

**Fathi Habashi**

My trips in  
**England  
& France**

**2015**



# My Trips in England & France

Volume derived from



**Fathi Habashi**

Department of Mining, Metallurgy, and Materials Engineering  
Laval University, Quebec City, Canada

2015

## The Book

The present volume is derived from *De Re Metallica. A Metallurgist on the Move*, which is a diary of the trips the author has undertaken during his professional career. He visited many industries, universities, research centres, and museums and participated in many conferences. The book therefore reflects the state of extractive metallurgy since he left his home country Egypt and went to study in Vienna. *De Re Metallica* is in seven volumes fully illustrated mainly by coloured photographs. It includes a short history of the place visited and its main sightseeing sites. Volume 1 Egypt, Volume 2 Canada, Volume 3 United States, Volume 4 Latin America, Volume 5 Asia [in two parts], Volume 6 Europe [in two parts], and Volume 7 Russia & other countries. Total number of pages was 5500.

Since these volumes could not be separated and therefore they will not be available to many readers, I decided to split the book into selected 29 small units, each representing one country or a group of countries closely related geographically. The present volume is one of these volumes.



## The Author

Fathi Habashi, Professor Emeritus at Laval University in Quebec City. He holds a B.Sc. degree in Chemical Engineering from the University of Cairo, Dr. techn. degree in Inorganic Chemical Technology from the University of Technology in Vienna, Dr. Sc. *honoris causa* from the Saint Petersburg Mining Institute, Dr. *h.c.* from National Technical University in Lima, and Dr. *h.c.* from San Marcos University also in Lima. He held the Canadian Government scholarship at the Mines Branch in Ottawa, taught at Montana College of Mineral Science & Technology, then

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*To Nadia,  
Hani, and Hatem  
with love*

## Other Books by the Author

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  - Volume 2: Hydrometallurgy (468 pages), 1970 (reprinted 1980) (out of print), Gordon & Breach Science Publishers.
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- F. Habashi, *De Re Metallica. A Metallurgist on the Move*, 7 volumes, 2015, 5523 pages.

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## Preface

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Since these volumes could not be separated and therefore they will not be available to many readers, I decided to split the book into selected 28 small units each representing one country or a group of countries closely related geographically as shown below.

---

1	Arab Countries	Jordan, Kuwait, Morocco, Syria, Tunis
2	Austria	
3	Australia & Southeast Asia	Australia, Cambodia, Indonesia, Malaysia, Philippines, Thailand, Vietnam
4	Balkans	Albania, Bosnia, Bulgaria, Croatia, Greece, Romania, Serbia, Slovenia
5	Baltic Countries	Latvia, Lithuania, Poland
6	Brazil	
7	Canada	
8	Caribbean	Cuba, Puerto Rico, Venezuela
9	Caucasus	Armenia, Azerbaijan, Georgia
10	Central Asia	Afghanistan, Kazakhstan, Mongolia, Uzbekistan
11	Central Europe	Czech Republic, Slovakia, Hungary, Switzerland
12	Chile and Argentina	
13	China	
14	Egypt	
15	England and France	
16	Germany	
17	Iberian Peninsula	
18	India	
19	Italy and Vatican	
20	Japan and Korea	
21	Low Countries	

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22	Mexico	
23	Middle East	Iran, Turkey
24	Peru and Bolivia	
25	Russia	
26	Scandinavia	
27	South Africa	
28	USA	

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I hope in this way the book will available to a large number of readers.

*Fathi Habashi*

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## HISTORICAL INTRODUCTION

Stonehenge (Figure 1.2), a prehistoric monument in the county of Wiltshire about 13 km north of Salisbury, is the remains of a ring of standing stones erected in several stages from ca. 3000 to 1500 BC.



**Figure 1.1:** Map of United Kingdom.

## Romans

In 55 BC, Julius Caesar invaded Britain but was unable to establish a province. It was Emperor Claudius who conquered the country in 43 AD and made it the Roman province Britannia. The Roman general Agricola incorporated Wales and Northern England into the province. Hadrian built a wall in 138 AD to protect the province from raids by the northern inhabitants of Scotland.



**Figure 1.2:** Stonehenge.

## Anglo-Saxons

When Roman rule in Britain started to breakdown from the middle of the 4th century England was progressively settled by Germanic groups collectively known as the Anglo-Saxons. These were Saxons from Northern Germany, and Angles and Jutes from the Jutland peninsula. They progressively spread into England, by military conquest and cultural assimilation. Christianity was introduced by Augustine, the first Archbishop of Canterbury (Figure 1.3), who took office in 597. In 878 King Alfred (849–899) (Figure 1.4) led a force that defeated the Danes. Alfred's success bought peace and economic recovery.



**Figure 1.3:** Saint Augustine, the first Archbishop of Canterbury.

In 978, two powerful Danish kings, Harold Bluetooth followed by his son Sweyn, invaded England and defeated the Anglo-Saxon forces in 991. Sweyn seized the throne but suddenly died in 1014 and was succeeded by Canute (994–1035) (Figure 1.5), who in 1016 defeated the remaining Saxons, and crowned himself King of England. Under his rule the kingdom became the centre of government for an empire which also included Denmark and Norway.

## Norman Conquest

On September 28, 1066, William of Normandy (1028–1087) (Figure 1.6), known as William the Conqueror, invaded England and defeated England's army at the Battle of Hastings (Figure 1.7). He was crowned king on Christmas Day 1066. For the next five years he faced a series of English

rebellions in various parts of the country and a Danish invasion, but he was able to subdue all resistance and establish an enduring regime.



**Figure 1.4:** King Alfred The Great (849–899).

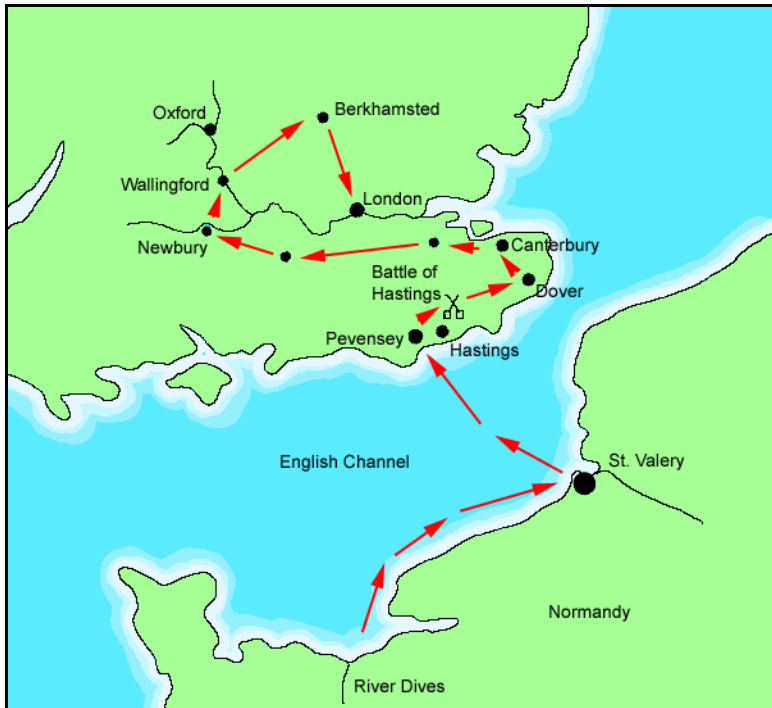


**Figure 1.5:** King Canute (994–1035).



**Figure 1.6:** William the Conqueror (1028–1087).

Henry I (1068–1135), the fourth son of William the Conqueror, came to the throne of England in 1100 and worked hard to smooth the differences between the Anglo-Saxon and Anglo-Norman societies. Upon his death, Henry's nephew became the new ruler. He was succeeded by Henry II (1133–1189) then by his son Richard I the Lionheart (1157–1199) (Figure 1.8) who was preoccupied with foreign wars, taking part in the Third Crusade and defending his French territories against Philippe II of France.



**Figure 1.7:** Battle of Hastings, September 28, 1066.



**Figure 1.8:** Richard Lion Heart (1157–1199).



**Figure 1.9:** King John (1166–1216).

## Magna Carta

King John (1166–1216) (Figure 1.9) succeeded his brother Richard Lion Heart but became unpopular with his barons. In 1215, they rebelled against him. This resulted in issuing the Great Charter (*Magna Carta* in Latin), which imposed legal limits on the king's personal powers. John's son, Henry III, was only 9 years old when he became king. He spent much of his reign fighting the barons over the Magna Carta and the royal rights, and was eventually forced to call the first parliament in 1264. Edward I (reigned 1272–1307) strengthened the powers of his government, and he summoned the Parliaments of England. His son, Edward II, spent most of his reign trying in vain to control the nobility.

In 1314, the English army was defeated by the Scots. Edward's downfall came in 1326 when his Queen Isabella travelled to her native France and then, along with her lover Roger Mortimer, invaded England. Edward was captured and charged with breaking his coronation oath. He was deposed and remained imprisoned until he was murdered in 1327. Edward III reigned 1327–1377, restored royal authority and went on to transform the Kingdom of England into the most efficient military power in Europe.

## Hundred Years' War

Edward III declared himself rightful heir to the French throne in 1338. This started what would be known as the Hundred Years' War conducted from 1338 to 1453 between the Kingdom of England and the Kingdom of France for control of the French throne. It was during this conflict that Joan of Arc (French: Jeanne d'Arc) (ca. 1412–1431) claimed divine guidance and led the French army to several victories which paved the way for the coronation of Charles VII of France. She was captured and put on trial by the pro-English Bishop for charges of "insubordination and heterodoxy" and was burned at the stake for heresy when she was 19 years old.

## Black Death

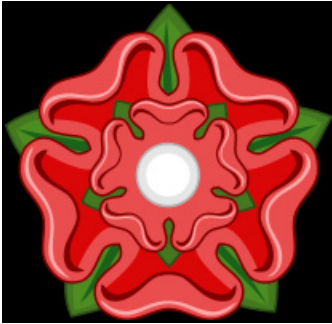
The Black Death, an epidemic that spread over the whole of Europe, arrived in England in 1348 and killed as much as a third of the population.

## Wars of the Roses

The Wars of the Roses were a series of dynastic wars fought between the houses of Lancaster and York for the throne of England. The heraldic symbols were the red and the white rose, respectively (Figures 1.10–1.11). They were fought between 1455 and 1485. The final victory went to a Lancastrian claimant, Henry Tudor, who defeated the last Yorkist king Richard III and married Edward IV's daughter Elizabeth of York to unite the two

houses. The House of Tudor subsequently ruled England and Wales for 117 years.

Henry Tudor became king as Henry VII. He formed an alliance with Spain and the Holy Roman Emperor Maximilian I, but in 1493, when they went to war with France, England was dragged into the conflict.



**Figure 1.10:** Red rose for Lancaster.



**Figure 1.11:** White rose for York.

## Henry VIII

Henry VIII (1491–1547) (Figure 1.12) was the second monarch of the House of Tudor, succeeding his father, Henry VII. He began his reign in 1509 with optimism. He married the widowed Catherine of Aragon (1485–1536), whose husband Prince of Wales Arthur was his elder brother and whose nephew was Charles V. She had been the Spanish ambassador to England.



**Figure 1.12:** Henry VIII (1491–1547).

### *Henry's wars*

In 1512, the young king embarked on a war in France regardless of the fact that his sister Mary was married to the French king Louis XII. The war accomplished little. Meanwhile, James IV of Scotland, despite being Henry's brother-in-law, activated his alliance with the French and declared war on England in 1513. The Scots were defeated and most of the Scottish nobility were killed along with James himself.

From 1536, Henry VIII decided to conquer Ireland and bring it under crown. However, he was not successful in converting the Catholic Irish to the Protestant religion. From the mid-16th to the early 17th century, crown governments carried out a policy of land confiscation and colonization. Scottish and English Protestant colonists were sent to replace the Irish Catholic landowners who were removed from their lands. These settlers formed the ruling class of future British appointed administrations in Ireland.

### *Henry's divorce and the new Church of England*

Henry and Catherine had several children, but none survived infancy except a daughter, Mary. When Catherine was no longer able to have any more children Henry decided in 1527 to divorce her. The Church would not grant this favour. At that time, the Pope Clement VII had been taken prisoner by the emperor Charles V, Catherine's nephew. As there was no possibility of getting a divorce in these circumstances, Henry decided to secede from the Church.

The newly established Church of England became the existing Catholic Church, but with the king as its head. The Church property was confiscated and many were executed for resisting the king's policies. Catherine was banished from court and spent the remainder of her life in an isolated manor home.

Henry married Anne Boleyn and in 1533, she gave birth to a daughter, Elizabeth. The king was devastated at his failure to have a son. In 1536 Anne was pregnant again and gave birth prematurely to a boy. The king was convinced that his marriage was hexed so he put Anne in the Tower of London on charges of witchcraft and afterwards she was beheaded.

Henry then married Jane Seymour who in 1537 gave birth to a healthy boy, Edward. However, the queen died ten days later. The king married a fourth time in 1540, to a German lady but quickly divorced her and married again a 19-year-old named Catherine Howard. She was accused of adultery and ended up on the scaffold. His sixth and last marriage was to Catherine Parr. Henry's suspicion worsened in his last years. Executions during his 38-year reign numbered in the tens of thousands. He died at the age of 55 and

was succeeded by his son Edward VI who was only nine years. He died in 1553 two months short of his 16th birthday.

## Mary I

Mary (1516–1558) (Figure 1.13), Henry's daughter from his first marriage with Catherine of Aragon, a devoted Catholic, took the throne in 1553. Returning England to Catholicism led to the brutal persecution of the Protestants that she earned the title Bloody Mary. She then married her cousin Philip (1527–1598), son of the emperor Charles V, and King of Spain when Charles abdicated in 1556. The union was not welcome since Philip was a Catholic, a foreigner, and spent little time in England. This wedding also had the effect of provoking the hostility of the French, already at war with Spain.



Figure 1.13: Queen Mary (1516–1558).



Figure 1.14: Queen Elizabeth (1533–1603).

## Elizabeth I

Elizabeth (1533–1603) (Figure 1.14), daughter of Henry VIII and his second wife Anne Boleyn. She came to the throne in 1558, re-established the Church of England, and restored order following the turbulence of the reigns of Edward and Mary. She never married. In 1570, the pope declared her illegitimate and released her subjects from obedience to her. Several conspiracies threatened her life but all plots were defeated.

Elizabeth's cousin Mary, Queen of Scots, was a devoted Catholic and the Catholic powers in Europe considered her, not Elizabeth, the legitimate ruler of England. However, she was forced to abdicate her throne and fled to

England. Elizabeth had her arrested, tried for treason, sentenced to death, and beheaded in 1587.

In the mid-1580s, war with Spain could no longer be avoided, and when Spain finally decided to attempt to conquer England in 1588, the failure of the Spanish Armada associated her with one of the greatest victories in English history.

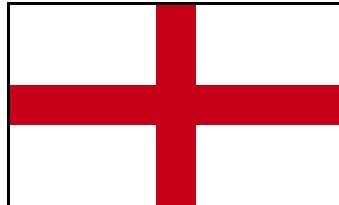
Elizabeth's reign is famous for the flourishing of English drama, led by playwrights such as William Shakespeare, and for adventures of Sir Francis Drake. Her 44 years on the throne provided stability for the kingdom and helped forge a sense of national identity. She died at the age of 69 and was the last monarch of the Tudor dynasty.

### *Union of the Crowns*

Elizabeth's closest male Protestant relative was the King of Scots, James VI, of the House of Stuart, who became King James I of England in a Union of the Crowns (Figure 1.15). King James I & VI, as he was styled, became the first monarch to rule the entire island of Great Britain, although it was merely a union of the English and Scottish crowns, and both countries remained separate political entities until 1707.



Flag of Scotland



Flag of England



Flag of the Union in 1606



Flag of the Union in 1707

**Figure 1.15:** Union of the Crowns.

## **Colonial England**

In 1607, England built an establishment at Jamestown. This was the beginning of colonialism by England in North America. Many English settled then in North America for religious or economic reasons. In 1617 the

British East India Company was given permission by Mughal Emperor Jahangir to trade in India.

## Cromwell

A Civil War broke out in 1642, as a result of series of conflicts between Charles I (1600–1649) (Figure 1.16), and Parliament. The defeat of the Royalist army by the New Model Army of Parliament under the command of Oliver Cromwell (1599–1658) (Figure 1.17) in 1645 destroyed the king's forces. Charles surrendered, was tried and beheaded in 1649, making England a republic.



**Figure 1.16:** Charles I Stuart (1600–1649). **Figure 1.17:** Oliver Cromwell (1599–1658).

Cromwell was given the title Lord Protector in 1653. After he died in 1658, his son Richard Cromwell succeeded him in the office but he was forced to abdicate within a year. Troops stationed in Scotland marched on London to restore order. The monarchy was restored in 1660, with King Charles II returning to London.

In 1665, London was swept by a visitation of the plague, and then, in 1666, the capital was swept by the Great Fire, which raged for 5 days. After the Restoration, there was an overall reduction in the power of the crown.

## Glorious Revolution

After the death of Charles II in 1685, his Catholic brother King James II & VII was crowned. There were various factions pressing for replacing him by his Protestant daughter Mary and her husband, Prince William III of Orange (1650–1702), who were in Holland. William and Mary (Figure 1.18) were offered the throne by the Parliament of England in 1688. William

landed in England and was crowned king. This became known as the Glorious Revolution. He then invaded Ireland in 1690.



**Figure 1.18:** William and Mary.

In 1689, the Bill of Rights was passed, which established restrictions on the royal prerogative. After Mary died in 1694, William ruled alone until his death. William and Mary were childless and were succeeded by Mary's younger sister, Anne.

## United Kingdom

In 1707, the Kingdom of England and the Kingdom of Scotland previously separate states, with separate legislatures but with the same monarch were united into a single Kingdom of Great Britain. In 1714, the reign of Queen Anne ended. Anne was the last monarch of the House of Stuart.

## House of Hanover

Since the Act of Settlement 1701 prohibited Catholics from inheriting the British throne, Anne was succeeded by her second cousin, George I, of the House of Hanover (1660–1727), who was Lutheran, a descendant of the Stuarts through his maternal grandmother, Elizabeth, daughter of James VI & I and living in Hanover, in what is now Germany. During George's reign, the powers of the monarchy diminished and Britain began a transition to the modern system of cabinet government led by a prime minister.

George I was succeeded by his son George II (1683–1760), who was succeeded by his son George III (1738–1820). Unlike his two Hanoverian predecessors, he was born in Britain, spoke English as his first language, and never visited Hanover. It was during his reign that many of the American colonies were lost in the American War of Independence and the defeat of Napoleon at the Battle of Waterloo in 1815. He was succeeded by his son George IV (1762–1830). Upon his death he was succeeded by his son William IV (1765–1837).

