Goethals News

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He comes, comes, ever comes

Rev. Dr. John Felix Raj, S.J.

Gurudeb Rabindranath Tagore has touchingly brought out the divine encounter in human life in his song, "Have you not heard his silent steps? He comes, comes, ever comes. Every moment and every age, every day and every night he comes, comes, ever comes. His coming is to propagate peace which is the most precious gift of God. As Christ visits us he reposes in us the message and meaning of the purpose of life, peace and prosperity.

On this occasion of the birth of the Divine Babe, let me recall for us the essential truth of every religious belief - religion is a way of life, it is an endeavor to preserve the beauty of our conscience and intention in our actions. Jesus is not only a historical person; he is a metaphor for human life, an avatar of love, self-giving and companionship in the service of humankind. So is every prophet, each preacher of all religious faiths.

An important message of Christmas is that of joyous giving. The Story of Santa Claus explains this dimension of Christmas.

Sixteen hundred years ago, there was a man called Nicholas in Patara, a town on Turkey's Mediterranean coast. He was very fond of children and was kind and generous to them and they came to think of him as their dear friend and their beloved saint. So it was that after a time the wonderful things he did were woven into a beautiful legend. Santa means Saint and Claus stands for Nicholas, and that is how he came to be known as Santa Claus.

In Santa Claus's own town, Patara, lived a nobleman who had three daughters. He was very poor, so poor that one day he was driven to the desperation of sending his daughters out to beg for food from his neighbors. Nicholas heard of the trouble the poor man was in, and made up his mind to help him secretly. So he went to the man's house at night, and as the moon shone out from behind a cloud, he saw an open window into which he threw a bag of gold, and with this gift the father was able to provide for his eldest daughter so that she could be married. On another night, Santa Claus set off with another bag of gold, and threw it in at the window, so the second daughter was provided for.

By this time, the father had grown eager to discover who the mysterious visitor could be, and next night he kept on the lookout. Then for the third time Santa Claus came with a bag of gold upon his back and pitched it in at the window. The old man at once recognized his fellow townsman, and falling on his knees, cried out "Oh! Nicholas, servant of God, why seek to hide yourself?"

We are the makers and markers of our destiny - on this joyous occasion of Christmas, let us pledge to break the boundaries of superstitions and parochialism, be illumined by divine delight that embraces us all and relieve the world of suffering caused by mis-appropriated manifestations of spiritual sentiments and religious fundamentalism.

I wish you all a Merry Christmas and a peaceful and prosperous year ahead. ■

Dear Readers,

It gives me great pleasure to present to you this Christmas edition of the Goethal's News. The pleasure is multiplied manifold as this is the fifth in the series dedicated to "Science and Religion". It contains the best articles selected from contributions made by students from across the various disciplines of St. Xavier's College, Kolkata.

Science and Religion, many err to believe, are a contradiction in terms – diverging forces that are perpetually pulling at opposite directions, ever testing the elasticity of knowledge, in the quest of reaching the elusive, but inevitable breaking point. Science and Religion are not mutually exclusive: different paths, perhaps, but paths that move towards the same goal of greater good. The "Invisible energy field present throughout the universe that imbues other particles with mass" in physics, is the same that gives meaning to life from the religious perspective.

As per The IsavasyaUpanisad, *"Ishavasyamidamsarvam"*, This whole Universe is fully pervaded by God. Noble, ignoble, living, non-living, sun, moon, earth, even one's own soul - has God in it. In the words of **Pierre Teilhard de Chardin,** "Only God could say what this new spiritgradually forming within you will be".When this view sets in, the whole world appears different and potentially every transaction with the material world can transform into the worship of the Omnipresent!

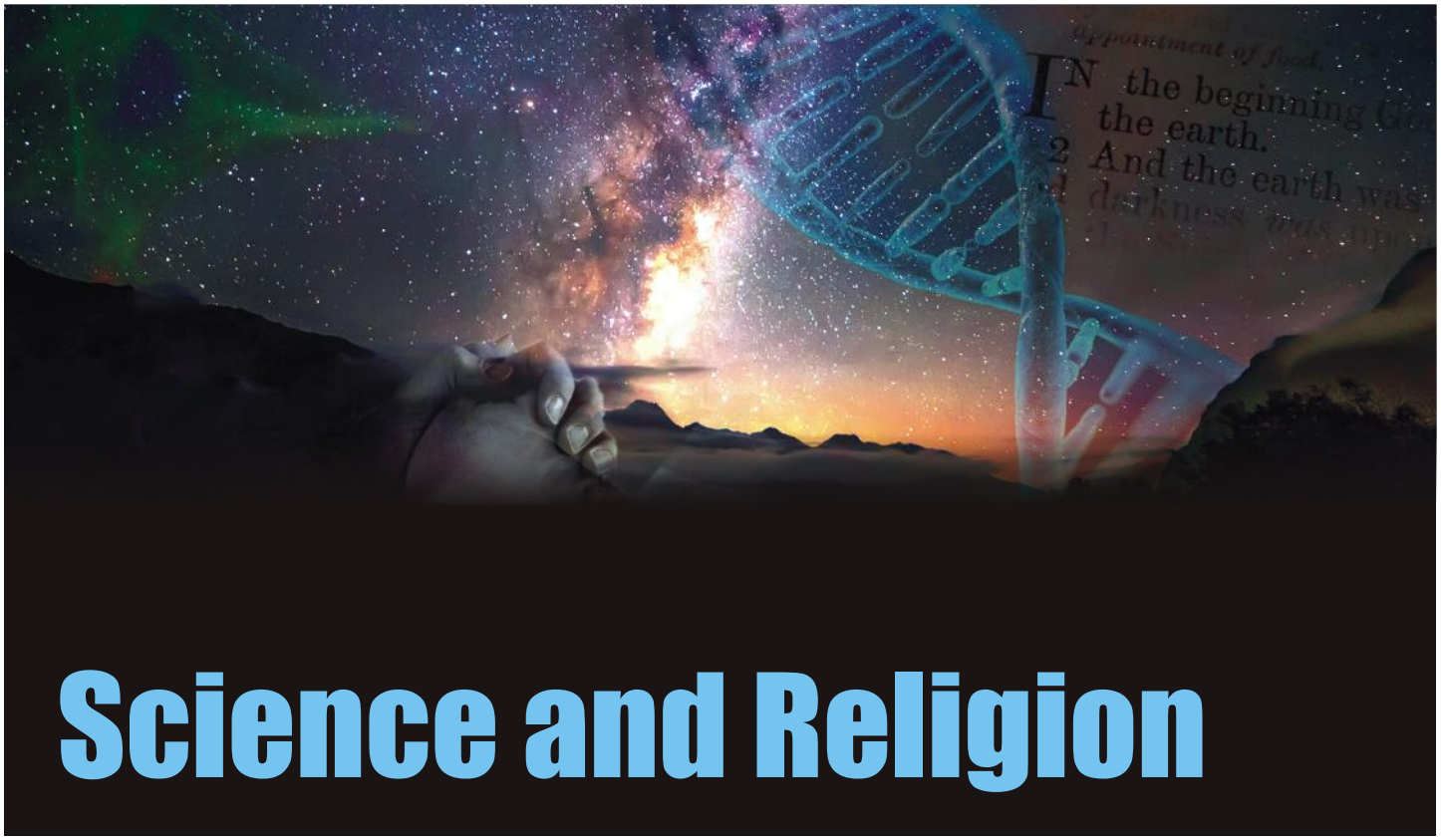
The most unique characteristic feature of modern science - its biggest strength, if you may – is its acceptance of the Latin injunction *"Ignoramus"* (we don't know everything). It accepts that we don't know everything and more critically, that the things we think we know can be proven wrong as we gain more knowledge. No concept, idea or theory is sacred and beyond challenge.

