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Title of the extended essay: The Spread of Vaccination through 19th century Europe: Why was the spread of Vaccination so rapid in the early years of the 19th century despite the turmoil of the Napoleonic Wars?

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History Extended Essay

**The Spread of Vaccination through 19th
Century Europe**

**Why was the spread of Vaccination so rapid in the early
years of the 19th century despite the turmoil of the
Napoleonic wars?**

By

May 2009

Candidate Number:

Word count: 3860

Abstract
Word Count: 285

Vaccination is an innovation that has transformed medicine irreversibly. As in the case of other innovations and discoveries, the medical world was sceptical about vaccination. Nevertheless, vaccination was able to spread through Europe and onto Mexico and India within 6 years of Jenner's first publication. This rapid dissemination is breathtaking, considering that the Napoleonic wars brought great turmoil to Europe. I have therefore decided to investigate why the spread of vaccination was so rapid in the early years of the 19th century despite the upheaval of the Napoleonic Wars.

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This paper will identify the factors that may have influenced this rapid dissemination of vaccination and analyse their importance in England, France and Spain. This will be achieved by looking at primary sources from all three countries to determine how the medical doctors in each country came to secure the knowledge and practice of vaccination. The influence of the war on the dissemination will also be assessed to determine to what extent it played a role in the rapid dissemination of vaccination.

Scope

The dissemination of vaccination was rapid because of a conjunction of conditions which have all been positively influenced by the general mobilisation of the Napoleonic wars that engulfed Europe. In the 19th century, just after the French Revolution, a dynamism of revolutionary mindset dominating Europe encouraged innovations. The enlightened individuals involved in the dissemination of vaccination were influenced by this mindset and therefore highly valued scientific development. As a result of this quest for knowledge, the trans-national scientific network was efficient in improving communication between scientists. Due to the zeal and the enthusiasm of these enlightened men vaccination was able to spread rapidly but its dissemination was soon impeded as their influence was curtailed.

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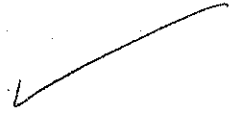
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Good

Introduction

Smallpox is the first and most important of the great infectious diseases to be eradicated from the World. It is still feared by those who deal with protecting populations against disease and remains according to them the most potent threat from terrorist action.¹ That it is no longer the killer that it was (in the 18th century and the 19th century smallpox was a deadly disease which killed 40,000 people annually in the UK²) is due to the discovery of Edward Jenner and the extraordinarily rapid work of European physicians and their supporters: a small network of men who disseminated the knowledge of vaccination³ and dispatched the all-important cowpox virus.

Their work took place against the devastation of the Coalition Wars in Europe (more than a million war casualties in France alone) in which neighbouring France was Britain's enemy and Britain's other continental neighbours were caught up in the Wars. Jenner's results were published in 1798 in a Britain at war, yet by 1802 vaccination had spread through Europe to reach India and, by 1804, Mexico City. It seems miraculous that from publication, to acceptance, to spread of the knowledge and the vaccine from an offshore island of Europe, by way of sailing ships and horse-drawn transport to a continent thousands of miles away, took a little under six years. What seems even more miraculous is that this all happened during a major European conflict, which, itself, had spread as far as India and the Caribbean.

It is easy to assume that vaccination would 'naturally' spread because it was so simple, cheap and effective. Yet the practice of variolation (the injection of less virulent strains of smallpox), which gave some immunity and had been known about in China and the Middle East for centuries, reached Europe in the early 1700s, but spread very slowly. This essay will ^{misstate} ~~argue that~~ the rapidity of the spread of vaccination was due to a conjunction of conditions which were the general mobilisation and

¹ "If terrorists were to use a biological agent, smallpox would be one choice. The reasons are that it is easily spread (by aerosol transmission), spreads relatively quickly, and has a high mortality rate (~30%). Vaccination of the general public ceased in the early '70s so the agent would be released on a susceptible population." Elmore, Mike. Personal interview. 18 July 2008.

