

Tea and the Industrial Revolution

A Cambridge professor says that a change in drinking habits was the reason for the Industrial Revolution in Britain. Anjana Abuja reports

A Alan Macfarlane, professor of anthropological science at King's College, Cambridge has, like other historians, spent decades wrestling with the enigma of the Industrial Revolution. Why did this particular Big Bang – the world-changing birth of industry-happen in Britain? And why did it strike at the end of the 18th century?

B Macfarlane compares the puzzle to a combination lock. 'There are about 20 different factors and all of them need to be present before the revolution can happen,' he says. For industry to take off, there needs to be the technology and power to drive factories, large urban populations to provide cheap labour, easy transport to move goods around, an affluent middle-class willing to buy mass-produced objects, a market-driven economy and a political system that allows this to happen. While this was the case for England, other nations, such as Japan, the Netherlands and France also met some of these criteria but were not industrialising. All these factors must have been necessary. But not sufficient to cause the revolution, says Macfarlane. 'After all, Holland had everything except coal while China also had many of these factors. Most historians are convinced there are one or two missing factors that you need to open the lock.'

C The missing factors, he proposes, are to be found in almost even kitchen cupboard. Tea and beer, two of the nation's favourite drinks, fuelled the revolution. The antiseptic properties of tannin, the active ingredient in tea, and of hops in beer – plus the fact that both are made with boiled water – allowed urban communities to flourish at close quarters without succumbing to water-borne diseases such as dysentery. The theory sounds eccentric but once he starts to explain the detective work that went into his deduction, the scepticism gives way to wary admiration. Macfarlane's case has been strengthened by support from notable quarters – Roy Porter, the distinguished medical historian, recently wrote a favourable appraisal of his research.

D Macfarlane had wondered for a long time how the Industrial Revolution came about. Historians had alighted on one interesting factor around the mid-18th century that required explanation. Between about 1650 and 1740 the population in Britain was static. But then there was a burst in population growth. Macfarlane says: 'The infant mortality rate halved in the space of 20 years, and this happened in both rural areas and cities, and across all classes. People suggested four possible causes. Was there a sudden change in the viruses and bacteria around? Unlikely. Was there a revolution in medical science? But this was a century before Lister's revolution*. Was there a change in environmental conditions? There were improvements in agriculture that wiped out malaria, but these were small gains. Sanitation did not become widespread until the 19th century. The only option left is food. But the height and weight statistics show a decline. So the food must have got worse. Efforts to explain this sudden reduction in child deaths appeared to draw a blank.'

E This population burst seemed to happen at just the right time to provide labour for the Industrial Revolution. 'When you start moving towards an industrial revolution, it is economically efficient to have people living close together,' says Macfarlane. 'But then you get disease, particularly from human waste.' Some digging around in historical records revealed that there was a change in the incidence of water-borne disease at that time,

especially dysentery. Macfarlane deduced that whatever the British were drinking must have been important in regulating disease. He says, 'We drank beer. For a long time, the English were protected by the strong antibacterial agent in hops, which were added to help preserve the beer. But in the late 17th century a tax was introduced on malt, the basic ingredient of beer. The poor turned to water and gin and in the 1720s the mortality rate began to rise again. Then it suddenly dropped again. What caused this?'

F Macfarlane looked to Japan, which was also developing large cities about the same time, and also had no sanitation. Water-borne diseases had a much looser grip on the Japanese population than those in Britain. Could it be the prevalence of tea in their culture? Macfarlane then noted that the history of tea in Britain provided an extraordinary coincidence of dates. Tea was relatively expensive until Britain started a direct dipper trade with China in the early 18th century. By the 1740s, about the time that infant mortality was dipping, the drink was common. Macfarlane guessed that the fact that water had to be boiled, together with the stomach-purifying properties of tea meant that the breast milk provided by mothers was healthier than it had ever been. No other European nation sipped tea like the British, which, by Macfarlanes logic, pushed these other countries out of contention for the revolution.

