Milestones in Evolution

De Buffon Laid Modern Basis

By Ruth A. Sparrow

With Milestones in Evolution Ruth A. Sparrow, Librarian, concludes her series on the Milestones of Science Collection which she began in October, 1937. In this period her articles have shown the scope of this celebrated group of early and first editions, the publication of which has made history in a world where there are many things "new under the sun."—Editor's Note.

● ● ● The history of evolution is one of long controversy ranging from fantastic ideas to various rather well-founded theories. Even in the earliest theories there were truths which, when slowly added to, during the centuries became part of the modern theories. No attempt will be made here to run down these theories to their sources nor to expound at any length their principles. Rather, a brief description of the contents of each book relating to the evolutionary theory will be given in chronological order.

Aristotle, the greatest of the Greek philosophers, in *De Animalibus* (Venice, 1476) expressed his views and observations upon the animal kingdom. He firmly believed in an evolutionary theory. While it differs in many details from the modern conception, yet it resembles it in principle.

It was not until the late eighteenth and early nineteenth centuries that any great advance was made in the subject. Georges L. L. de Buffon (1707-1788), the French naturalist, was first to present natural history in a popular and understandable manner. *Histoire Naturelle, Générale et Particulière* (Paris, 1749-1789) appeared in parts from time to time and did much to stimulate interest in the study of nature. Buffon attempted to work out a collection and systematization of all the facts of nature. Dr. Henry Fairfield Osborn writes: "He may be called the naturalist founder of the modern applied form of the Evolution theory. It is true that his conception of the range of Evolution changed during three periods of his life; that it is difficult to gather from his conflicting statements exactly what his opinions were, yet he laid the basis of modern Evolution in Zoology and Botany. We claim this for him, because he first pointed out, on a broad scale, the mutability of species in relation to changes of environment."

Johann Wolfgang von Goethe (1749-1832) is most popularly remembered as Germany's greatest poet and dramatist. He did exert, however, the greatest influence in the history of the evolutionary theory. He believed in organic evolution and anticipated Darwin in many respects. In *Versuch die Metamorphose der Pflanzen zu Erklären* (Gotha, 1790) he advances the theory that all parts of flowers are metamorphosed or modified leaves, and this was soon regarded as of fundamental importance.

Another poet who aided in the historical development of the evolutionary theory was Erasmus Darwin (1731-1802), an English physician and naturalist, and grandfather of Charles Darwin. His *Zoonomia* (London, 1794-1796) was most revolutionary. He wrote much that his grandson was later to confirm. His theory was that modifications come from within by the reactions of organisms, thus anticipating the Lamarckian theory. It also contains a system of pathology and a treatise on generation.

Seven years later Jean Baptiste P. A. de Lamarck (1744-1929), French naturalist, published his first expres-

sion on evolution in *Systême des Animaux sans Vertebres* (Paris, 1801). This was later elaborated on in *Philosophie Zoologique* (Paris, 1809). The Lamarckian theory is the foundation of the modern ideas of evolution as opposed to the separate creation of species. It maintains that change in environment causes changes in structure of plants and animals, especially by creating new or further use of certain parts or organs, thereby resulting in adaptive modification or greater development and causing also disuse and finally atrophy of other organs. He also believed that such acquired characters are transmitted to offspring. Darwin accepted this theory of inheritance of acquired characteristics as one of the contributing factors to evolution.

Lamarck's greatest opponent was a fellow countryman, Georges Cuvier (1769-1832). Not only was Cuvier opposed to his doctrines but to the whole evolutionary theory as well. He was of the catastrophic school and affirmed that the modifications of life forms in the organic and inorganic world are the result of sudden catastrophic events. He is chiefly remembered for *Le Regne Animal Distribue d'Apres Son Organization* (Paris, 1817) which embodies the results of his researches on the structure of fossil and living remains.

