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Scientist, Soldier, Statesman, Spy: Count Rumford

THE BOOK

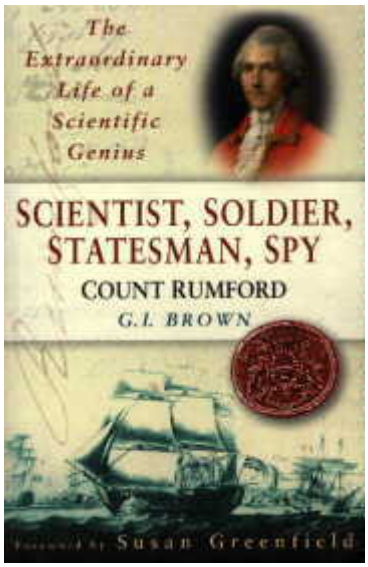
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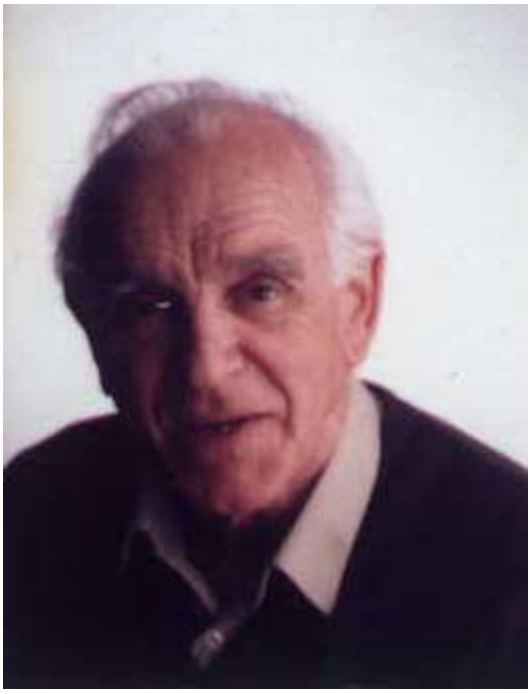
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EXCELLENT, WELL-RESEARCHED BIOGRAPHY

Scientist, Soldier, Statesman, Spy: Count Rumford, (1999, Paperback edition 2001) by G.I.Brown (softcover)
Sutton Publishing Limited, Phoenix Mill, Thrupp, Stroud, Gloucestershire, GL5 2BU. : 182 + x pages, ISBN 0-7509-2674-0 (Paperback), Price $12.95





G.I. Brown is a retired teacher of chemistry and the author of a number of popular books such as "*The Big Bang: A history of Explosives*". His book "*Invisible Rays: A History Of Radioactivity*" was reviewed in the last issue of this journal.
During the Second World War he served as a technical officer with the Special Operations Executive in England and with the Services Reconnaissance Department in Australia. What the blurbs don't mention is that he is the author of "Introduction to Physical Chemistry" (Longmans, 1964) a well-recognised school chemistry text in the 1960's. Our sister publication has run a detailed interview of Dr. Brown. Readers desirous of reading this interview may want to click here. Readers desirous of contacting G.I.Brown may click here.

Most of us, who have studied science in school, have known about Count Rumford only as an American-born British physicist and founder of the Royal Institution of Great Britain, London, whose investigations of heat overturned the caloric theory of heat and established the beginnings of the modern theory of heat as a form of motion. No school or college textbook ever described his other pursuits, as a soldier, spy or statesman. Sadly, it is sometimes difficult to understand and appreciate the real worth of a person without the knowledge of his or her entire range of interests and pursuits. Brown's excellent, well-researched biography of this scientific genius proves the point; Rumford's was indeed an extraordinary life, not known to many.

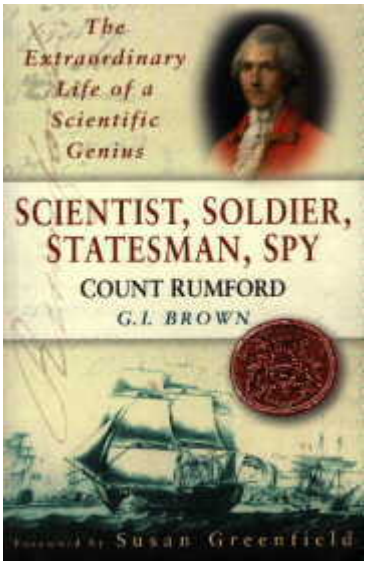
The most amazing thing about Count Rumford (who was born as Benjamin Thompson in Massachusetts, in 1753) is that he did hardly any serious scientific work till he was past his forty's, although he published over 70 research papers in his lifetime. Rumford attributed his particular interest in the nature of heat to his reading, at the age of sixteen, a long chapter on 'Fire' in the book *New Methods of Chemistry*, written by a Dutch physician named Hermann Boerhaave. After leaving school at the age of thirteen, young Benjamin was apprenticed to a general store, and later to a Boston trader as shop assistant. But it soon became clear that he was not fit to be a shop assistant because he spent most of his time "under the counter with gimlets, knife and saw, constructing

some little machine, or looking over some book of science, than behind it arranging the cloths or waiting on customers."

