AJLLSE GLOBAL RESEARCH NETWORK

AMERICAN Journal of Language, Literacy and Learning in STEM Education
Volume 02, Issue 06, 2024 ISSN (E): 2993-2769

Darwin's Theory of Origin of Species

Phanidhar Mech
Associate Professor, Dept. of History, B.H.B. College, Sarupeta, Assam

Introduction

Commemorative festivities of two major events took place in 2009. To commemorate 400 years since Galileo used the telescope to peer up at the sky, the UN proclaimed it the International Year of Astronomy. Additionally, there were celebrations held all across the world to commemorate the 150th anniversary of the release of Charles Darwin's seminal work, On the Origin of Species. Although the Copernican revolution laid the groundwork for both of these revolutionary events, it took several years for biological sciences to mature and spark a revolution, which accounts for the 250-year gap between them. This has to do with the fact that conservatism, which was defeated in the physical sciences following Galileo, did not lose its hold on biology. This is especially true since biology deals with our comprehension of life, a subject that is more resistant to change than topics pertaining to non-living objects. Galileo made two significant contributions to the field of thought. In order to put heaven and earth on same footing, he first demonstrated the value of experiments and how to get from the specific to the general. The century-old stalemate in biology was here to stay. Even though Leonardo da Vinci's anatomy studies and the first significant event in experimental biology—the British physician William Harvey's demonstration of blood circulation in living bodies in 1628—had given experimental biology a boost, the field's advancement was rather sluggish. The prevailing belief was that you could play with the non-living but not with the living.

The issue of evolution had already been raised by the time Charles Darwin entered the picture.

was present, and some first concepts had already been shared. It was the time of colonial expansion and the industrial revolution. Colonialists also produced enthusiastic naturalists who conducted extensive explorations and researched the plants, animals, raw resources, and minerals of various regions of the world. They subsequently developed complex classifications as a result, i.e. Finding the parallels and differences connections among the items they discovered. The Greeks, including Aristotle, were the first to classify things in biology. Although this was his constructive contribution, the advancement was also halted by Aristotelian mysticism. When colonial explorers encountered the world's diversity and complexity, they asked, "How did the earth evolve?" They also asked, "How does nature provide the species with mystical Noah's ark, as appears in the Biblical legend?" and "How did the earth evolve?"

Charles Darwin had the good fortune to be exposed to these topics at a young age by his grandpa, Erasmus Darwin, who belonged to the Lunar Society, a prestigious scientific organisation. In the early 1790s, Erasmus Darwin, one of the pioneers of biology, put out the theory of evolution. Charles Darwin was also fortunate to have been exposed to the writings of a modern geologist, Charles Lyell. Darwin's first significant contribution was in the field of geology, specifically the issue of coral reefs. Charles Darwin's admiration for Lyell's work served as a doorway into new ideas and enabled him to connect the topic of species evolution with the phases of earth's evolution. However, as many significant aspects of Earth's evolutionary history, such as the movement of tectonic plates, were first

discovered to man in the twentieth century, one should not strive for the level of completeness that we currently possess.

Some progress on the subject of species evolution has been made with the works by Buffon, Cuirer, and Lamarck, three French naturalists. Lamarck put out the idea in 1809 that various species have distinct traits because the organs in living things vary depending on how they are used. Lamarck claims that the giraffe's attempt to reach the upper branches of trees in order to consume the green leaves is the reason it grows a long neck. After being gained in a single generation, this "acquired trait" is passed on to the offspring, who also have longer necks. Since the subject of speciation was being studied using a materialistic model for the first time, Lamarck's theories were quite popular at the time. Lamarck's theories had flaws. According to his method, if a person exercises to build powerful bi-ceps, this acquired attribute may be passed on to a son or daughter. We are aware that this doesn't occur. However, Lamarck's theories persisted in being adopted in the absence of any other alternatives, and Darwin was not immune to this impact either. However, Lamarck deserves recognition for highlighting two crucial

The biological community's concepts include (a) species evolution and (b) the need to understand evolution in terms of systemic processes.