### *Pax Britannica*

*Pax Britannica* was the period from the defeat of Napoleon I at the Battle of Waterloo in 1815 and the beginning of World War I in 1914. It was imposed by Great Britain after capturing and exiling the French Emperor. However, wars still were going on: the Crimean War between Russia and a Franco-British Alliance, the Opium Wars, the Second Italian War of Independence in 1859, the Austro-Prussian War in 1866, and the Franco-Prussian War in 1870–1871. It was during this period that Britain suppressed piracy and combated slave trade.

## Queen Victoria

William IV was succeeded by Alexandrina Victoria (1819–1901) (Figure 1.19). In 1840, she married her cousin, Prince Albert of Saxe-Coburg and Gotha (1819–1861). Their nine children married into royal and noble families across the continent. She was the last British monarch of the House of Hanover.



**Figure 1.19:** Queen Victoria (1819–1901).

### *Queen Victoria and European monarchs*

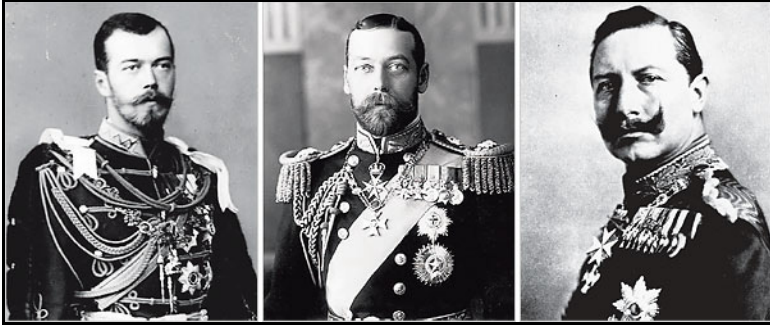
Queen Victoria had an uncle who reigned as King Leopold I of the Belgians and was succeeded by his son Leopold II who was cousin to Queen Victoria. Prince Consort Albert himself was a cousin of the Queen — his father was Ernst I, Duke of Saxe-Coburg and Gotha who was another brother of Victoria's mother. King George V of the United Kingdom, whose parents were Edward VII of the United Kingdom and Alexandra of Denmark, was maternal cousin to Tsar Nicholas II of Russia and paternal cousin of Kaiser Wilhelm II of Germany (Figure 1.21).



**Figure 1.20:** Queen Victoria and five of her nine children.

### *Great Exhibition*

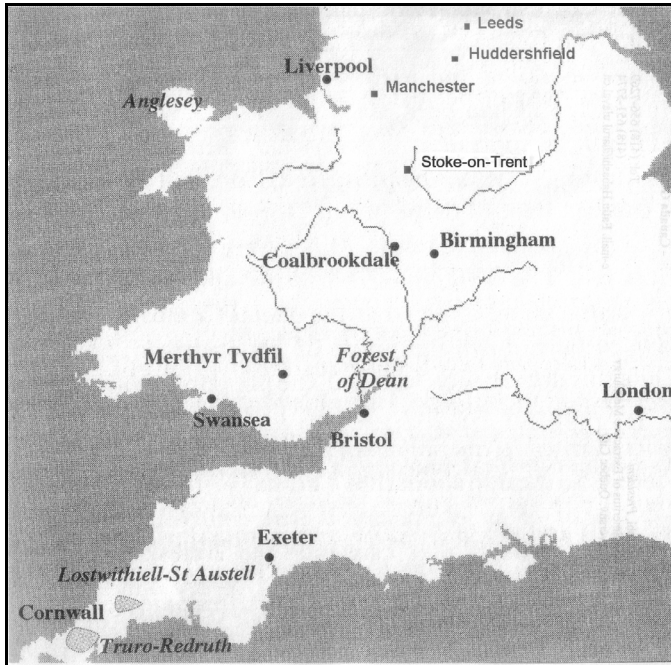
In 1851, the Great Exhibition took place at the Crystal Palace in Hyde Park in London. It was the first international exhibition ever held. More than 14 000 exhibitors from around the world gathered in the palace to display examples of the latest technology developed in the Industrial Revolution. The life of the Great Exhibition was limited to six months, after which it was dismantled. Incidentally, profits from this venture helped finance the formation of the Science Museum in 1857 and other educational institutions.



**Figure 1.21:** Tsar Nicholas II, maternal first cousin of King George V (middle) who in turn was the paternal first cousin of Kaiser Wilhelm II.

## The Industrial Revolution

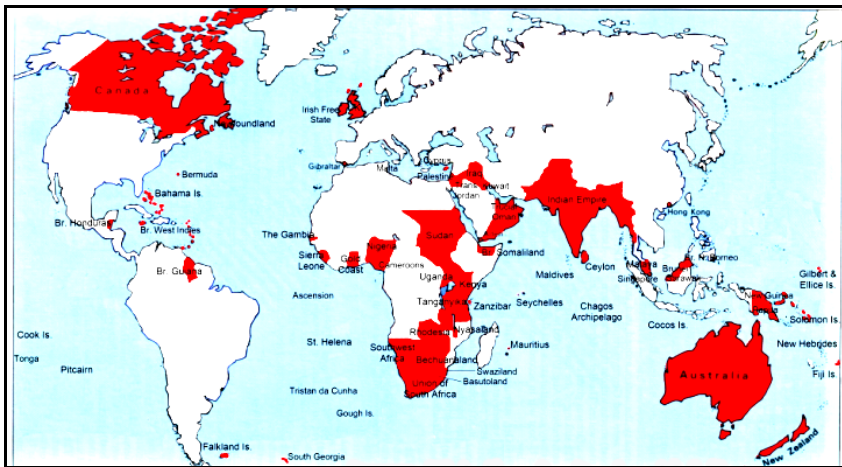
England was the birthplace of the Industrial Revolution (Figure 1.22) and this resulted in creating the British Empire. A distinctive characteristic of this period was replacing wood as a fuel and the extensive use of coal that was widely available both as a fuel and as a chemical.



**Figure 1.22:** The centre of the Industrial Revolution.

## The British Empire

In the 19th century, Europe was the master of the world and Britain was the master of Europe (Figure 1.23). In 1887 London celebrated the golden jubilee of Queen Victoria whose empire covered a quarter of the globe. Chemistry and metallurgy, science and technology, the arts and architecture flourished during this period, as the British economy became increasingly dependent on machinery and steam power. Britain was the world's largest producer of lead, copper, tin, iron, and coal, supplying more than half of the world's demand for some of these metals.



**Figure 1.23:** The British Empire.

British scientists are credited with a large number of discoveries and inventions. Science and technology go hand in hand, and both require a democratic atmosphere for survival.

## House of Windsor

Edward VII (1841–1910) (Figure 1.24) was the first British monarch of the House of Saxe-Coburg and Gotha, which was re-named the House of Windsor by his son, George V (1865–1936) (Figure 1.25) who succeeded him. George V was succeeded by his son Edward VIII (1894–1972) who abdicated after few months and was succeeded by his younger brother Albert, who chose the regnal name George VI (1895–1952). He was the last Emperor of India and was succeeded by the present Queen Elizabeth II.



**Figure 1.24:** Edward VII (1841–1910).



**Figure 1.25:** George V (1865–1936).

## THE IRISH PROBLEM

### Introduction

Saint Patrick arrived in 432 AD to Christianize the Irish people. From the 9th century, waves of Viking raiders plundered Irish monasteries and towns and also were involved in establishing most of the major coastal settlements in Ireland: Dublin, Limerick, Cork, and others. A mission founded in 563 by an Irish monk began a missionary work that spread Christianity to Scotland, England and the Frankish Empire after the fall of Rome. In 1172, the Irish Church was integrated with Rome.

After the invasion of England by William the Conqueror his descendants invaded Ireland. In 1175, Henry II (1133–1189) (Figure 1.26) became Lord of Ireland. When Norman rulers and the Gaelic Irish elites intermarried, laws were issued in 1376 to prevent the assimilation of the Normans into Irish society. However, by the end of the 15th century central English authority in Ireland disappeared and a renewed Irish culture and language was dominant again.



Figure 1.26: King Henry II (1133–1189).

## Invasion of Ireland

In 1541 Henry VIII proclaimed himself King of Ireland. The English authorities in Dublin established control over the island bringing a centralized government and successfully disarmed the native lordships. However, the English were not successful in converting the Catholic Irish to the Protestant religion and the brutal methods used by royal authority to bring the country under English control heightened resentment of English rule.

From the mid-16th to the early 17th century, governments carried out a policy of land confiscation and colonization Scottish and English Protestant. These Protestant settlers replaced the Irish Catholic landowners who were removed from their lands. The settlers formed the ruling class of the British appointed administrations. Naturally, Irish Catholics rebelled against the domination of English and Protestant settlers but were brutally suppressed. Oliver Cromwell rounded up Catholics throughout the Irish countryside and placed them on ships bound for the Caribbean, mainly Barbados.

Irish antagonism toward England was aggravated by the economic situation in the 18th century. Catholics could not become members of the Irish Parliament, or become government officials. Some were attracted to the more militant example of the French Revolution of 1789 and this culminated in a Rebellion in 1798 which was bloodily suppressed.

The Orange Order, a Protestant organization based in Northern Ireland was founded in 1796 after a Catholic mob burned a Protestant meeting house. The Order's aim was to commemorate the civil and religious liberties

conferred by William of Orange, the Dutch prince who became King of England, Scotland, and Ireland in the Glorious Revolution of 1688. William of Orange defeated the army of Catholic James II at the Battle of the Boyne across the River Boyne near Drogheda on the east coast of Ireland (Figure 1.27). The battle took place on July 1, 1690 in the Julian calendar, equivalent to July 11 in the Gregorian calendar, although today its commemoration is held on July 12. The Order is Loyalist and strongly supports the Monarchy of England. Few years later the United Irishmen was formed and became a revolutionary group advocating an independent Irish Republic.

In 1800 the British and the Irish parliaments merged creating a new political entity called United Kingdom of Great Britain and Ireland. In 1823 the UK parliament under the leadership of the Dublin-born Prime Minister, Arthur Wellesley, 1st Duke of Wellington and hero of the Napoleonic Wars permitted members of the Catholic Church to sit in the parliament at Westminster. During 1845–1849 the country was stuck by famine and population dropped due to starvation or emigration. The Irish spoken language declined in use sharply and was replaced by English. Most of the island was predominantly Catholic and agrarian. The northeast, however, was predominantly Protestant and industrialized.



**Figure 1.27:** Battle of the Boyne  across the River Boyne near Drogheda on the east coast of Ireland in 1690.

## Partition

During World War I, political violence ended in the partition of the island (Figure 1.28). The violence used in the suppression of the uprising led many to support the rebels. In addition, the threat of Irishmen conscripted in the British Army in 1918 accelerated this change. On January 21, 1919 the Irish Republic Parliament, declared sovereignty over the entire island and the new Irish Republican Army waged a guerilla war. In December 1921 an agreement was reached creating the Irish Free State [in 1949 became Republic of Ireland] and Northern Ireland that could stay within the United Kingdom. The treaty divided the republican movement into those who wanted to fight on until unification was achieved and those who accepted the partition as a first step towards full independence and unity. Between 1922 and 1923 both sides fought a bloody Civil War. The anti-Treaty supporters were defeated.



Figure 1.28: The partition of Ireland.

With the partition of Ireland in 1922, the Free State's population was mainly Catholic. The Protestant minority opted for emigration due to the strict Catholic Church control. On the other hand, the Northern Ireland was mainly Protestant with Catholic minority. Discrimination against the minorities was in both states evident and turned to brutal acts of violence. The Irish Republican Army was founded by militant Catholics to protect the working class Catholics who were vulnerable to police and civilian brutality in Northern Ireland. During the 1970s British policy concentrated on defeating the IRA by military means. Gradually the demographics of Northern Ireland had undergone significant change, and more than 40% of the population was Catholic.

## Orange parades

Parades (Figures 1.29–1.30) are an important part of the Orange Order's activities. A yearly parade is held from the Orange hall to a local church. The Order sees itself as defending civil and religious liberties gained via the Protestant Reformation, the Glorious Revolution, and other historical events. Marching through Catholic quarters often creates violence (Figure 1.31).



**Figure 1.29:** A typical Orange parade in Northern Ireland commemorating July 12.



**Figure 1.30:** A typical Orange parade in Northern Ireland commemorating July 12.



**Figure 1.31:** Violence during Orange parade marching in a Catholic quarter.

**Table 1.1:** Visits to England.

Dates	Cities visited	Purpose of visit
January 1963	London	Royal School of Mines
June 1969	London	Gordon & Breach Science Publisher British Museum
June 1980	Stevenage	Warren Springs Laboratory
	London	<ul style="list-style-type: none"> <li>• British Sulphur Corporation</li> <li>• Royal School of Mines</li> <li>• Science Museum</li> <li>• Geological Museum</li> <li>• Victoria &amp; Albert Museum</li> <li>• Duke of Wellington Museum</li> </ul>
July 1987	London	Transit: sight seeing in the morning, departure to Johannesburg in the evening
September–November 1987	London	<ul style="list-style-type: none"> <li>• British Council</li> <li>• Royal Society</li> <li>• Royal Institution</li> <li>• Royal School of Mines</li> <li>• Institution of Mining &amp; Metallurgy conference on pyrometallurgy</li> </ul>
	Telford	Iron Bridge Museum
	Cambridge	<ul style="list-style-type: none"> <li>• University of Cambridge</li> <li>• Cavendish Laboratory</li> </ul>

Dates	Cities visited	Purpose of visit
May 1994	Truro	<ul style="list-style-type: none"> <li>• Camborne School of Mines</li> <li>• Wheal Jane Tin Concentrator</li> </ul>
	Oxford	Oxford University Press
	Stratford-on-Avon	Shakespeare's home town
	Leeds	University of Leeds
	Bradford	University of Bradford
January 2001	Swansea	Cultural visit
	Epsom	Magnesium project

### LONDON

The founding of London is usually attributed to the first-century Romans. It became a sufficiently important city to deserve protective walls and a fortress. By the third century, the trading community had its own mint. It became a prosperous port but suffered from the 1665 plague and the 1666 Great Fire. By the 19th century it became the commercial, political, and intellectual capital of the British Empire. London (Figures 1.32–1.37) is famous of its numerous museums, a number of art galleries, cathedrals, and palaces. The city was heavily bombarded during World War II.



Figure 1.32: London airports.



Figure 1.33: Map of Central London.



Figure 1.34: Stations for underground transportation.



Figure 1.35: Landmarks of London.



**Figure 1.36:** General view of London today showing River Thames, London Bridge, Houses of Parliament, and Westminster Abbey.

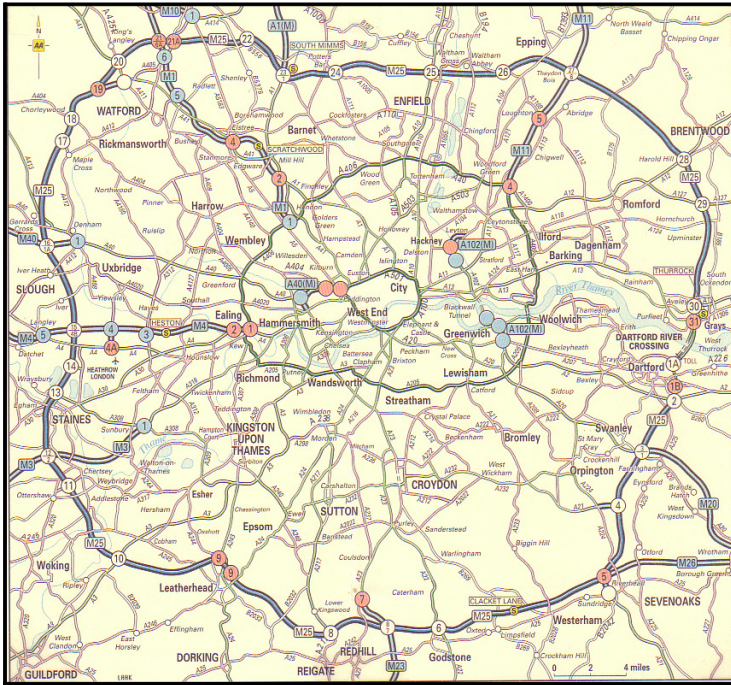


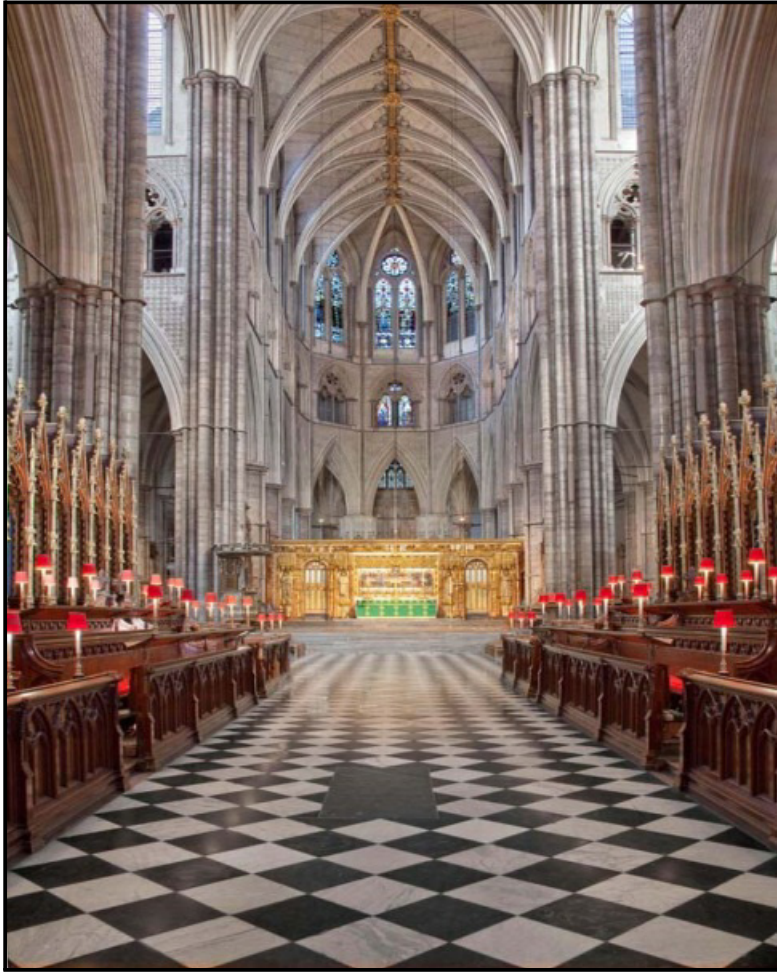
Figure 1.37: Ground transportation.

## Westminster Abbey

Westminster Abbey (Figures 1.38–1.39) is next to Big Ben and the Houses of Parliament, was built between 1042 and 1052 by King Edward the Confessor (ca. 1003–1066) where he was also buried. William the Conqueror was crowned there in 1066 and since then all British monarchs. It is the final resting place of Queen Elizabeth I, Mary Queen of Scots, Isaac Newton, Charles Dickens, Charles Darwin, and others.



Figure 1.38: Westminster Abbey.