² "A comparative view of the Natural Small-Pox, Inoculated small-pox and Inoculated Co-Pox, in their effects on individuals in Society." Chart. 1803. Address of the Royal Jennerian Society for the extermination of the Small-Pox. By Royal Jennerian Society. London: W. Phillips, 1803.

³ Vaccination: The inoculation of cowpox.

Variolation: The inoculation of a less severe strain of small pox.

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demands of the war, the enthusiasm of groups of Enlightenment individuals, the efficacy of their trans-national scientific networks and the dynamism of a revolutionary mindset which dominated central Europe. *context good but seem to have varied the q.*

The dissemination of the Practice of Variolation

Background clearly started.

Europe in the century preceding the Napoleonic Wars was not always peaceful (The Wars of the Spanish Succession - 1701-1714, the Seven Years War - 1756-1763). However, travel was possible and European contacts essential to the spread of Enlightenment ideas. Against this relatively benign background, the practice of variolation, the inoculation of a less severe strain of small-pox,⁴ took a long time to spread through Europe, taking more than half of the 18th century.

Many physicians (British, French, Italian and Germans) became aware of this new variolation practiced outside of Europe at the turn of the 17th century. *The Royal Society* was informed of Chinese variolation on the 14th of February 1700 by Dr. Clopton Havers. However, no further information on this subject was introduced to the Royal Society until 1712 and early 1713 when Richard Weller, Secretary of the Royal Society, started a campaign to better inform the society. This involved soliciting some correspondents in foreign countries to contribute their experiences with this new protection against smallpox. Two physicians, Pyrlani and Timoni, published their observations on this new practice. However, these two scientific articles did not arouse much interest because many deemed this practice merely a skillful amusement. London physicians were also cautious and did not want to risk their reputation with a novel innovation in a cold climate where smallpox was thriving. More was needed to persuade English physicians to practice variolation.

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The example of Lady Mary Wortley Montagu, wife to a British Ambassador Extraordinary to the King, was very persuasive. Lady Mary Wortley Montagu's biggest accomplishment was the inoculation of her own children, starting a trend among the nobility. The practice, however, did not become widely accepted because it entailed some risk to the inoculated and the minor infection produced was contagious.

⁴ See Appendix 1.1

page?

Sources?

Other western European countries started to practice variolation in the mid 18th century.

Many physicians travelled to England to study variolation and its practice. Variolation was first practised in Amsterdam, in 1748 by Theodore Tronchin, a Genevan, who also introduced variolation to Geneva in 1749. Theodore Tronchin subsequently introduced variolation to Paris in 1756. In Germany, Frederik the Great invited Dr. William Baylies of Bath to Berlin to teach his method of variolation to fourteen physicians in the provinces.⁵ Even though variolation was fallible, it still gave some immunity. Yet it took half a century for the practice of variolation to spread to France from Britain from the time the first knowledge of the practice was introduced into Britain even though no war was raging. In comparison vaccination spread from England to Spain within five years.

Some
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Edward Jenner's Innovation and the response in England

In Britain, the Prime Minister William Pitt the younger had a lot to cope with, especially with the ongoing war with France and other domestic problems (Irish rebellion of 1798).⁶ Apart from the Armistice that lasted less than a year in 1802⁷ the British were always at war with France making communication an ordeal, if not impossible. The problems with communicating between the two countries only delayed the introduction of vaccination into France by a year. Meanwhile in other European countries vaccination had already been successfully introduced because they were able to freely communicate with the British medical doctors.

⁵ Behbehani, Abbas M. "The Smallpox Story: Life and Death of an Old." Microbiological reviews 47.4 (Dec. 1983): 455-509. 22 July 2008

<<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=281588>>. Path: Smallpox Story.

⁶ Bloy, Marjie. "William Pitt the Younger (1759-1806)." The Victorian Web. 4 Jan. 2006. National University of Singapore. 1 Aug. 2008

<<http://www.victorianweb.org/history/pms/pitt.html>

⁷ "The French Revolution and Europe, 1789-1914." The Encyclopedia of World History. Ed. Peter N Stearns. 6th ed. The Encyclopedia of World History. Houghton Mifflin Company, 2001. Bartleby. 2008. 1 Aug. 2008 <<http://www.bartleby.com/67/toc5.html>>.

