CENTENARIES

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Bowditch, Nathaniel (1773–1838)

NATHANIEL BOWDITCH, an American mathematician, was born in Salem, Mass., March 26, 1773. His father was a cooper. The family's poverty led to the withdrawal of Nathaniel from school when he was but ten. But "Learning came natural to him". The following incident in his short school career will be of interest to the teaching profession. When he was about six years, his teacher, a person of violent temper, gave him a difficult sum in arithmetic. The pupil went to the desk and soon brought up the slate with the question solved. The teacher, surprised at the quickness of his return, asked him who had been doing the sum for him; and on assuring "Nobody—I did it myself" the teacher gave him "a severe chastisement for *lying*, not believing it possible that he could, of himself, without any assistance, perform so difficult a question".

Prepares Almanac at 15

On leaving school, he became a clerk in a ship-chandlery and remained as such till 1795. But every moment that he could snatch from the counter was given to the slate. An old gentleman said to his wife, "I never go into that shop but I see that boy ciphering and figuring away on his slate....If he goes on at this rate....I should not at all wonder if, at last, in course of time, he should get to be an almanac writer". This expectation was speedily fulfilled; for in 1788, when he was only fifteen, he actually made an almanac for 1790. The original manuscript is said to be still in the family.

Ardent Love for Reading

He had an ardent love for reading. During this period, he read through the whole of *Chambers' cyclopædia*, without omitting a single article. He read Euclid. He learned algebra, borrowing a text-book from a local teacher. He learned Latin to read Newton's *Principia*. The *Philosophical transactions of the Royal Society of London* and many other similar works came his way to delight and enrich him by an accident, which was described by him as follows in his last will:—

An Accident Favours

A valuable scientific library was captured in the British Channel (on its way to Ireland) by an American privateer. And it was deposited in the Salem Atheneum. "Thus in early life, I found near me a better collection of philosophical and scientific works than could be found in any other part of the United States....I was permitted freely to take books from that library and to consult and study them at pleasure."

Practical Navigator

From 1795 to 1804, he followed a nautical career. During this period, he revised the thirteenth edition of J. H. Moore's *Practical navigator* and brought out a corrected American edition (1799). But he found the book to be "a tissue of errors from beginning to end". In fact, he had to correct "*eight thousand* errors in the nautical tables". This made him issue the corrected book in his own name under the title the *New American practical navigator* (1800). This useful book went through 56 editions. The scholarship displayed in the book won for him an honorary degree of M.A. from the Harvard University (1802).

His Later Career

In 1804, he retired from the sea-faring life and became President of an Insurance Office at Salem. Later in 1823 he went to Boston as the Actuary of the Massachusetts Hospital Life Insurance Company, a position which he held till his death.

Lissajous Curves

During this part of his career he pursued his scientific work to a remarkable degree. He surveyed and made accurate charts of the harbours of Salem, Beverley and Manchester. He published as many as 23 scientific papers in the *Memoirs of the American Academy of Arts and Sciences*. While most of them relate to Astronomy, the ninth paper (1815) entitled *On the motion of a pendulum suspended from two points* was the mathematical exposition of a problem which became famous, many years later, in connection with certain acoustic phenomena, as Lissajous curves.

Celestial Mechanics

A monumental contribution of Bowditch was the translation, with profuse commentary, of Laplace's *Mechanique celeste* in four volumes (1829–39). In the words of His Royal Highness the Duke of Sussex, as President of the Royal Society, "In Dr. Bowditch's very elaborate commentary every deficient step is supplied, every suppressed demonstration is introduced, every reference explained and illustrated, and a work which the labours of an ordinary life could hardly master, is rendered accessible to every reader." Laplace himself is said to have remarked, "He has not only detected my errors, but he has also shown me how I came to fall into them."

His Faith in Books

Among the numerous services which Dr. Bowditch rendered to the cause of good learning and the diffusion of useful knowledge after he came to Boston was the active interest he took in the Boston Atheneum. He fought hard and succeeded in breaking the blind tradition of refusing loan of books from its splendid library. He met with strenuous opposition in this attempt. But he knew the value of books and he believed and said that the circulation of books would make the library ten times more useful. He persevered till he won his object. He also exerted himself in enriching the collection in the library and making the conditions of loan extremely easy.

After a short period of illness due to some gastric trouble Bowditch died on Friday, March 16, 1838.

