

## CENTENARIES

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### Bartram, William (1739-1823)

WILLIAM BARTRAM, an American naturalist, was born February 9, 1739 in the house of stone erected by his father John with his own hands in his Botanic Garden (the first in the new world) in Philadelphia. William early displayed great talent for drawing natural objects. Various trades were attempted; for example, Benjamin Franklin offered to teach him printing. In 1765-66, he accompanied his father in exploring all the 400 miles of St. John's River. In 1773-77, William explored the south-eastern part of the U.S.A. In 1782 he was elected Professor of Botany in the University of Pennsylvania but declined the position for reasons of health.

#### HIS FAME

The chief cause of Bartram's fame is his fascinating *Travels through North and South Carolina, East and West Florida, the Charokee Country, the Extensive Territories of the Muscogulges or Creek Confederacy and the County of the Chactaus*. It was republished and translated in England, Ireland, Germany, Holland and France. The literary influence of the *Travels* was immense. "It is a work of high merit every way" wrote Coleridge, whose *Kubla Khan* is as much based on it as Wordsworth's *Ruth*. The *Travels* reveal a man with a deep reverence for the Creative Spirit he felt in all about him. For him the solitary "Woodpelican", alone on the topmost limb of a dead cypress, "looks extremely grave, sorrowful and melancholy, as if in deepest thought" and we find Wordsworth echoing the same in the *Prelude*

....and the pelican  
Upon the Cypress spire in lonely thought  
Might sit and sun himself—Alas! Alas!  
In vain for such solemnity I looked.

#### HIS HONOURS

Bartram's varied knowledge was at the service of all who applied to him; he corresponded with naturalists abroad and was a member of many foreign societies. In his own country he became (1786) a member of the American Philosophical Society, which was founded by his father and Benjamin Franklin. His thought, his findings and his drawings were freely incorporated in the contemporary books. Alexander Wilson's *American ornithology* (1808-14) owed its inspiration to Bartram.

#### HIS END

Bartram lived as a bachelor in his father's Botanic Garden all through his later life. He had just finished writing the description of a plant and was stepping out for a stroll in his beloved Garden, when a blood vessel in the lungs ruptured and he died suddenly, July 22, 1823.

### Gibbs, Josiah Willard (1839-1903)

JOSIAH WILLARD GIBBS, an American mathematician, was born in New Haven, February 11, 1839. Both his parents were graduates. He took prize in Mathematics and Latin in Yale College and graduated in 1858. He took a doctorate in 1863 and after teaching Latin and Natural Philosophy for some time he spent three years in Europe and came under the influence of several of the most distinguished mathematicians and physicists of the world. In 1869, he returned to New Haven and in 1871 he was appointed Professor of Mathematical Physics in his own college and he continued as such for thirty-two years until his death.

#### HIS INFLUENCE

As the classics were the fashion in those days, he attracted few advanced students. He is said to have remarked a year before his death that during thirty years of his professorship he had had only about half a dozen students really equipped to profit by his lectures. Gibbs' influence came chiefly from his writings.

#### HIS CONTRIBUTIONS

Multiple algebra, vector analysis, thermodynamics, theory of light and theory of electricity were the fields of knowledge enriched by the twenty-one papers and the two books of Gibbs. Most of the papers were published in the *American journal of science*. Of the books, *Vector analysis* was first privately printed (1881-84) for the use of his class and published in 1901 in a greatly expanded form by one of his students. It was the result of his gift for elegance and conciseness and his earnest effort to devise a calculus by which the more or less complicated space relations of physics could be conveniently and perspicuously expressed. He also called attention to the great saving of labour, which the use of this calculus would cause in certain astronomical problems such as the determination of orbits and the solution of differential equations giving the perturbations.

#### STATISTICAL MECHANICS

His last work *Elementary principles in statistical mechanics* (1902) may be said to have supplied one of the great deficiencies in the scientific record of the nineteenth century. In spite of many dogmatic assertions that heat was a mode of molecular motion, this principle had not been put on a firm foundation until Gibbs established that the extra-dynamical laws of heat were consequences of the immense number of independent mechanical systems in any body—a number so great that only certain averages are perceptible. In the first twelve chapters, Gibbs forges out a perfect weapon for attacking the problem and its triumphant use in the last three chapters, makes



the familiar formulæ of thermodynamics appear almost spontaneously.