Exactly the belief that we at St Xavier's have held over the last one and a half century and continue to hold dear – "Nihil Ultra, Nothing beyond". Let the new born baby Jesus illumine our hearts and souls as "The Light", usher in peace in the violence-ridden world as a "Prince of Peace"

Merry Christmas and Happy Reading,

Xavier Savarimuthu, SJ

Assistant Director, GILRS



Science and Religion

Abid Rashid

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The so-called "conflict thesis", which holds that religion and science are (and have always been) inherently incompatible, was popularized in the 19th century by John William Draper and Andrew Dickson White. It was during this time that the relationship between science and religion became an actual formal topic of discourse. Over the years the tone of this discourse shifted, and today most thinker stend to favor a nuanced understanding of the problem(as opposed to a more "confrontational" one).Historian of science Gary Ferngren points out, for example, that:"although popular images of controversy continue to exemplify the supposed hostility of Christianity to new scientific theories, studies have shown that Christianity has often nurtured and encouraged scientific endeavor, while at other times the two have co-existed without either tension or attempts at harmonization. If Galileo and the Scopes trial come to mind as examples of conflict, they were the exceptions rather than the rule."

An example that is often cited by those who support the "conflict hypothesis" is the so-called "Galileo affair", which revolved around certain inconsistencies between the Book of Genesis and the Copernican notion of heliocentrism. It is well known that Galileo supported the model proposed by Copernicus, and that he traveled to Rome in 1616 to persuade Church authorities to accept it as a viable possibility. Historical documents tell us that his efforts were unsuccessful, and that he was eventually found to be"vehemently suspect of heresy". What is not widely known, however, is that before all this Pope Urban VIII personally asked Galileo to provide arguments for and against heliocentrism in a book, and to avoid advocating heliocentrism as a proven hypothesis (since the scientific consensus at the time was that the evidence for heliocentrism was weak). If we take that into account, it would appear that the Church authorities had not overreacted, and had merely sided with the prevailing scientific views.

Pope Urban VIII also asked that his own opinions on the matter be included in Galileo's book. Galileo did this, but in a way that antagonized the Pope. The problem was that he put the words of Urban VIII into the mouth of a character called Simplicio, who was the defender of the Aristotelian /Ptolemaic geocentric view in the Dialogue Concerning the Two Chief World Systems. Throughout the book, Simplicio (whose name means "simpleton" in Italian) was often portrayed as an ignorant fool who lacked any kind of scientific training. Not surprisingly, the Pope did not take this public ridicule lightly, and neither did the Church authorities.

Although historians of science are aware of what actually happened in this case, the Galileo affair is still used to illustrate how the Church obstructed scientific progress, and opposed any new scientific discovery that questioned its authority. It seems to me, however, that such arguments are overly simplistic. When it comes to the relationship between science and religion, the real issue is whether faith should be followed blindly, or whether it should meet certain logical standards. I personally believe in the latter, and will try to explain why by using the "fine-tuning" of the universe as an example.

The term "fine tuning"implies that if certain physical constants were even slightly different from what they are, the Universe would not be capable of supporting life. A typical example are the relative strengths of electromagnetic and gravitational forces. For a pair of protons, the ratio of these forces is approximately 1036, and if it were any smaller, only a tiny(and short-lived) universe could exist.

Another example of "fine tuning" is the so-called Hoyle state, which is the third lowest energy state of the carbon-12 nucleus (its energy is 7.656 MeV above the ground level). According to some estimates, if the energy level of this state was lower than 7.3 or greater than 7.9 MeV, there wouldn't be enough carbon in the universe to support life. For the levels of carbon to be what they are today, the energy of the Hoyle state would have to be between 7.596 and 7.716 MeV, which is an extremely narrow range.

