

Scientific Contributions in Evolutionary Biology to Study the Roots of Variation in the Existing Life Forms



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Abstract

Evolution is a slow change in the existing organism with the passage of time which results in creating a new species after millions and billion years of its accumulation. This variation in the existing species implies to the change in the genetic material and physical attributes such as structure and is the basis for studying evolutionary relationships between ancestors to descendants. This review discusses the numerous scientific contributions made by eminent scholars and scientists in the field of evolutionary biology to explain variation and its contributing factors which laid the foundation of our present day biology.

Keywords: Lamarckism; Shortia galacifolia; Natural selection; Vestigial; Homo diurnis

Introduction

Ernst haeckel

Ernst Haeckel proposed the biogenetic law in 1866 in his manuscript entitled General Morphology of the Organisms [1]. Biogenetic law states that each embryo's developmental stage represents an adult form of an evolutionary ancestor [2] and supported his theory using embryos drawings during different stages of development [3]. In 1874, his work anthropogenie included drawings of embryonic fish, salamanders, tortoises, chicks, pigs, cows, rabbits, and humans at different stages of development placed next to one another for comparison [4].

Asa gray

Asa Gray known as the "Father of American Botany" was a botanist [5]. He named an unknown herbarium specimen as Shortia galacifolia [6]. He accumulated a more than 200,000 preserved plants, which he donated to Harvard and collected over 1,000 specimens during his visit in American West [7, 8]. His most widely used book was Manual of the Botany commonly known as Gray's Manual [9].

Charles robert darwin

Charles Robert Darwin was scientist, naturalist, geologist and author [10]. At the age of 22 years old, he was selected as a naturalist for a long journey of scientific on the HMS Beagle. In that voyage, he visited South America, the Galapagos Island, Africa and island in the Pacific Ocean and collected a lots of animals, plants fossils and rocks for his research work [11]. After

finishing along five years journey, Darwin returns homeland with a

- 3000 pages
- He Collected 1529 species and
- 3907 skins
- 12 catalogs of plants and animals [12]

He published his first major book on his findings, entitled Zoology of the Beagle [13]. His later research on evolution and natural selection was based on his long journey of Beagle, in which he examined many plants, animals, fossils and the natural earth [14]. Darwin was influenced by the Principle of Geology which was represented by Sir Charles Lyell. He made a new way to observe nature, he explained that small changes can cause a large change. Darwin observed many natural phenomenon such as erosion, earthquake, volcanoes, etc. After his deep observation he noticed that Lyell was correct [15]. The origin of species by natural selection was published in 1859 [16]. He wrote in his book that all organisms are adapted, developed and modified themselves according to their environment for their survival. He said that all the descendent are descended from a common ancestor, there is not different lines of ancestry but as a tree branches and retrenches. It has not happened so he thought that large number of organisms should destroyed before they reproduced. He examined that the species that has the capability to survive in harsh environment by adaptation

that will remain. Although the inferior, weak and less adaptive species will disappear by natural selection [17]. Darwin's theory of evolution by natural selection explained from where the people came and how they developed and evolved from a common ancestor. There is heredity, selection and adaptation in species which is due to different factors which affect them in different ways [18]. On that time no one knew about evolution, Darwin's theory of evolution was a great modernization. The idea of Darwin was so difficult for many people to accept on that time. Darwin wrote a few books which were on the basis of his observations of the voyage of Beagle and on his further researches. The books and essays which were written by him supported his theory of evolution.

The names of his famous books were

- a. On the origin of species (1859) [19]
- b. The voyage of Beagle (1839) [20]
- c. The expression of the motions in man and animals (1872) [21]
- d. The descent of man and selection in relation to sex (1871) [22]
- e. Natural selection [23]
- f. Geology observation of South America (1846) [24]
- g. The variation of animals and plants under Domestication (1868) [25]
- h. The power of movement in plant (1880) [26]
- i. Fertilization of orchids (1862) [27]
- j. On the movements and habits of Climbing plants (1875) [28]
- k. The different forms of flowers on plants of the same species [29]
- l. Geology observation of volcanic islands (1844) [30]

Buffon

George-louis lecher, Comte de Buffon was born in 7 September 1707 at Mont bard, Burgundy at France [31]. He wrote the book *Histoire Naturelle* and was complete summary of his work [32]. Buffon's concept of species was "Natural progress by unknown gradation and consequently does not submit to our absolute division when passing from one species to another and mostly from one genus to another" [33]. His work has been reviewed largely in its relationship to later thought and work. Accordingly, he was a most often given the dubious honor of being cited as a precursor first of Cuvier then Darwin [34].

