

time did the production of this commodity develop into an important industry.

There were scattered attempts to build up a wine industry, with both native and imported grapes. At several times French vine-dressers were brought over for the purpose of establishing vineyards, but for one reason or another they were usually not successful.

Copper and gold deposits apparently were not worked in colonial Virginia. Lead was discovered in Wythe County by a Colonel Chiswell, who worked the deposits until the beginning of the Revolutionary War, when he was arrested for his Tory sympathies.

Other industries included a salt works at Cape Charles on the Eastern Shore, and the cultivation of silk from the mulberry tree. It is said that Charles II at his coronation in 1661 wore a robe and hose of Virginia silk (2).

Generally speaking, Colonial Virginia was an agricultural community. To a large extent, manufactures were still in the handicraft stage, and most goods were produced for local and home use. Many of the colonial industries were carried on in the home. The industrial progress was not great by present day standards, but of course the conditions of pioneer life must be considered.

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## OLD CHEMISTRIES

### Thomas Ewell's "Plain Discourses on the Laws or Properties of Matter"

*Robert H. Goldsmith, St. Mary's College of Maryland*

Thomas Ewell's *Plain Discourses on the Laws or Properties of Matter Containing the Elements or Principles of Modern Chemistry* was published in 1806 for an audience of artisans, farmers and fellow citizens and has been described as a nontechnical presentation of useful chemical knowledge (1). This was the first and only edition of a work which was used primarily in the Southern and Eastern United States in the first quarter of the 19th century (2). Despite the fact that it was intended for popular use, it was also used as a textbook at the College of William and Mary (3).

The book's arrangement and choice of subject matter resemble that found in other chemical publications of this time period, and Ewell admitted that, in writing his book, he had utilized the chemical works of Thomson, Chaptal and Murray, as well as numerous quotations from Accum's works (4). He also provided an extensive outline, placed a list of definitions at the end of the text, and stated that he had utilized as few technical terms as possible, since he felt that the use of such terms was confusing to the average citizen and irrelevant to an understanding of the basic principles (5). The text is also characterized by the lack of utilization of a large number of divisions and subdivisions and the omission of historical background on noteworthy chemists and their discoveries.

Ewell's text is divided into a dedication, a preface, an introduction, 15 chapters (which are called discourses) and a summary. In the dedication the book was inscribed to Thomas Jefferson. The introduction presents Ewell's view of chemistry and its value in society. The first discourse deals with physical and chemical properties, the nature of matter and an introduction to heat. The second discourse presents views of light, galvanism and electricity, while the third discourse describes the composition of the atmosphere and the versatility of water. The fourth and fifth discourses describe the chemical nature and uses of common inorganic compounds and the nonmetallic elements. The sixth discourse focuses on the elementary earths, while the next two deal with the metals. The ninth discourse restricts itself to a description of the nature, production and value of the most important minerals. The properties, growth and identification of vegetable substances are well treated in the next three discourses and the thirteenth and fourteenth do the same with animal substances. The final discourse introduces nutrition and the technology of dye use. The author concludes with a brief restatement of basic principles.

An examination of the textual material reveals that nearly all of the subject matter presented is in accord with prevailing

chemical theory. However, there are several items that reflect Ewell's own research efforts and beliefs. Of greatest interest to chemists are his experimental and theoretical objections to Dr. Black's theory of latent heat and his presentation of his own version of the caloric theory (6). In support of his theory, he presented original data from experiments designed to show that, when heat is released or gained, there is an equivalent gain or loss in weight. Ewell asserted that these experiments, which had been originally published in the *Medical Repository* and were later included in a compilation of his works published in 1819, proved that heat was a form of matter (7). Ewell also presented his own viewpoints on electricity and the nature of vegetation, and mentioned experiments he had performed with coal, but without giving any details.

The most interesting aspect of this book is that it is probably the first American-authored textbook designed explicitly for the nonspecialist or the common man. In the preface Ewell makes the following statement (8):

