

Chemistry ISU

Articles (Scientific Americans)

AFRICIUS C.M Tan
Mr. Jason Ellis
Period: 4
30th September 2002
SCHOAc

Journey to the Farthest Planet (Pluto)

Summary

The once most deserted and isolated planet in our solar system has provide new insights for astronomers. Recently, astronomers have found out that the planet could provide clues that scientists could obtain revelations in the history of our solar system. Astronomers have discovered a swarm of comets (around 100 000) orbiting the planet which came to known as the kuiper belt and that they have not identify the frequent faint objects hurling towards and orbiting around the planet. The amazing Hubble Space Telescope could only provide blurred image of that region and the planet. Pluto has one satellite Charon, which is half the planet's size. One thing peculiar is the vast differences between the planet and Charon is the unique appearance and their bizarre atmosphere. Astronomers said that Pluto is made up of water ice and essential gas for life to pervade, which they conclude Pluto and Charon could somehow provide critical information of evolution and science and the concepts of binary world and stars. Now, NASA has planned to learn about this discovery but is cancelled due to the staggering amount needed to run the program. NASA was not without supporters and was opened to universities and institutions to compete in coming with the fastest, feasible and lowest cost in making this program 'alive'. Last November, NASA had finally chosen a team comprising various universities and institution called New Horizon to study the region and the planet. The craft they are researching will be launched in 2006 and reaching Pluto in 2015 taking the shortest route when the planets are in their 'right position'. In this program, New Horizon spacecraft will also study the moons of Jupiter before venturing into kuiper belt.

Reflection

I think when there is a will, there is a way. One must always take the lead to make miracles or something to happen. Even though the program requires close to a billion, I think it is all worthwhile. It could provide important information and findings which we never would have known if the mission was abolished. Or miracle might happen that the craft indeed found life or strange mysteries there. One would never know if he does not try. Since the kuiper belt (KBO) holds the key to how our solar system is formed, it is wiser that the mission should be done at the quickest possible time regardless of cost and disagreement. I deeply hope that the New Horizon research program will work out the way that it is and that we can all learn something new from the journey no man has experience before. But one thing I asked was that is the team sending only one spacecraft to the unknown? What if the craft was destroyed by some meteors or comets due to some miscalculation? The whole mission they have been craving for years is gone. But we sincerely pray such thing never happen.

How to Build a Time Machine

Summary

Einstein's theories of relativity clearly shows that time indeed could be altered. In the proposed theories from scientists, 'twin paradox' and 'Jet Lag' are the only alternative way to alter time in reality. Only objects reaching close to speed of light or under massive gravitational force (a neutron star) could be time travel a reality. Such explanations are plausible under the hypothesis drew from Peter Bollinger creator of the 'wormhole'. A wormhole is considered a time warp or a 'short-cut' between two spaces and it could only be the time machine so far. Wormhole (relic left behind the big bang) are scattered throughout the universe and that it could be 'adjusted' to useful size that allows time travel to take place. A towing spacecraft could change the direction of wormhole and position it towards a neutron star whereby the gravity of the star causes time to pass slowly. At the entrance or exit of the wormhole, the two observers will either jump ahead or leap back in time depending on the distance between the two holes. In another theory proposed a plausibility of time travel denotes a 'notorious paradox' whereby a 'billiard ball' is shot into a wormhole, traveled back in time, came out from exit and hits earlier self and prevent it from entering. But Stephen W. Hawking proposed a 'chronology protection conjecture' whereby certain attempts to alter the past is restricted due to reasonless explanation based on realism prospective.