Jenner discovered the efficacy of cowpox vaccination in 1796 when he conducted an experiment which proved the efficiency of his new vaccination, but it took a few years to convince his peers, in his own country, of the importance of his discovery. Many English physicians were dubious and did not want to acknowledge Jenner's success. On May 14th, 1796 Jenner successfully vaccinated a boy named James Phipps from a sore of a milkmaid Sarah Nelmes who had been infected by cowpox while milking her masters' cows.⁸ It was not until two years later after several rejections, that he was able to publish his findings in a pamphlet called *An Inquiry into the Cases and Effects of Variolae Vaccinae*. In his inquiry he claimed, "That the cowpox protects the human constitution from the infection of smallpox."⁹ Apart from general scepticism or distrust there was also another practical factor which made it more difficult for physicians to repeat his experiment to verify his claim—obtaining cowpox matter. However, in 1799 everything changed when there was an outbreak of cowpox in a dairy farm near London, which provided Jenner's opponents the cowpox material to repeat his experiment.

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Jenner's opponents were a formidable group of London physicians who delayed the widespread dissemination of vaccination because of their scepticism. Two of his most formidable opponents were Dr. William Woodville and Dr. George Pearson. Together they vaccinated nearly 4000 people.¹⁰ Although they had ironically unequivocally proved Jenner's claim correct, they still did not fully agree with Jenner's observations. This was because their cowpox vaccine was contaminated thus producing different results. This was a problem that many physicians faced; finding a way to preserve the vaccine and to ensure it was not contaminated. Woodville continued to vaccinate and by 1802 had vaccinated 7,500 people and about one-half of these were exposed to smallpox without any ill-effect. The physicians, with so much evidence, were obliged to confess that Jenner's preservative was indeed effective.¹¹ In England it took almost

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⁸ Edwardes, Edward J. *A Concise History of Small-Pox and Vaccination in Europe*. London: H.K.Lewis, 1902.

⁹ Jenner, Edward. *An Inquiry into the Cases and effects of the Variolae Vaccinae A disease discovered in some western counties of England, particularly Gloucestershire, an known by the name of the Cow Pox*. London: Sampson, 1798.

¹⁰ Dunbar, Robert G. "The Introduction of the Practice of Vaccination into Napoleonic France." *Bulletin of the History of Medicine*. Ed. Henry E Sigerist. Vol. 10. *Bulletin of the History of Medicine*. Baltimore: The John Hopkins Press, 1941. 635-650.

¹¹ Cano, Francisco D. *Respuesta a las Objeciones que se hacen a la nueva Inoculacion de la Vacuna*. Zaragoza: La Oficina de Heras, 1802.

four years from the day Jenner published his findings for vaccination to be finally widely accepted as a method of preventing smallpox. It took longer for vaccination to disseminate through England than it did through France or Spain. Unlike the physicians abroad, the British were slower in reacting to the importance of the discovery. This may have been, because the revolutionary mindset that dominated continental Europe had not spread to England.

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The arrival of the Knowledge and Practice of Vaccination in France

Napoleon Bonaparte was a proud and ambitious patriot who strove to make France the most powerful country in Europe. In order to achieve this, he led the French into a period of constant wars and battles. These wars included the First Coalition War, the Second Coalition War, the Battle of the Nile and the Battle of the Pyramids.¹² Such massive and far-reaching military adventures demanded a general mobilisation of populations and equipment. Transportation and communication had to be efficient and frequent. Although the spread of disease would be encouraged under these conditions, immunisation could spread too. So, in 1804 Napoleon recognised the importance of vaccination and ordered the introduction of vaccination into the Grande Armée, itself at high risk from smallpox outbreaks.¹³

Napoleon had created the conditions in France conducive to science and scientific research and this had allowed innovation, even that from enemy countries, to be welcomed in France. He had taken power with a coup d'état and before long he centralised the administration, which was, on the whole, sympathetic to science and scientists.¹⁴ In France, the practice of vaccination was apparently supported by Napoleon who was said to have remarked that when Jenner requested the release of English prisoners of war, that he (Napoleon) could not refuse anything to such a great "benefactor of humankind".¹⁵ Many exiles were allowed to return to France including

A little more about Napoleon's science - even a footnote.