Charles Darwin had training in both theology and medicine. He enlisted as a naturalist on the British voyage HMS Beagle on December 27, 1831, when he was 22 years old. During this five-year journey (until October 2, 1836), he collected and examined flora and animals as well as anthropological details wherever he visited. From England, he travelled to Bahia, Brazil; around Patagonia; along the Chilean coast; over the Pacific to New Zealand, Australia; to the Cape of Good Hope; back to Bahia; and after that, back to England. Charles Darwin meticulously examined his records and samples for twenty years. He wrote a 230-page article in 1844 that contained all of the crucial details of his later work On the Origin of Species, but it was never published. Nonetheless, Darwin was certain of the significance of his discoveries and urged his wife to have them published in the event that he passed away before they were released. Alfred Russel Wallace, a fellow young British biologist who shared Charles Darwin's evolutionist beliefs and eventually came up with the term "Darwinism," published his book almost simultaneously with Darwin. However, Darwin's work, which also frequently cited Wallace's results, was more widely accepted due to his straightforward style, thorough justifications, and numerous real-world examples.

Darwin's findings

Although Darwin's observations, which he gathered over the course of five years of sea travel, were varied, the great synthesist was able to recognise the connections between the disparate, unrelated phenomena. He witnessed the diversity and abundance of the Amazonian woods as well as the fossilised mammals found in Patagonia's granite beds. He recorded the geographic distribution of the plants, animals, and fossils at every stop along the way. He studied their environment, eating patterns, and physical features. He saw the several tortoise species in the Galapagos Islands and realised how crucial geographic isolation is to a species' ancestry. He noted the environment and dietary conditions for population differentiation, as was the case with the Galapagos finches, in the same Galapagos Islands. With

Darwin integrated the experiences of plant and animal breeders, who employed cross-fertilization to secure living forms of a certain type, with these observations.

Darwin's book's first two chapters provide a thorough description of the outcomes of artificial cross-fertilization and variations under domesti-cation. He discusses the idea of the battle for existence in the third chapter, and the idea of natural selection is explained in the fourth. Darwin identified the following key characteristics in his observations: (a) variation within species, (b) variation across species, (c) anatomical relationships between species, and (d) environmental adaptability. Natural selection, which is at the heart of the question of how species evolve, is the result of Darwin's subsequent integration of these facts to support the theory of fight for existence.

SURVIVAL AND NATURAL SELECTION STRUGGLE

Surprisingly, after reading the same essay, Darwin and Wallace came to the same conclusion on the role of fight for existence in natural selection.

For example... "An Essay on the Principle of Population" by Thomas Malthus was released in 1798. According to Malthus, the resources available to a single person will gradually diminish over time due to the exponential growth of the human population. Therefore, in order to obtain their fair share of resources for existence, each individual should push out others. According to Darwin, every person is fighting for their life, and those who possess traits that are conducive to survival will endure while those who do not will perish. This will explain the observed species specificities and variances. Here are some examples. Because they can run more quickly, rabbits will be able to elude the wolves and live. Basically, the wolves that are unable to run quickly enough to get the rabbit will die. Similar to this, mice with brownish coats will naturally blend in with their surroundings and evade predators, whereas mice with pinkish skin will be spotted and devoured by eagles. We will be left with mice that are primarily brown-skinned if these brown-skinned mice can procreate quickly enough. Unless they multiply really quickly, the pink-skinned ones will go extinct.

Darwin observed that breeders of plants and animals use selective breeding.

in order to acquire specific qualities. Darwin provides the explanation for this artificial selection.

illustration of a pigeon stock bred by an emperor. It may take a few generations for the breeder to successfully produce the desired trait in the organisms they are breeding, yet each generation is perceived as being distinct from the one before it. As we move on to subsequent generations, a vast array of traits become available due to these processes. Artificial selection was effective. Darwin and Wallace posed the challenge of how features might evolve and persist under a scenario devoid of guidance or control, or natural selection. Alternatively, how does natural selection enable features to persist in populations? The following factors would need to be considered by natural selection: (a) the species' members differ in certain traits; (b) some traits can be passed on to the offspring; (c) each individual has both beneficial and detrimental traits; (d) the surviving members must be fit to reproduce; and (e) evolution occurs in small steps, meaning that for evolution to be successful, the species must survive and reproduce for a sufficient number of generations.