A number of prominent scientists have argued that such fine-tuning cannot be attributed to chance. Physicist Paul Davies, for instance, has asserted that "there is now broad agreement among physicists and cosmologists that the universe is in several respects 'finely tuned' for life". He adds, however, that "the conclusion is not so much that the universe is finely tuned for life; rather, it is finely tuned for the building blocks and environments that life requires." He also notes that "anthropic" reasoning fails to distinguish between universes in which life is permitted but is only marginally possible, and universes in which life flourishes because a biogenesis occurs frequently".

Physicist Leonard Susskind is more skeptical, and does not necessarily see the universe as being finely tuned. Instead, he suggests that some parts of the "megaverse" (including the one in which we live) might, by pure chance, be suitable for the emergence of life, while other parts might not be. Steven Weinberg has a similar attitude, and rejects the argument about the fine-tuning of the carbon cycle. According to him, "it is still too early to tell whether there is some fundamental principle that can explain why the cosmological constant must be this small."

The "fine-tuned universe" argument has also been criticized because it implicitly assumes that all life must be carbon based (this position is sometimes referred to as "carbon chauvinism"). Those who adopt such a view have pointed out that other forms life are possible (at least, in principle). Thinking along these lines, physicist Victor Stenger has argued that"we have no reason to believe that our kind of carbon-based life is all that is possible. Furthermore, modern cosmology theorizes that multiple universes may exist with different constants and laws of physics. So, it is not surprising that we live in the one suited for us. The universe is not fine-tuned to life; life is fine-tuned to the universe."

A number of contemporary theologians have engaged in this debate as well, and many of them have speculated that divine providence is responsible for fine-tuning.Christian philosopher Alvin Plantinga, for example, maintains that appeals to randomness and chance coincidences are not explanatory, and only raise the question of why this universe should be so "lucky" to have the precise conditions that support life. He points out that the entire biological evolutionary process depends on the unusual chemistry of carbon, which allows it to bond to itself (as well as to other elements). This unique property allows for the synthesis of highly complex molecules, which are stable over prevailing terrestrial temperatures and are capable of conveying genetic information.

What can one conclude from all this? I personally believe that there is a creator, and that religion is not to be followed blindly. I am a Muslim by choice and not by chance. When I read the verses in the Islamic scriptures that are related to science and its role in society, I am struck by the wisdom and foresight of those who wrote them (although their knowledge of science was very limited compared to ours). Having given this some thought, I honestly can't say that I see any inherent conflicts between science and religion, as long as both are practiced intelligently. ■

The Magnificent Blueprint

Adwaita Bose

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"The Universe is full of magical things patiently waiting for our wits to grow stronger."

Eden Phillpots

The universe is indeed magical. Apprehending its beauty, however, requires a great deal of imagination, since nature is not always predictable, and can sometimes be erratic. In the vast sea of stars and galaxies that surrounds us, we humans are ephemeral creatures who have grasped only a tiny portion of the great mystery of the universe. This is something that both scientists and religious thinkers need to be aware of.

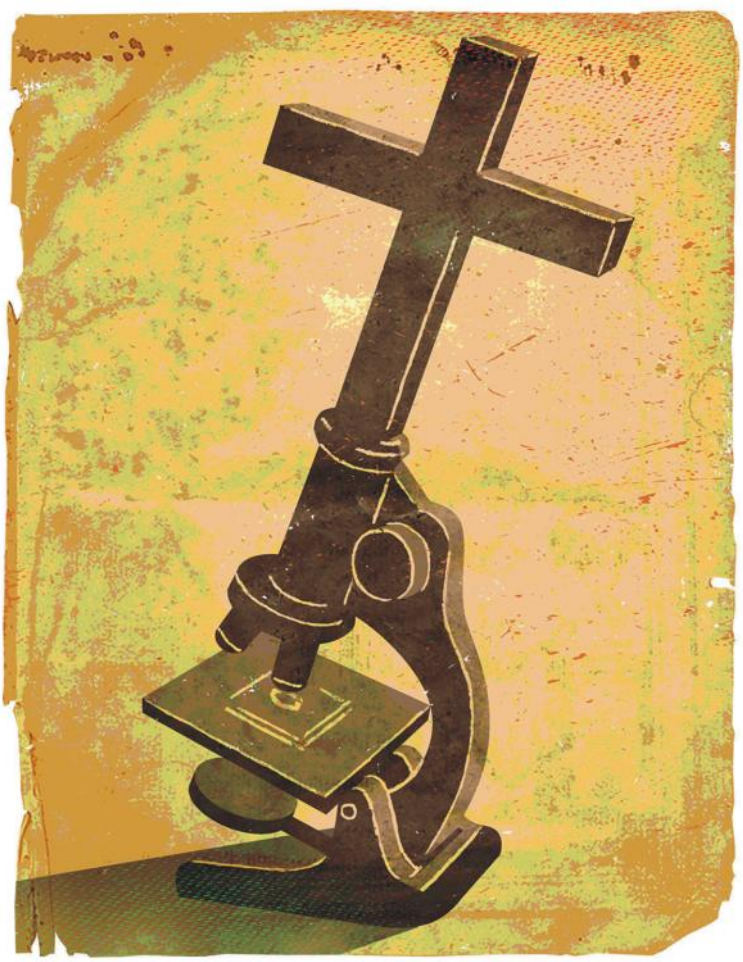
Although most of us realize that human knowledge is limited, scientists never really accepted the possibility that certain natural processes could be inexplicable. As a result, they continue to search for the basic principles that gave rise to the universe, and produced the complex structures and dynamic patterns that we observe within it. This has left them contemplating fundamental questions such as:

- How does the universe behave?
- Why does it behave so?
- Who or what made possible the existence of the universe? Is there a creator?
- Is the order that we observe in nature the doing of a supreme being?