**Figure 1.39:** Westminster Abbey interior.

## **Tower of London**

Tower of London (Figures 1.41–1.43) was founded towards the end of 1066 as part of the Norman Conquest of England by William the Conqueror. Early in its history it served as a royal residence later was used later as a prison. The Tower is a complex of several buildings set within two concentric rings of defensive walls and a moat. The Tower has served variously as an armoury, a treasury, a menagerie, the home of the Royal Mint, a public records office, and the home of the Crown Jewels of the United Kingdom. In the latter half of the 19th century, the Royal Mint moved out.



**Figure 1.40:** Houses of Parliament.



**Figure 1.41:** Tower of London and Tower Bridge.



Figure 1.42: Tower of London.

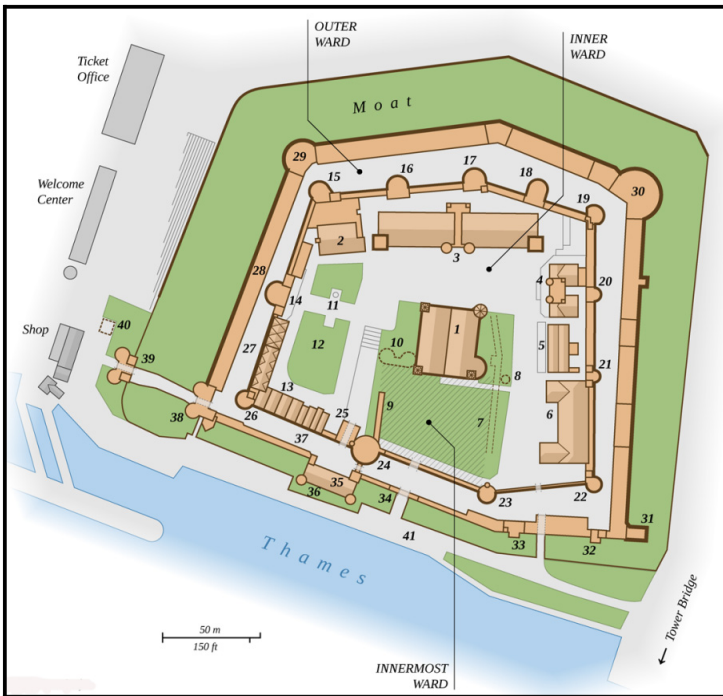


Figure 1.43: Tower of London, plan.

## Triumphal arches

Triumphal arches were built to commemorate Britain's victories in the Napoleonic Wars. Marble Arch (Figure 1.44) was built in 1828 as the chief entrance to Buckingham Palace, but when the Palace was extended in 1851, the Arch was moved to its current site as an entrance to Hyde Park. Wellington Arch (Figure 1.45) is located south of Hyde Park (see below).



Figure 1.44: Marble Arch.



Figure 1.45: Wellington Arch.

## Duke of Wellington Museum

Arthur Wellesley (1769–1852) (Figure 1.46) was 1st Duke of Wellington, soldier and statesman. Together with Gebhard Leberecht von Blücher, he defeated Napoleon at Waterloo. He was twice prime minister. His home in London is kept as a museum (Figures 1.47–1.49).



**Figure 1.46:** Duke of Wellington (1769–1852).



**Figure 1.47:** Wellington Museum.



Figure 1.48: Wellington Museum [interior].



Figure 1.49: Wellington Museum [interior].

## Cleopatra's Needle

Cleopatra's Needle [obelisk] was made around 1450 BC during the reign of the Pharaoh Thutmose III but was falsely named Cleopatra's needle. It is made of red granite, 21 m high and weighs 224 tons. It was originally erected in the Egyptian city of Heliopolis. The inscriptions were added about 200 years later by Ramses II to commemorate his military victories. The obelisk was moved to Alexandria and set up in the Caesareum — a temple built by Cleopatra in honour of Mark Antony in 12 BC. Around 1300 AD, the obelisk was toppled and gradually enveloped by sand. It was presented to the United Kingdom in 1819 by Muhammad Ali, the ruler of Egypt, in commemoration of the victories of Lord Nelson at the Battle of Aboukir Bay in 1798 [also known as Battle of the Nile] and Sir Ralph Abercromby at the Battle of Alexandria in 1801, both were against the French Expedition in Egypt.



**Figure 1.50:** A historic picture showing the iron cylinder containing the obelisk leaving Alexandria.

The obelisk remained in Alexandria until 1877 when it was encased in a large iron cylinder 28 m long and 4.9 m in diameter (Figure 1.50) with internal supports and elastic packing to secure the obelisk from shocks, to be towed by a tug to London. A storm in the Bay of Biscay capsized the boat and all six crew were lost. Another boat saved the captain and the remaining crew. The Captain reported the *Cleopatra* abandoned and sinking, but actually it drifted in the Bay until it was found floating four days later by Spanish boats. It was rescued and taken to Spain for repairs. The needle finally arrived in London and was erected on the Victoria Embankment on

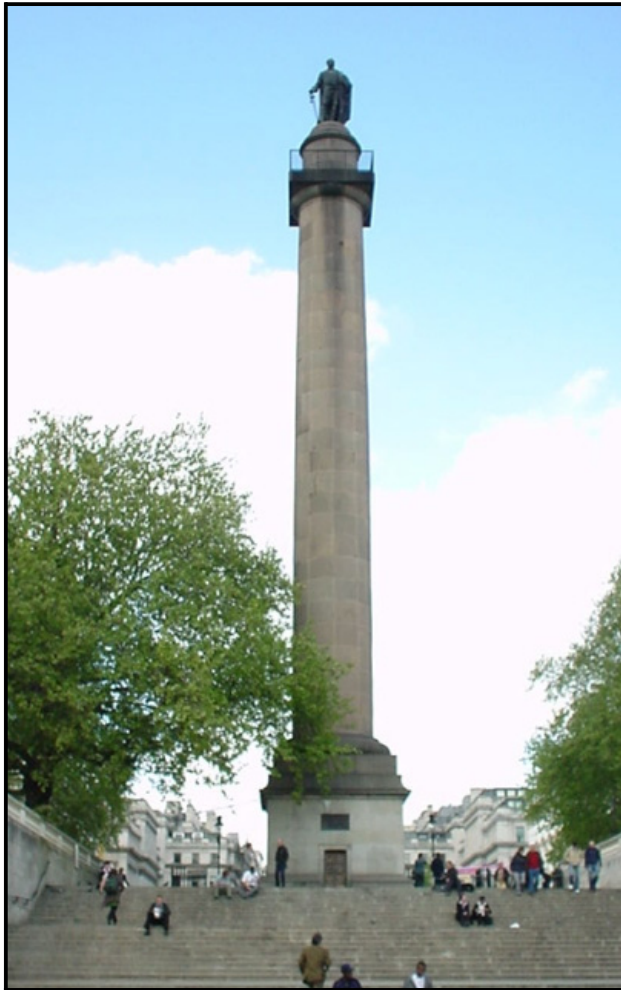
September 12, 1878 (Figure 1.51). A twin obelisk stands now in Central Park in New York.



**Figure 1.51:** Cleopatra's needle.

## Duke of York Column

Duke of York Column (Figures 1.52–1.53) is a monument to Prince Frederick, Duke of York (1763–1827) son of King George III, who was the commander-in-chief of the British Army during the French Revolutionary Wars. The total height of the monument to the top of the statue is 42 m. The Duke reformed the Army and founded the Military Academy Sandhurst. Fredericton, the capital of the Canadian province of New Brunswick, was named after him. The city was originally named Frederick's Town.



**Figure 1.52:** Duke of York Column.



Figure 1.53: Duke of York at the top of the column.

## Trafalgar Square

At the centre of Trafalgar Square is Nelson's Column (Figure 1.54), which is guarded by four lion statues at its base. Admiral Horatio Nelson (1758–1805) (Figure 1.55), famous for his service in the Royal Navy, partic-

ularly during the Napoleonic Wars. Of his several victories, the best known and most notable was the Battle of Trafalgar in 1805, during which he was shot and killed.



**Figure 1.54:** Nelson's Column in Trafalgar Square.

At the Battle of Trafalgar (Figure 1.56), British fleet under Admiral Lord Nelson defeated a combined French and Spanish fleet, fought off the coast of Spain on October 21, 1805.

## National Gallery

The National Gallery (Figure 1.57) is an art museum on Trafalgar Square, founded in 1824. It houses a collection of over 2 300 paintings dating from the mid-13th century to 1900.



**Figure 1.55:** Admiral Horatio Nelson (1758–1805).

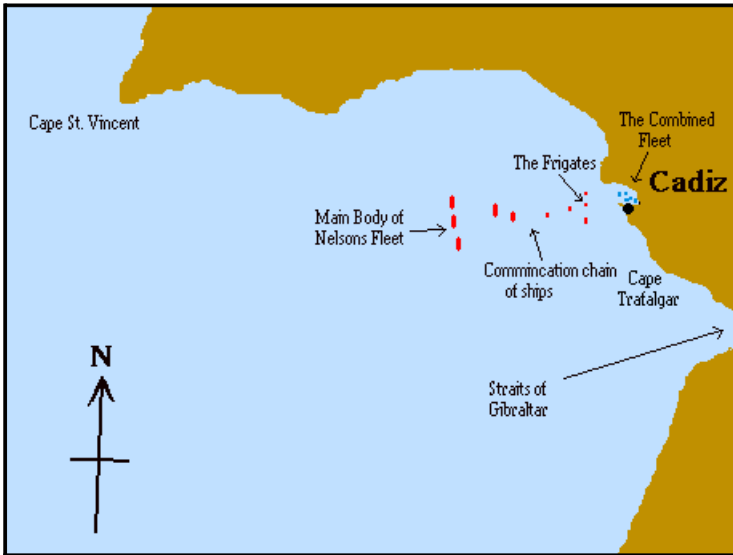


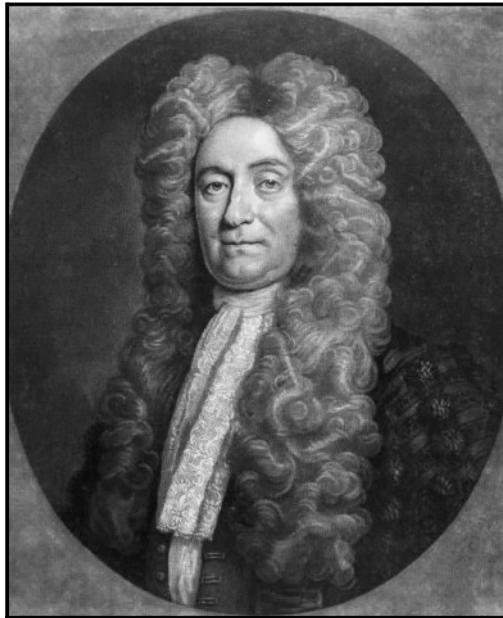
Figure 1.56: Battle of Trafalgar.



Figure 1.57: The National Gallery.

## British Museum

The British Museum was established in 1753, based on the collections of the Irish physician and scientist Sir Hans Sloane (1660–1753) (Figure 1.58). At that time, Sloane's collection consisted of around 71 000 objects of all kinds including some 40 000 books, 7 000 manuscripts, extensive natural history specimens including 337 volumes of dried plants, prints and drawings including those by Albrecht Dürer, and antiquities from Egypt, Greece, Rome, the Ancient Near and Far East and the Americas.



**Figure 1.58:** Sir Hans Sloane (1660–1753).

The British Museum (Figures 1.59–1.64) illustrates and documents the story of human culture from its beginnings to the present. Its expansion over the following two and a half centuries was largely a result of an expanding British Empire. For example, the museum includes objects from the South Seas brought from the voyages of Captain James Cook and the travels of other explorers. Further, archaeological expeditions were sent to excavate ancient sites. For example, more than 30,000 cuneiform tablets and fragments of Ashurbanipal, King of Assyria (668–around 630 BC) at his capital, Nineveh near the modern town of Mosul in northern Iraq were collected by the museum staff.



**Figure 1.59:** British Museum.



**Figure 1.60:** Reading Room.

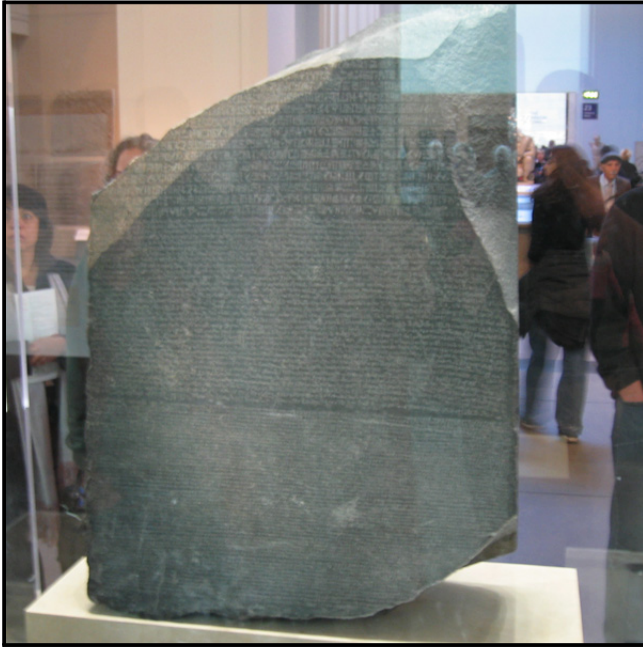


**Figure 1.61:** Massive statues from Mesopotamia.



**Figure 1.62:** Roman gallery.

After the defeat of the French Campaign in the Battle of the Nile, in 1801, the British Museum acquired more Egyptian sculpture including the Rosetta Stone (Figure 1.63) — key to the deciphering of hieroglyphs. Gifts and purchases from British Consul General in Egypt, beginning with the Colossal bust of Ramses II in 1818, laid the foundations of the collection of Egyptian Monumental Sculpture. In 1806, the British ambassador to the Ottoman Empire from 1799 to 1803 removed the large collection of marble sculptures from the Parthenon, on the Acropolis in Athens and transferred them to the UK which were acquired by The British Museum.



**Figure 1.63:** Rosetta stone acquired in 1802 from the French Expedition to Egypt.



**Figure 1.64:** Cuneiform tablets.

In 1822 the personal library of King George III comprising 65 000 volumes, 19 000 pamphlets, maps, charts and topographical drawing were donated to the museum. The Ancient Near Eastern collection also had its beginnings in 1825 with the purchase of Assyrian and Babylonian antiquities from the widow of Claudius James Rich. By the last years of the 19th century, the British Museum's collections had increased so much that the Museum building was no longer big enough for them. Nearby land was acquired and in 1906 the museum expanded.

## Other landmarks

Other landmarks include: Tower Bridge (Figures 1.65–1.66), Houses of Parliament, Saint Paul Cathedral (Figures 1.67–1.68), Albert Memorial in Hyde Park [Prince Consort to Queen Victoria] (Figure 1.72), Royal Albert Hall (Figure 1.73), and Harrods department store (Figure 1.76).



Figure 1.65: Tower Bridge.



**Figure 1.66:** Tower Bridge open for ships.



**Figure 1.67:** Saint Paul Cathedral designed by Christopher Wren (1632–1723) after the London Great Fire of 1666.



**Figure 1.68:** Inside Saint Paul Cathedral.



**Figure 1.69:** Christopher Wren (1632–1723).



**Figure 1.70:** Sixty-metre monument by Christopher Wren to commemorate the Great Fire of London in 1666.



**Figure 1.71:** A superstructure rises from the balcony at top and supports a copper vase of flames.



**Figure 1.72:** Albert Memorial in Hyde Park [Prince Consort to Queen Victoria (1819–1861)].



**Figure 1.73:** Royal Albert Hall.



**Figure 1.74:** Piccadilly Circus with statue of Cupid.



**Figure 1.75:** Statue of Cupid at Piccadilly.



**Figure 1.76:** Harrods department store.

## Royal School of Mines

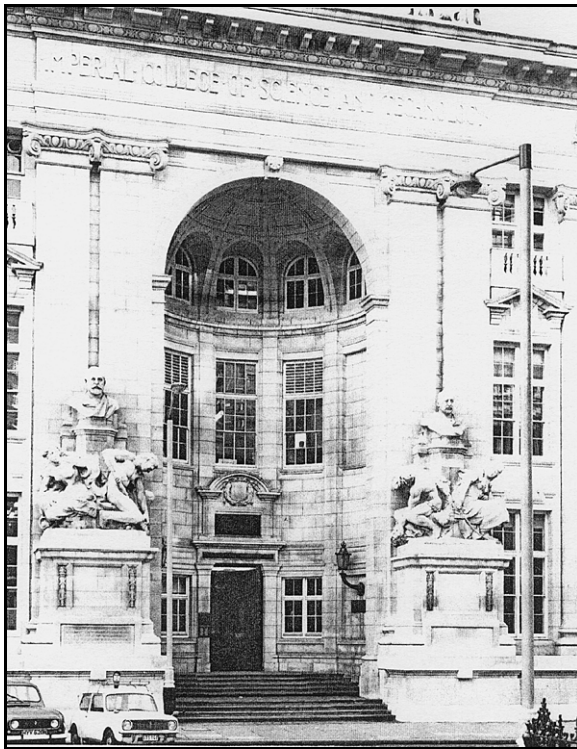
When Queen Victoria married in 1840 her cousin Prince Albert who was prince of Saxe-Coburg-Gotha, a region near Justus von Liebig's laboratory, Prince Albert, was able to interest a number of British landowners and industrialists in founding a College of Chemistry.

In 1845 the Royal College of Chemistry was opened, with Liebig's former student, August Wilhelm von Hofmann (1818–1892), as its first director. Along with his teaching, Hofmann carried on a research derived from coal tar which was plentiful in England, and virtually without use. In 1851, Prince Albert also sponsored the foundation of the Government School of Mining and Science Applied to the Arts. The new School was housed with the Geological Surveys at the Museum of Practical Geology.

There was discontent among the institution's financial supporters who disagreed with Hofmann's emphasis on basic science. English industrialists wanted scientists who would immediately pay their way in established industries by introducing more efficient processes, developing new products, and finding profitable uses for by-products. As time went on, the Royal College enrolment dropped and it was finally consolidated with the Royal School of Mines. Hofmann resigned in 1864 and returned to Germany. Eventually in 1907 the Royal School of Mines became part of Imperial College of Science and Technology.



**Figure 1.77:** Royal School of Mines on Prince Consort Road.



**Figure 1.78:** Main entrance to the Royal School of Mines in London. The statues are those of its two main benefactors, Cecil Rhodes (1853–1902) and Julius Wernher (1850–1912).

The School was visited a number of times. The first visit was in January 1963 to presenting a seminar at the Metallurgy Department entitled, “The Role of Oxygen in Hydrometallurgy”. Invitation of Prof. F. D. Richardson (1913–1983) (Figure 1.79). Guide: Dr. Richard Burkin (1923–2008) (Figure 1.80), Professor of Hydrometallurgy.