¹² "The French Revolution and Europe, 1789-1914." The Encyclopedia of World History.

¹³ Meynell, Elinor. "French Reactions to Jenner's Discovery of Smallpox Vaccination: The Primary Sources." Social History of Medicine. Ed. Anne Crowther and Paul Weindling. Vol. 8. Social History of Medicine. N.p.: The Oxford University Press, 1995. 285-303.

¹⁴ Sutton, Geoffrey. The Politics of Science in early Napoleonic France: The case of the Voltaic pile. Vol. 11. Historical Studies in the Physical Sciences. N.p.: University of California press, 1980-81.

¹⁵ Behbehani, Abbas M. "The Smallpox Story: Life and Death of an Old Disease."

'philosophes' who had been forced to flee during the French Revolution and the Reign of Terror.¹⁶ Many of these émigrés were instrumental in the dissemination of vaccination in France. This is why the Napoleonic period is associated in the history of science to the "return of the brilliance of French research after the dull period during the French Revolution".¹⁷ Napoleon, considered himself a philosophe and therefore encouraged research in Science which gave the philosophes the liberty to widen their horizon and test new theories. This mindset motivated the physicians to adopt Jenner's innovation and test it.

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The knowledge of Jenner's discovery first arrived in France through the medium of the *Bibliothèque Britannique*, a monthly journal which had been founded in 1796 in Geneva to make current British literature available to the French-reading public in continental Europe. This was the only source of information for the French physicians because communication between France and Britain was near to impossible. Unlike the British physicians, Genevan doctors, ironically of which many had been educated in the UK, immediately recognised the significance of Jenner's innovation and lost no time in spreading the news of this innovation in Europe. In the fall of 1798 one of the editors of *Bibliothèque Britannique*, Professor Marc-Auguste Pictet of the University of Geneva, travelled to England with the goal of obtaining material for the journal and he returned with a copy of Jenner's *Inquiry*. The first notice of Jenner's discovery was in the October 1798 issue. This was followed by the almost complete translation of Jenner's *Inquiry* in the October and November issue by Dr. Louis Odier, a Genevan physician who had been educated at the University of Edinburgh.¹⁸ A short review of the *Inquiry* appeared in the August-September issue of the *Recueil Périodique de Littérature Médicale Etrangère*,¹⁹ a magazine published in Paris by the members of the *Society of Medicine of Paris*. Had it not been for the efficient trans-national scientific network which centred on the journal the *Bibliothèque Britannique* the

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¹⁶ Sutton, Geoffrey. *The Politics of Science in early Napoleonic France: The case of the Voltaic pile.*

¹⁷ Fyffe, C A. *History of Modern Europe 1792-1878. Vol. 1.* Adamant Media Corporation, 2000. Google Books. 1 Aug. 2008 <<http://books.google.co.uk/books>

¹⁸ Odier, L. *Mémoire sur l'inoculation de la Vaccine A Genève.* Geneve: L'imprimerie de la Bibliothèque Britannique, 1801.

¹⁹ Dunbar, Robert G. "The Introduction of the Practice of Vaccination into Napoleonic France."

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French would not have been informed of the innovation so soon after Jenner's first publication.

On August 16th, 1799 the first vaccination in Paris was carried out by Dr. Aubert (A Genevan doctor) and Dr. Pinel with threads impregnated with the vaccine sent by Dr. Pearson from London. Four days later Dr. Carro (another Genevan doctor) carried out the first successful vaccination in Austria who had received a supply from his friend Dr. Alexander. G. Marcet at Guy's Hospital in London.²⁰ However, this first vaccination in Paris like the second was a failure. This was because the vaccine had lost its efficacy due to the heat or the inexperience of the doctors conducting the procedure. Carro in contrast had been in contact with Jenner prior to receiving the vaccine and Jenner had told him how he preserved the vaccine in between two pieces of glass.²¹ Without any delay in 1800 Dr. Aubert, a Genevan physician working in Paris, decided to journey to London to study vaccination and the procedure. Aubert was welcomed by both Jenner and Woodville and was given the opportunity to not only observe but to perform vaccinations. Although he procured accurate knowledge of the procedure still no successful vaccination had been conducted in France. Dr. Carro and Dr. Aubert as Genevans both served as intermediates between the French physicians and the British physicians which again shows that the trans-national scientific network had been successfully adapted to the obstructions of war. ✓