In order to address these questions, we should first consider what enables us to know anything at all about the universe. Most scientists agree that this is possible because we are capable of formulating laws and theories that allow us to systematically describe observed physical processes, and make them somewhat predictable. But what exactly qualifies as a "law", and how did these laws originate? The term "law of nature" is usually reserved for a scientific statement that explains a broad range of natural phenomena, and is based on repeated empirical observations and measurements. In that respect, it differs from hypotheses and postulates, which are proposed *before* a scientific model has been fully validated.

Before humans engaged in systematic scientific thought, their understanding of natural phenomena was closely related to their religious beliefs, and was passed on from one generation to another in the form of stories and myths. It is reasonable to assume that this is how the concept of 'God' emerged – it provided our distant ancestors with a way to mitigate the uncertainties that they faced, and to lessen their fear of nature's power. This would explain why most early deities appeared inscrutable and omnipotent, and why their actions were often associated with natural phenomena (whose causes were unknown in prehistoric times).

Some contemporary thinkers have argued, however, that we cannot rely exclusively on historical and anthropological interpretations, and must also take into account our genetic predisposition toward religion. According to geneticist Dean Hamer, the development of human spirituality was influenced by a specific gene called Vesicular Monoamine Transporter 2 (VMAT2) (or the "God gene"). Hamer believed that individuals with an unregulated "God gene"were favored by natural selection, since this generally leads to a sense of optimism (and therefore reduces stress). He also noted that contemporary religious believers can use the existence a "God gene"to reinforce their faith, and interpret it as "one more sign of the Creator's ingenuity."



When speaking about the relationship between natural laws and religion, it is logical to ask whether some of these laws allow for exceptions, and if it would be appropriate to qualify such exceptions as "miracles". In order to address this question, we first need to specify what the term "miracle" means. Wayne Gruden defined it as "a less common kind of God's activity in which he arouses people's awe and wonder, and bears witness to himself." A somewhat different way to put this would be to say that miracles are highly improbable occurrences that are inexplicable by known scientific laws, and can be reasonably attributed to God.

The so-called logistic equation, x(k+1) = px(k)[1+x(k)], gives us some insight into why science is unable to explain such anomalies. When the dynamic behavior of this system is represented graphically, it becomes apparent that a small portion of the curve behaves very differently from the rest of it. It is important to recognize, however, that this phenomenon is *not*a violation of the equation, although it represents a deviation from "normal" behavior. While it is true that observing something like that is statistically unlikely, it is certainly not impossible. If we now draw an analogy between this example and miracles, it seems reasonable to assume that they, too, are not violations of natural laws, although they are exceedingly rare and appear to contradict our everyday experience.

If we view natural laws in this broader sense and recognize that we cannot fully grasp them based on our observations, what can we say about their origins? Did they arise as a mere coincidence, or were they part of an underlying "plan"? An argument that is often used in such discussions points to the fact that the universe is extremely fine-tuned, and that even an infinitesimal alteration in its structure would make it unfit for life (at least, as we know it). Calculations show that if protons were heavier by only 2%, they would decay into neutrons, thus causing atomic destabilization. Something similar can be also said about the cosmological constant in Einstein's theory of general relativity:

"Our Universe and its laws appear to have a design that is both tailor-made to support us and, if we are to exist, leaves little room for alteration." *Stephen Hawking*

What this suggests is that the universe is not simply the outcome of random processes, and that it conforms to some deep underlying principles which we may never fully understand. As a student of science, I would like to further uncover the truth, but since not everything in nature is entirely explicable, I cannot completely rule out the existence of a causal force (if not divinity) that might be the source of this magnificent blueprint that we are a part of. ■

Humours in Science and Religion

Dr. Xavier Savarimuthu, SJ.

I am sure after going through the pages on the issues of science and religion, you are feeling quite heavy. I thought of refreshing your mind before you move on to the next set of articles; there fore I have named this article as " Humours in Science and Religion". They correspond to various dimensions of our lives and so I am presenting them here for your humorous reading.

Dilemma …. Leads to …

Wife: Can I cut my hair and make it short?
Husband: Cut it.
W: I took lot of efforts to grow it long..
H: Then don't cut it
W: They say short hair is the fashion these days..
H: Then cut it
W: What if the fashion changes after I cut?
H: Then don't cut it
W: All my friends say that I will look beautiful with a short hair..
H: Then cut it
W: But I doubt whether short hair will suit my small face..
H: Then don't cut it
W: But short hair is very easy to manage..
H: Then cut it
W: But how can I wear flowers in my hair. I love to wear flowers.
H: Then don't cut it
W: I think there is nothing wrong in trying once...
H: Then cut it
W: But it may take a long time to grow hair again.
H: Then don't cut it
W: Still I feel like giving it a try once
H: Then cut it
W: If I look ugly after cutting my hair ....
H: Then don't cut it
.
.
..
.

.The husband is undergoing treatment in a mental hospital presently.
He doesn't speak anything except two sentences." Then cut it and then don't cut it."
The doctors wonder what is to be cut.
They are conducting all tests.
They also intend getting expert advice from Doctors abroad!

"Is my time up ?"

A 65-year-old woman had a heart attack and was taken to the hospital.

While on the operating table she had a near death experience.

Seeing God she asked: "Is my time up?"

God said:

"No, you have another 33 years, 2 months and 8 days to live."

Upon recovery, the woman decided to stay in the hospital and have a Face-lift, liposuction, breast implants and a tummy tuck.

She even had someone come in and change her hair colour and brighten her teeth!

Since she had so much more time to live, she figured she might as well make the most of it.

After her last operation, she was released from the hospital.