**Figure 1.79:** Prof. F. D. Richardson (1913–1983).

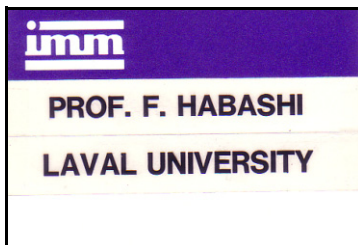


**Figure 1.80:** Richard Burkin (1923–2008).

The Department of Metallurgy was visited again in June 1980 where a meeting was held with Prof. John Monehemius and in September 1987 where a meeting was held with Prof. M. P. Jones in charge of a project on the analysis of ancient copper slags.

## Pyrometallurgy '87

The conference (Figure 1.81) was organized by the Institution of Mining & Metallurgy in London and was held at Imperial College of Science & Technology. Proceedings volume was obtained.



**Figure 1.81:** Conference badges.

## British Council

The British Council was founded in 1934 as a charity organization specialising in promoting international educational and cultural opportunities. Its headquarters are in Spring Gardens, near Whitehall in Central London. I benefited in 1987 from a stipend from the British Council to visit a number of cultural and historical organizations in UK. The program was well planned and well executed and included visits to: Royal Society, Royal Institution, University of Cambridge, Cavendish Laboratory, Camborne School of Mines, Wheal Jane Tin Concentrator in Truro, and Iron Bridge Museum.



**Figure 1.82:** The Royal Society.

## Royal Society

The Royal Society (Figure 1.82) is a learned society for science founded in 1660. It started from groups of physicians and natural philosophers including Christopher Wren and Robert Boyle, meeting at variety of locations in London. They were influenced by the writings of Francis Bacon (1561–1626) on science. The Society's early meetings included experiments performed by members such as Robert Hooke and Denis Papin. Editions of the *Philosophical Transactions of the Royal Society* were published regularly. Isaac Newton (1642–1727) (Figure 1.83) was President from 1703 until his death.



**Figure 1.83:** Isaac Newton (1642–1727).

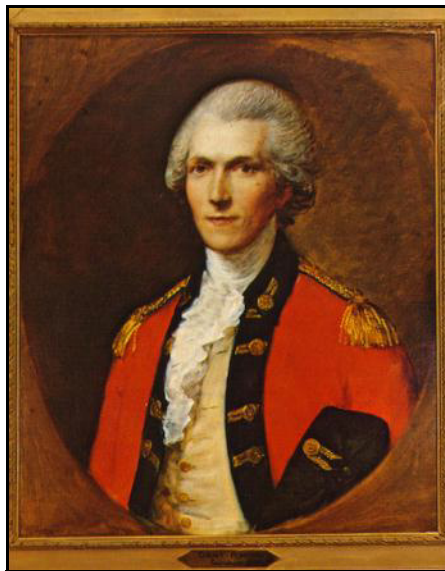
The Society has a library, a picture library, a collection related to the history of science, and archives. Today, it acts as a scientific advisor to the British government and funds research.

## **Royal Institution**

The Royal Institution of Great Britain (Figure 1.84) was founded in 1799 by American-born British scientist and philanthropist Benjamin Thompson [Count Rumford] (1753–1814) (Figure 1.85). Notable scientists who worked there include Humphry Davy (Figure 1.86), Michael Faraday, James Dewar, William Henry Bragg and William Lawrence Bragg, Max Perutz, and others. Fifteen scientists attached to the Royal Institution have won Nobel Prizes. Ten chemical elements were discovered there as well as the electric generator and the atomic structure of crystals. The Royal Institution also has a museum, which houses a collection of original apparatus used by Faraday during his 50 years there. The collections of the Royal Institution include the original apparatus and papers of many of those who have researched, lectured, and lived in the building.



**Figure 1.84:** The Royal Institution of Great Britain.



**Figure 1.85:** Benjamin Thompson [Count Rumford] (1753–1814).



**Figure 1.86:** Humphry Davy (1778–1829), first Director of the Institution.



**Figure 1.87:** Main staircase at the Royal Institution with statue of Michael Faraday.

## British Sulphur Corporation

British Sulphur Corporation is a private organization specialized in organizing conferences on sulfur, sulfuric acid, fertilizers, and related products. It publishes the proceedings in special volumes as well as other technical books and magazines related to the fertilizer industry. In 1979, the organization established Chemecon Publishing as a daughter company and published my book *Mineral Resources of the Arab Countries* co-authored with F. A. Bassyouni (Figure 1.88). The editorial staff was located in Mount Pleasant in London.

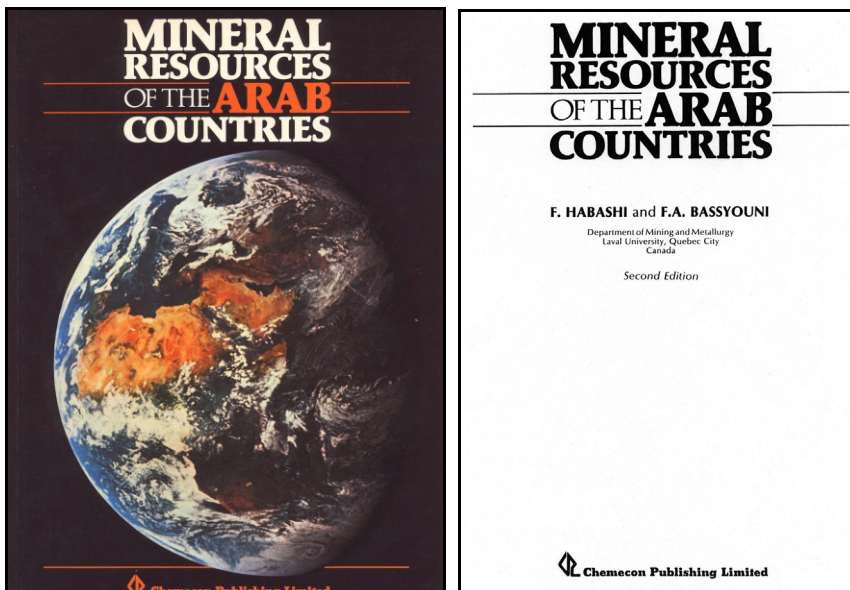


Figure 1.88: Front sheets of a book published by Chemecon Publishing in 1979.

## Science Museum

A museum was founded in 1857 from the collection of the Royal Society of Arts and items from the Great Exhibition. In 1885, the Science Collections were re-named the Science Museum (Figure 1.89). The Art Collections were re-named the Art Museum, which eventually became the Victoria and Albert Museum.

## Geological Museum

The Geological Museum (Figure 1.90) was founded in 1835 the same year the Geological Survey was founded. In 1965, they merged with the

Overseas Geological Surveys, under the name of Institute of Geological Sciences. In 1984, the institute was re-named the British Geological Survey.



**Figure 1.89:** Science Museum.



**Figure 1.90:** The Geological Museum.

## Victoria and Albert Museum

The Victoria and Albert Museum (Figures 1.91–1.93) founded in 1852, is the world's largest museum of decorative arts and design, named after Prince Albert and Queen Victoria. Its collection of art spans from ancient times to the present day from the cultures of Europe, North America, Asia and North Africa. The holdings of ceramics, glass, textiles, costumes, silver, ironwork, jewellery, furniture, sculpture, prints and drawings, and photographs are among the largest in the world.



**Figure 1.91:** Façade of Victoria and Albert Museum.



**Figure 1.92:** Internal court of Victoria and Albert Museum.



**Figure 1.93:** Inside on of the halls at Victoria & Albert Museum.

## STEVENAGE

### Warren Springs Laboratory

The Warren Spring Laboratory is equivalent to the former US Bureau of Mines. It is located about half way between London and Cambridge and can be reached by train from King's Cross Station in about 50 minutes. The laboratory was opened in 1959 as one of the research institutions of the Ministry of Technology. Other research institutions are the Atomic Energy Authority and the National Physical Laboratory. Research efforts in the lab are directed by a steering committee consisting of representatives from industry and universities. The lab takes its name from a lane that formerly crossed the site. Staff is about 340 of which 100 have university degrees; these are supported by an industrial labour force of about 100. The laboratory maintained a good library and an abstracting service. Director: Mr. Robinson. Guide: Douglas Flett. The lab was closed a few years later.

#### *Mineral Science and Technology Division*

This division is composed of about 90 people and is headed by Archibald W. Fletcher, who later emigrated to USA. Work done there covers all aspects of mineral beneficiation and extractive metallurgy. The division has an apparatus for doing solvent extraction studies continuously; it is a mixer-centrifuge system in which the aqueous and organic phases are equilibrated, then separated, and analysed. All work on beryllium was discontinued. Some work is being done on electrolysis using a "fluidized-bed cathode." Other interesting topics were the conversion of ferrous sulfate to ferrous sulfide by a reducing bacteria; the reduction of nickel hydroxide slurry by  $H_2$  under pressure in an autoclave at  $150^\circ C$ ; and the recovery of nickel and cobalt from scrap alloys.

#### *Chemical Engineering Division*

This division is mainly concerned with control of chemical and process plants by computers and other computing devices: the handling, storage, and mixing of powders, granular materials, pastes, slurries, catalysis, and the solid-gas systems.

#### *Air Pollution Division*

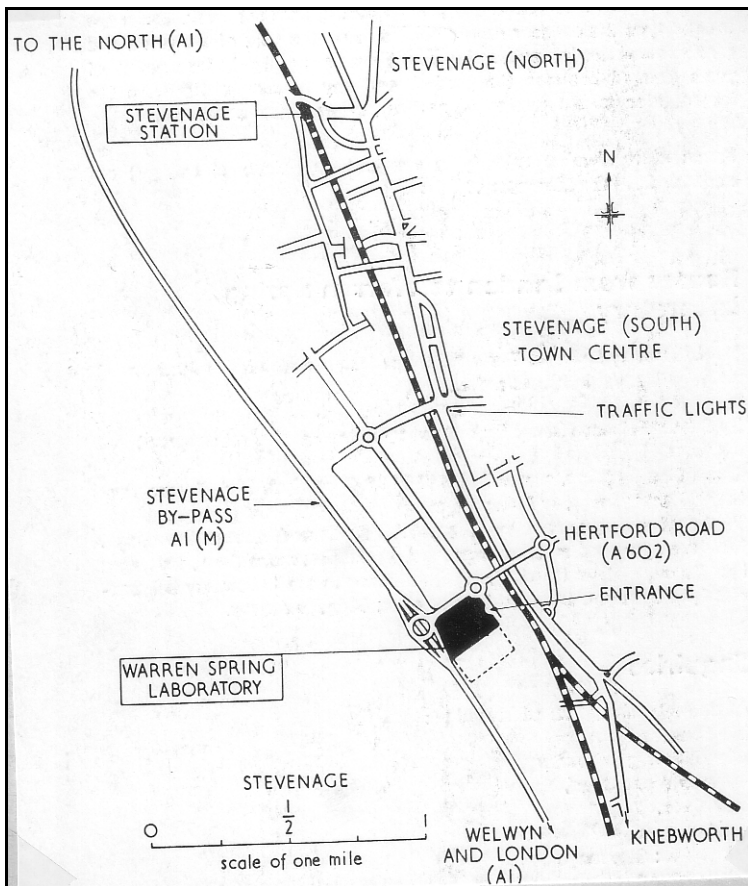
The laboratory maintains 1 100 stations in the United Kingdom to measure daily  $SO_2$  and smoke in the atmosphere; results of these data are evaluated at Warren Spring.

### *Chemistry and Physics Services Division*

This division is well equipped with a variety of apparatuses, e.g., spectrograph, electron microscope, electron microprobe, X-ray diffraction, x-ray fluorescence, etc. Head: Dr. P. G. Jeffery

### *Engineering Services Division*

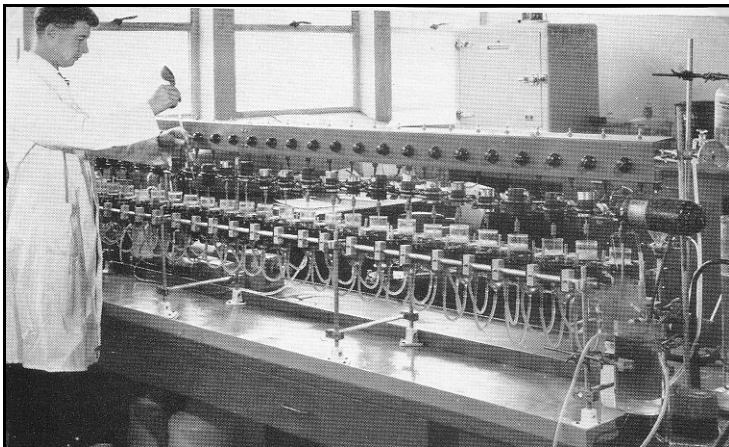
This division is concerned with the construction, installation and maintenance of the experimental plant required by the research divisions, as well as preparing tenders and drawings of mechanical and electrical equipment purchased by the laboratory. Reference: A. W. Fletcher entitled "Extraction Metallurgy Research at Warren Spring Laboratory," *Metals and Materials*, January 1969



**Figure 1.94:** The way to Warren Springs Laboratory.



**Figure 1.95:** Entrance to Warren Springs Laboratory.



**Figure 1.96:** Dr. Douglas Flett operating the solvent extraction unit.

## Telford

Telford is about 50 km west of Birmingham named after civil engineer Thomas Telford (1757–1834) (Figure 1.97). It is reached from London via Euston Station by British Rail. Telford includes Ironbridge Gorge, a UNESCO World Heritage Site. Due to its proximity to Coalbrookdale and other places in the Ironbridge Gorge area is recognized as being the birth place of the Industrial Revolution, being constructed on the Shropshire Coalfield. The River Severn flows along its southernmost boundary.



Figure 1.97: Thomas Telford (1757–1834).

### Iron Bridge

The small town Iron Bridge near Telford got its name from the world's first iron bridge constructed at this location in 1779 across the River Severn. This place was the centre of the Industrial Revolution: There were nine blast furnaces in operation and the largest foundry in the world. There the world's first steam railway locomotive was built and the first iron railway wheels were cast; most important was the first transformation of coal into coke by Abraham Darby I in 1709. Three of the blast furnaces were excavated in 1973 and constitute a part of the Iron Bridge Museum. Guide: Mr. J. Powell.

The availability of large deposits of iron ore and coal, and the undesirability of reliance on charcoal for iron smelting, were stimuli for technical development of iron production in England. The production of large amounts of iron made possible the casting of large number of cannons as well as the production of armour plates for battle ships. As well, it permitted the construction in 1779 of the first bridge in the world made of iron (Figures 1.98–1.99), across the Severn River near Coalbrookdale. The importance of this bridge lies in the fact that although iron had been used for thousands of years it had not been a major construction material because there was not enough of it.



**Figure 1.98:** Iron Bridge on the River Sever.



**Figure 1.99:** Iron Bridge on the River Sever. Photo by Mr. J. Powell [Guide], 1987.

## Iron Bridge Museum

Next to the Museum is a village constructed in the Victorian Age style of authentic old material.

A view of the Coalbrookdale furnace was painted at night by a contemporary artist shows the flame coming out of the open top of the furnace (Figure 1.101).



**Figure 1.100:** Iron Bridge Museum.

## TRURO

Truro is the administrative centre of Cornwall [Kernow is Cornish for Cornwall] — the peninsula in the south of England (Figures 1.102–1.103). There is little evidence that Roman rule was effective west of Exeter. This area was originally inhabited by people with distinctive cultural relations to neighbouring Wales and Brittany. Cornwall is the traditional homeland of the Cornish people and is recognized as one of the Celtic nations. It is believed that the Phoenicians monopolized the trade cassiterite [the tin mineral] in the Mediterranean.



**Figure 1.101:** Coalbrookdale at night, a contemporary painting by Philip James de Loutherbourg (1740–1812), now in the Science Museum, London.

Historically tin mining was important in the Cornish economy, becoming increasingly significant during the High Middle Ages and expanding greatly during the 19th century when rich copper mines were also in production. In the mid-nineteenth century, however, the tin and copper mines entered a period of decline (Figure 1.104). Subsequently china clay extraction became more important and metal mining had virtually ended by the 1990s.



**Figure 1.102:** Location of Cornwall.



**Figure 1.103:** Location of Camborne, Redruth, Truro, Falmouth, and Penzance.



**Figure 1.104:** Abandoned tin mine.

## Camborne School of Mines

Classes at Camborne School of Mines in Camborne, Cornwall (Figure 1.105), started in 1859, i.e., ten years after the Royal School of Mines in London but the School was officially founded in 1888. The need for creating the school was due to the intensive mining activity in Cornwall during the 19th century. The School is small (200 students in 1987) but modern. Hosts: Prof. Victor Phillips and Prof. Barry Wills.



**Figure 1.105:** Camborne School of Mines.

## Wheal Jane Tin Concentrator

Wheal in Cornish means “mine.” During the 19th century, Cornwall produced more than half of the world’s tin and copper as well as substantial amounts of lead and zinc. Wheal Jane is now one of the very few mines for nonferrous metals still operating in UK. The ore is a pyrite matrix containing 3% Zn, 0.3% Cu, 10–16% S, and 0.9–1.0% Sn. Tin is mainly present as cassiterite and is associated with the gangue minerals. Three flotation concentrates are produced as follows: Tin concentrate 53–55% Sn, copper concentrate 12–14% Cu, and zinc concentrate 50% Zn. Guide: Superintendent Andy Wells. Assistant: Garry Le Jeune.

## SWANSEA

Swansea (Figure 1.106) is a coastal city in Wales. During the 19th century Swansea was a key centre of the copper industry. Coal mines were opened and smelters (mostly along the Tawe valley) were opened and flourished. Through the 20th century, heavy industries in the town declined. Welsh is a branch of the Celtic languages spoken natively in Wales. Unfortunately, there were not much historical exhibits available during a visit in 1994.



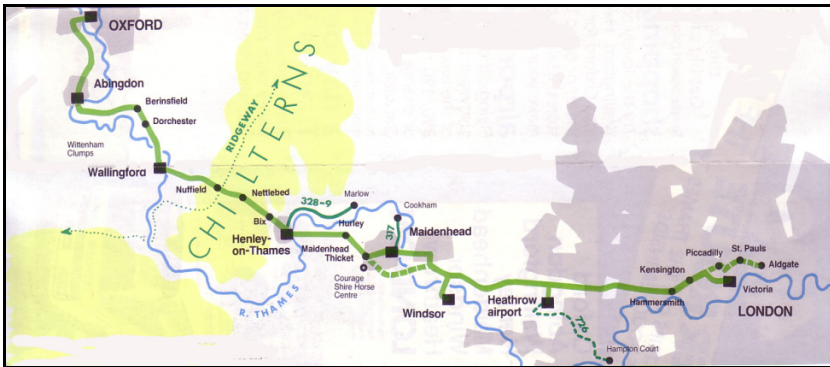
Figure 1.106: Location of Swansea.