Benjamin's penchant for learning and rising in life was clear from the notes he kept between the ages of sixteen and nineteen, one of the entries in which says, "never allow an opportunity of advancement to escape me." In fact, this was to be one of the guiding lights of his life as he began "the process of self-advancement not uncommon in ambitious young men with innate ability and plenty of energy."

Although any challenging task attracted him, entries in his notebook show that his main interest was in science and technology. He liked both the theoretical and practical science and built several gadgets himself to try out some innovative experiments, including a perpetual motion machine. He almost blew himself up while making some fireworks, commenting later that "the force of gunpowder is so great, and its effects so sudden and so terrible, that, notwithstanding all the precautions possible, there is ever a considerable degree of danger attending the management of it, as I have more than once found to my cost."

Extracts from the Foreword



Benjamin Thompson, Count Rumford of the Holy Roman Empire, has always enjoyed a mixed press. President Roosevelt ranked Rumford, along with Benjamin Franklin and Thomas Jefferson, as 'the greatest mind America has produced', while a more recent commentator has written that 'he was unbelievably cold-blooded, inherently egotistic and a snob'. Of course these two assessments are not mutually exclusive and this very readable biography of Thompson explores his complex personality. In his scientific work Thompson played a major role in establishing both the Royal Institution and the theory that heat was a mode of motion. Both the Institution and the theory continue to exert their influence to this day.

Thompson's notoriety stemmed from the necessity of making a living in a time of drastic political upheaval and he thus had to trim his sails accordingly. In this he was no worse than the French mathematician Pierre-Simon Laplace who at least avoided the guillotine, unlike his colleague the chemist Antoine Lavoisier, whose widow Thompson later married and lived unhappily ever after. Thompson's womanizing (he left at least two illegitimate children) was not particularly at odds with the social mores of the upper classes at the time. To appreciate this one has only to think of

the activities of the Prince Regent, Lord Nelson and Lord Palmerston (Lady Palmerston being one of Rumford's mistresses for a while). In Thompson's case, and perhaps the others as well, the cause of such patterns of behaviour was the interminable wars which were fought in the late eighteenth and early nineteenth centuries. For most of his adult life Thompson was an officer in one army or another in America and Europe. He fought against the rebels in the American War of Independence and later helped Bavaria to retain its independence during the wars against France. In all of this Thompson's actions increasingly reflected the sturm-und-drang atmosphere of the period as the war continued seemingly without end; indeed Thompson died the year before the Battle of Waterloo finally put an end to the conflict.

Why Thompson is singled out for criticism, in a way that some of the others mentioned above are not, is because he did scientific work. Scientists are, in the popular imagination, supposed to be a special type of person above the conflicts of the world. This image was constructed during the eighteenth century and still exerts a powerful influence today. George Brown, in this splendid biography, shows that science is a very human activity which can be undertaken even in the most extreme of circumstances.

-Susan Greenfield
Director, Royal Institution of Great Britain
July 1999

Later, as Secretary to the Province of Georgia, Thompson embarked upon an important series of experiments with gunpowder. First he tried to lay to rest the commonly held view that slightly moist gunpowder was more effective in guns than dry powder. His conclusion was that the presence of moisture actually reduced the effectiveness of gunpowder. He didn't stop at that, but went on to design an apparatus for measuring the strength of a charge. His apparatus came to be called an éprouvette (gunpowder-tester). He used it to find the best position for the vent hole in a gun, and to compare the velocity of a bullet when it emerged from the muzzle of the gun and when it impinged on its target. Thompson published his findings in the 1781 volume of the *Philosophical Transactions of the Royal Society*.

The brilliance of Thompson as an innovator came out during his days in Boston in the 1770s, when he regularly supplied sensitive military information about the American War of Independence to the British government. As was discovered later, Thompson gave important details of a planned attack on Boston in a letter written in ink made of a solution of gallotannic acid which, when dry, is invisible. The invisible writing could be made visible by soaking it in a solution of iron sulphate. (A transcript of Thompson's invisible letter given in the Appendix makes interesting reading.) What is interesting is that he wrote the message in invisible ink in the white spaces between portions written in Indian ink of a conventional letter. And to get nutgalls, from which gallotannic acid was made, without raising suspicion, he feigned diarrhoea for which infusion of nutgalls was a common remedy!