While crossing the street on her way home, she was killed by an ambulance.

Arriving in front of God, she demanded:

"God, you said I had

another 33 years to live? Why didn't you pull me from out of the path of the Ambulance?"

(You'll love this)

God replied:**"I didn't recognize you..... !!!!!"**

People on a rope

Eleven people were hanging on a rope,
Under a helicopter.
10 men and 1 woman
The rope was not strong enough to carry them All, so they decided that one had to leave,
Because otherwise they were all going to fall.
They weren't able to choose that person,
Until the woman gave a very touching speech.
She said that she would voluntarily let go of the rope, because, As a woman, she was used to
giving up everything for her Husband and kids or for men in general , and was used to always making sacrifices with little in return.

As soon as she finished her speech,
All the men started clapping .....

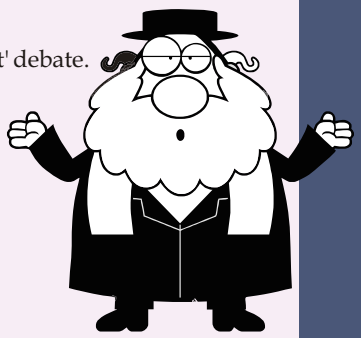
Symbols and Interpretations

Several centuries ago, the Pope decreed that all the Jews had to convert to Catholicism or leave Italy. There was a huge outcry from the Jewish community, so the Pope offered a deal. He'd have a religious debate with the leader of the Jewish community.

If the Jews won, they could stay in Italy; if the Pope won, they'd have to convert or leave.

The Jewish people met and picked an aged and wise Rabbi to represent them in the debate.

However, as the Rabbi spoke no Italian, and the Pope spoke no Hebrew, they agreed that it would be a 'silent' debate.



On the chosen day, the Pope and the Rabbi sat opposite each other

The Pope raised his hand and showed three fingers.

The Rabbi looked back and raised one finger.

Next, the Pope waved his finger around his head. The Rabbi pointed to the ground where he sat.

The Pope brought out a communion wafer and a chalice of wine.

The Rabbi pulled out an apple.

With that, the Pope stood up and declared himself beaten and said that the Rabbi was too clever. The Jews could stay in Italy!

Later the cardinals met with the Pope and asked him what had happened. The Pope said, 'First I held up three fingers to represent the Trinity. He responded by holding up a single finger to remind me there is still only one God common to both our beliefs.' 'Then, I waved my finger around my head to show him that God was all around us. He responded by pointing to the ground to show that God was also right here with us.' 'Finally, I pulled out the wine and wafer to show that God absolves us of all our sins. He pulled out an apple to remind me of the original sin.' 'He bested me at every move and I could not continue!'

Meanwhile, the Jewish community gathered to ask the Rabbi how he had won. 'I don't have a clue!!!' the Rabbi said. 'First, he told me that we had three days to get out of Italy, so I gave him the finger.' Then he tells me that the whole country would be cleared of Jews, so I told him that we were staying right here. 'And then what?' asked a woman. 'Who knows...' said the Rabbi. 'He took out his lunch, so I took out mine!'

Smart Flight Attendant

A 50-something year old conservative man arrived at his seat on a crowded flight and immediately didn't want the seat.? The seat was next to an elderly white woman reading her Bible.

Disgusted, the man immediately summoned the flight attendant and demanded a new seat.? The man said"I cannot sit here next to this infidel."? The flight attendant said "Let me see if I can find another seat."

After checking, the flight attendant returned and stated? "There are no more seats in economy, but I will check with the captain and see if there is something in first class."

About 10 minutes went by and the flight attendant returned and stated? "The captain has confirmed that there are no more seats in economy, ? but there is one in first class.? It is our company policy to never move a person from economy to first class,? but being that it would be some sort of scandal to force a person to sit next to an UNPLEASANT person,? the captain agreed to make the switch to first class."

Before the irate conservative man could say anything, the attendant gestured to the elderly woman and said,? "Therefore, madam, if you would so kindly retrieve your personal items,? we would like to move you to the comfort of first class as the captain doesn't want you to sit next to an unpleasant person."

Passengers in the seats nearby began to applaud while some gave a standing ovation.

I say, can I get an Amen to that!

The Life-giver and Protector

John worked at a cold storage. One day, when he finished with his work schedule, he went into the cold room (Freezer) to inspect something but in a moment of bad luck, the door closed and he was locked inside with no help in sight. Although he screamed and knocked with all his might, his cries went unheard as no one could hear him. Most of the workers had already gone and outside the cold room (freezer), it's impossible to hear what was going on inside. Five hours later, whilst John was on the verge of death, the security guard of the factory eventually opened the door and saved him. John then asked the security guard what he came to do there as it wasn't part of his work routine.

His replies: "I've been working in this factory for 35 years. Hundreds of workers come in and out every day but you're one of the few who greets me in the morning and says goodbye to me every night when leaving after working hours. Many treat me as if I am invisible. So today like every other day, you greeted me in your simple manner "Hello" at the entrance when resuming for work, but curiously after working hours today, I observed I've not heard your "Good bye see you tomorrow". Hence, I decided to check around the factory.

I look forward to your greetings every day because to you, I am someone. By not hearing your farewell, I knew something had happened. Then I Sought and found you!

Moral Lesson:

Be humble, love and respect those around you because life is too short. Try to have an impact on people in ways we can't even imagine especially the people that cross our path daily. Stay blessed!

Science and Religion – Two Sides of the Same Coin

Atrey Dutta

Department of Biotechnology, 4th Year

History teaches us that most early civilizations worshipped nature as God. This should not surprise us, since natural phenomena that could cause destruction were usually unexplained (and were therefore feared). As civilization developed, humans began to examine these phenomena more closely, and noticed certain patterns. Although this early "scientific" activity was intimately related to religion, people eventually learned to differentiate between the two, and started to debate which approach represents a more accurate reflection of reality.