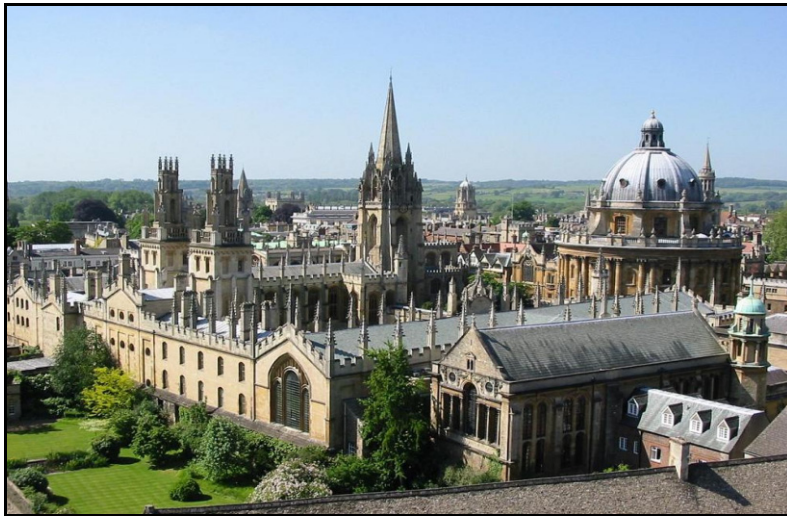
Figure 1.107: Map showing location of Oxford and Cambridge.

## OXFORD

Oxford is mainly a university city. Its university was founded in the 12th century as the first English-speaking university. It can be reached bus from Heathrow Airport (Figures 1.107–1.109).



**Figure 1.108:** Detailed map showing transportation from Heathrow Air-  
port to Oxford.



**Figure 1.109:** Oxford University.

## Oxford University Press

Oxford University Press (Figure 1.110) is a large publishing house has reputation in publishing multi-volume dictionaries and comprehensive historical and scientific works. *Dictionary of National Biography* is of special interest. In September 1987 a meeting was held an editor to discuss editing *History of Metallurgy*. An agreement was successfully reached and the book was published in 1994 (Figures 1.111–1.113).



Figure 1.110: Entrance to Oxford University Press.

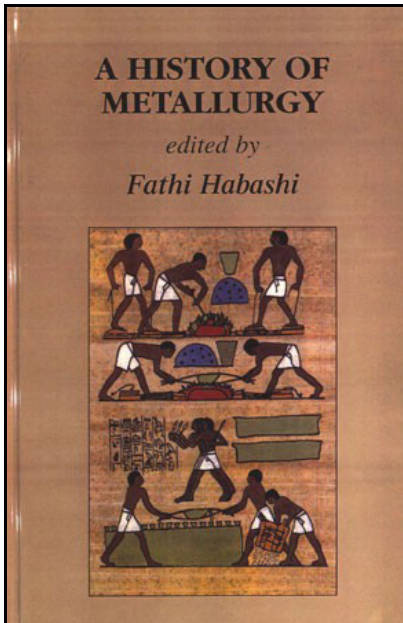


Figure 1.111: *History of Metallurgy*, 1994.

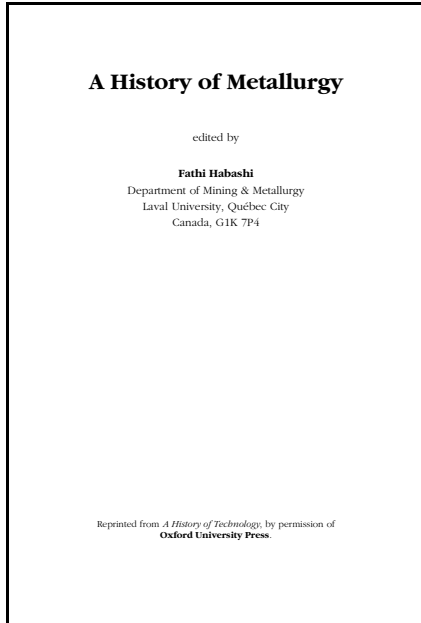


Figure 1.112: Acknowledgement to Oxford University Press.

## Museum of the History of Science

The Museum (Figure 1.114) is a department of the University of Oxford and a public museum. It houses a collection of early scientific instruments such as astrolabes, sundials, optical instruments such as microscopes, telescopes, cameras, and other items.

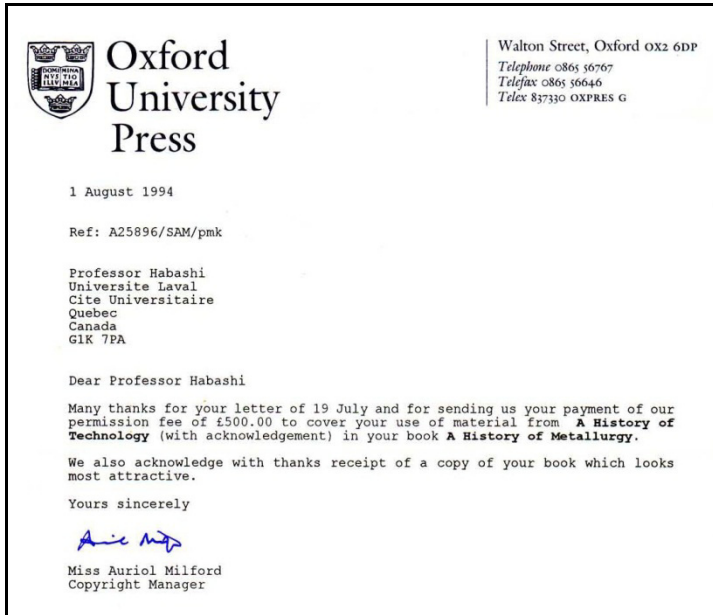


Figure 1.113: Correspondence with Oxford University Press.

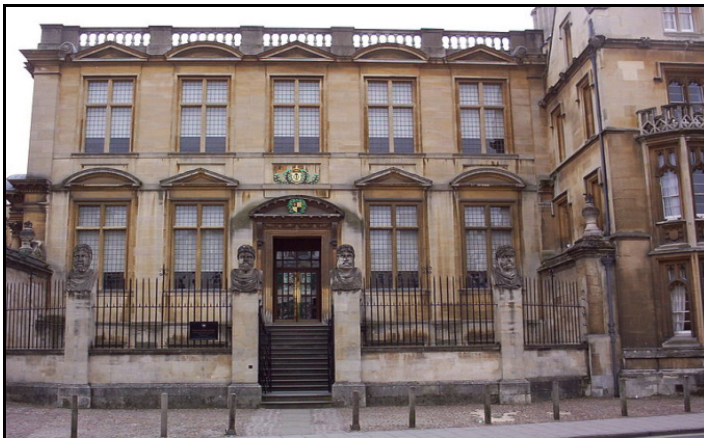


Figure 1.114: Museum of the History of Science in Oxford.

## CAMBRIDGE

Cambridge is 80 km northeast of London and can be reached by train from King's Cross railway station. The River Cam flows through the city and the name of the city is derived from the river (Figure 1.115). Cambridge is best known as the home of the University of Cambridge, the Cavendish Laboratory, King's College Chapel (Figures 1.116–1.118), and the Cambridge University Library.



**Figure 1.115:** The River Cam.



**Figure 1.116:** King's College Chapel.



**Figure 1.117:** Inside King's College Chapel.



**Figure 1.118:** Stained glass in King's College Chapel.

## University of Cambridge

The University of Cambridge (Figure 1.119) was founded in 1209. It has 31 colleges (Figure 1.120). Isaac Newton (1642–1727) (Figure 1.121)

was professor of mathematics at Trinity College (Figure 1.122) from 1667 to 1696 before moving to London to become Master of the Mint.



Figure 1.119: Crest of the University.

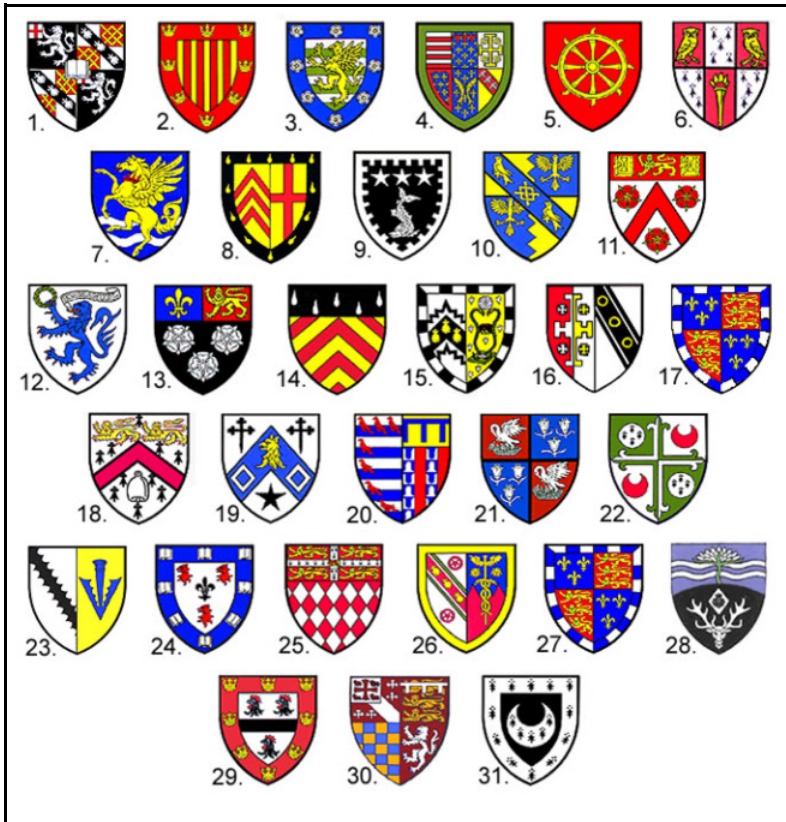


Figure 1.120: Crests of University of Cambridge colleges.



**Figure 1.121:** Statue of Isaac Newton (1642–1727) in Cambridge.

Meetings were held with Prof. James Charles at Department of Materials Science & Metallurgy who works on certain aspects of historical metallurgy. Professor J. P. Chilton, a hydrometallurgist who reviewed my book *Chalcopyrite – Its Chemistry and Metallurgy*, published in 1978.



Figure 1.122: Trinity College.



Figure 1.123: Henry Cavendish (1731–1810).

## Cavendish Laboratory

The Cavendish Laboratory is the Department of Physics at the University of Cambridge, and is part of the university's School of Physical Sciences. It was opened in 1874 as a teaching laboratory. The Department is named to

commemorate British chemist and physicist Henry Cavendish (1731–1810) (Figure 1.123) for contributions to science and his relative William Cavendish, 7th Duke of Devonshire, who served as Chancellor of the University and donated money for the construction of the laboratory. Professor James Clerk Maxwell, the developer of electromagnetic theory, was a founder of the lab and became the first Cavendish Professor of Physics. As of 2011, 29 Cavendish researchers have won Nobel Prizes (Table 1.2). Guide: Prof. Lawrence Michael Brown, a Canadian by birth.

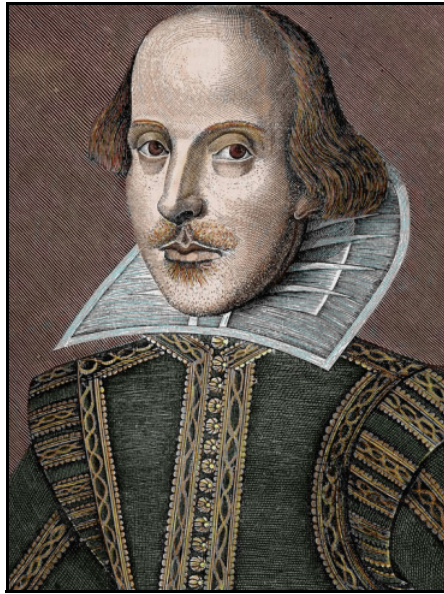
**Table 1.2:** Nobel Prize-winning Cavendish researchers.

1904	Lord Rayleigh	Physics
1906	J. J. Thomson	Physics
1908	Ernest Rutherford	Chemistry
1915	Lawrence Bragg	Physics
1917	Charles Barkla	Physics
1922	Francis Aston	Chemistry
1927	C. T. R. Wilson Arthur Compton	Physics
1928	Owen Richardson	Physics
1935	James Chadwick	Physics
1937	George Thomson	Physics
1947	Edward Appleton	Physics
1948	Patrick Blackett	Physics
1951	John Cockcroft Ernest Walton	Physics
1962	Francis Crick James Watson	Physiology/ Medicine
1962	Max Perutz John Kendrew	Chemistry
1964	Dorothy Hodgkin	Chemistry
1973	Brian Josephson	Physics
1974	Martin Ryle Antony Hewish	Physics
1977	Nevill Mott Philip Anderson	Physics
1978	Pjotr Kapitsa	Physics
1979	Allan Cormack	Physiology/ Medicine
1982	Aaron Klug	Chemistry
1979	Abdus Salam	Physics

## STRATFORD-ON-AVON

Stratford-upon-Avon lies on the River Avon. The town is the birthplace of the playwright and poet William Shakespeare (1564–1616) (Figures

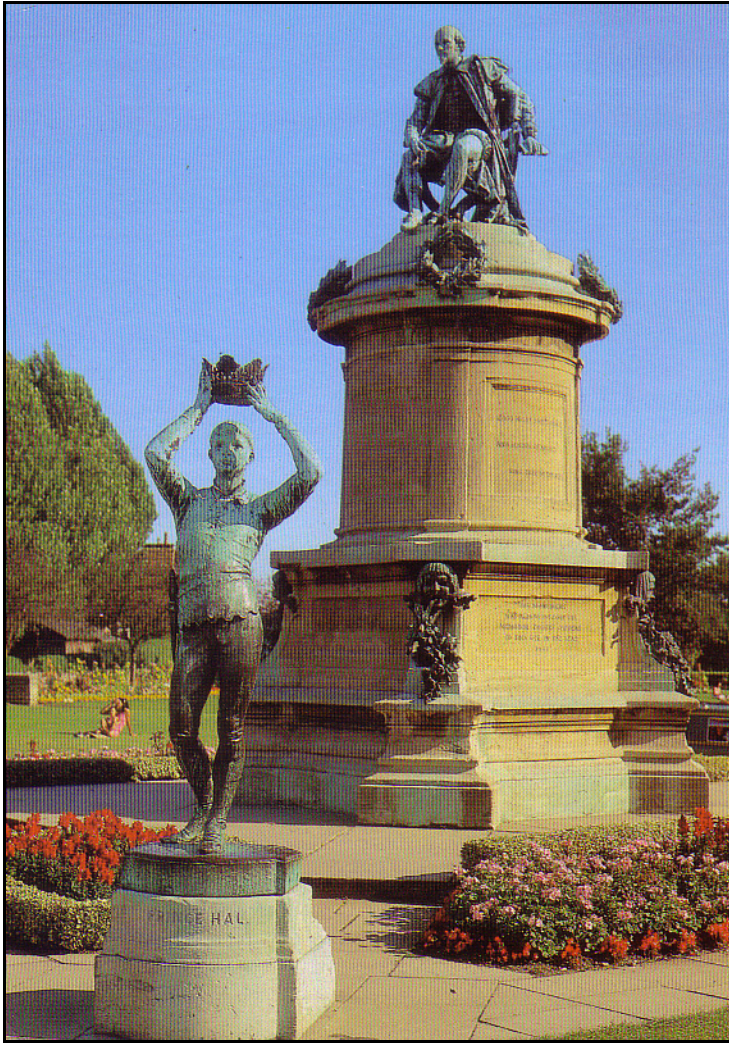
1.124–1.126). It is a northwest from Oxford and takes one hour bus drive. It was visited during the trip to Oxford.



**Figure 1.124:** William Shakespeare (1564–1616).



**Figure 1.125:** Monument to William Shakespeare.



**Figure 1.126:** Monument to William Shakespeare.

## LEEDS

In the 17th and 18th centuries Leeds was a major centre for the production and trading of wool. Then, during the Industrial Revolution, it developed into a major industrial centre. Growth, in textiles was accelerated by the building of the Leeds and Liverpool Canal in 1816. In 1834 railways pro-

vided communications with Manchester and Liverpool giving improved access to international markets.

## University of Leeds

University of Leeds (Figure 1.127) was founded in 1904. One of its distinguished chemistry professors was Edward Thorpe, editor of *Dictionary of Applied Chemistry*, first published in 1894, went through numerous editions, the fourth edition was in 12 volumes published between 1937 and 1956.

A seminar was held at the Department of Mining and Mineral Engineering (Figure 1.128). Hosts: Prof. Nevill Rice and Dr. Vasant Kumar (Figure 1.129).



**Figure 1.127:** University of Leeds.

THURSDAY 19TH MAY  
11.30AM - 1.00PM  
VISITING LECTURE  
Research and Undergraduate Mineral Engineering  
PROF F HABASHI  
(Laval University, Quebec)  
EXTRACTIVE METALLURGY  
TODAY  
PROGRESS AND PROBLEMS  
ALL WELCOME

Figure 1.128: Announcement for lecture, 1994.

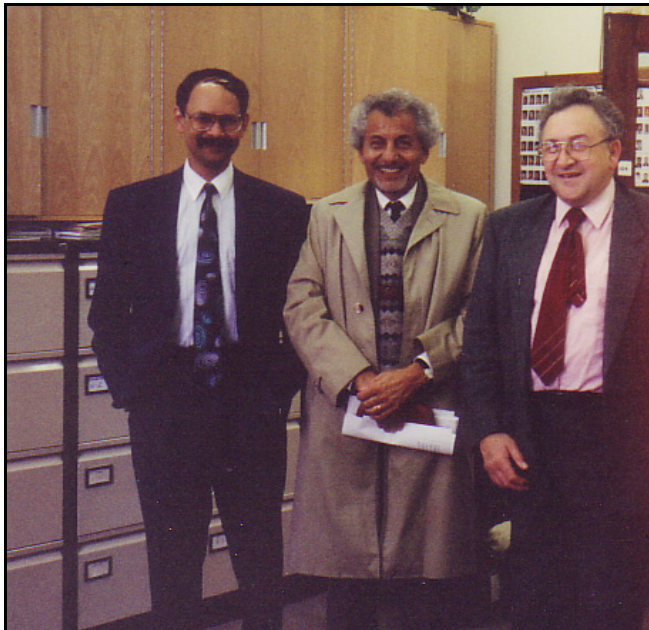


Figure 1.129: Dr. Vasant Kumar [left], Prof. Nevill Rice [right], 1994.

## BRADFORD

Bradford is 14 km west of Leeds in West Yorkshire. It rose to prominence during the 19th century as the “wool capital of the world.” There were many Pakistani and Indian population. However, the textile sector fell into decline from the mid-20th century.

### University of Bradford

The University of Bradford was founded in 1966. A meeting was held with Prof. Mike Slater and Dr. Hadj Benkreira at the Department of Chemical engineering (Figure 1.130).



**Figure 1.130:** Prof. Mike Slater [left], Dr. Hadj Benkreira [right], 1994.

## EPSOM

Epsom in Surrey (Figure 1.131) within the Greater London Urban Area was known as a spa town. Epsom salt, named after the town, is magnesium sulfate, was originally prepared by boiling down mineral waters at Epsom.