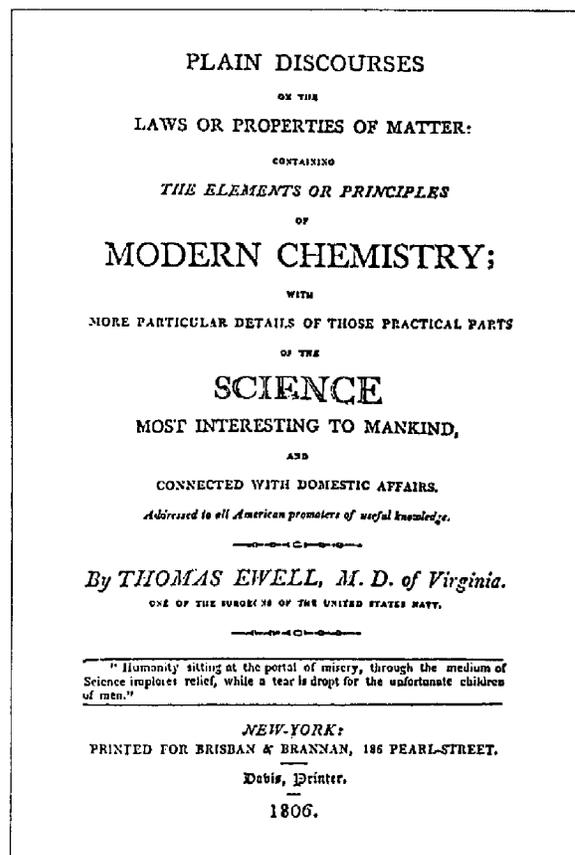
The following plain work I prepared with a view to lessen the difficulties and to increase the conveniences of the citizens of the United States, by introducing them to a more intimate acquaintance with chemistry of the qualities of the substances around them. The immense advantages, which will result from the general diffusion of such knowledge, are glanced at in the introductory discourse. These advantages, I have indulged in the hope, will lead the respectable farmers and artists, the benevolent editors of publications, particularly the teachers of seminaries, my brethren of the medical faculty, and the intelligent of every denomination, to favor and promote the undertaking.

Support for this approach was given in letter which Ewell received from Thomas Jefferson (9):

Of the importance of turning a knowledge of chemistry to household purposes, I have long been satisfied. The common herd of philosophers seem to write only for one another. The chemists have filled volumes on the composition of a thousand substances of no sort of importance to the purposes of life: while the arts of making bread, butter, cheese, vinegar, soap, beer, cider and cc. remain unexplained. Good treatises on these subjects should receive general approbation.

Another letter from Bushwood Washington, nephew of George Washington and Associate Justice of the Supreme Court, also endorsed Ewell's approach (10):

I have long thought that a work upon the plan you suggest was much wanted by those who form the great bulk of readers on chemical subjects. I have not met with a single treatise, which has not appeared unnecessarily obscured by technical terms, which only scholars can understand. They have been more generally addressed to the comprehension of professional and learned men, than to those of the humble walks of life; for whose use this science might be made most



essentially to contribute, by adapting it to their capacities and by pointing out the way by which its principles may be applied to the more common arts, in which they are daily employed. You will I think do great good to society and much honor to yourself, by executing such a work as you propose.

This book represents Ewell's attempt to relate the basic ideas of chemistry along with useful chemical information on practical chemical concerns such as gunpowder, glasses, pottery, fertilizers, metallurgy, gilding, inks, sugars, wines and dyes to the nontechnical citizen in the simplest manner possible, and it should be noted that his efforts did receive recognition (11).

Thomas Ewell was born on 22 May 1785 on his family's estate near Dumfries, Virginia (12). Detailed information on his early life is not available but it is known that he studied medicine with Dr. George Graham of Dumfries and shortly thereafter with Dr. John Weems in Washington, D.C. His medical studies were pursued at the University of Pennsylvania, where he received his M.D. in 1805. Among his instructors at this institution was Dr. Benjamin Rush, one of the first teachers of chemistry in Colonial America.

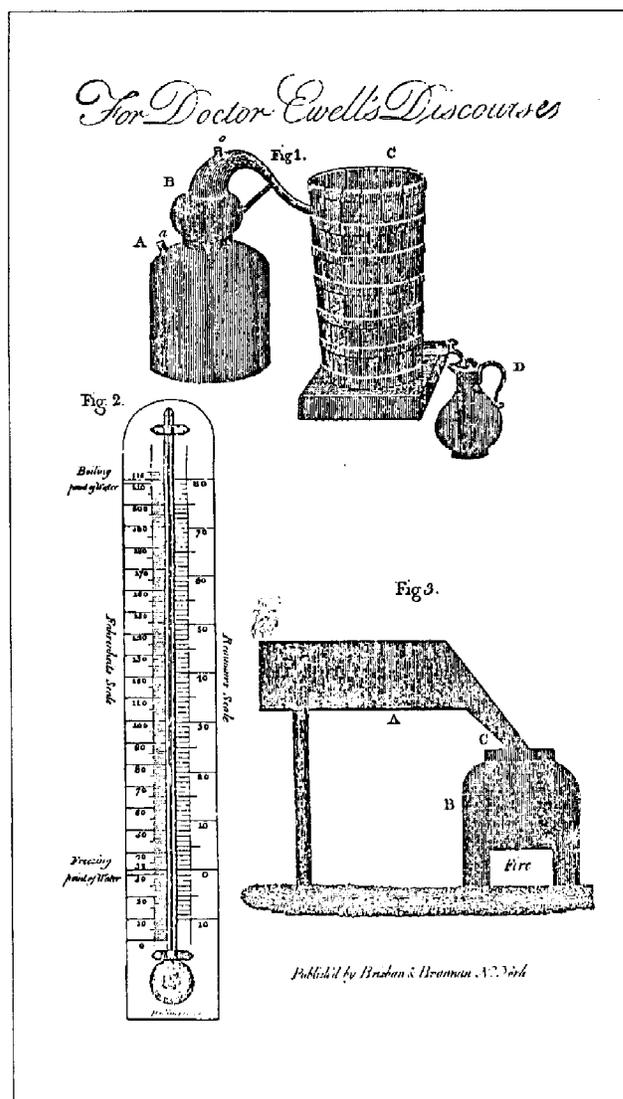
Upon graduation, Ewell published his thesis, entitled *Notes on the Stomach and Secretion*, in which he carried out one of