The Genevan doctors introduced the knowledge of vaccination to Paris but it was the Parisian doctors who introduced the practice of vaccination successfully in France. The man most notably recognised for his efforts spent in trying to introduce vaccination was *La Rochefoucauld-Liancourt* an émigré, who had been exiled and who returned to Paris after Napoleon's coup d'état. On his way back from America he stopped off in England where he witnessed the procedure of vaccination. In February 1800 Liancourt established a semi-official body called the *Comité Central de Vaccine* ✓

²⁰ Behbehani, Abbas M. "The Smallpox Story: Life and Death of an old Disease." Microbiological reviews.

²¹ Jannetta, Ann, and Ann Bowman Jannetta. *The Vaccinators: Smallpox, Medical Knowledge, and the "Opening" of Japan*. Stanford University Press, 2007. 4 Aug. 2008 <<http://books.google.co.uk/books>

(a similar establishment to Dr. Pearson's Vaccination Institute in London) to keep track of the development in the practice of vaccination in France.²²

Now that the Comité was established, a supply of the cowpox vaccine was needed to commence the trials. Although the French would have preferred to obtain the vaccine from a French source, they had no other option but to ask the British to provide a supply because "Cette maladie des vaches n'est pas connue sur le continent; si elle y existe elle n'a pas encore été observée".²³ The vaccine was procured from Dr. Pearson's Institute in London but with some difficulty. At the time Napoleon was crossing the Alps preparatory to the Battle of Marengo so relations between France and Britain were frozen. Nevertheless with the help of Talleyrand (French Foreign Minister) and also the cooperation of Louis- Guillaume Otto (surprisingly the representative of France in Great Britain) the vaccine was sent May 27th, 1800 and arrived June 2nd.²⁴ In doing so the French had set aside their contempt for the English in the name of medicine. This third attempt was also a failure producing unsatisfactory results. Hearing of the failed attempt, Woodville decided to come to Paris to superintend the procedure of vaccination. The necessary passports and papers were obtained from Talleyrand and without further delay Woodville, an enemy doctor and his companion Tomas Nowell travelled to France. On arriving in Boulogne, Woodville was detained by French officials for reasons related to his passport. Nevertheless, Woodville made his stay in Boulogne-sur-mer worthwhile by vaccinating a couple of children.²⁵ On July 25th, 1800, Woodville arrived in Paris and the Comité was able to resume its trials but the vaccine produced no effect on account of its age. Fortunately the vaccination Woodville performed in Boulogne had been successful and provided the Comité with an infinite supply of vaccine less than 24

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²² Meynell, Elinor. "French Reactions to Jenner's Discovery of Smallpox Vaccination: The Primary Sources." Social History of Medicine.

²³ "This disease of Cows is not known about on the continent; if it exists it has not been observed yet" (Translation by Belene Podmore) Aubert, A. Rapport sur la Vaccine ou Traité sur cette Maladie. Paris, 1801.

²⁴ Comité Central de Vaccine. Rapport du Comité Central de Vaccine. Paris: Imprimerie de Guilleminet, 1803.

²⁵ Marti, Sierr, and Oliver Marti, comps. La Vacuna en Espafia o Cartas Familiares sobre esta nueva inoculacion. Escritas a la Señora por el Dr. Francisco Piguillem. Madrid, 1801.



hours old.²⁶ On August 8th, 1800 in Paris the first successful vaccination was carried out. Owing to the ingenuity and enthusiasm of certain enlightenment individuals and the help of the French government vaccination was permanently introduced in France, about a year and four months after it was introduced in Austria by Dr. Carro (April 1799) and several months after it was introduced in Prussia, Geneva and America.²⁷ However, although the vaccination procedure had been a success it was not until 1803 that the committee made its final reports confirming Jenner's claims. The introduction of vaccination was delayed by the war, however within one month of the failure of the third attempt the zeal of the French and Genevan physicians managed to bring about success.