Strictly opposed to the catastrophic theory was the celebrated English geologist, Sir Charles Lyell (1797-1875). It was in great part due to his efforts that this theory was overthrown. *Principles of Geology* (1830-1833) is one of the classics in geological literature. It was the first to establish the fact of geological evolution, it exploded the theories of Cuvier, it was the basis for the Darwin-Wallace theory of evolution, and it gave Darwin the basic principles for the origin of species. Darwin took this valuable book with him on his voyage of the *Beagle*. In the dedication to the second edition of the *Journal*, covering his trip, he wrote: ". . . with grateful pleasure as an acknowledgment that the chief part of whatever scientific merit this Journal and other works of the author may possess, has been derived from studying the well-known and admirable *Principles of Geology*."

It was late in 1831 that young Charles Darwin (1809-1882) shipped as naturalist on the world cruise of the *Beagle*. On the long five-year trip he made many notes and observations. Not until 1842 did he draft a manuscript setting down his theory of evolution. For some years he worked and studied on this theory, though it was not until 1858 that he made any announcement of it. This was brought about by one of the most amazing coincidences in scientific history. Another English naturalist, Alfred R. Wallace (1823-1913) had been working along the same lines, quietly and independently. In 1855 he published his beliefs without going into the reasons. Several years later while in South America the answer to his problem came to him. He applied it to plants and animals and finally to man: in the struggle for existence it is the strongest that survive; gradually by a process of elimination and selection an improved race develops. This theory was transcribed and sent to Darwin for publication. It was a shock to Darwin to find that after sixteen years of hard work another had reached the conclusions identical with his. Anxious to be fair he put the matter before Lyell and Hooker who suggested that the papers be published simultaneously so that both might receive the proper credit. These papers were read before the Linnaean Society on July 1, 1858: *On the Tendency of Species to Form Varieties* and *On the Perpetuation of Species and Varieties by Means of*

Natural Selection. They were published in London in 1858.

The next year Darwin published *On the Origin of the Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (London, 1859). This revolutionized the whole study of zoology from the standpoint of evolution. It amplified his theory and proclaimed what is now known as Darwinism. This, according to Webster, "maintains that organisms tend to produce offspring varying slightly from their parents and that the process of natural selection tends to favor the survival of individuals whose peculiarities render them best adapted to their environment; also, that chiefly by the continued operation of these factors, new species not only have been and may still be produced, but organisms of widely differing groups may have risen from a common ancestor." It is this last statement which has led to the erroneous belief that man descended from the ape rather than a true and understandable one—that they have a *common* ancestor.

Since Darwin, his theory is the one most universally accepted by scientists as the true theory of evolution. It is a law of nature and can be scientifically proved as other laws are. There are no known facts to contradict it and scores to prove it.

» MUSEUM NEWS «

Board. Elected to the Board of Managers at its May 25 meeting, Chauncey J. Hamilin, Jr., will fill the unexpired term of the late Dr. Lesser Kauffman which runs until 1941.

Honor. On June 5, forty years after receiving his A.B. degree from Syracuse University, Dr. Carlos E. Cummings, Director of the Buffalo Museum of Science, was awarded a citation of merit by his alma mater "in recognition of his service as an interpreter of natural science."

Scholarship. A traveling scholarship awarded to Irving G. Reimann, Curator of Geology, will take him to Mexico this summer where he will collect fossils and minerals in the regions of that country that are unusually rich in minerals. The award was made by the American Association of Museums.

The "Unnoticed Man." Some time during the month of March the Museum received an important but unnoticed visitor.

This "unnoticed man"—or perhaps it was a woman or a child—was important because he unwittingly served as a yardstick to measure the service freely given to all comers by this institution. He was unnoticed because his coming and going were as the coming and going of 1,249 others who visited the Museum daily.

The unnoticed and unknown visitor was the four millionth person to come to the Museum since its opening ten years ago last January.

Wild Flowers Bloom. Seventy-three eastern wild flowers burst into bloom last month when Alice Pomeroy Roberts' collection of water colors opened. Included were many rare orchids, pitcher plants, most of the Alpine flowering plants, and the more common wayside friends.

Mrs. Roberts is trying to convince the public, through her paintings, "that wild flowers, with their fleeting beauty, should be given a chance to live."

Wild flowers in real life bloomed in the Hall of Plant Life when members