Reflection

I think that time travel will be extremely difficult to achieve but not impossible. Based on Einstein's definition of time and space and the numerous theories proposed by famous scientists, it is not surprising to say that time travel is indeed possible in a sense that such 'upheaval job' could not be put in realism in the present but at least for centuries to come. It would be fascinating to know that such thing is indeed happening and that we could return to the past or to the future. Based on the profound statement Stephen uttered 'chronology protection conjecture', what if a person really changes the past, how could the 'restriction' be put to prevent the person from doing it? And if a person leaps into the future and learns the things which we humans are going to learn in the future, isn't it true to say that we human has a 'made systematic course' ahead of us and knowing it in the matter of time? Then, is 'faith' the word to answer these mysteries? Even from all the scientific explanations proposed in making time travel a feasible act, then are the questions above satisfy the act? I would want to know.

Interview with Ross MacPhee

Summary

The long forgotten 'Mammal era' has begun to take its toe once again in this world. Ross MacPhee has given a new fundamental theory to propose his ideas that the once mega fauna in the Pleistocene was indeed wiped out by hyper lethal disease from human beings. The mammoth domination first occurred in the tropics of North America and was extinct due to arrival of the first 'band' of people who brought about these new diseases. The tragic extinction not only occurred there but other places where humans had set foot on. Considering over killing might be the ultimate cause of extinction, humans only does it for purposes and specific objectives. It will not affect their population sizes. The only plausible explanation to the mass destruction of mega fauna can only be something incurable and widespread. This is not done by nature but comes to a conclusion that human were the ultimate creators of these deadly diseases such as the *Culex* which wiped out the Hawaiian honeycreeper and the chytrid, which caused the golden toad in Australia to extinct. These "seeking prey" virus attacked several regions with mega fauna more prone to the diseases (pathogens) while others were more resistant or host tolerant or that pathogens had already been present in the region will not be affected. These massive killings had only left wolves, elk and moose to survive until present. In order to justify that diseases indeed cause the 'havoc', visualizing PCR (polymerase chain reaction) under which if a pathogen protein is positive in fossil tissues, conclusion could be drawn that disease was the only logical explanation towards the extinction of the mega fauna.

Reflection

I think Ross MacPhee clearly stated that mega fauna was wiped out not because of their domination over the skilled hunters (humans) but from the diseases that roomed the world 100 centuries ago. But there is one thing strange. If there were millions of these mega creatures that ruled the world long time ago, couldn't their trace of evidence be obvious. There were very few sightings of these mega fauna 'bone yards' compared to the numerous sites of the dinosaurs. One will then conclude that the humans were once savage hunters, brutally killing the mega creatures in mass numbers to gain their dominance over the land. And that they see killing the only way to ensure their survival. The 'remnants' of the creature may be exploited by these hunters who will then make into useful tools and weapons which they could hunt again. This does stretch plausibility. Since hyper lethal disease was the cause, what were introduced to human that made him capable of introducing new diseases? How all these diseases do came about in the first place? Who was the actual ultimate creator?

Why Go to Mars?

Summary

For decades, people have talked about manned missions to Mars in search of life that could answer the biggest question in the world, “is there life out there”? Well, everything is changed when scientists discovered that water exists in that cold planet and seemingly approved by the canals observed by The Surveyor last year. So, beginning the greatest adventure of space exploration, NASA is planning to send humans to Mars and to find out whether life indeed exists there. Such tremendous mission would require humans to facilitate and accomplish more quicker than robotics mission, argue by most scientists as humans would require to only find life in a deeper scale by retrieving critical samples kilometers down than a few meters which life form mostly, would be destroyed by UV radiations and hydrogen peroxide. Such objectives would be too much for robotics mission. But manned mission will cost 10 times more than a robotic mission but the results we get will be enormous. Studies showed that manned mission requires approximately 55 billion and that NASA will look deeper into this program. In order to ‘understand’ exactly how the red planet is liked, scientists have begun studying the Canadian Arctic which has similar geographical features and ‘world’ like Mars. Scientists will also be trained under its inhospitable climate and perform scientific evaluations. In the mission, astronauts will be driving in versatile rovers and collecting samples at the same time.