The arrival of the knowledge and practice of vaccination in Spain

In Spain power was held by pro-French Prime Minister Don Manuel Godoy; not King Carlos IV. After the defeat of Spain by the French in 1796, Spain entered the service of France. A formal treaty (*The Treaty of San Ildefonso*)²⁸ was signed between Spain and France, which greatly eased communication between the two countries. This frequent communication facilitated the dissemination of vaccination from France to Spain.

During the Napoleonic wars Spain was under the rule of France. In consequence communication between both countries was imposed. However, having relations with France meant making an enemy of Britain which made it difficult for Spanish physicians to contact Woodville and Jenner directly. The physicians had to resort to the French to receive any news of discoveries. However, Dr. Piguillem, a correspondent from *La Commission Centrale de Paris* (another semi-official body founded in Paris in 1801), stated that communication was not as efficient as it should have been when he says that "aunque rayanos, somos tardos en recibir las

²⁶ Moreau de la Sarthe, J L. *Traité Historique et Pratique de la Vaccine*. Paris: L'imprimerie de Stoupe, 1801.

²⁷ Dunbar, Robert G. "The Introduction of the Practice of Vaccination into Napoleonic France."

²⁸ Millar, Stephen. "The Royal Favorite: Manuel Francisco Domingo de Godoy, Prince of the Peace." *The Napoleon Series*. Oct. 2007. 1 Aug. 2008
<http://www.napoleon-series.org/research/biographies/Spain/c_Godoy.html#_ftn1>.

novelerías”.²⁹ Dr. Piguillem was the physician to whom Spain owes the success of vaccination.³⁰ In November 1800, Piguillem received notice from his friend, that the trials that the French had undertaken confirmed that the new inoculation was benign. Without delay Dr. Piguillem requested a portion of the material used in Paris that he received on the 3rd of December.³¹ Soon after Dr. Piguillem started his trials and was successful. In Spain like in the rest of Central Europe the revolutionary mindset dominated. Dr. Piguillem, like the French and Swiss physicians welcomed innovation and recognised its importance to humankind. Between two pieces of crystal Dr. Piguillem sent the vaccine to Madrid from where the vaccine was dispatched to the rest of the country.

How do
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The spread of vaccination beyond France, England and Spain in the first decade of the 19th Century

Two odysseys in the early 1800's made the story of smallpox one of the most important to humankind. In 1803, King Carlos IV, in response to a smallpox epidemic in Bogota ordered Dr. Francisco Xavier de Balmis to lead an expedition called *La Real Expedición Marítima de la Vacuna*, with the purpose of introducing vaccination to all of the Spanish colonies. On board were 22 boys who had been vaccinated and who at 9-10 days' interval were revaccinated. In being repeatedly vaccinated the boys carried a fresh source of vaccine needed for the whole voyage. The expedition, lasting three years, established vaccination centres in the Spanish America, the Philippines and China.³² Knowledge and practice of vaccination had already reached some parts of South America³³ but the expedition ensured that all Spanish colonies had a supply

another
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episode

²⁹ "Although they (The French) are on the other side of the border, we receive news of discoveries late" Translation by Belene Podmore (*La Vacuna en España o Cartas Familiares sobre esta nueva inoculación. Escritas a la Señora por el Dr. Francisco Piguillem. Madrid, 1801.*)

³⁰ Cano, Francisco D. Respuesta a las Objeciones que se hacen a la nueva Inoculación de la Vacuna. Zaragoza: La Oficina de Heras, 1802.