The species Darwin thoroughly examined and considered to be of utmost importance

The finches of the Galapagos Islands were used as a case study to make conclusions about natural selection. Long before he wrote Origin of Species, he had made the following observation: "One might really fancy that from an original paucity of birds on this archipelago, one species had been taken and modified for different ends, seeing this gradation and diversity of structure in one small, intimately related group of birds." The widely scattered Galapagos Islands are a volcanic mass in the Pacific Ocean, 4000 kilometres from the South American coast. The coastline area is arid, but the hills are heavily forested. Thirteen different species of finches call the Galapagos home, and Darwin observed that these finches' beak sizes—a crucial indicator of speciation—vary greatly depending on their dietary preferences. While insect caterpillars in forests, which pierce tree holes to locate insects, have larger beaks, such as the woodpecker, seed eaters in arid coastal regions have shorter beaks. However, even their habits differed from the wood pecker's. These long-beaked finches use a twig in their beak to poke a hole in the tree rather than prodding it with their beak. It had mastered the use of a tool. Darwin came to the conclusion that this kind of adaptation was a predecessor to natural selection—in fact, it is a component of it—because separate speciation is a very gradual process.

The following is the Lamarckian theory for the finches' evolutionary history. By using their beaks to better effectively gather food in their various habitats, finches would adapt this specific organ to have either long or short beaks. Compare the Darwinian explanation with this. Due to their geographic separation from their American cousins, Galapagos finches would only breed with other Galapagos finches. Their characteristics will differ from those of their American counterparts as they grow through the generations. The birds would grow beaks of various shapes. If they had lived on tall trees, the shorter-beaked species would have had a hard time catching insects and would have disappeared

from the area. However, they would have survived (or migrated to) drier places, where they could feed on seeds, which their short beaks could easily gather. Similar to this, animals with longer beaks would either migrate to higher trees where their long beaks would make it easier for them to capture insects or would perish in desert areas where they would find it impossible to acquire food. In reality, these so-called adaption phenomena are an expression of natural selection. The species that possess characteristics that enable them to adapt will endure. A species' capacity for adaptation, survival, and evolution increases with the diversity of its features. The ability to reproduce, the ability to create hybrids, the reproductive viability of the hybrids, the availability of food, protection from predators, and other conditions all influence how much natural selection would permit the species to evolve.

According to estimates from contemporary scientists, there are around two million extant species.

live on the planet, and over the past few million years, hundreds of species have gone extinct and hundreds more have emerged. Modern medical experiences reveal some of the signs that the average person is now aware of. It is well known that numerous bacteria have developed drug resistance, which has reduced the effectiveness of medications that were formerly thought to be the cure for many illnesses. The idea that this was an example of "inheritance of acquired traits" was once held. However, as will be shown later, controlled tests have demonstrated that this is not the case and is instead the consequence of genetic mutation.

ANSWERS FOR DARWINISM

Like Galileo, Darwin's theory was criticised by the church. It's easy to find the cause of that. It was believed that God created the earth, the universe, the living world, and the non-living world through a series of separate acts as components of a divine plan, with man appearing last. It was thought that the entire process just took a few days. According to evolutionary theory, we evolved from reptiles approximately 300 million years ago, while "father Adam" and "mother Eve" had ancestry in gorillas until about 8 million years ago and chimpanzees until about 4 million years ago (human DNA is roughly 98.4% similar to that of chimpanzees). The morphological comparison of skeletons, fossils, etc. served as the basis for these results. Evolution, as stated by Darwin in The Descent of Man (1871) and Thomas Huxley in Evidence as to Man's Place in Nature (1863), holds that man is a relatively new occupant of our planet and will continue to evolve. It is also evident that evolution has continued and not ceased with man. Evolution had ousted man from the highest level of creation, as is frequently asserted, in the same way that Galileo had pushed the earth from the centre of the universe. The idea of a divine will was therefore seriously insulted by the notion of evolution, which freed human will from being subservient to the divine. Racists remain among the most vocal opponents of Darwinism, aside from religious dogma. They couldn't sell their idea of a better race if all humans shared ancestry. The same is true with regard to caste; if the two are indeed related by a single progenitor, then the "vanar sena's" subservience to the "Aryan gods" can no longer be justified.