Reflection

I think that life exists on Mars. It is hard to figure out life would pervade in that harsh planet but based on I have learnt, I still think life does exist, not only in Mars, but other satellites of other planets in our solar system. I do not think that if life form or evolution indeed exists on other places would basically advance itself into intelligence or capable of asking similar questions as we do. There could be microscopic organisms which could be the 'species' entire evolution compared to the animals and birds of earth or could there be life which exists in space alone, in vacuum, we don't know either. Our solar system is so huge that we only covered or have learnt a tiny area of it. Like Arthur C. Clarke said in his story 'THE GARDEN OF RAMA', "the entire set of knowledge in the human domain, everything that any member of the human species had ever learned or experienced, was no more than a single grain of sand on the great beach representing everything that had ever been known by all the sentient creatures of the universe". Life could be present in many places. If our solar system which was formed from the big bang would have easily spread its 'seeds' which begin evolution in that particular place and the 'seeds' could also have scattered throughout our solar system and nearby stars. So, I think space exploration presently is still at its infant state and that there are still so many things to learn about before we can find life out there in the unknown universe.

Hope in a Vial

Summary

The deadliest virus in earth presently, AIDS have claimed over 3 million lives last year. Gregg Gonclaves, an AIDS expert has begun his trial in search of AIDS vaccines in his second scene. HIV (retroviruses) is hard to deal with, invading and mutating at alarming rate that stuns our immune system before our antibodies could identify the cause. The first potential vaccine is known to be gp120, a made protein that is absorb by cells that immobilize the membrane of HIV that cause itself to mutate and 'breed'. This vaccine activates our immune system that could attack the virus before they enter in our bloodstream. The results of this experiment which is being tested in over 10000 people will be announced at year end. AIDS researchers are confident as gp120 gives an 'unpleasant' respond which cause confusion to HIV without eliciting the immune systems. Still not encouraging enough as it provide 'feeble' protection, a new gp120/canarypox vaccine is created consisting solely of DNA and HIV gag gene (adenovirus). Cells take in the gene will produce a more robust response that causes the cytotoxic T cells (white blood cells) to attack. Studies showed 44% to 67% of people receiving such doses of vaccines have generated the immune systems. Even though the immune systems have been activated, antibodies continue to identify the virus or try to attack it which could cause the adenovirus to perform poorly or will be affected. Researchers will have to find a way to prevent the antibodies from acting and also to separate our immune systems and cytotoxic T cells from it. Scientists have classified AIDS dependency ratio into 5 clades comprising five main places with most number of AIDS patients. Scientists say that vaccine that work for certain clades could not be use for the other as the virus could be somehow different. Researchers are beginning to create a vaccine that could work for all 5 clades but side effects are still evident.

Reflection

I still doubt that the vaccines will work by the end of the year. The results shown were not very confident and risks of side effects are still at stake. I hope that scientists should conduct more experiment and research deeper before they conclude that they have found an AIDS vaccine. How could a vaccine that only provides 30% to 50% protection be on sale? There is one in every four African contracting AIDS and that is a staggering amount. I think that the international AIDS society or what so ever AIDS researching association are progressing very slowly in terms of their fundamental scientific research which often yield a negative result. It has been almost 20 years since AIDS was first discovered and there is still no sign in which AIDS could somehow be stopped. Is the virus really that difficult to deal with? I think there must be a reason behind why scientists 'refuse' to find a cure to AIDS. It will be a great rescue for the innocents who contracted AIDS when they were born but also, just think what the world might become if there is a vaccine or cure to AIDS? There will be immorality everywhere. People will be into indecency, drugs and sexual 'play' which slowly will debilitate humanity. Given that it could save millions of people around the world, I still wonder whether should an AIDS vaccine or maybe a miracle that happen which cure AIDS should save the AIDS patient or be known.

Where Are They?