### Atkins

A. W. Atkins is a large engineering consulting firm and project management with over 300 offices around the world. The office in Epsom was charged to evaluate a project to extract magnesium from the sabkha in Abu Dhabi, United Arab Emirates. Sabkha is an Arabic word meaning “fertilizer”. Such material is so used because of its nitrate and potassium contents – two essential nutrient elements for plant. Sabkha is a brine in contact

with a complex salt deposit of chlorides of sodium, potassium, and magnesium as well as some sulfates, contaminated with sand and clay. Dr. Peter Carr was project director (Figure 1.132). I was part of the evaluation team (Figure 1.133).



**Figure 1.131:** Location of Epsom.



**Figure 1.132:** Magnesium Project Director Dr. Peter Carr.

## CULTURE

Colourful royal parades are typical in United Kingdom (Figures 1.134–1.142).



**Figure 1.133:** Magnesium Project participants. Photo by Peter Carr, 2001.



**Figure 1.134:** Palace guards.



Figure 1.135: Tower of London guards.



Figure 1.136: Parade.



Figure 1.137: Parade.



Figure 1.138: Bagpipers parade.



Figure 1.139: Bagpipers parade.



Figure 1.140: Royal procession.



Figure 1.141: Royal procession.



Figure 1.142: Royal procession.

## Chapter 2

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## France

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<b>Parque La Villette</b> .....	114	<b>Chatenay-Malabry</b> .....	144
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<b>Collège des Quatre-Nations</b> .....	127	<b>nique de Lorraine</b> .....	167
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<b>Place de la République</b> .....	130	<b>Géologie Appliquée et de Pros-</b>	
<b>Place Vendôme</b> .....	130	<b>pection Minière</b> .....	169
<b>Place de la Bastille</b> .....	131	<b>Baccarat</b> .....	173
<b>Place du Châtelet</b> .....	132	<b>Strasbourg</b> .....	174
<b>Place Clichy</b> .....	134	<b>Côte d'Azur</b> .....	177
<b>Palais de Justice</b> .....	134	<b>Nice</b> .....	177
<b>La Conciergerie</b> .....	135	<b>Monaco</b> .....	179
<b>Assemblée nationale</b> .....	137	<b>Villefranche</b> .....	182
<b>Eiffel Tower</b> .....	137		

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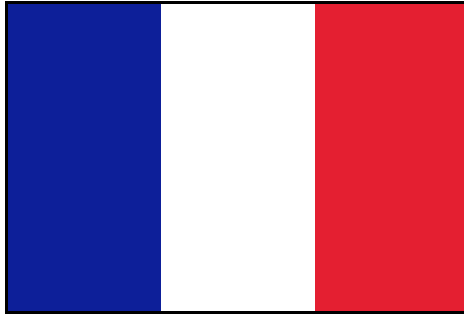


Figure 2.1: Flag of France.

## HISTORICAL INTRODUCTION



Figure 2.2: Gaul during Roman times.



**Figure 2.3:** France in 843 after the death of Charlemagne.

**Table 2.1:** Visits to France.

Dates	Cities	Purpose of visit
September 1960	Paris	Transit from Vienna to Canada
	Saclay	Energie Atomique
June 1980	Paris	Cooperation France-Quebec
	Orleans	BRGM
	Nancy	École de Mines
	Trappes	Centre de Recherche
	Versaille	Cultural visit
	Fontainebleau	Cultural visit
July 1984	Paris	Transit to Lisbon
December 1993-January 1994	Nancy	Thesis examination
May 1995	Paris	Patrimoine sans Frontieres
November 1995	Paris	Cultural visit
	Nancy	Thesis examination
	Baccarat	Cultural visit
	Strasbourg	Cultural visit
January 2000	Cagnes and Monaco, Côte d'Azur	Visiting a school mate from Cairo
October 2008	Villefranche, Côte d'Azur	Mediterranean cruise



Figure 2.4: France today.

## PARIS

The basic maps of Paris and its surroundings are shown in Figures 2.6–2.8.

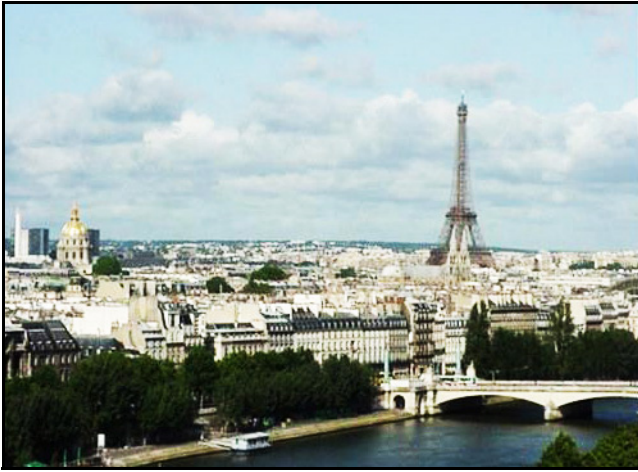


Figure 2.5: View of Paris.

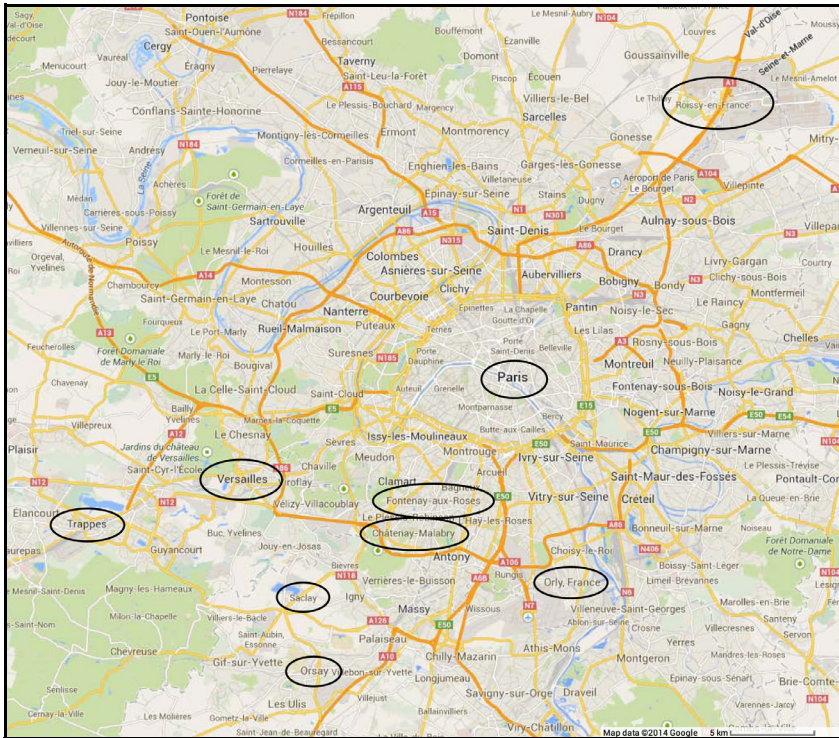


Figure 2.6: Paris and the surroundings visited.



Figure 2.7: Basic map of Paris showing the River Seine and Notre-Dame Cathedral.



Figure 2.8: Map showing location of Versailles and Fontainebleau.

### Paris Airports

There are two airports in Paris: Charles-de-Gaulle and Orly (Figures 2.9–2.11).

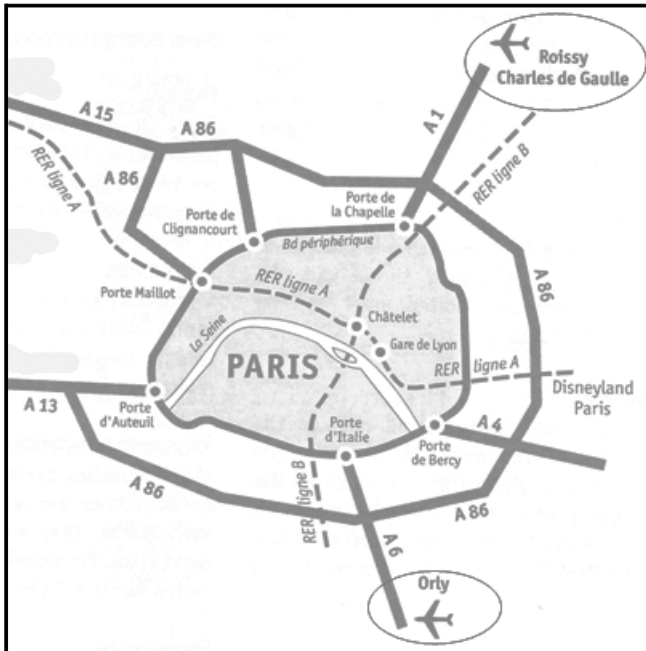
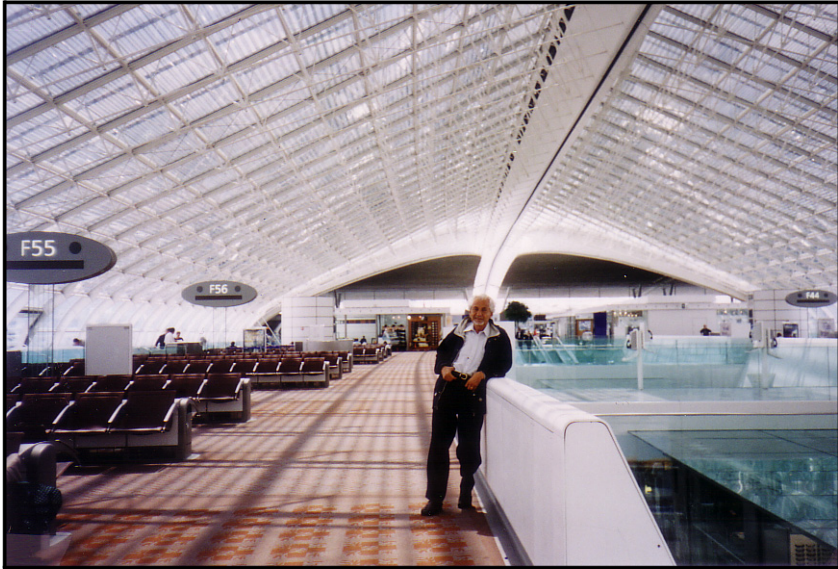
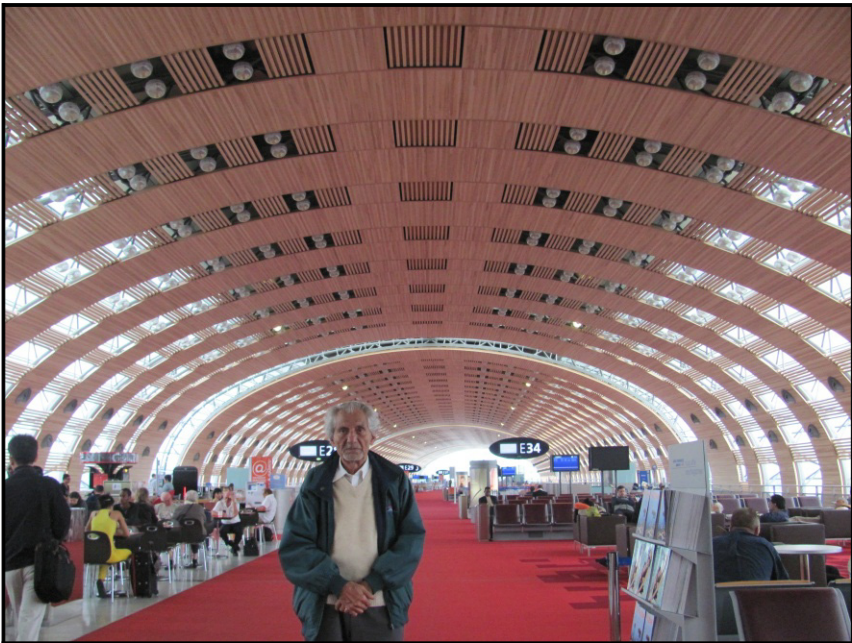


Figure 2.9: Paris airports.



**Figure 2.10:** Paris–Charles de Gaulle Airport 2002 [Photo by Nadia Habashi].



**Figure 2.11:** Paris–Charles de Gaulle Airport 2011 [Photo by Nadia Habashi].

## Paris Metro

The Metro is the most versatile way of transportation in Paris (Figure 2.12).



Figure 2.12: Metro station.

## Quartier Latin

The Quartier Latin (Figures 2.13–2.16) is situated on the left bank of the Seine, around the Sorbonne known for its student life and bookstores since it is the home to a number of higher education establishments besides the university itself, such as the École Normale Supérieure, the École des Mines de Paris, the École Polytechnique, and others.

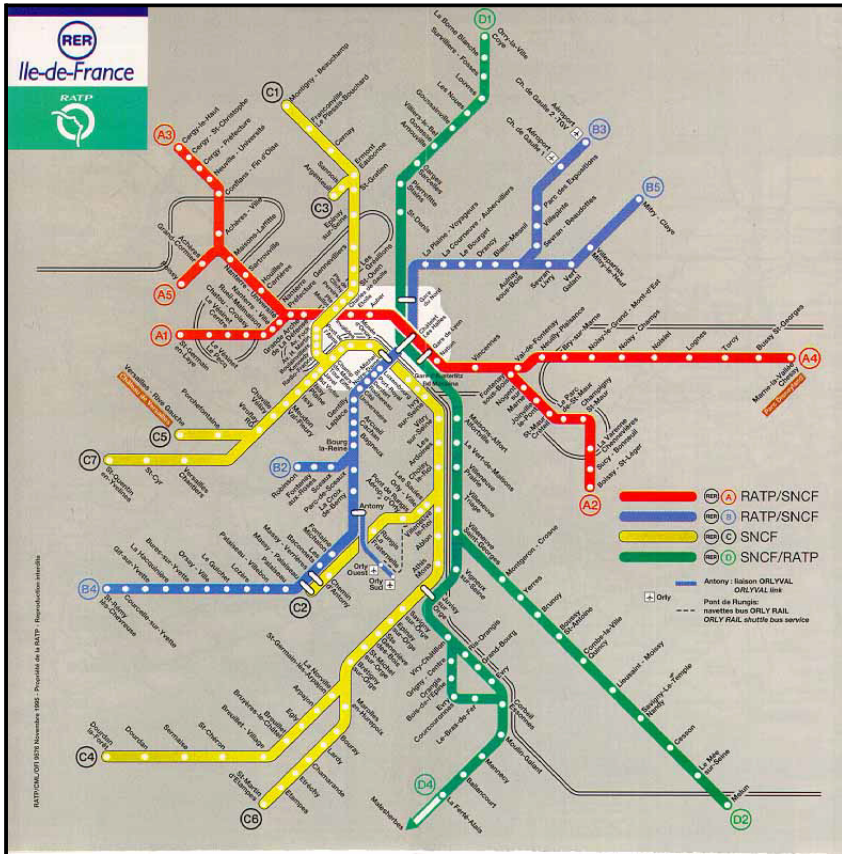


Figure 2.13: Paris Metro map.



**Figure 2.14:** A fountain in the Quartier Latin.



Figure 2.15: A view in the Quartier Latin.



Figure 2.16: With a delegation from Université Laval in the Quartier Latin. From right: David Karel, Philippe Dubé, Henri Dorion. Photo by Nadia Habashi, 1995.

## Sorbonne

The name Sorbonne is derived from the Collège de Sorbonne, founded in 1257 by Robert de Sorbon (1201–1274), French theologian and chaplain of Louis IX, as one of the first significant colleges of the medieval University of Paris (Figure 2.17). During the 16th century, the Sorbonne became a focal point of the intellectual struggle between Catholics and Protestants. The University served as a major stronghold of Catholic conservative attitudes, and as such conducted a bitter struggle against the policy of tolerance towards the French Protestants by King François I.

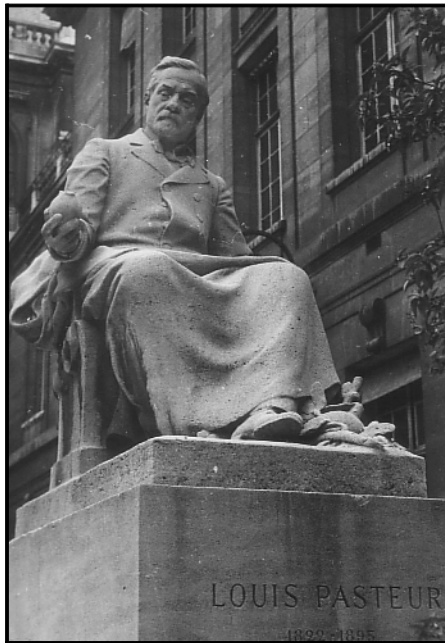


**Figure 2.17:** The Sorbonne.

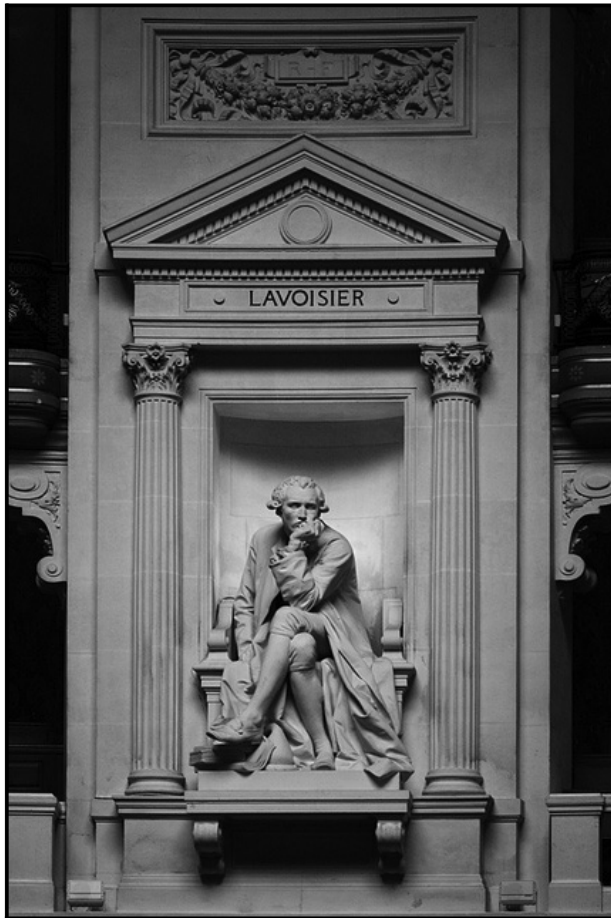
In front of the building there is a monument to French philosopher Michel de Montaigne (1533–1592) (Figure 2.18). In side the building is a monument to Louis Pasteur (1822–1895) (Figure 2.19) who was professor in 1867 and another for Antoine Laurent Lavoisier (1743–1794) (Figure 2.20). In 1970, the University of Paris was divided into thirteen different universities. These universities still stand under the management of a common rectorate — the Rectorate of Paris — with offices in the Sorbonne.