To examine the kind of controversy that resulted from natural selection, we cite a study that was featured in the commemorative edition of Scientific American magazine. According to a report from an 1860 British Academy of Sciences session, Sir B. Brodi disapproved of the evolutionary theory, stating that, Man did not understand how the ability of self-consciousness, which was different from everything in the material world, could have originated in lower organisms. This human capacity was the same as divine intelligence.

-ligence.

The evolutionary hypothesis did in fact become a subject of public discussion, since Galileo had stated that he wished to bring astronomy to the marketplace. In one of these

With the Bible in hand, the captain of the HMS Beagle, which carried Darwin on the expedition, apologised in a public assembly for bringing Darwin along. In a public conference, Thomas Huxley was explicitly questioned if he did not feel ashamed to be referred to as an ape descendant. In response, Huxley said he would be much less embarrassed than to be referred to as the descendent of some people he had known.

Although Darwin faced criticism from the church, many biologists were also shocked because they believed that some features were inherited from blood (such as the royal blue blood) and that blood was no longer sacrosanct. But Darwin's evidence convinced the biologists to agree with him. A new life has been given to biology. The subsequent new rise was no coincidence. Despite Darwin's distance from them, two new noteworthy events transpired. The father of modern genetics, Gregor Mendel, was an obscure Austrian Christian preacher who established the theory of heredity. In France, Louis Pasteur established the germ hypothesis of diseases, which ultimately prevented many people from facing certain death. While acknowledging the impact of Darwin's work, JD Bernal noted that although it was a source of new ideas, it also diverted attention from some basic topics, like as the structure of cells and tissues, which begged to be investigated. It's important to remember that Darwinian evolution has not been supplanted 150 years after it was first proposed. However, as other branches of biology have improved, new problems have emerged that have taken a long time to resolve. The progress will be summarised in the account that follows.

GENETICS AND EVOLUTION

Even while the notion of evolution was still gaining traction, geneticists like August Weismann posed a significant scientific challenge to it. Weismann argued that since the chromosomes in the cell nucleus contain the hereditary features (as shown by all scientific studies), it was improbable that adaptation could start the modifications that ultimately result in speciation. Weismann's results cast doubt on natural selection while also disproving the Lamarckian idea. The issue was not so much with natural selection as it was with Darwin's (and the scientists') ignorance of the

Darwin had reluctantly accepted the Lamarckian concepts of "inheritance of acquired traits" and the Mendelian rules of genetics in the lack of anything more tenable. Darwinism was thus pulled along with Lamarck when Weismann discredited him.

The realisation that Mendelian genetics genuinely filled the void left by Darwinian evolution took around half a century. While studying fruit flies in the early 1900s, Thomas Morgan made a new discovery about Mendelian genetics. He saw that chromosome-based qualities do, in fact, vary from generation to generation. We refer to this process as mutation. It is discovered that the mutation is aimless.

i.e., producing characteristics that may be advantageous or detrimental to the organism's ability to survive. Additionally, it was discovered that extrinsic influences such as chemicals (such as mustard gas) and ionising radiation (such as x-rays and gamma rays) might influence the pace of mutation. The discoverers of mutation, such as Morgan, were dubious about natural selection and did not think it helpful to examine the implications of their laboratory results in natural processes, even though these data were later revealed to be crucial inputs to complete Darwinian notions. Two significant developments had occurred by the 1920s. First, mathematical biologists like Lotka and Volterra attempted to explain the startling finding that there were regular fluctuations in the catch of both large and small fish throughout the Adriatic coast. Using mathematical methods that are already in use in many fields, even outside of the context in which they were found, they could describe this as a competition between predator and prey. But more significantly, S.S. R.A. Fisher and J.B.S. Haldane in England, Chetverikov in the USSR, and S. Wright could see that the best way to describe the diversity and transmission of features was through mutation, not inheritance of acquired qualities. The statistical estimates of genetic variation resulting from mutation and natural selection were provided by their mathematical work, which is relatively unknown to most scientists. Theodosius Dobzhansky and colleagues then conducted extensive experiments in which they forced competing populations—which breed quickly—to interact under carefully monitored laboratory conditions. The outcomes were observed to be consistent with natural selection.