G But, if tea is a factor in the combination lock, why didn't Japan forge ahead in a tea-soaked industrial revolution of its own? Macfarlane notes that even though 17th-century Japan had large cities, high literacy rates, even a futures market, it had turned its back on the essence of any work-based revolution by giving up labour-saving devices such as animals, afraid that they would put people out of work. So, the nation that we now think of as one of the most technologically advanced entered the 19th century having 'abandoned the wheel'.

Questions 1-7

Reading Passage has seven paragraphs, **A-G**.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, **i-ix**, in boxes **1-7** on your answer sheet

List of Headings

- i The search for the reasons for an increase in population
- ii Industrialisation and the fear of unemployment
- iii The development of cities in Japan
- 4 The time and place of the Industrial Revolution
- iv The time and place of the Industrial Revolution
- v The cases of Holland, France and China
- vi Changes in drinking habits in Britain
- vii Two keys to Britain's industrial revolution
- viii Conditions required for industrialisation
- ix Comparisons with Japan lead to the answer

- 1 Paragraph A 1.....
- 2 Paragraph B 2.....
- 3 Paragraph C 3.....
- 4 Paragraph D 4.....
- 5 Paragraph E 5.....
- 6 Paragraph F 6.....
- 7 Paragraph G 7.....

Questions 8-13

Do the following statements agree with the information given in Reading Passage?

In boxes **8-13** on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

- 8..... China's transport system was not suitable for industry in the 18th century.
- 9..... Tea and beer both helped to prevent dysentery in Britain.
- 10..... Roy Porter disagrees with Professor Macfarlane's findings.
- 11..... After 1740 there was a reduction in population in Britain.
- 12..... People in Britain used to make beer at home.
- 13..... The tax on malt indirectly caused a rise in the death rate.

Alfred Nobel: The man behind the Nobel Prize

A

Since 1901, the Nobel Prize has been honoring men and women from all corners of the globe for outstanding achievements in physics, chemistry, medicine, literature, and for work in peace. The foundations for the prize were laid in 1895 when Alfred Nobel wrote his last will, leaving much of his wealth to the establishment of the Nobel Prize.

B

Alfred Nobel was born in Stockholm on October 21, 1833. His father Immanuel Nobel was an engineer and inventor who built bridges and buildings in Stockholm. In connection with his construction work, Immanuel Nobel also experimented with different techniques for blasting rocks. Successful in his industrial and business ventures, Immanuel Nobel was able, in 1842, to bring his family to St. Petersburg. There, his sons were given a first-class education by private teachers. The training included natural sciences, languages and literature. By the age of 17, Alfred Nobel was fluent in Swedish, Russian, French, English and German. His primary interests were in English literature and poetry as well as in chemistry and physics. Alfred's father, who wanted his sons to join his enterprise as engineers, disliked Alfred's interest in poetry and found his son rather introverted.

C

In order to widen Alfred's horizons, his father sent him abroad for further training in chemical engineering. During a two year period, Alfred Nobel visited Sweden, Germany, France and the United States. In Paris, the city he came to like best, he worked in the private laboratory of Professor T. J. Pclouze, a famous chemist. There he met the young Italian chemist Ascanio Sobrero who, three years earlier, had invented nitroglycerine, a highly explosive liquid. But it was considered too dangerous to be of any practical use. Although its explosive power greatly exceeded that of gunpowder, the liquid would explode in a very unpredictable manner if subjected to heat and pressure. Alfred Nobel became very interested in nitroglycerine and how it could be put to practical use in construction work. He also realized that the safety problems had to be solved and a method had to be developed for the controlled detonation of nitroglycerine.

D

After his return to Sweden in 1863, Alfred Nobel concentrated on developing nitroglycerine as an explosive. Several explosions, including one (1864) in which his brother Emil and several other persons were killed, convinced the authorities that nitroglycerine production was exceedingly dangerous. They forbade further experimentation with nitroglycerine within the Stockholm city limits and Alfred Nobel had to move his experimentation to a barge anchored on Lake Malaren. Alfred was not discouraged and in 1864 he was able to start mass production of nitroglycerine. To make the handling of nitroglycerine safer Alfred Nobel experimented with different additives. He soon found that mixing nitroglycerine with kieselguhr would turn the liquid into a paste which could be shaped into rods of a size and form suitable for insertion into drilling holes. In 1867 he patented this material under the name of dynamite. To be able to detonate the dynamite rods he also invented a detonator (blasting cap) which could be ignited by lighting a fuse. These inventions were made at the

same time as the pneumatic drill came into general use. Together these inventions drastically reduced the cost of blasting rock, drilling tunnels, building canals and many other forms of construction work.