³¹ Marti, Sierr, and Oliver Marti, comps. *La Vacuna en España o Cartas Familiares sobre esta nueva inoculación. Escritas a la Señora por el Dr. Francisco Piguillem. Madrid, 1801.*

³² "Supplement to The Madrid Gazette of the 14th October." *Madrid Gazette* [Cheltenham] 14 Oct. 1806: 3

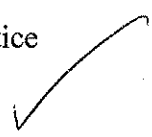
³³ Rigau-Perez, Jose G. "La difusión en Hispanoamérica de las primeras Publicaciones Españolas sobre Vacuna, 1799-1804." Asclepio. Vol. 44. Asclepio. Madrid: Graficas Loureiro, 1992. 165-179.

of the vaccine.³⁴ On his return voyage from Manila in 1806, Dr. Xavier de Balmis stopped in St. Helena where to his surprise vaccination was not being practiced. With some perseverance, he was able to prevail on the British to adopt this new practice which they had ignored during eight years although it was a discovery made in their country. The English did not seem to view spreading vaccination to their colonies a priority like the Spanish.

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Similarly, another ingenious individual, Dr. Carro, a Genevan doctor who lived in Austria engineered an eastward odyssey. The vaccine used in his eastward odyssey is most likely the vaccine received from the Italian physician, Luigi Sacco³⁵ in early 1801. Carro started the odyssey by sending Sacco's vaccine to Baghdad where it was revived on 31st of March, 1802 and after a series of passages it arrived in Basra. In late May the vaccine was taken to Bombay where it arrived after three weeks. The first successful vaccination in India was performed by Dr. Helenus Scott on 14th October 1802. Shortly after vaccination was introduced to Ceylon and the French colonies of Ile de France and La Réunion. Within a few months vaccination had been successfully introduced in the East.³⁶

Meanwhile in Europe the future practice of vaccination seemed assured. In Bavaria, Denmark, Hanover, Sweden and Norway vaccination was made compulsory by 1821. In the Prussian dominions in 1817 an account given by the official vaccinators reported that 307,956 persons were vaccinated which far exceeds the births that had taken place at the time.³⁷ This showed a great development in making the practice universal.



³⁴ Jannetta, Ann, and Ann Bowman Jannetta. The Vaccinators: Smallpox, Medical Knowledge, and the "Opening" of Japan.

³⁵ Luigi Sacco is regarded as "the Jenner of Italy". He obtained his vaccine from an infected horse in the autumn of 1800. He vaccinated over 8000 people by October 1801. He sent his vaccine to Jenner and Woodville and it was subsequently used widely in Britain. Behbehani, Abbas M. "The Smallpox Story: Life and Death of an Old." Microbiological reviews

³⁶ Behbehani, Abbas M. "The Smallpox Story: Life and Death of an Old." Microbiological reviews.

³⁷ Baron, John. The Life of Edward Jenner M.D, Physician Extraordinary to the King.

Conclusion

Vaccination, discovered by Dr. Jenner in 1796, spread from rural England all the way to Mexico City and further by 1804. In England, it took some time before British physicians recognised the importance of Jenner's innovation. In contrast the Genevan doctors had recognised the importance of such an innovation and were instrumental in the introduction of vaccination into France and countries further east. In France, the introduction was delayed slightly partly because the war between France and England made it difficult to obtain a fresh supply of cowpox material. Nevertheless after more experience and a method to preserve the vaccine, vaccination spread through France and then onto Spain. Dr. Xavier de Balmis and Dr. Carro, using orphaned boys as carriers of the cowpox virus, then initiated two odysseys that spread vaccination throughout the world.

The question is how was the practice of vaccination and the vaccine able to spread so rapidly when a war was raging? France is England's closest neighbour and the dissemination of such a beneficial innovation, given a favourable reception from the medical profession, should be fast, however during a war one might expect obstruction until the war was over. This was not the case with smallpox vaccination. In contrast, variolation took nearly half a century to spread through Europe from England in the 18th Century when Europe was not engulfed in conflict.

It may be, then, that the war and its revolutionary beginnings may have been positive factors that speeded up the spread of vaccination because of the general mobilisation of populations and the importance of avoiding smallpox outbreaks in armies.

Napoleon Bonaparte was, as has been shown, a supporter of vaccination. It may be that the story that most parallels the story of the discovery and early dissemination of vaccination is that of penicillin whose development and rapid dissemination was a direct result of the American war effort in World War II.³⁸

YES

✓

More
might
have
been
made

about Napoleon's
interest

³⁸ "Penicillin: Medicine's Wartime Wonder Drug and Its Production at Peoria, Illinois." Illinois periodicals online. Northern Illinois University . 15 Sept. 2008 <<http://www.lib.niu.edu/2001/iht810139.html>>.