Let's take another look at the Galapagos finches before we wrap up this part.

For the past 30 years, the same species has been the subject of yearly research. The

The most significant discovery that emerges is that these birds are still evolving. It is evident that the species' physical characteristics (such as the size of its beak) and behavioural patterns are changing

in response to their natural environment. In reaction to drought and other natural environmental changes, noticeable alterations are observed to occur, even on a yearly basis. As was previously mentioned, these can be explained in terms of natural selection. Important conclusions have been reached regarding humanity as well. Based on fossils discovered in Africa, it is known that humans initially arrived in the Horn of Africa 2.3 million years ago, but Homo sapiens evolved between 400,000 and 250,000 years ago. Races have emerged as a result of their movement, geographic separation, and mutation. Some significant facts about human evolution will soon be revealed as a result of the mapping of the human genome. Regarding Darwinism, it may be claimed that it has been effective in using natural selection to explain adaptability. There are still a lot of unanswered questions in evolutionary biology. In addition to determining whether the evolutionary process, however sluggish, can exhibit breakdowns or whether it has extended periods of stability interspersed with spurts of the evolutionary process, they also address the genetic theory of speciation (natural selection's participation is undeniable). Other ongoing discussions between geneticists and evolutionists centre on whether genes play a major role in selection or if selection is influenced by other variables and genes just contribute to diversity. Following the discovery of the DNA structure, these discussions have entered the field of evolutionary biology.

IMPACT ON THE HUMAN MENTALITY

Karl Marx said approximately a year after the Origin of Species was published, "This book contains the basis of natural history of our views, even though it is developed in a crude English style. Marx is known to have considered dedicating the Capital to Darwin. Although some doubt its veracity, it is true that Marx sent a copy of Volume I of Capital to Darwin, which Darwin acknowledged. However, it is to be noted that Darwin's social outlook was deeply rooted in Malthusian views, which Darwin acknowledged. Instead, what mattered to Marx and Engels was that nature displayed manifestations of natural selection, and whether or not it had to be viewed through "Malthusian glasses" was irrelevant.

Now let's look at the Malthusian principle. At the time, bourgeois liberals like Bentham and Mill asked, "How can capitalism be reformed to make it more humane?" so that it could deliver "the greatest happiness to the greatest number." The opposite. view was expressed by Malthus, who in 1798 wrote that such attempts would be futile, since there were too many with whom the resources have to be shared and they (i.e. the poor) have no means of restraint, multiply at an uncontrolled rate, leading to a state of "diminishing returns". Strife, war and famine, according to Malthus would inevitably follow. Malthusian influ- ence apart, many an interested social scientist of the capitalist school borrows Darwin's idea of "survival of the fittest" to defend the survival and supremacy of capital over labour. Many others were led to believe that by suitably tuning the competition and by proper controlled breeding between races (here questions of heredity and genetics are also involved), newer races with "superior traits" can be created. The last view was founded as "eugenics", under the leadership of Francis Galton, a cousin of Charles Darwin. These views acted as inspirations to the Na- zis of the future and are also shared by many in our country too, who believe that the caste system ensures that some profound qualities are preserved in certain breed of people who must thus enjoy certain social privileges. Such arguments are most commonly heard on issues like reservation and in defense of "protection of merit". It is also argued - particularly by the saffron brigade in India - that certain qualities e.g. patriotism are determined by heredity and certain religious groups have greater propensity to betrayal of the national cause. From these debates, many moral questions also have emanated. Should genetic researches be directed to study the origin of certain characteristics of races? While some argue that such studies are necessary for the sake of science many others state that in absence of social controls, when everything (including moral issues) are left to the market forces, such research carry the grave risk of being used against certain races.