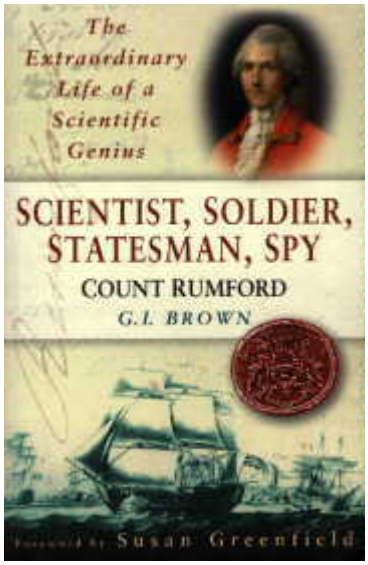
Count Rumford is best remembered for his work on the nature of heat, which he carried out in Munich. In 1798 he began his studies of heat and friction. By a series of carefully designed experiments, Rumford was able to measure the amount of heat generated during the boring of a cannon which was used to heat and even boil water. He wrote, "The result of this beautiful experiment was very striking and the pleasure it afforded me amply repaid me all the trouble I had had in contriving and arranging the complicated machinery used in making it." "It would be

difficult to describe," he wrote, "the surprise and astonishment of expressed in the countenances of the bystanders, on seeing so large a quantity of cold water heated, and actually made to boil, without any fire." He reported some of his findings in the classic paper "An Experimental Enquiry Concerning the Source of the Heat which is Excited by Friction" (1798), which described one of the earliest measurements of the equivalence of heat and mechanical energy.

Although the nature heat was his first love, Rumford's interests knew no bounds. In 1794, he turned his attention to the measurement of light intensities, which he used to design better lamps. He designed a simple device called a 'photometer' for comparing the intensities of two light sources by matching the shadows cast by the two. With his photometer, Rumford was able to collect a lot of significant data. For example, he found that as much as 15 per cent of light was lost when it passed through clean glass; and that there was a loss of about 30 per cent when light was reflected from even the best mirror. He also introduced the idea of 'candle-power' as a unit of intensity of light emanating from a candle made to a particular specification. Significantly, this unit of candle-power was used as an international standard unit for almost a century-and-a-half, until the introduction of the 'candela' unit in 1948.

Rumford used his photometer not only to compare various kinds of oil lamps, but also to test the efficiency of different fuels and wick designs, and this eventually led him to design improved lamps that came to be known as 'Rumford lamps.' One of the new lamps designed by Rumford could give more light than six of the best lamps available at that time. But Rumford did not patent his designs. He wrote, "I desire only that the whole world should profit by it, without preventing others from using it with equal freedom."

Rumford also experimented with fireplace and chimney design and made improvements in both. His final experiment in room heating took him close to something like modern-day central heating. He published his ideas in 1804 in an essay titled 'Of the Use of Steam as a Vehicle for Transporting Heat from One Place to Another.' He even tried out the idea by heating the great lecture-room in the Royal Institution, which he helped set up "to be a reliable source of information and also of teaching about 'new applications of science to the useful purposes of life.'" In later years, the annual Christmas lectures at the Royal Institution, started by Michael Faraday, became the most popular scientific expositions of the time.



" .. Rumford was no doubt a person with multifarious talents. He was elected a fellow of the Royal Society in 1779; was knighted by King George III in 1781; and was made a Count of the Holy Roman Empire by the Elector of Bavaria in 1792. Yet he had his weaknesses, too. He liked to flirt with women, often to gain some advantage. When he married the widow of the famous French chemist Antoine Lavoisier (his second marriage), a London daily made an interesting remark ... "

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"Married; in Paris, Count Rumford to the widow of Lavoisier; by which nuptial experiment he obtains a fortune of 8,000 pounds per annum - the most effective of all the Rumfordizing projects for keeping a house warm."

Not surprisingly, the marriage did not last long and a divorce was signed in 1809.

Rumford is also said to have been extremely vengeful to his opponents. While leading a regiment in USA during the American War of Independence, he is said to have built barracks for his men on a burial ground belonging to a local chapel, and deliberately pitched his tent over the grave of the Rev. Ebenezer Percy, a well-known supporter of American liberty. The gravestones were used by Thompson's men to build baking ovens. No wonder, the local people regarded Thompson as the devil incarnate.

Count Rumford was indeed an irrepressible achiever, whom the American President Franklin Roosevelt rated as 'the greatest mind America has produced'. He was a great scientist, inventor, and administrator, but failed in his personal relationships. After he died in 1814, he was given a simple burial, in the presence of just a few friends. No dignitaries were present. Why did such a talented achiever meet such a sad end? Brown's evocative biography will provide the answer.

-Biman Basu

-Biman Basu
Biman Basu is a prominent writer of Asia, having written more than 15 books on various subjects. He has reviewed a number of books for various journals. He has been associated with Anil Aggrawal's Internet Journal of Book Reviews since its inception. He can be contacted at basu_biman@yahoo.com. More information about him can be had by clicking here.



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-Editor-in-Chief