War may have helped but without certain enlightened individuals vaccination would not have spread as quickly as it did. These individuals were typical enlightenment figures who highly valued scientific development and rational thought. They were found in every country in central Europe because enlightenment thought and the dynamism of a revolutionary mindset permeated elites in central Europe. The role of the Genevan doctors and the return of well-educated and well-travelled émigrés were crucial to eventual success in France. ✓

The importance of enlightenment thought and its revolutionary connections to the practice of smallpox vaccination is made quite clear in France by the fact that vaccination continued to stay in favour until the succession of the ultra-rightist Charles X in 1824. He abolished the *Comité Central de Vaccine* and vaccination, regarded as a revolutionary practice, fell into disrepute. Although Napoleon had introduced vaccination into the army for all army recruits as early as 1804, it was abandoned by the French army. The catastrophic result was that in 1870-71 during the Franco- Prussian War, the French suffered 23,400 casualties from smallpox.³⁹

Another interesting point is an unanswered question that could be researched.

Research on vaccination is excellent: the essay could have been a little more 'historical', by omitting some of the details/narrative of the experiments - or putting some briefly in footnotes. But it is an extremely well written & clearly argued essay. Sources are not evaluated.

³⁹ Meynell, Elinor. "French Reactions to Jenner's Discovery of Smallpox Vaccination: The Primary Sources."

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✓
Excellent bibliography.

Appendix

Figure 1.1 ⁴⁰

	<i>History</i>		<i>Eruptions</i>
	<i>General Character</i>	<i>Mortality</i>	
Natural Small-pox	<i>-Contagious, for the most part violent, painful, loathsome and dangerous to life. In some instances mild.</i>	<i>-One in six dies - At least half of mankind have it. -London 3000 annually UK 40,000 annually</i>	<i>-Numerous, painful, disgusting</i>
Inoculated Small-pox	<i>-Contagious, for the most part mild but in some instances violent and dangerous to life.</i>	<i>-One in 300 inoculated dies. In London probably one in a 100.</i>	<i>- Eruption of constant occurrence in great or less numbers.</i>
<i>The inoculation has become the means of spreading the infection and has thus increased its general mortality. In London (by the bills) this increase has been in the ratio of 17 in every 1000.</i>			
Inoculated Cow-pox	<i>-Not contagious when properly conducted, mild, inoffensive, and seldom painful.</i>	<i>Never fatal</i>	<i>- A pustule on the inoculated part only.</i>

With a knowledge of the facts..., it is presumed that no person can conscientiously refuse or hesitate to embrace the opportunity now providentially offered of preserving his own family from so dreadful and destructive pestilence as the small-pox...⁴¹

⁴⁰ Only section of full chart.

⁴¹ "A comparative view of the Natural Small-Pox, Inoculated small-pox and Inoculated Co-Pox, in their effects on individuals in Society." Chart. 1803. Address of the Royal Jennerian Society for the extermination of the Small-Pox. By Royal Jennerian Society. London: W.Phillips, 1803.

Assessment form (for examiner use only)

Candidate session number	0	0							
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Assessment criteria		Achievement level		
		First examiner	maximum	Second examiner
A	research question	1	2	<input type="checkbox"/>
B	introduction	1	2	<input type="checkbox"/>
C	investigation	4	4	<input type="checkbox"/>
D	knowledge and understanding	4	4	<input type="checkbox"/>
E	reasoned argument	4	4	<input type="checkbox"/>
F	analysis and evaluation	3	4	<input type="checkbox"/>
G	use of subject language	4	4	<input type="checkbox"/>
H	conclusion	2	2	<input type="checkbox"/>
I	formal presentation	4	4	<input type="checkbox"/>
J	abstract	2	2	<input type="checkbox"/>
K	holistic judgment	4	4	<input type="checkbox"/>
Total out of 36		33		<input type="checkbox"/>

name of first examiner: _____
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Examiner number: _____

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Examiner number: _____