Humanity has always been at risk of distortions, and the fight against

Since irrationality is a component of our struggle, it is crucial to remember that Charles Darwin's contemporaries, Marx and Engels, were also involved in same struggles in their own time. Darwin's hypothesis constituted a turning point in the history of science and human thought. It was an evolutionary theory, which set forth a revolution. An avowed aristocrat, a reluctant revolutionary,

who was alarmed by the revolution- ary upheavals in contemporary Europe, Charles Darwin's work gave the revolu- tionaries like Marx and Engels, the break they were looking for. Describing Darwin's work as "splendid" and "epoch-making" Karl Marx commented that it had delivered "for the first time" a "mortal blow" to teleology (i.e. everything in nature is designed to satisfy a divine plan). But Marx (a political revolutionary, battling against German natural philosophy) took a leap from where Darwin had stopped. Even Huxley, who was no materialist, was embarrassed at Darwin's re- peated assertion, "nature makes no leaps". Huxley, maintained, "Nature does make jumps now and then, and a recognition of the fact is of no small importance in disposing of many minor objections to the doctrine of transmutation". Noting that Darwin had established "the history of natural technology", Marx continued, Doesn't the history of the organs that produce in human society that form the material foundation of each distinct social organisation, deserve equal attention? Technology exposes the direct process of life production and the active relationship between man and nature, which in turn exposes the process of creating life's social relations and the ideas that arise from them.

Similar theoretical issues are revisited in Engels' unfinished work, Dialectics of Nature, where he added a new parameter, namely the role of labour in this evolutionary process. Engels claimed that the hand and brain are what set humans apart from other animals, but that "the hand is not only the organ of labour, it is also the product of labour," and that "first labour, after it, and then with it, speech - these were the first two most essential stimuli, under the influence of which the brain of the ape gradually changed into that of man, which for all its similarity is far larger and more perfect." Engels based this analysis on the Darwinian law of correlation of growth and stated:

The development of the brain and its associated senses, the growing clarity of consciousness, the power of abstraction and conclusion, and the reaction on labour and speech gave both an ever-renewing impulse to further develop. This development did not culminate when man finally became different from the ape, but overall made

This further development has been strongly urged forward, on the one hand, and guided along more definite directions, on the other, by a new element which came into play with the appearance of fully-fledged man, namely society. This further powerful progress, its degree and direction varying among different peoples and at different times, and here and there even being interrupted by local or temporary regression.

The aforementioned understanding has Lamarckian overtones (they were also present with Dar-win). The fact is that labour does not contribute to genetic transformations; rather, labour has played a role in creating a social environment (better habitat, food resources) that has improved man's ability to survive.

Even one hundred and fifty years after its publication, attacks on Darwin- ism still continue. In 1925, an American school teacher, John Scopes was dis- missed for teaching Darwinism and the court upheld this dismissal. Though a future ruling in 1968 negated the earlier ones, fresh attacks on Darwinism came up from the 1980s. The Arkansas state, in 1981, made it obligatory to teach creationism simultaneously with Darwinism; more recently, in June 2008, a legisla- tion signed by the Louisiana governor Bobby Jindal (a darling of the Indian busi- ness classes and the media) allows teachers to use "supplemental text books" to "help students critique and review scientific theories." Anti-Darwinism works under two organized reactionary movements, (i) creationism, which upholds the biblical position given in the Genesis and (ii) intelligent design, which does not explicitly state the identity of the creator but holds that evolution does occur in tune with the wishes of an intelligent designer. Why are these irrationalities promoted? Or did they come hand in hand with the ideas of neo-colonialism, neo-liberalism and globalization? There is not necessarily a direct link, but it is also true that such irrational ideas are promoted by even secular sections as can be seen in the man- ner, secular Congressmen such as A.K.Antony and Digvijay Singh developing cold feet in opposing the saffron brigade sponsorship of the teaching of astrology not long ago.

As the globe observes the devastation and chaos caused by impe-

Engels' observations must be revisited in light of rialist globalization's assault on labour and the world:

The final, crucial difference between humans and other animals is that, while the animal uses nature and changes it just by being there, man alters it to suit his purposes. With the tremendous advancements in natural science over the past century, we are becoming more and more aware of and able to control even the more distant natural consequences of our more commonplace productive activities. However, the more this occurs, the more men will perceive and understand their unity with nature, making the absurd and antinatural notion of a contradiction between mind and matter, man and nature, soul and body, as it emerged in Europe after the decline of classical antiquity and reached its highest elaboration in Christianity.

Darwin's groundbreaking research did, in fact, provide significant momentum at the time for the development of such innovative ideas.