One of the main questions in this debate was whether science and religion are mutually exclusive, and if not, whether they can co-exist. My personal opinion is that science is opposed to superstitious beliefs, but is not opposed to religion as a whole. In that respect, I tend to agree with Sir Isaac Newton, who said that: "gravity explains the motions of the planets; but it cannot explain who sets the plant in motion." Like him, I believe that a person of faith can follow the rules and practices prescribed by religious traditions, and simultaneously have an inquisitive mind that constantly searches for answers.

When thinking about this question, it is important to stress that the primary goal of all religions is to guide their followers to the path of truth. Although it is impossible to precisely describe what the ultimate truth looks like, there is no doubt that following a certain code of conduct can bring us closer to it, and can introduce peace and harmony into our lives. Most religions agree on this point, and preach the value of love, family, and charity,while advising against violence and vice.

What role (if any) does science play in this process? In general,science undermines superstitious beliefs, and is skeptical about anything that it cannot prove. But does such an outlook automatically invalidate the principal teachings of major religious traditions? Not necessarily, since science cannot answer all the questions that are of interest to us. To understand why this is so, it is helpful to draw a distinction between the unknown and the unknowable. The unknown is something that we can expect to resolve in the future, but the unknowable is not. This is the point where science has to stop, and can go no further.

To this, we should add the observation that science, like religion, is ultimately based on a set of a priori beliefs and assumptions. No one can prove, for example, that the laws which hold true on Earth are exactly same in every corner of the Universe. Nor can we claim with certainty that we know the laws of nature as they really are. The general public is not aware of this, however, and the success that science has had over the past few centuries has made it harder for people to accept religious teachings.

It would be a mistake to assume, however, that science is in some way "superior" to religion. Those who claim that this is the case should keep in mind that science and religion ultimately share the same objective, which is the search for truth. They do so in different ways, of course, but that doesn't automatically make one "better" than the other. The fact of the matter is that bothscience and religion can be misused, and can cause considerable harm to the society. It is well known, for example, that various technological advancements have led to the development of lethal weapons that can destroy entire cities and kill millions. When properly interpreted, religion can guard against such excesses, by guidingtheir adherentstoward a peaceful and harmonious life. But when its teachings are misinterpreted, the effects of religion can be similarly devastating. In order to prevent that, it is important to educate young people not just about science and mathematics, but also about the value of tolerance, compassion and kindness.

In conclusion, I think it is fair to say that although science has been very useful to us, it cannot explain everything. Part of the reason for this lies in the fact that the universe we live in is complex and unpredictable, and that much of what happens in it is influenced by chance events. It should be noted, however, that this randomness often goes hand in hand with orderly patterns, which can be detected if we know where (and how) to look. Chaos theory shows us that quite clearly, and teaches us that many seemingly random processes actually represent a mixture of order and disorder. Such processes clearly suggest that our knowledge has certain inherent limits, but also imply that we should never stop searching for answers. ■

Being Aware of Who We Are

Arunima Bhattacharya

Department Biotechnology, 3rd Year

One of the characteristics that distinguishes humans from other living forms is our ability to be conscious of our own self. According to the Oxford Living Dictionary, consciousness represents "the state of being aware of and responsive to one's surroundings". Consciousness can also be related to our ability to receive and process information, and decide whether it should be stored or rejected.

The sense of being an individual, the feeling of I-ness that is well known by all and yet very difficult to define, has perplexed humans since the dawn of civilization. The famous 17th century French philosopher René Descartes argued that consciousness is essentially axiomatic, because it always requires something that is external to it (we need, in other words, something to be *conscious of*). One can explain this idea using an analogy with a car engine, which can generate electricity for its own use, but needs to be given a 'start' externally. In a similar way, our consciousness needs to perceive something that *already exists* apart from it. This is the reasoning that led to Descartes' famous statement "Je pense, donc je suis" (I think, therefore I am).

The English philosopher John Locke took a somewhat different approach to this problem, and associated consciousness with the notion of 'personhood':

"[A *person*] is a thinking intelligent Being, that has reason and reflection, and can consider itself as itself, the same thinking thing in different times and places; which it does only by that consciousness, which is inseparable from thinking, and as it seems to me essential to it: It being impossible for anyone to perceive, without perceiving, that he does perceive." (*Essay* 2.27.9)

Some of the first neuro scientific insights in to the nature of consciousness came from experiments conducted on monkeys. In the 1990s, a team of Italian researchers

identified a distinct type of neuronal cells from the brains of macaque monkeys, which were found to fire during both during the *execution* and the *observation* of a specific action. These cells were named 'mirror neurons', since they 'reflected' the actions of others and linked them to different types of behaviors (such as empathy and learning by imitation, for example).

Although there were a number of subsequent attempts to study neuronal connectivity in humans (many of them as part of the Human Connectome Project of 2009), describing the complete "wiring diagram" of the brain proved to be elusive. One of the immediate consequences was the realization that mirror neurons in humans cannot be precisely traced. Despite that, however, we can safely say that these specialized cells play a role in helping us understand the world 'from the inside', so to speak.

Since the notion of the 'self' cannot be separated from our physical constitution, it makes sense to ask why we experience ourselves as located within our bodies, and why we recognize our bodies as our own. This phenomenon (which is known as *body ownership*) can be explained by the fact that the brain can distinctly identify what is part of one's self and what is not. This identification takes place in certain regions of the right parietal lobe which contain a dynamic representation of the body (or a model of the 'self'). Such a representation is often referred to in the literature as the 'body schema'.

