

pressed opinions which approached the complete theory, they certainly did not reach it.—SIR HENRY E. ROSCOE, LL. D., F. R. S.

READERS' AND STUDENTS' NOTES

1. The account of Dalton most readily available to the ordinary reader is Sir Henry Roscoe's "*John Dalton, and the Rise of Modern Chemistry*," in "*The Century Science Series*," edited by Sir Henry Roscoe (New York: The Macmillan Co., \$1.25).

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teenth year; and as his father's pension had been lost it was necessary for him at once to begin to earn his own living. Accordingly he accepted a position as a private tutor in the family of a gentleman residing at Caen, Normandy.

It was at Caen that Cuvier first became known to the world as a naturalist. He spent six years there—from 1788 to 1794, the terrible years of the revolution—but his life, despite the storm and turmoil of the outside world, was quiet and wholly studious and contemplative. The proximity of the sea led him to give his attention to the study of marine plants and animals. Though he was without scientific books, and felt the need of intercourse with other men of science, yet the observations he made, and the descriptions he sent of them to learned societies, soon gave evidence of his remarkable powers. He was fortunate, too, in winning the notice and friendship of the celebrated Abbé Tessier, who was then in Normandy in disguise, sheltering himself from the fury of the revolution. Tessier wrote of him to scientific friends in Paris describing him as "a violet hidden in the grass." In particular, he secured for him the interest of the rising young naturalist, Geoffroy Saint-Hilaire. Finally, in 1795, when he was but twenty-six years old, by Saint-Hilaire's influence he was appointed assistant professor of comparative anatomy in the Museum of Natural History in the Jardin des Plantes.

Cuvier's history, from the time he first settled in Paris until his death, is wholly a record of honorable appointments and successful discharges of the duties of his appointments. He served the directory, he served Napoleon as first consul, he served Napoleon as emperor, and he

served Louis XVIII., Charles X., and Louis Philippe. But under whatsoever government he served, or whomsoever he served, his one thought was to promote the interests of science, and of scientific and general education. It was not long before he was made professor of comparative anatomy at the Jardin des Plantes. He was also appointed lecturer to the Central School of the Panthéon. In 1799 he was made professor of natural history in the College of France. In 1802 he was made one of the inspectors-general of public instruction. In 1803 he was appointed perpetual secretary of the Institute of France. In 1808 he was made a councilor of the Imperial University. In 1814 he was made by Napoleon a member of the Council of State, and this appointment was continued to him upon the restoration of the Bourbons. Other offices to which he was appointed were: Chancellor of the Imperial University, President of the Council of Public Instruction, and President of the Committee of the Interior, the latter being an important office of government administration, which he retained until his death. In 1826 Charles X. made him grand officer of the Legion of Honor, and in 1831 Louis Philippe made him a peer of France. Finally, in 1832 he was nominated to the high office of President of the Council of State—perhaps the most honorable public office in the gift of his country—but this position, owing to his untimely death, he never actually held.

These distinguished offices and honors indicate the esteem in which Cuvier was held by his countrymen. They were not mere compliments. They were bestowed upon him for his real worth as an administrative officer. Napoleon was careful in his choice of men for administrative positions, and when he selected Cuvier for the reorganiza-

tion of the educational systems of the country he selected the very best man he could lay his hands upon. As an instance of the amount of work which these administrative offices entailed upon Cuvier it may be mentioned that in the single position of President of the Committee of the Interior ten thousand distinct and separate matters came before him annually for his judgment and decision. But the honor of all these offices and dignities sinks into insignificance compared with the honor and grandeur of the work he was able to do for science—although this can only be touched upon here. There are, however, three things Cuvier did for science which at least must be mentioned. In the first place he substituted for the artificial classification of the animal kingdom which Linnæus had set up a natural classification based on fundamental anatomical resemblances and differences. Cuvier had the most profound knowledge of structural anatomy ever possessed by man. His gift for divining anatomical structure was indeed a sort of morphological instinct. This instinct led him to see that many animals, apparently unlike, were, on a closer examination of their parts, really alike, and that many animals, apparently alike, were really unlike. With him, therefore, classification had to rest upon considerations of morphology and homology—that is to say, upon consideration of structural form, and of likeness or unlikeness in the structural form. In this doctrine Cuvier has been wholly followed by all modern scientists. In the second place, it is to Cuvier that the world owes the science of comparative anatomy. It was he, for example, who first pointed out the correspondence between the arm of a man, the fore-leg of a quadruped, and the wing of a bird; and it was he who first established the now generally