**Figure 2.18:** Michel de Montaigne (1533–1592).



**Figure 2.19:** Louis Pasteur (1822–1895). Photo by Fathi Habashi, 1960.



**Figure 2.20:** Antoine Laurent Lavoisier (1743–1794).

## **École supérieure de physique et de chimie industrielles de la ville de Paris**

The School is an engineering college founded by the city of Paris in 1882 following the annexation of Alsace and Lorraine by Germany when France lost the École de Chimie de Mulhouse which was at that time the best chemistry school in the country. From 1880 on, Pierre and Jacques Curie started research on crystal electrical properties that led to the discovery of piezoelectricity. It was also there that Pierre Curie (1859–1906) and Marie Curie (1867–1934) discovered polonium in July 1898 and radium in December of the same year. Pierre and Marie Curie received the Physics

Nobel Prize in 1903. After the death of her husband, Marie Curie was awarded the Chemistry Nobel Prize in 1911. The School maintains Madame Curie's office as a museum. A bust of the couple is placed at the School (Figure 2.21). A street is named after them (Figure 2.22).



**Figure 2.21:** Pierre and Marie Curie at the École supérieure de physique et de chimie industrielles de la ville de Paris. Photo by Fathi Habashi, 1960.



**Figure 2.22:** Street named after the Curies.



**Figure 2.23:** Marie Curie office.

Among the distinguished graduates from the School were Georges Claude (1870–1960) founder of Air Liquide, Paul Langevin (1872–1946) physicist and inventor, and Frédéric Joliot-Curie (1900–1958), founder of the Commissariat d'Énergie Atomique and Nobel Prize in Chemistry in 1935 with his wife Irène (1897–1956) (Figure 2.24), Pierre-Gilles de Gennes (Nobel Prize in Physics, 1991) and Georges Charpak (Nobel Prize in Physics, 1992).



Figure 2.24: Frédéric Joliot-Curie and his wife Irène.

## Institut du Monde Arabe

The Institut du Monde Arabe was founded in 1980 by 18 Arab countries with France to research and disseminate information about the Arab world and its cultural.



Figure 2.25: Institut du Monde Arabe.



Figure 2.26: Institut du Monde Arabe.



Figure 2.27: The Library.

## Jardin du Roi

The Musée d'Histoire naturelle de Paris (Figures 2.28–2.29) was founded in 1793, during the French Revolution. Its origins lie, however, in the Jardin royal des plantes médicinales created by King Louis XIII in 1635. During the 18th century (1739–1788), the garden was under the direction of

Georges-Louis Leclerc, Comte de Buffon, one of the leading naturalists of the Enlightenment.



**Figure 2.28:** Musée d'Histoire naturelle de Paris.



**Figure 2.29:** One of the galleries inside Musée d'Histoire naturelle.

Many eminent French scientists worked there, for example, Antoine-Laurent de Jussieu, Georges Cuvier, Jean-Baptiste de Lamarck, Michel Eugène Chevreul, Henri Becquerel, Antoine-François Fourcroy, Gay-Lussac, and others. It was there that the phenomenon of radioactivity was discovered (Figure 2.30).



**Figure 2.30:** Plaque commemorating the discovery of radioactivity.

## Musée des Arts et Métiers

The Musée des Arts et Métiers (Figure 2.31) was founded in 1794 as a repository for the preservation of scientific instruments and inventions. It is located in Saint-Martin-des-Champs and can be reached by Paris Métro station Arts et Métiers. Some equipment of Lavoisier are on display there.



**Figure 2.31:** Musée des Arts et Métiers.

## Parque La Villette

The park houses museums, concert halls, live performance stages, and theatres, as well as playgrounds for children, and other museums. These include:

- Cité des Sciences et de l'Industrie
- La Géode, an IMAX theatre inside of a 36-metre diameter geodesic dome (Figure 2.32)
- Cité de la musique
- Le Zénith, a large concert arena



**Figure 2.32:** Geodesic dome.

## Le Louvre

The Louvre Palace (Figures 2.33–2.34) began as a fortress built in the late 12th century under Philip II. Some believe that the word “louvre” may refer to the structure’s status as the largest in late 12th century Paris (from the French L’Œuvre, masterpiece). The building was extended many times to form the present Louvre Palace. In 1682, Louis XIV chose the Palace of Versailles for his household, leaving the Louvre as a place to display the royal collection.

During the French Revolution, the National Assembly decreed that the Louvre should be used as a museum, to display the nation's masterpieces. The size of the collection increased under Napoleon but after his defeat at Waterloo, many works seized by his armies were returned to their original owners. The collection was further increased during the reigns of Louis XVIII and Charles X. The glass pyramid in front of the building was constructed in 1989 as the main entrance.

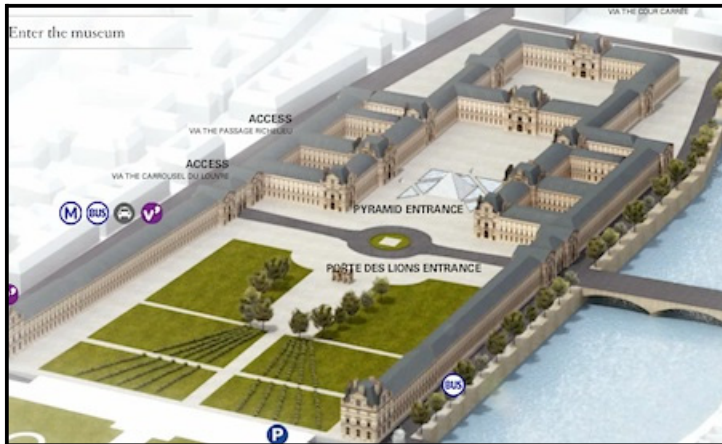


Figure 2.33: Louvre.



Figure 2.34: Entrance to Louvre.

## Palais Royal

Just to its north of the Louvre was the residence of the Cardinal de Richelieu (Figures 2.35–2.36). Upon Richelieu's death in 1642 the palace became the property of the King and acquired the new name Palais Royal.



Figure 2.35: Palais Royal.



Figure 2.36: Cardinal de Richelieu (1585–1642), chief minister to King Louis XIII.

## Musée d'Orsay

The building of Musée d'Orsay (Figure 2.37) was a railroad station that was converted into a museum to house the 19th century art collections scattered in the different Paris museums. The Museum is named in honour of Orsay, a suburb 20 km south of Paris.



Figure 2.37: Musée d'Orsay.

## Hôtel de Ville

The building houses the City of Paris's administration (Figure 2.38). Since the French Revolution, it has been the scene of a number of historical events, notably the proclamation of the French Third Republic in 1870 and the speech by Charles de Gaulle on August 25, 1944 during the Liberation of Paris when he greeted the crowd from a front window.



Figure 2.38: Hôtel de Ville.

## Opéra

The present building of Opéra de Paris (Figure 2.39) dates back to 1875 during the reign of Napoleon III.



Figure 2.39: The Opéra.

## Les Champs-Élysées

The avenue (Figure 2.40) runs from the Place Charles-de-Gaulle (formerly the Place de l'Étoile) in the west, location of the Arc de Triomphe to the Place de la Concorde in the east, with the Obelisk of Luxor.

The Arc de Triomphe (Figures 2.41–2.42) honours those who fought and died for France in the French Revolutionary and the Napoleonic Wars, with the names of all French victories and generals inscribed on its inner and outer surfaces. Beneath its vault lies the Tomb of the Unknown Soldier from World War I. The monument is a huge structure 50 m high, 45 m wide, and 22 m deep.

During the French Revolution, the statue of Louis XV in the square with the same name was torn down and the area renamed Place de la Révolution, later renamed Place de la Concorde (Figure 2.43). The new revolutionary government erected the guillotine in the square, and it was there that King Louis XVI was executed on January 21, 1793. Other important figures guillotined on the site were Queen Marie-Antoinette, Georges Danton, Antoine Lavoisier, Maximilien Robespierre, and others.



**Figure 2.40:** Les Champs-Élysées.



**Figure 2.41:** Arc de Triomphe.



**Figure 2.42:** Place Charles de Gaulle (formerly the Place de l'Étoile) with Arc de Triomphe.



**Figure 2.43:** Place de la Concorde with Luxor needle.

The centre of the Square is occupied by a giant Egyptian obelisk given to France in the 19th century by the Ottoman viceroy of Egypt Muhammad Ali in 1829. In 1836, King Louis Philippe had it placed in the centre of Place de la Concorde, where a guillotine used to stand. There are also beautiful fountains (Figure 2.44).



**Figure 2.44:** On of the fountains in Place de la Concorde.

## Le Marais

Le Marais district hosts many outstanding buildings of historic and architectural importance. It is most known for its Place des Vosges, Musée Carnavalet (Figure 2.46), etc. Inaugurated as Place Royale in 1612. This area fell out of royal favour when the King's court left for the Louvre then Versailles.



**Figure 2.45:** Hôtel de Sully, Le Marais.



Figure 2.46: Musée Carnavalet, Le Marais.

## Panthéon

King Louis XV vowed in 1744 that if he recovered from his illness he would replace the ruined church of the Abbey of Sainte-Geneviève with an edifice worthy of the patron saint of Paris. He did recover, and construction of started in 1757. Now known as the Panthéon (Figure 2.47) and functions as a mausoleum containing the remains of distinguished French citizens.

## Hôtel des Monnaies

The Hôtel des Monnaies (Figure 2.49) was completed in 1773. It housed mint workshops, administrative rooms, and residential quarters. It includes a numismatics museum located within what was once the main foundry.



**Figure 2.47:** The Panthéon.



**Figure 2.48:** The dedication of the Panthéon to the great people of the fatherland.



Figure 2.49: Hôtel des Monnaies.



Figure 2.50: Les Invalides.

## Les Invalides

L'Hôtel National des Invalides (Figures 2.50–2.52) is a complex of buildings containing museums and monuments relating to the military history of France, as well as a hospital and a retirement home for war veterans, the building's original purpose. The buildings house also the burial site for some of France's war heroes, notably Napoléon Bonaparte (Figure 2.53).



**Figure 2.51:** Musée Militaire. Photo by Fathi Habashi, 1995.



**Figure 2.52:** Musée Militaire. Photo by Fathi Habashi, 1995.



**Figure 2.53:** Tomb of Napoléon Bonaparte.

## Champ de Mars

Champ de Mars (Figure 2.54) is a large public park located between the Eiffel Tower and the École Militaire named after the Campus Martius in Rome, a tribute to the Roman god of war. The park was formerly used as drilling and marching grounds by the French military.



Figure 2.54: Champ de Mars.

## École Militaire

The École Militaire (Figure 2.55) is a vast complex of buildings housing various military training facilities founded by Louis XV in 1750.



Figure 2.55: École Militaire.

## Collège des Quatre-Nations

The Collège des Quatre-Nations (Figure 2.56) was one of the colleges of the historic University of Paris. It was founded through a bequest by the Cardinal Mazarin (Figure 2.57). At his death in 1661 he also bequeathed his

library to the Collège. The name of the college alludes to the four nations of students at the medieval Parisian university. It was intended for students coming from territories which had recently come under French rule.



**Figure 2.56:** The Collège des Quatre-Nations.



**Figure 2.57:** Cardinal Jules Mazarin (1602–1661), a French–Italian diplomat who succeeded Cardinal Richelieu as the chief minister of France from 1642 until his death.

## La Madeleine

La Madeleine (Figure 2.58) was conceived in 1806 by Napoleon to erect a memorial, a Temple de la Gloire de la Grande Armée. After the fall of Napoleon, King Louis XVIII determined that the structure would be used as a church, dedicated to Mary Magdalene.



**Figure 2.58:** La Madeleine.



**Figure 2.59:** Monument for the Third Republic in Place de la République.

## Place de la République

Place de la République includes a great bronze monument (Figure 2.59) devoted to the newly proclaimed Third Republic (1870–1940), inaugurated on 14 July 1883.

## Place Vendôme

The Vendôme Column (Figure 2.60) at the centre of the square was erected by Napoleon I to commemorate the battle of Austerlitz. It was modelled after Trajan's Column in Rome. Its veneer of spiralling bas-relief bronze plates were made out of cannon taken from the combined armies of Europe. A statue of Napoleon was placed atop the column.



**Figure 2.60:** The Vendôme Column.

## Place de la Bastille

Place de la Bastille is the square where the Bastille prison stood until its destruction on July 14, 1789 during the French Revolution. In 1833, Louis-Philippe decided to build the July Column as originally planned in 1792. It was inaugurated in 1840 (Figure 2.61). It is 47 m high made of cast bronze weighing over 74 tonnes containing an interior spiral staircase. The column is engraved in gold with the names of Parisians who died during the revolution. Over the Corinthian capital is a gallery surmounted with a gilded globe, on which stands a colossal gilded figure, the “Spirit of Freedom,” perched on one foot the star-crowned nude brandishes the torch of civilization and the remains of his broken chains (Figure 2.62).

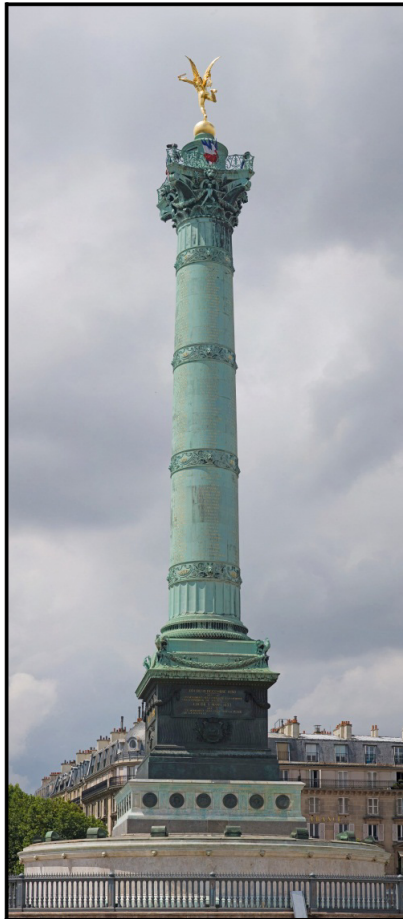


Figure 2.61: July Column.



**Figure 2.62:** The Spirit of Freedom.

## Place du Châtelet

Châtelet means a small castle. The square (Figures 2.63–2.64) is named Châtelet because there was a castle in this place in the Middle Ages to protect the city. It includes a theatre and a fountain installed in 1806 in the middle of the square to celebrate Napoleon's victory in military battles.



**Figure 2.63:** Place du Châtelet and the fountain.



**Figure 2.64:** The Victory statue at the top of the column.

## Place Clichy

Place Clichy (Figure 2.65) was named after the *Barrière de Clichy*, a gate built on the road to the village of Clichy. In March 1814, soldiers of various foreign armies marched on Paris. In the face of the advancing enemy, the *Maréchal de Moncey* (1754–1842) a prominent soldier in the Napoleonic Wars defended the city by volunteered students from the *École polytechnique* and the *École vétérinaire* — and, despite their inexperience, they resisted the Russian contingent until an armistice was declared on March 30, 1814. A bronze statue stands in the centre of the square dedicated to de Moncey (Figure 2.66).



Figure 2.65: Place Clichy.

## Palais de Justice

Palais de Justice (Figure 2.67) was the seat of the *Parlement de Paris* from the 16th century to the French Revolution. Today it is a court house.



Figure 2.66: Monument to the Maréchal de Moncey in Place Clichy.

## La Conciergerie

La Conciergerie (Figure 2.68) was the seat of the medieval Kings of France from the 10th to the 14th centuries and a prison, located near the Cathedral of Notre-Dame. During the French Revolution it housed the Revolutionary Tribunal and from there hundreds of prisoners including Marie-Antoinette (1755–1793) (Figure 2.69) were taken to be executed on the guillotine at a number of locations around Paris. Today it is a museum.



**Figure 2.67:** Palais de Justice.



**Figure 2.68:** La Conciergerie.



**Figure 2.69:** Marie-Antoinette (1755–1793).

### **Assemblée nationale**

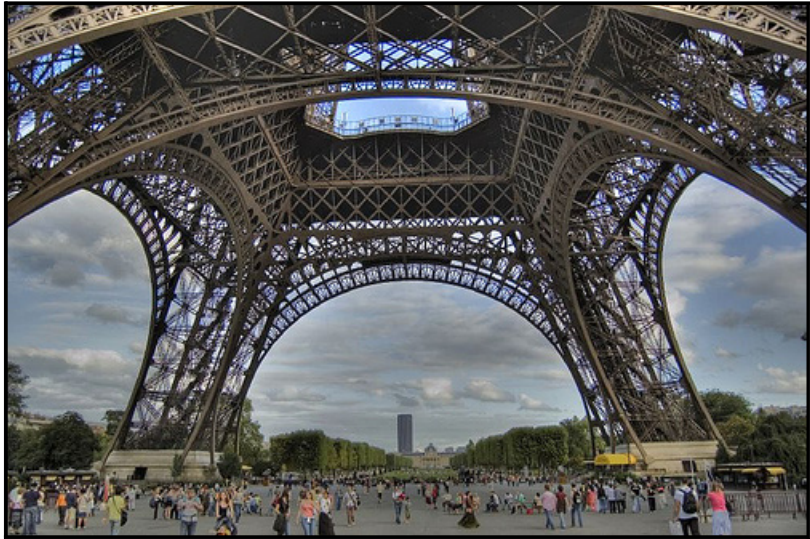
The National Assembly (Figure 2.70) is located in Place de la Concorde, was originally the residence of the daughter of Louis XIV.

### **Eiffel Tower**

Built by Gustave Eiffel (1832–1923) in 1889 on the occasion of the World Fair and the 100th anniversary of the French Revolution (Figures 2.71–2.72).



**Figure 2.70:** Assemblée nationale [Palais Bourbon].



**Figure 2.71:** A unique photo of Eiffel Tower from below.



**Figure 2.72:** Name of French scientists on Eiffel Tower.

## Bridge Alexander III

Bridge Alexander III (Figure 2.73) was built between 1896 and 1900. It is named after Tsar Alexander III, who had concluded the Franco-Russian Alliance in 1892.



Figure 2.73: Bridge Alexander III.

## Joan of Arc

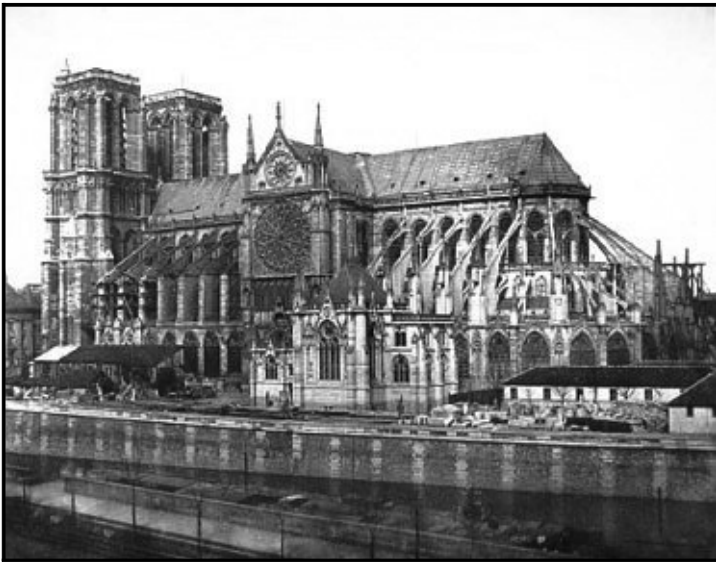
The young maiden Joan of Arc (1412–1431) led an army at the age of 17 to expel the British from France. She was told in a vision from God that she must lead Charles VII to his coronation at Reims. She was captured by the Burgundians who were allied with England, put on trial and burned at the stake as a heretic when she was only 19 years old. Later she was recognized as a heroine and was beatified by the Church. There is more than one monument for her in Paris (Figure 2.74).