Summary

Are we alone in this universe? Scientists are certain that over 100 billion stars exist in our galaxy and 20% of them have orbiting planets. Evolution might be scarce and even if so; it will inevitably cause the species to become intelligent and asking similar questions as we do. Enrico Fermi proclaims shouldn't their existence be seen and where could they be? These questions have become to known as Fermi Paradox. For decades, SETI (search for extraterrestrial intelligence) have been trying to detect signals from the nearby stars but to no avail. Scientists expect at least one obvious 'detection' within 1000 light-years away. Since our galaxy is formed 12 billion years ago, evolution should and must have or presently pervades. Scientists estimated that civilization abounds for 1000 years or so, there will be 12 billion civilizations since our galaxy is formed. But shouldn't their trace of evidence be obvious? Scientists have come out of four main reasons to justify the mysteries of ETs. Perhaps space travel for that civilization is infeasible even if they want to or if so, they wouldn't wish to travel. It could also be that they are seeking 'where they belong' but have not reached us yet. If there is an advanced intelligent species, it could have colonized the entire galaxy giving no hope for other evolution to take its place. Studies showed that if colonizing were to take place under which 'colonies' are 10 light-years apart, establishing itself and sending out colonies takes 400 years, then the entire galaxy could be colonized in 5 million years. Fermi paradox also presumes that the sequence of evolution not occurred in a single period of time but as a random of 'rise and fall'. Even if evolution does exist, micro organism or variety of creatures that formed which will not advance itself to intelligence as what we seen from dinosaurs is more reasonable as intelligence species might be extremely scarce. William Whewell proclaims that if humans are the most advanced species that exists, it will be our destiny to colonize the galaxy.

Reflection

I think based on the wholesome scientific movies and articles presented; people would definitely say that we are not alone in this universe. The theories scientists proposed sounded too easy for an advanced species to colonize the entire galaxy. Even if they are indeed that advanced, there might still be mysteries and obstacles that they could not solve. We humans often thought ourselves as the most advanced or supreme species that had ever lived but is that really true. There are a lot of things 'in the distant' that occasionally pass us by that we do not know. I think that the proposed Fermi paradox had inevitably suggest that we are indeed the advance species in the galaxy since there are no other suggestions to prove other possibilities. I think that evidence is something we must find. It could be given to us in a less significant manner but we have not found it yet. We need a series of serious studying and expenditure researching to find whether life indeed pervades the galaxy. Perhaps there are a small number of species in our galaxy living presently but will vanish in the future? A clear example from our ancestry who had walked the earth, Dinosaurs. Perhaps we humans will be wiped out in the future like the dinosaurs but in return will give new evolution of another species? There are still numerous other suggestions which stretch possibilities. So, I think it is time for scientists to try new ways and different approach to this epoch.

Solving the Mystery of Insect Flight

Summary

Scientists have finally given some new theories to answer the mysteries of insect flight. Insects could flap their wings around 60 to 600 times a second but how do they do that? Research shown that insects have the capabilities to rotate their wings to determine their flight course and to stay aloft. Such aerodynamics generated by insects are seen under the experiment drawn by Michael Dickenson that insects actually cut through the air using what is known to be 'angle tilting' to remain flying. The wings cut through the air which eventually creates an area of low pressure beneath the wings and higher pressure on top. This result in higher velocity on the wings top and help the insect to stay aloft. Also the 'edge-vortex' on the tip and tail of the wings creates a long spiraling whirlpool which in turn provides pressure and aid in the insect flight. The wings of insect will then reverse and switch opposite direction and flap once again. Like a tennis ball, the spinning axis of X creates a stationary axis of Y which allows the ball to fly due to the lower pressure on the upper spinning part. Scientists have identified the amount of energy created by the wings of an insect when it rotates and that the energy given off (in an uneven manner) could somehow help to create pressures which cause the insect to stay afloat. Now, scientists are beginning a step ahead in using computer generated insect craft under 'dense fluid' (sticky air) which they will observe the flight and motions of insects in more details.