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admitted principle that there can be no real scientific zoological study that does not include the recognition of likeness in structure (whatever the functional unlikeness may be) of corresponding parts in different animals. Thirdly, it was Cuvier who first gave value and character to the science of palæontology—that is to say, the science which deals with forms of animal life now extinct and known to us only by their fossil remains. Before Cuvier's time, when fossil remains of animals were found they were usually crudely believed to be the remains of human giants, or the remains of giant specimens of animals now existing. The world was astonished beyond measure—the scientific world no less than the ordinary world—when Cuvier showed that these fossil remains (remains, for example, that the people of Luzerne, in Switzerland, fondly thought to be relics of their ancient kings) were the bones of huge rhinoceros-elephant-boars, bird-lizards, fish-lizards, fish-serpents, etc., all species of animals which no longer exist. Still more was the world astonished when Cuvier showed that the earth in former ages was peopled with whole genera of species which no longer exist, and that the true understanding of the characters and habits of these extinct species could be learned by the study of the characters and habits of species that do now exist.

These three things, thus crudely described, and also many others, Cuvier did for science. His life was a full one in every respect. It was fortunate and happy, too, in every respect but one. His children, whom he most fondly loved, all died before him. And when in 1828 his second daughter died, his only child that lived to maturity, his heart broke. He lived a few years longer; but his hair whitened with grief, and labor became a sorrow to him;

VII. BARON CUVIER

1769-1832

BIOGRAPHICAL STUDY

BY JOHN EBENEZER BRYANT, M. A.

The career of Cuvier was, perhaps, the most brilliantly successful in the whole history of science. There was scarcely any sort of honor or honorable estimation that he did not attain. As a careful and accurate original scientific observer and investigator he won the esteem of all other scientific observers and investigators. As a scientific teacher and lecturer he won the affectionate admiration of all his hearers, and this not more by the profundity of his knowledge than by the interest he always inspired in the subjects of his discourses, and the enthusiasm he constantly excited for the prosecution of scientific research. As a scientific writer he not only united the widest and soundest information with a graceful and pleasing style, but he was able by his indefatigable energy and industry to turn out whole libraries of classical productions, any one of which was of sufficient importance to have made any man famous. And further, by his scientific insight and discernment he was able to establish new

scientific truths, to present new views of scientific facts, to discover and invent new systems of scientific order and classification, which have justly entitled him to a leading place in the very first rank of the world's scientific philosophers. And yet all this was only one part of the work he did in the world. Cuvier was not merely a scholar and a scientist; he was a man of practical affairs. Although he lived and worked with an eye single to the cause of scientific truth, his genius for administration soon became recognized by his countrymen; and, first in the administration of affairs connected with higher education, then in the administration of affairs connected with general education, and finally in the administration of the affairs of state generally, he was given one public employment after another, until, in the end, if hard work and grief for the loss of his loved children had not cut off his years untimely, he would undoubtedly have had the administration of the whole internal affairs of his country upon his shoulders.

Léopold Chrétien Frédéric Dagobert Cuvier, afterward by the wish of his mother called Georges, which was the name of an elder brother, deceased, was born at Montbéliard, on the eastern border of France, August 23, 1769. His father was a retired Swiss officer. His mother, who was much younger than her husband, was also a Swiss. She was a woman of refined culture and noble character, and to her loving, watchful direction and supervision of his studies, to her loving counsels and precepts, to the influence of her long-continued companionship, he owed much of his early rapid mental development; much, too, of the sterling uprightness and sense of duty, the charm of manner, tactfulness, and discretion, which distinguished

him all through life. From the very first he was fond of nature, and his inborn faculty of observation was stimulated by the habit which his mother fostered in him of making drawings of natural objects, and coloring them to agree with nature. From his tenth to his fourteenth year he attended the high school of his native town, where his progress in the prescribed academic studies of the time was remarkable. But his progress in the studies that he pursued out of school was even more remarkable. He had found in the house of a friend a complete set of the works of the celebrated naturalist Buffon, and these he studied with such ardor, making copies of the illustrations and coloring them, that at the age of twelve he was an accomplished naturalist. In his fifteenth year his reputation as a lad of genius and industry had secured for him many friends, and one of these recommended him to the duke of Würtemberg, who placed him in his own academy in the University of Stuttgart. At this university, by the duke's kindness, he remained four years, taking not only the usual courses in philosophy, classics, mathematics, etc., but also special courses in political economy, finance, and jurisprudence. His university course was a very brilliant one; and yet once more his extra-academic studies were more remarkable and important than his academic studies. He collected an herbarium. He also studied and made drawings of animals, birds, insects, and plants. Of insects, indeed, he made a special study, and kept collections of living insects in his room, and fed them and watched their habits. As he afterward acknowledged, the foundations of his subsequent scientific fame were laid in these self-directed, voluntary scientific pursuits at Stuttgart. When he left the university he was in his nine-