the early studies in digestive biochemistry. His research focused on the biological effects of gastric juice, emphasizing its dissolving ability and its potential medicinal value. He proposed that it might be possible to mix specific drugs, such as opium, in set doses with the gastric juice taken from a healthy animal, with the result that the drug would become more effective. Ewell designed experiments to find out what would happen if there was an accumulation of blood in the stomach. One of his major arguments was that colored bile associated with certain disease states was not formed in the liver, as was commonly believed, but was formed in other parts of the digestive system not directly associated with the liver. His thesis was noteworthy not only because it was one of the earliest to deal with this topic, but also for the original ideas he articulated.

Ewell accepted an appointment as a surgeon in the U.S. Navy on 2 November 1805 and in 1806 took charge of the Marine Guard at New York. From 1807 to 1813 he was attached to the Washington Navy Yard. During the latter part of his appointment he was actively involved in the setting up and the operation of a powder manufactory near Bladensburg, Maryland. After his resignation from the Navy, he remained in the area to take care of the powder mill, which did not become successful commercially, and to institute a private medical practice. He left Washington D.C. about 1815 to return to Philadelphia in order to attend lectures and to pursue his writing interests, returning again to the District of Columbia in 1819 to practice medicine. There he remained until he moved to his country estate, "Bellevue", in Prince William County, Virginia. Subsequently he moved to Centerville, Virginia, which was his final residence.

Ewell's interests were focused largely on medical rather than chemical matters, but his connection with gunpowder research resulted in the development of several techniques designed to improve the efficiency and safety of gunpowder manufacturing. Three patents relating to these techniques were awarded to him (13). He is believed to be the first gunpowder manufacturer to use a wheel to incorporate the gunpowder ingredients. This method was in sharp contrast with the more dangerous stamp mills that were in use at the time in this country. His second technique involved the use of steam to bring about a liquid slush instead of handling a dry mass. This technique was not used again in the United States until a Colonel Rains reintroduced it during the Civil War. The third innovation was the creation of a new granulating machine of which nothing is known, since the patent records were destroyed by fire and the advertisements for the machine contain no specific details about either its design or operation.

Besides his chemistry text and his various articles in the *Medical Repository*, Ewell authored several other books. His book, *Letters to Ladies*, published in 1817, concerned basic medical advice for women and children. A compilation of his previous papers and addresses was published in 1819 as



A plate from Ewell's *Plain Discourses*

*Statement of Improvements in Medicine*. His *American Family Physician*, published in 1824, was a popular guide to medical treatments. He also edited the first American edition of David Hume's *Philosophical Essays on Morals, Literature and Politics*, and coauthored several reports of which the most significant was a report on the Naval Hospital System and a plan to establish a general hospital in the District of Columbia area.

Ewell's brother, Dr. James Ewell, was a distinguished physician who also had an outstanding record of achievement. After his medical education and practice in Virginia, he moved to Savannah, Georgia, where he worked to introduce the practice of vaccination and wrote the first edition of *The Planter's and Mariner's Medical Companion*. This was sold extensively in the south and west and a total of ten editions were published. James later became a leading physician in the

Washington, D.C., area, and spent his final years in New Orleans.

In 1807 Ewell married Elizabeth Stoddert, the daughter of Benjamin Stoddert, first Secretary of the Navy. They had four daughters and five sons, two of whom - Benjamin Stoddert Ewell and Richard Stoddert Ewell - were distinguished Confederate officers. Thomas Ewell died on 11 May 1826 at the age of 41. Unfortunately, no portraits or other likenesses of him appear to have survived.

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