Reflection

After watching numerous documentaries, I finally understood how insects manage to stay aloft. I am awe-struck by how flying insects could perform such an amazing skills which equivalently to how we humans could walk. What a wonderful creation that our Mother Nature had created? I still do not understand how, neither do scientists, that insects can manage to flip their wings so fast and seemingly be done by its body. We humans would definitely not capable of walking 300 steps per second. How could anything so small capable of doing such ‘mechanical prodigy’? Perhaps there is reason behind it. In my opinion, Mother Nature created all these wonderful things so that we could acquire information about them and put them into useful form. A clear example can be seen from bats. We first identify bats having the capabilities to avoid or ‘dodging’ obstacles even in the pitch black. We later use the skills bats have in creating signals and radio waves presently. So I think that everything living in this world is constantly giving us humans something they want to tell. They can’t just exist without a purpose. There must be a reason behind everything. So I hope that in science, we can hopefully appreciate the wonders of things that Mother Nature has given us and that we could learn something valuable and useful from it.

Attacking Anthrax

Summary

Knowing that anthrax, the virus known to be *B. anthracis* could actually kill humans when they inhaled the spores of such virus or that the virus had entered from a cut in the skin which it will then seek its prey, the blood vessel and slowly mutates itself and spread the main deadly virus to its victim, scientists have come out with a way to fight against this virus by neutralizing the core protein. Anthrax usually kills by accumulating its virus in the lymph nodes and entering the blood stream. *B. anthracis* have three protein which the first usually binds itself with human cells. Enzymes it produces will cut off the tip of the protein to allow binding to take place. The tip will join itself to form a ring shaped heptamer which contains two other proteins which will then be transported to a compartment known as endosome. In the acidic endosome, the two proteins will be released and slowly it pierce the membrane of cells and release toxins which cause confusion to ion distribution in water whereby resulting in the swelling of humans tissue. Since research have not identify which cell does the protein actually bind itself to, genetically made sATR (anthrax toxin receptor) will allow themselves to be bind rather than allowing the virus to bind with the actual cell. Also, another way is to clog the heptamer by not allowing it to release the two proteins. To do so, randomly constructed peptides (amino acids) could block the two proteins from activating. Another method shows that by changing a little of the cells' 'image' which the virus takes copies to mutate itself could prevent the process from taking place. Scientists are now researching on making our immune system capable of attacking the virus with a complement to the sATR. Also, since scientists are not certain about the virus in the lungs, doses of vaccine (consisting of sATR and other substances) are given at intervals to completely remove the virus.

Reflection

I still do not know how and when anthrax was created. Sometimes I wonder. Why it is viruses and diseases always giving us more harm than good? Why is there always new viruses and diseases been created that eventually, we humans are going to suffer from it? Is there a point in time which viruses could do us some good? The answer I know is simple. It is called viruses and diseases because it could only harm or kill us. In a different way of saying, I mean, why must it be viruses and diseases that will harm or kill us? What created viruses in the first place? New viruses and diseases are been identified in fact everyday by scientists but mostly are just micro organism that lived. Is it true to say that we humans created all this harmful viruses? Then that raise other questions. Why are we humans creating something 'biological' that will harm us in return? Why is it viruses always seeking its victim and the most surprising part is, how does the viruses know what and which area in the body and how to attack in a so professionally way that we humans have trouble obtaining and stopping the 'perusal' of its trail? Perhaps there are no reasons behind all this 'creation' and we have to live with it. Perhaps such things are meant to live with us and we have to find solution to solve it? Anything is possible.