E

The market for dynamite and detonating caps grew very rapidly and Alfred Nobel also proved himself to be a very skillful entrepreneur and businessman. Over the years he founded factories and laboratories in some 90 different places in more than 20 countries. Although he lived in Paris much of his life he was constantly traveling. When he was not traveling or engaging in business activities Nobel himself worked intensively in his various laboratories, first in Stockholm and later in other places. He focused on the development of explosives technology as well as other chemical inventions including such materials as synthetic rubber and leather, artificial silk, etc. By the time of his death in 1896, he had 355 patents.

F

Intensive work and travel did not leave much time for private life. At the age of 43, he was feeling like an old man. At this time he advertised in a newspaper "Wealthy, highly-educated elderly gentleman seeks the lady of mature age, versed in languages, as secretary and supervisor of household." The most qualified applicant turned out to be an Austrian woman, Countess Bertha Kinsky. After working a very short time for Nobel she decided to return to Austria to marry Count Arthur von Suttner. In spite of this Alfred Nobel and Bertha von Suttner remained friends and kept writing letters to each other for decades. Over the years Bertha von Suttner became increasingly critical of the arms race. She wrote a famous book, *Lay Down Your Arms* and became a prominent figure in the peace movement. No doubt this influenced Alfred Nobel when he wrote his final will which was to include a Prize for persons or organizations who promoted peace. Several years after the death of Alfred Nobel, the **Norwegian Storting** (Parliament) decided to award the 1905 Nobel Peace Prize to Bertha von Suttner.

G

Alfred Nobel died in San Remo, Italy, on December 10, 1896. When his will was opened it came as a surprise that his fortune was to be used for Prizes in Physics, Chemistry, Physiology or Medicine, Literature and Peace. The executors of his will were two young engineers, Ragnar Sohlman and Rudolf Lilljequist. They set about forming the Nobel Foundation as an organization to take care of the financial assets left by Nobel for this purpose and to coordinate the work of the Prize-Awarding Institutions. This was not without its difficulties since the will was contested by relatives and questioned by authorities in various countries.

H

Alfred Nobel's greatness lay in his ability to combine the penetrating mind of the scientist and inventor with the forward-looking dynamism of the industrialist. Nobel was very interested in social and peace-related issues and held what were considered radical views in his era. He had a great interest in literature and wrote his own poetry and dramatic works. The Nobel Prizes became an extension and a fulfillment of his lifetime interests.

Questions 1-6

Do the following statements agree with the information given in Reading Passage?

In boxes 1-6 on your answer sheet, write

TRUE if the statement is true

FALSE if the statement is false

NOT GIVEN if the information is not given in the passage

- 1..... The first Nobel Prize was awarded in 1895.
- 2..... Nobel's father wanted his son to have a better education than what he had had.
- 3..... Nobel was an unsuccessful businessman.
- 4..... *Bertha von Suttner* was selected by Nobel himself for the first peace prize.
- 5..... The Nobel Foundation was established after the death of Nobel
- 6..... Nobel's social involvement was uncommon in the 1800s.

Questions 7-13

Complete the notes below using **NO MORE THAN TWO WORDS** from the passage.

Write your answers in boxes 7-13 on your answer sheet.

Education:

Having accumulated a great fortune in his business, Nobel's father determined to give his son the best education and sent him abroad to be trained in 7..... during Nobel's study in Paris, he worked in a private laboratory, where he came in contact with a young engineer 8..... and his invention nitroglycerine, a more powerful explosive than 9.....

Benefits in construction works:

Nobel became really interested in this new explosive and experimented on it. But nitroglycerine was too dangerous and was banned for experiments within the city of 10..... So Nobel had to move his experiments to a lake. To make nitroglycerine easily usable, Nobel invented dynamite along with 11..... while in the meantime 12..... became popular, all of which dramatically lowered the 13..... of construction works.