25	26	"*Birth of John Carew Eccles(1903) John Carew Eccles was an Australian physiologist who shared the 1963 Nobel Prize for Physiology or Pharmaceutical for his revelation of the chemical implies by which driving forces are communicated or quelled by nerve cells." 27	*Birth of Robert Wi (1922) He was an A chemist sharing the in Physiology/Medi

Time Machine

sday	Friday	Saturday	Sunday
31	* Birth of Satyendra Nath Bose! (1894) He worked with Einstein in developing a theory regarding the gaslike qualities of electromagnetic radiation.(Bose-Einstein consendate) *Edward Joseph Hoffman was born in 1942. He invented the PET scanner that locates cancer cells in the body. 01	* In 1959 Soviet Union launched Luna 1, the first space craft that went near to the moon. It became the first manmade that entered to the Sun's orbit too. 02	03
ed and built the rrent induction 3. 07	* Birth of Stephen Hawking! (1942) 08	09	* In 1911, the first photograph from an airplane was taken in the US. 10
14	15	16	17
21	22	23	24
lliam Holley! American natural e 1968 Nobel Prize cine. 28	*Birth of Lewis Frederick Urry! (1927): He was a Canadian-American chemical engineer who prepared the ubiquitous antacid batteries and then lithium batteries. 29	*Birth of Rudolf Ludwig Mössbauer!(1929). He is a German physicist and co-winner of the Nobel Prize in Materials Science in 1961 for his research on the echoing of gamma rays and their disclosure in this relationship, the Mössbauer effect. 30	31

Bibliography

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