Perkin, William Henry (1838–1907)

WILLIAM HENRY PERKIN, a British chemist, was born at Shadwell, March 12, 1838. His father was a builder. William received his early education at a private school, and was afterwards sent to the City of London School, where the enthusiasm of Thomas Hall fixed his interests definitely in chemistry. The following account of Perkin himself will be of interest:

Choice of a Career

"As long as I can remember, the kind of pursuit I should follow during my life was a subject that occupied my thoughts very much. My father being a builder, the first idea was that I should follow his footsteps and I used to watch the carpenters at work and also tried my hand at carpentry myself. Other things I noticed led me to take an interest in mechanics and engineering, and I used to pore over an old book called *The Artisan* which described some of the steam engines then in use, and I tried to make an engine myself··· I had always been fond of drawing···This led me on to painting and made me think I should like to be artist···But when I was between twelve and thirteen years of age, a young friend showed me some chemical experiments and the wonderful power of substances to crystallise in definite forms, and the latter especially struck me very much, with the result that I saw there was in chemistry something far beyond the other pursuits with which I had previously been occupied···My choice was fixed and I determined if possible to become a chemist, and I immediately commenced to accumulate bottles of chemicals and make experiments."

His Career

In 1853, Perkin entered the Royal College of Chemistry as a student of Hofmann. In 1854 he fitted up a laboratory in his own home. Inspired by some remarks of his professor, he tried to synthesise quinine but obtained a black product from which he was able to extract a bluish substance with excellent dyeing properties. This led to his taking up a patent and setting up dye-works at Greenford Green in 1857. It proved to be a flourishing business. About 1874, having put by enough money, he abandoned his business and devoted himself exclusively to research.

Synthetic Chemistry

The first epoch-making discovery of Perkin was the "Mauve," a synthetic dye. This discovery ultimately led to the supersession of vegetable by synthetic dyestuffs. Next, Perkin discovered processes for the manufacture of artificial alizarin. He succeeded in synthesising several other substances as well. He described these processes in about ninety papers published mostly in the *Transactions* of the Chemical Society.

Physical Chemistry

In 1881, he turned his attention to physical chemistry, and by a systematic study of

the magnetic rotatory power, he delved into the chemical constitution of substances. In the words of Prof. Bruhl of Heidelberg, this work of Perkin "created a new branch of science".

His Honours

Perkin's services were widely recognised. He received several medals and several honorary degrees. In July 1906, the Golden Jubilee of Perkin's creation of the coal-tar dyeing industry was celebrated, practically all the countries participating in it, and he was knighted. Perkin Medals were founded.

After four days' illness, Perkin died of double pneumonia at his residence at Sadbury, July 14, 1907.

ASTRONOMICAL NOTES.

Planets during April 1938.—Mercury can be seen as an evening star early in the month; on April 21 it passes conjunction with the Sun and about the end of the month, will be visible in the eastern sky, just before sunrise. Venus can be seen low down in the west for about an hour after sunset; it will closely approach Uranus on April 15, when the angular distance between the two planets will be only 9 minutes of arc.

Mars will not be well placed for observation during the month, being too near the horizon in the western sky at sunset; it will be in conjunction with the Moon on April 3, the planet being 42′ south of the Moon at the time. Jupiter will be a fairly bright object in the sky in the latter part of the night, rising about 2 hours after midnight. Saturn also can be seen near the eastern horizon about an hour before sunrise. The ring ellipse is gradually widening, the major and minor axes being 36″ and 5″ respectively about the middle of April. Neptune is situated about 2° to the north-west of the star τ Leonis and can be picked up with a binocular.

Occultations of Stars by the Moon.—The observations of occultations provide valuable material for determining the errors of the Moon's position as given in the Ephemeris. From a discussion of the results of 1405 occultations observed at various places in 1935 (*Astronomical Journal*, 1076), Prof. E. W. Brown and Dirk Bronwer have found the mean correction to be $+3''\cdot41$ in longitude and $0''\cdot53$ perpendicular to the plane of the Moon's orbit. The mean correction, it may be noticed, is slowly decreasing from a value of about 7″ in 1926.

Galactic Rotation.—Planetary nebulæ, like globular clusters are recognized to be remote members of the stellar system. The number of planetary nebulæ known at present is about 150; and they are situated at distances varying from 500 to 12,000 *parsecs*. From a study of the distribution and motions of these objects, Prof. Louis Berman has obtained (*L.O.B.*, 486) a new determination of the constants defining the rotation of the galaxy. The direction of the centre of rotation is given by $l_0 = 333°\cdot0$ and the distance of the Sun from the centre is estimated to be 9360 *parsecs*. The period of its orbital revolution about the galactic centre is 210 million years. The results appear to be in good agreement with those derived from the investigations of Oort as well as Plaskett and Pearce. (The unit of distance—one *parsec*—is equal to 3·26 light years).

T. P. B.