The Serious Search for an Anti-Aging Pill

Summary

Researchers are trying to find a pill that will not allow people to go hungry but enjoying the food and also prolonging good health. This sound like a miracle but research is showing that calorie-restriction (CR) could somehow be the key to prolonging life and a youthful complexion. Such CR has been tested in small animals and it has proved useful. Scientists are confident that if it works for rodents, it could work for humans as well. Calorie-restriction scheme is targeted during 'metabolism' whereby food is taken in and processes into fuel that the body uses as energy. During metabolism, carbohydrates are broken down into what is known as ATP, adenosine triphosphate which provides energy for cellular activities. Researchers want to find a way which the ATR will 'fool' the human cell into preserving and repairing rather than to 'exhaust' itself which will tend to weaken and consequences are, aging. The 2DG (2-deoxy-D-glucose) which reduces the amount of insulin secretion, the main cause to heart diseases and other chronic diseases have been prove useful. 2DG could also increase certain hormones that basically retain a youthful appearance and figure when the amount of ATP is sufficient to maintain such a job. Since ATP is constantly in creation when glucose is broken down, doses of 2DG is the only anti-aging pill. 2DG could also maximize a person life span, reduce risks of heart failure and most importantly, it does not allow people to go hungry. But such a perfect pill also raises other problems. Research shown that it becomes a toxin in animal's body when given over long period. Scientists will look into this matter carefully.

Reflection

Finally there is hope for people who wants to live longer or wants a younger appearance. I think that an anti-aging pill should work and that we will not need to worry about the fact that we all will be living longer. But studies still show that just CR treatment is still prone to unexpected problems as research is still shallow among the possibilities. In my opinion, I think the most important factor in prolonging life and a youthful appearance is to eat healthily and exercise regularly. A lot of people, despite the endless posters and advertisements that show that these are the only way to obtain what they really want, the problems are 'that is what the people don't really want'. How could you live long without a healthy heart and soul? One must really observe his meals which count the days he will live. We can't just rely on a miracle pill that will serve to give us what we deeply want. In my opinion, 'disciplinary restrictions' and perseverance are the only way to keep our desired appearance and figure in shape. Most would think we live to eat. We don't eat for a nice figure nor do we eat unhealthily for a long life. So I think that one must be willing to sacrifice for what he wants.

The Social Psychology of Modern Slavery

Summary

When one talks about slavery, it is obvious to him that consequences are, the pain had been unbearable. Studies shown that numerous factors have contributed to modern slavery and why does it persist until today? In Africa and Asia having the highest number of slaves, researchers have begun finding answer and seeking actual victims (slaves) to have their painful stories told. In certain areas, enslaving has been like a tradition that the people feel a necessity to discipline and to feed their people. Many Africans have been enslaved basically to repay their debts that have been accumulated for years and until they could repay it, children as young as five are captured and forced to work under harsh and undesirable condition and frequent assaults and violence by the slave master. Large numbers are also 'imported' from certain countries which first said to provide opportunities and career prospective but deceived they had and forced into 'sweat shops' or brothel. Such inhumane act has been the highlight of social science and that researchers said that governments and slaves master are concealing what they are doing. Slaves that are free often resolve themselves into suicide or uneven emotional behavior as we couldn't feel what the slaves have gone through all these years. Sex slavery and 'dark factory' are still the prime dominant caused. Researchers have tried to explain the persistent of such a controversial act but the results and information they gotten are not that appealing.

Reflection

I think that enslaving a person in forcing him to do something he did not want to but to 'please' and to appease your satisfaction is the worst thing a human being can do. I have judge humans having the same status regarding their background, race, religion, looks and age. Often at night, I yearn for the children that are much less fortunate than me that they could be safe and happy. Sometimes, we people have to realize the fact that how fortunate we are and are we doing our job and part for our 'neglected' brothers and sisters who gravely need our constant help and care? Isn't the world a place for united brotherhood that will never let someone to suffer as much as they want you to suffer? Many people think 'it is none of my businesses' and skin colour and discrimination still play the vital role which halt a united nation instantly. I am too young to make something dramatic but to say something which I feel is right. Each human being in this world has his/her own rights and that none of us could take those rights away. Why must we human seem supreme or having higher status over those poor or 'they deserve to be in such a state'? I understand why it is so difficult and possibly impossible for world peace to conceive and to archive a total harmony. Each of us has a heart to play a part. Let us hope that regarding whatever the cause, slavery will not exist on this planet again.