His collected papers were published in two volumes in 1906 and two volumes of *Commentary* on these papers were published in 1936 to honour his memory.

Gibbs died at New Haven, April 28, 1903.

### Seeley, Harry Govier (1839-1909)

**HARRY GOVIER SEELEY**, an English palæontologist, was born in London, February 18, 1839. In the early years he found a copy of Lyell's *Principles of geology* in the London Library and this stimulated interest in natural history. Under the old regulations, it was possible for him to gain admission to the British Museum Library even at seventeen. This opportunity he used to the fullest during the next three years. He supplemented his study by attending the lectures of eminent professors like Owen, Forbes and Brayley. He also received encouragement from Woodward of the Geological Department of the British Museum.

When he went to Cambridge in 1859 for literary work, Professor Sedgwick invited him to be his assistant. The regard that the Professor had for the young Seeley is shown by a letter of his, which reads: "In youth, you had a reputation for genius. . . . It was that reputation which made me seek you out and secure your co-operation as my assistant and fellow-labourer". Till 1871, Seeley stayed in Cambridge and did considerable research work. From 1872, he held various teaching posts in London.

#### HIS PUBLICATIONS

In addition to eight books published between 1870 and 1901, Seeley contributed nearly 200 papers to the organs of learned societies. His ten years' work in the Woodwardian Museum of Cambridge resulted in the publication of the much valued *Index to the fossil remains of Aves, ornithosauria and reptilia* (1869). The most voluminous sequence of his papers entitled *Researches on the structure, organisation and classification of the fossil reptilia* appeared regularly in the *Philosophical transactions* from 1888 to 1896.

#### FIELD TEACHING

Besides the valuable addition he made to palæontological knowledge as disclosed by his papers, Seeley did much to popularise scientific knowledge and scientific method. From 1880 to 1890 he gave lectures for the London Society for the Extension of University Teaching and established the London Geological Field Class, in which he conducted excursions week by week for twenty-one years in the summer. And now it has borne fruit in the recognition by the University of London, of Field Teaching as a necessary condition for graduation in Geology.

Seeley died in London, January 8, 1909.

### Verrill, Addison Emery (1839-1926)

**ADDISON EMERY VERRILL**, an American Marine Zoologist, was born at Greenwood, February 9, 1839. He received his early education at Norway Liberal Institute. Even before his thirteenth year, he had learned to recognise the varieties of rocks and minerals in his native place and had built up a herbarium of several hundred species of wild flowers. At seventeen, he had acquired a collection of the local shells, insects, amphibia, reptiles and mammals and identified them.

In 1859, he entered the Harvard College and came to work under the great Agassiz. Instead of listening to lectures and studying, he was asked by Agassiz what field appealed to him. On replying he was most interested in birds, he was asked to make a study of the goose. After some weeks, when the young Verrill had completed what seemed to him an exhaustive study of the bird's anatomy, Agassiz genially pointed out to him the incompleteness of his investigation and gave him directions for several months' additional work. A new subject was then taken up.

#### HIS CAREER

Verrill was called to Yale University as its Professor of Zoology in 1864, and he held that post till 1907. From 1871 to 1887 he was also in charge of the scientific work of the United States Commission of Fish and Fisheries. In connection with this, he devised a cradle sieve, a rake dredge and a rope tangle for collecting star fishes in oyster beds.

#### DICTIONARY WORK

For several years prior to 1890, he worked on Webster's *International Dictionary* and furnished all the zoological definitions and illustrations.

#### HIS PUBLICATIONS

Verrill was a profuse writer for about 64 years. His contributions number nearly 300. While they cover a wide range, the majority deal with marine invertebrates—particularly those of the Northern New England Coast, the Gulf Stream, the Pacific Coast of Central America, the Bermudas and the West Indies. He estimated that he had discovered a thousand undescribed forms. At eighty-five, still sturdy and vigorous, he extended his exploration to the Hawaiian Islands and discovered many new species. His most exhaustive work is said to be that on corals and coelenterates, including his studies of the collections of the Canadian Arctic Expedition. Some time before his death, he had placed in the hands of the publishers his monograph on the *Alcyonaria* consisting of upwards of a thousand pages of manuscripts and 150 plates.

Verrill died at his son's residence in California, December 19, 1926.