Carl-linnaeus

He is known as the Father of taxonomy and formulated the classification system *Systema Naturae* [35]. He referred to humanity as *Homo diurnis*, or "man of the day" in 1735 [36]. He

was the first to name us *Homo sapiens*, and to class us primates [37]. Linnaeus classified organisms in to five categories; Class, order, genus, species and variety [38]. He divided plant genera according to the number size, placement, shape of stamen and pistils [39]. But he grouped animals on the basis of their teeth, locomotion, type of blood if any, and habitual system like water or land [40]. He estimated about 40,000 plants and animal species, and a few hundred minerals were present on earth [41].

Georges Cuvier

Georges Cuvier whose full name was Jean Léopold Nicolas Frederic. In 1784, he studied comparative anatomy [42]. He wrote an essay on theory which is called "(Correlation of part)" in which he stated that all anatomical body structures were functionally related and dependent on the rest of the body parts of an organism [43]. Furthermore, he explained that any change in an organism's anatomy can cause major change and make them unable to survive [44]. Cuvier proposed that some of the organisms are extinct from the surface of the world or they might be extinct from some part of the globe [45]. At that time, the view of vanishing an organism was unbelievable and not accepted by the people. Therefore, Cuvier studied the fossils found in eighteenth century and passed a theory that some fossils of organisms were found are different from the anatomy of living organisms. For example: the fossils of elephant left in Italy where they could not be found anymore. He discovered that their anatomy were totally disparate from the present elephant's anatomy. Those elephants were gone even from Siberia, Africa, and India. He explained that those organisms which were vanished didn't belong to any organisms present now [46]. Cuvier proposed, by the passage of time earth has gone to sudden changes, and each change has brought new species and vanished the old ones. He claimed that the evidence pointed to an earlier and pre-human "world" that had been destroyed by some kind of catastrophe. Although he didn't explain why the event must have been sudden, he did imply that it was common and it might be repeated in the future [47]. Cuvier had also contributed to the evolutionary biology through his studies of fossils [48].

He published as many books and essays as he could.

- a. Cuvier's 1st research was (*Elementary Survey of the Natural History of Animals*) in 1797 [49].
- b. In 1800-1805, he published (*Lessons of Comparative Anatomy*) [50].
- c. He wrote on (*Historical Report on the Progress of the Science*) and it was published in 1810 [51].
- d. In 1811, he was titled chevalier which means lord [52].
- e. In 1812, he did research which was (*Research on the Bones of Fossil Vertebrates*) [53].
- f. In 1825, his essays and research were published in the form of book which is (*Discourse on the Revolutions of the Globe*) [54].

g. In 1817, Cuvier published his (system of animal classification) [55].

h. In 1815, he wrote an essay on (The Theory of Earth) [56].

Jean- baptiste lamarck

A French Biologist who proposed Lamarckism, a nevolutionary theory in his book "Philosophic Zoologies", published in 1809 [57]. Lamarck also coined the terms biology, Invertebrates and annelida [58, 59].

Lamarcks Proposition

Internal vital force: internal vital force is responsible for the growth of all the living organisms and their components [60].

Effect of surroundings and new essentials: Changing environment affects the living organism resulting in producing species with new structures [61].

Use and disuse of organs: Persistent use of a specific organ will result in its further development whereas organ disuse results in its deterioration [62]

Inheritance of acquired traits: Acquired traits of an organism is transmitted to the next progeny. After several generations the distinctions produces a novel specie [63].

Lamarck elucidated his theory with the help of examples including evolution of giraffe, webbed toes of aquatic birds, disappearance of limbs in snake, flat fishes, flightless birds and cave dwellers [64].

William bateson

William Bateson, an English biologist who coined the term genetics to describe the study of heredity [65]. His book entitled "Materials for the Study of Variation" was published in 1894 [66]. By studying variation and advocating Mendelian genetics, Bateson emphasis on the use of experimental methodology to study genetic inheritance [67].

Malthus thomas robert

His book entitled Essay on the principle of population was published in 1798 which postulated that for the existence of mankind food is a need and the passion between the sexes will remain nearly in its present state [68].

Conclusion

Thus the contributions made by these scientific researchers in the field of evolutionary biology is immense to understand variation in the existing life forms.

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