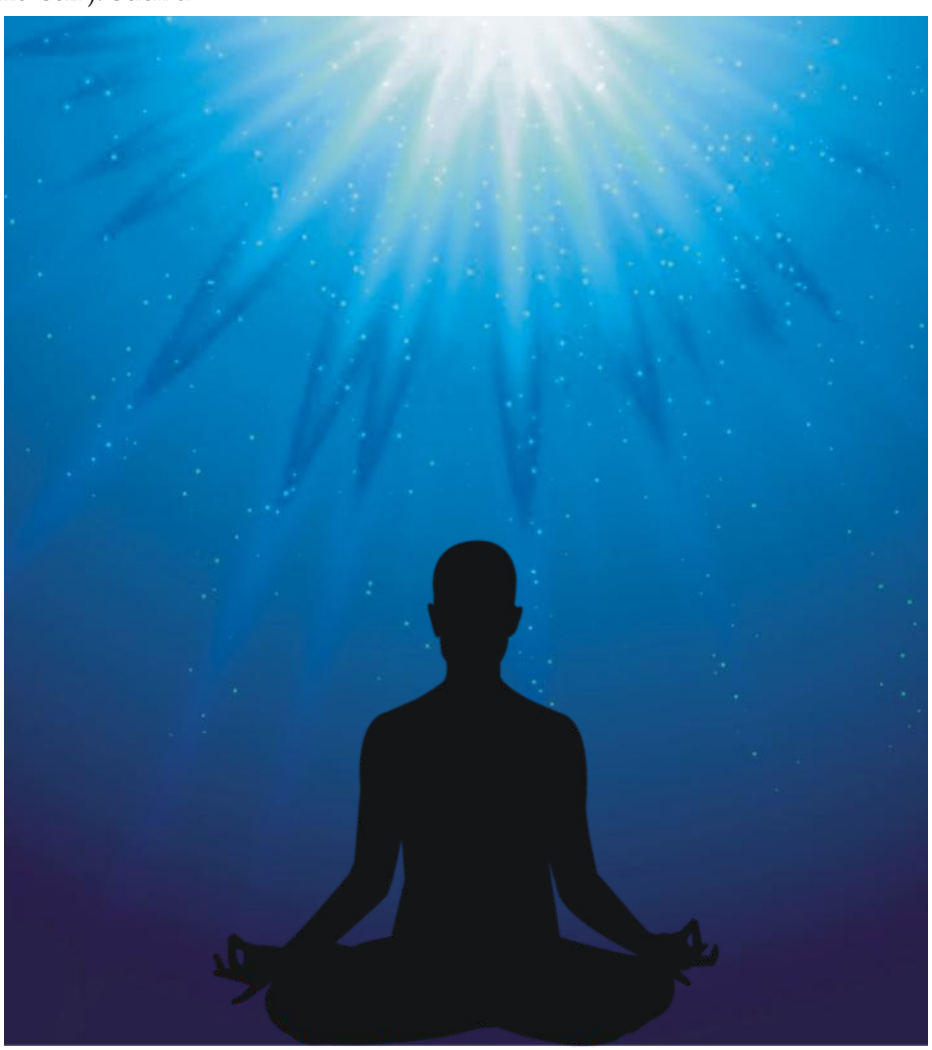
This observation brings us to the central question of this essay, which is the relationship between religion and consciousness. In order to describe the how the Indian tradition sees this relationship, we must first say a few words about the Upanishads, which contain the central philosophical tenets of Hinduism (and have also strongly influenced Buddhism and Jainism).It is in the Upanishads that consciousness meets spirituality, and its religious implications are revealed.

The two major spiritual concepts in the Vedantas are the *Brahman* and the *Atman*. The Brahman is a metaphysical concept, which is often regarded as the unifying force behind all the diversity in nature. As such, it can be described as the final cause of all existence, or the "Ultimate Reality". The Atman, on the other hand, is the inner self, the individual, who can be compared to a drop amidst the ocean that is the Brahman.

There are two schools of thought regarding the relationship between the Atman and the Brahman (both of which have shaped the Indian understanding of consciousness and the self). The first one is the *Dvaita Vedanta*, which views the Brahman and Atman as separate entities. The second (and older) school of thought is the *Advaita Vedanta*, which integrates the concepts of Atman and Brahman, and claims that the complete knowledge of one's self transforms the Atman into the Brahman. Advaita Vedanta is considered to be one of the earliest examples of a coherent philosophical view that was able address certain fundamental metaphysical questions (many of which appeared in religions that developed later).

It is interesting to note that some elements of this outlook can be found in contemporary Western thought as well. In view of that, I would like to conclude with a quote fromthe famous American aviator Charles A. Lindbergh:

"Then what am I – the body substance which I can see with my eyes and feel with my hands? Or am I this realization, this greater understanding which dwells within it, yet expands through the universe outside; a part of all existence, powerless but without need for power; immersed in solitude, yet in contact with all creation? There are moments when the two appear inseparable, and others when they could be cut apart by the merest flash of light." ■



Origin and Evolution – the Notion of Intelligent Design

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Life on earth originated some 5 billion years ago, evolving from the simplest forms to the very complex and diverse organisms that we see today. Despite the many theories and hypotheses that have been proposed to date, the origin of life is still an unsolved mystery. Among the principal schools of thought that exist on this subject, there are two that appear to be in direct opposition to each other. The first is Creationism, which promotes the belief that God created the universe in a single act, and that life formed out of nothing (*ex nihilo*). This belief is based on a literal interpretation of the Biblical claim that: "In the beginning God created Heaven and Earth." In contrast to Creationism, Darwinism maintains that all species developed through the process of natural selection, and that their ability to survive was inherently increased by genetic variations.

Which of these two explanations is closer to the truth? In his book *The Origin of Species*, Charles Darwin deliberately avoided the subject of life's origins, but he did acknowledge that "all organic beings that have lived on earth could have descended from some primordial form".In the 1920s, Aleksandr Oparin and J.B.S. Haldane developed this idea, and proposed that non-living matter gave rise to life on earth through a process of gradual chemical evolution. According to the Oparin-Haldane hypothesis, reactions between simple inorganic molecules were fueled by processes in the earth's atmosphere that were "energized" by lightning. This led to the formation of amino acids and nucleotides, which produced what is commonly referred to as the 'primordial soup'. Amino acids and nucleotides eventually combined to form larger polymers, which were considerably more complex and were capable of assembling themselves into self-sustaining and self-replicating structures.

In the 1970s, the advent of the 'Genes first' hypothesis raised the possibility that self-replicating nucleic acids (DNA or RNA) could have been the first "building blocks" of life, and that other elements which made up metabolic networks were added later. A related (but somewhat different) idea is the so-called 'RNA world' hypothesis, which favors RNA as the first genetic molecule. This hypothesis is based on the recognition that RNA is potentially autocatalytic, and therefore has the capacity to accelerate chemical reactions that allow it to replicate itself.

Given that these theories explicitly refute Creationism, can the scientific and religious views on the origins of life be reconciled in any way? In order to answer this question, we must first point out that Creationism is not the only possible religious explanation for the origins of life. There are those, for example, who believe that God created laws that are conducive to the development of living organisms, and the emergence of intelligent behavior. This idea finds some support in the fact that every star in the universe has a spherical habitable shell environment called the *circumstellar habitable zone* (CHZ) (or the "Goldilocks zone"). This shell defines the distance between the star and planets that could potentially maintain water in liquid state on its surface for several billion years. Based on data from the Kepler space telescope, it would appear that some 40 billion earth-sized planets in the Milky Way satisfy this condition.

If that is indeed the case, however, what (if anything) makes the earth "special"? One of the key factors is the presence of a magnetic field which protects our planet from the highly energized and charged solar winds. This field prevents the earth's atmosphere from getting ionized and being blown away into space. As far as we know, no other planet in our solar system (and beyond) has this particular feature.

A somewhat different approach to resolving potential disputes about evolution was proposed by paleontologist Stephen Jay Gould, who argued that science and religion represent very different domains of human inquiry, and that their interpretations of the origins of life necessarily reflect that. He referred to these two domains as "Non-Overlapping Magisteria", since science is based on experiments and verifiable facts, while religion is rooted in metaphysical beliefs and transcendental experiences. Although he himself was a scientist, Gould recognized that religion plays a key role in defining what is important in our lives, which is just as relevant as scientific knowledge.

There are also those who argue that science and religion can achieve a certain level of agreement when it comes to evolution. English physicist John Polkinghorne, for example, maintains that one does not necessarily have to choose between these two outlooks when it comes to exploring the origins of life. He sees the process of evolution as an indicator that God works less like an "engineer" and more like a "gardener"who allows creation to self-organize into an endless web of complex forms. When seen from that perspective, evolution could be viewed as a"tool" that God used(and still uses) to create the diversity of life without having to directly intervene.

When using such arguments, it is important to keep in mind that our current evolutionary models cannot properly account for the emergence of technologically advanced intelligence, the complexity of the human mind or the phenomenon of consciousness. How these traits developed is still something of a mystery. We know that for the better part of our evolutionary history, the size of the human brain was similar to that of present day apes. We also know that the size of the human brain increased significantly just before our distant ancestors developed the ability to communicate verbally and use tools. What is interesting, however, is that over the past 10,000 years our brain size has remained largely unchanged(and even experienced a slight decrease). And yet, it was during this period that we developed some of our most striking advances.

A possible explanation for this apparent paradox has to do with the way our brains store and process information. According to the so-called Integrated Information Theory (IIT), the information stored by the brain is shared by many different neural networks. It is speculated that this gives rise to a rich "conscious experience", whose intensity depends on the brain's ability to aggregate all the sensory data that it receives into a coherent"whole". This theory suggests that the size of the brain is not the only relevant factor in the development of intelligence, and that the way we manipulate information matters just as much (if not more).

Perhaps all this is part of a "grand design", whose Creator has given nature the freedom to spontaneously evolve, and eventually produce intelligence and consciousness. The fact that this idea can be found in many religious traditions suggests that they may all be inspired by the *same* transcendent reality, and that the differences between them become less pronounced when this reality is directly experienced.

"The religion of the future will be a cosmic religion. It should transcend a personal God and avoid dogma and theology. Covering both the natural and the spiritual, it should be based on a religious sense arising from the experience of all things, natural and spiritual, as a meaningful unity." *~ Albert Einstein* ■

Science and Religion batch of 2019

COURSE ON SCIENCE AND RELIGION (ENGR 343)

(SXC's International Exchange Program Initiative with Santa Clara University, California, USA)

Course Duration: January 2 - March 15, 2018 (30 hours)

Resource Person: Dr. Aleksandar Zecevic (azecevic@scu.edu)

Professor of Electrical Engineering & Associate Dean, School of Engineering, Santa Clara University, California, USA.

• One 2 hour lecture per week for a total of 10 weeks) = 20 hrs • Project Work Hours = 10 hrs
• Online Lectures will be Posted in You tube •Lectures at St. Xavier's College (Mid February of 2018)

Course Syllabus available at: http://www.engr.scu.edu/~azecevic/

Participants: • Faculty Members involved in teaching Foundational Courses • 4th Semester Students of Science (UG)
• 2nd Semester Students of Science (PG) • 6th and 8th Sem Students of Biotechnology (BMBT)

Registration: Last Date by 20th December 2019) | Contact Person: Fr. S. Xavier, SJ. (sxavi2005@gmail.com)

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