## Notre-Dame Cathedral

The Notre-Dame Cathedral (Figure 2.75) on the eastern half of the Île de la Cité. Construction started in 1163 during the reign of King Louis VII finished until around 1345. A statue of Charlemagne is located in the space at the main entrance (Figure 2.76).



**Figure 2.74:** Joan of Arc (1412–1431).



**Figure 2.75:** Notre-Dame Cathedral.



**Figure 2.76:** Charlemagne monument next to Notre-Dame Cathedral.  
Photo by Nadia Habashi, 1995.

## École Nationale Supérieure des Mines

The School of Mines was founded in 1783. It is situated at the extreme end of Jardin du Luxembourg on Boulevard Saint-Michel in the centre of the Quartier Latin (Figure 2.77). The department visited was called Proces-

sus et Apparatur; its director was Prof. Henri Renon. Together with M. Baratin, hydrometallurgical research was conducted, e.g., leaching of chalcopyrite with  $\text{CuCl}_2$  solution saturated with  $\text{NaCl}$  at atmospheric pressure, solvent extraction of  $\text{Cu}^{2+}$  by LIX, oxidation of  $\text{Cu}$  by oxygen, leaching of phosphate rock, and others. The School possesses an excellent collection of minerals.



Figure 2.77: École Nationale Supérieure des Mines.

## Montmartre

Montmartre is Paris' highest hill where Sacré-Cœur Basilica constructed in 1919 (Figure 2.78). The district has mid-19th-century cabarets like the Moulin Rouge and Pigalle.

## SACLAY

### Commissariat de l'Énergie Atomique

Before leaving the University of Vienna in September 1960 where I was a Research Associate at the Chemistry Department on my way to Paris, Professor Engelbert Broda (1910–1983) gave me a letter in French to his colleague Moïse Haïssinsky (1898–1976) to receive me at his Department at Saclay and show me around. By coincidence Prof. Berta Karlik (1904–1990)

Director of the Radiumforschung Institut in Vienna whom I attended many of her lectures was also visiting Saclay.



**Figure 2.78:** Sacré-Cœur Basilica.

## FONTENAY-AUX-ROSES

### Commissariat de l'Énergie Atomique

The visit to CEA was within the cooperative program France–Quebec in 1980 [details below]. I was accompanied by Prof. Tivadar Kikindai from École Centrale who had many of his previous students working there, one of them was Dr. Robaglia Head of Department Génie Radioactif who was our guide. The pilot plant for treating the deep-sea manganese nodules was inspected. Both the sulfuric acid and the ammonia leaching processes were under study.

## CHATENAY-MALABRY

### École Centrale des Arts et Manufactures

The École Centrale was founded in 1829; it boasts the graduation of distinguished engineers e.g., Eiffel and chemists, e.g., Leclanché, and metallurgists, e.g., Guillet. It is located in the south of Paris and can be reached by the Metro; a trip of one hour. Prof. T. Kikindai is doing a variety of work in pure chemistry (kinetics, clathrate formation, mass transfer in liquid–liquid

extraction, third phase formation in solvent extraction) and also in hydro-metallurgy (aqueous oxidation of elemental sulfur, separation of cobalt and nickel, extraction of uranium from phosphoric acid, etc.). Dr. Daniel Gourisse (Figure 2.79) is the Director of the school; he is a chemist and a former student of Prof. Kikindai. He took us for lunch at his private dining room.



Figure 2.79: Dr. Daniel Gourisse.

## TRAPPES

### Minemet Recherches

Trappes is a suburb of Paris and can be reached by train. Minemet Recherches was established by the major French metallurgical companies: Peñarroya, Le Nickel, and Minemet, which are grouped under the name Imetal. Guides: Dr. Jean-Jacques Predali, a former researcher at Laval University, together with Dr. A. Georgeaux. Among those present were Dr. Pierre Blanquet (consultant), M. Ricalens (Head, Patent Section), and Prof. Michel Wozniak from the École Nationale Supérieure de Chimie de Lille.

## VERSAILLES

Versailles is 20 km southwest of Paris. The Versailles Palace (Figures 2.80–2.81) is one of the largest and one of the first luxurious palace to be constructed in the world. King Louis XIV (1638–1715) (Figure 2.82) and his court was officially established there in 1682. However, King Louis XVI (1754–1793) (Figure 2.83) was forced to return to Paris in October 1789 after the beginning of the French Revolution. It was in the Hall of Mirrors (Figure 2.84) that the German Chancellor Bismarck proclaimed the German Empire after the defeat of France in the 1871 war and then later in 1919 the signing of the Peace Treaty after the defeat of Germany in World War I.



**Figure 2.80:** General view of Versailles Palace.



**Figure 2.81:** View of one of the gates of Versailles Palace.



**Figure 2.82:** King Louis XIV (1638–1715).



**Figure 2.83:** King Louis XVI (1754–1793).



**Figure 2.84:** Hall of Mirrors.

## FONTAINEBLEAU

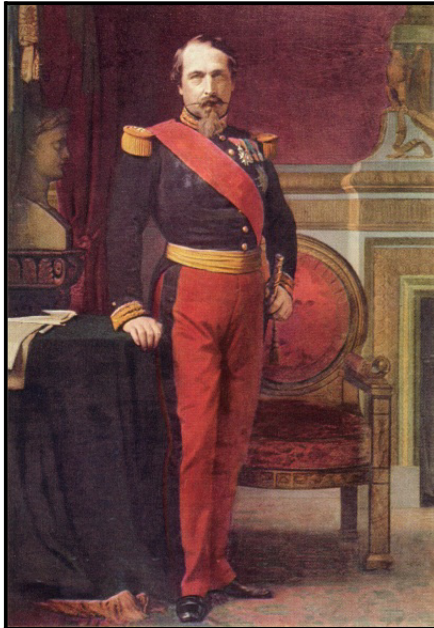
Fontainebleau (Figure 2.85) is about 55 km southeast of Paris originally known as Fontaine Belle Eau. It was King François I (1494–1547) (Figure 2.86) who re-constructed, expanded, and transformed the royal château at Fontainebleau. All members of French ruling dynasties, have lived there. Thirty-four sovereigns, from Louis VI (1081–1137) to Napoleon III (1808–1873) (Figure 2.87), spent time at Fontainebleau. It was there in 1814 that Napoleon I was stripped of his powers and sent into exile on Elba (Figure 2.88).



**Figure 2.85:** Fontainebleau.



**Figure 2.86:** King François I (1494–1547).



**Figure 2.87:** Napoleon III (1808–1873).



**Figure 2.88:** Napoleon abdication on April 4, 1814 at Fontainebleau by French artist François Bouchot.

## ORLÉANS

Orléans is 130 km southwest of Paris. Joan of Arc (1412–1431) (Figure 2.89) is the city's patron. At the ages of 17 Joan of Arc led her army to Orleans in late April, 1429 to lift the English siege. Orléans is the home to Bureau de Recherches Géologiques et Minières.



**Figure 2.89:** Joan of Arc, patron saint of Orléans.

## **BRGM**

The Bureau de Recherches Géologiques et Minières, known as BRGM, is the French national institute for research on Earth and environment sciences. It can be reached by train from Austerlitz Railway Station in Paris to des Aubrais and from there by bus to Orléans la Source. The visit [1980] was sponsored by the program Coopération France–Québec (Figures 2.90–2.92). Director of Mineral Processing Department: Gilles Barbery. Assistant to Director: René Bloise. Co-workers: Jean-Luc Cécile and Béatrice Cécile doing hydrometallurgy studies.

Dr. Jean-Paul Jacquin is heading the Geochemistry and Analysis Department while M. Jacobus Gravesteijn is heading the Documentation Centre. This Centre abstracts literature on earth sciences and published the Bulletin Signalétique. It also publishes the journal “Revue de Presse d’Économie Minière,” and French translations of numerous journal articles in earth sciences. M. Pierre Vandenbroucke is in charge of the Programme de Coopération France–Québec at BRGM.

MINISTÈRE DES AFFAIRES ÉTRANGÈRES  DIRECTION GÉNÉRALE DES RELATIONS CULTURELLES  ACCUEIL	RÉPUBLIQUE FRANÇAISE  PARIS, LE 6 Juin 1980
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Programme de Séjour en France de  
 Monsieur Fathi HABASHI  
 Professeur au Département Mines et Métallurgie  
 Université Laval  
 \_\_\_\_\_  
 QUEBEC  
 \_\_\_\_\_  
 Séjour du 6 au 13 Juin 1980

Vendredi 6 Juin

9 H 25 - Accueil à l'Aéroport Charles de Gaulle

- Entretien avec Madame LENFANT-LEGLU  
 Bureau d'Organisation et de Coordination des  
 Visites des Personnalités Etrangères  
 Ministère des Affaires Etrangères  
 42 avenue Raymond Poincaré  
75116 Paris Tél: 502 14 23

- Logement: Hôtel EUGENIE  
 31 rue Saint André des Arts  
75006 Paris Tél: 326 29 03

15:00 - Ecole des Mines Prof Barakim  
 Renou .../...

Figure 2.90: Program of visit to France in 1980 [page 1].

Mundi 9 Juin

- 9 H 07 - Départ en train de Paris - Gare d'Austerlitz
- 10 H 07 - Arrivée en gare des Aubrais (avant Orléans)
  - Prendre la navette pour aller au B.R.G.M.
  - Entretien avec Monsieur BLOISE  
Bureau de Recherches Géologiques et Minières  
45000 Orléans Tél: 38/63 80 01
  - Logement sur place au B.R.G.M.

Mardi 10 Juin

- Suite des Entretiens au B.R.G.M.
- 15 H 15 - Départ des Aubrais pour Paris en train
- 16 H 30 - Arrivée à Paris - Gare d'Austerlitz
  - Transfert de la Gare d'Austerlitz à la Gare de l'Est  
( métro ligne n° 5 )
- 17 H 18 - Départ de la Gare de l'Est en train
- 20 H 00 - Arrivée à Nancy
  - Logement: Hôtel des PORTES d'OR  
12 rue Stanislas  
54000 Nancy Tél: 8/335 42 34

Mercredi 11 Juin

- 9 H 30 - une personne de l'E.N.S.G. viendra vous chercher à votre hôtel
  - Entretien avec Monsieur BLAZY  
Directeur de l'E.N.S.G.  
Ecole Nationale Supérieure de Géologie Appliquée et de Prospection Minière  
94 avenue du Maréchal de Lattre de Tassigny  
54011 Nancy Cedex Tél: 8/351 43 71
- 18 H 26 - Départ de Nancy en train
- 21 H 08 - Arrivée à Paris - gare de l'Est -
  - Logement à l'Hôtel EUGENIE

Figure 2.91: Program of visit to France in 1980 [page 2].

Jeudi 12 Juin 8:30 - *Depart du Hotel*

9 H 30 - Entretien avec Monsieur le Professeur KIKENDAI  
 Ecole Centrale des Arts et Manufactures  
 Grande Voie des Vignes  
92290 Châtenay-Malabry Tél: 661 33 10

( rendez-vous: Direction - Bâtiment Administratif)

*14:00 Commissariat d'Énergie Atomique*

Vendredi 13 Juin 9:30 - *Depart du Hotel*

10 H 30 - Entretien avec Monsieur DEMARTHE  
 Minimet Recherche  
 1 avenue Albert Einstein  
78190 Trappes  
 ( Zone Industrielle)

Tél: 050 61 88

- Projection d'un Audio-Visuel
- Visite des Usines
- Déjeuner
- Discussion et Tables rondes

*Samedi 14*

*8:00 - Depart du Hotel*

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Figure 2.92: Program of visit to France in 1980 [page 3].

## NANCY

Nancy was the ancient capital of Lorraine (Lothringen in German) which was a part of Lotharingia, the central portion of the Empire which Charlemagne gave to his son Lothaire I and was named after him. It is 250 kilometres east of Paris, not far from the German border. It is a university city has a large university and a Polytechnic Institute. It was the home of the French mathematician Henri Poincaré (1854–1912) (Figure 2.93).



**Figure 2.93:** Henri Poincaré (1854–1912).

Nancy can be reached by train from la Gare de l'Est in Paris; a trip of about 3 hours. Lorraine district in France (Figures 2.94–2.95) had one of the richest iron deposits in Europe and the major iron producer in France which made the country for a long time the third largest iron ore producer in the world. This may be one of the reasons that made the district a disputed area between Germany and France for centuries.

Lorraine iron ore contains about 2% phosphorus and when Bessemer process was applied to iron produced from this ore the process failed because excessive lime had to be used which destroyed the silica lining of the converter. The problem was solved a few years later by Thomas, who used for the first time magnesia lining for the converter.



**Figure 2.94:** Map of France showing the contested region Alsace–Lorraine.

After the tenth century, parts of Lorraine became a duchy of the Holy Roman Empire. In 1670 it was occupied by France but in 1697 it was recovered by the Austrian Duke Leopold (1679–1729)<sup>1</sup>. The Lorraine region changed hands many times between France and Germany. When King of France Louis XV married Maria Leszczyńska in 1725, he donated the Duchy of Lorraine to her father, the exiled Polish king Stanisław Leszczyński (1677–1766) (Figure 2.96).

The iron artist Jean Lamour (1698–1771) (Figure 2.97) was in service of Stanisław Leszczyński and he created for him excellent forged iron pieces that became land marks for Nancy (Figures 2.98–2.102).

<sup>1</sup> His son Franz (1708–1765) went to Vienna, where he married Maria Theresa and became Emperor. He and his descendants, the House of Habsburg–Lorraine, ruled Austria until 1918.



Figure 2.95: Map of Lorraine.



Figure 2.96: Stanisław Leszczyński (1677–1766).



Figure 2.97: Jean Lamour (1698–1771).



**Figure 2.98:** Forged iron gates at Stanislas Square in Nancy created by Jean Lamour in 1755.



**Figure 2.99:** Other forged iron works by Jean Lamour.



Figure 2.100: Stanislas Square.

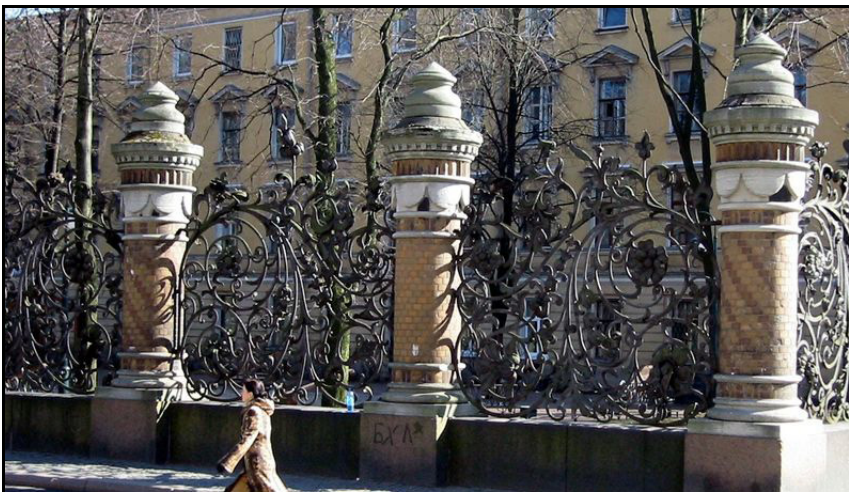


Figure 2.101: Other forged iron works by Jean Lamour.



Figure 2.102: Other forged iron works by Jean Lamour.

## Iron Museum

In 1955 an International Colloquium entitled *Iron Through the Ages* was held in Nancy. One of its recommendations was to create a Research Centre for the History of Iron Metallurgy<sup>1</sup>. In 1957 this research centre was founded by the National Centre of Scientific Research, the City of Nancy, the University of Nancy, the Chamber of French Iron Metallurgy, and the Society of Archaeology of Lorraine. The project received generous subventions from various organizations. It was conceived from the very beginning that a museum be attached to the Research Centre. At the end of 1966 the opening of the museum was officially inaugurated and was opened to the public a little later (Figure 2.103).

The Research Centre includes a Documentation Department and a Laboratory for the Archaeology of Metals — the only of its type in France. The Laboratory is specialized in studying all problems related to the ancient metallic objects: ferrous and non-ferrous, their identification, their conservation, and trying to find out the method by which they were produced.

<sup>1</sup> The proceeding of the conference was published in 1956 under the title *Actes du Colloque international de Nancy* in *Annales de l'Est*, mémoire number 16, in Nancy, 592 pages.

The Laboratory acts as consultant for all French museums and archaeologists. It receives also a number of foreign research visitors from around the world.



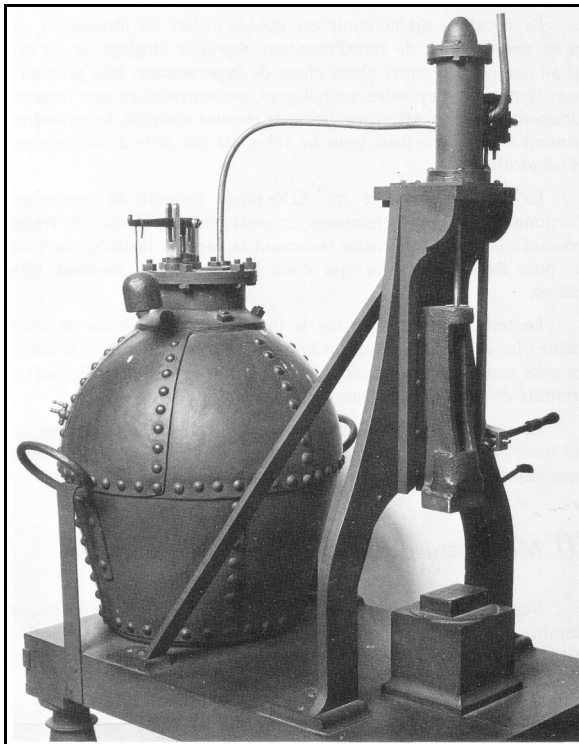
**Figure 2.103:** Iron Museum in Nancy.

The Museum illustrates chronologically the different methods of iron and steel making and shows clearly the influence of iron on society and how it was transformed from a primitive agricultural into an industrial society. The Museum illustrates this point marvellously by the many display of models of plants, pictures of equipment, photographs of inventors, etc. This museum may be considered the most complete museum for iron and steel. Some examples displayed are:

- Bellow for blowing air in a blast furnace operated by water power (Figure 2.104).
- Forging hammer weighing 2.5 tonnes and drops from a height of 2 m, operated by a steam engine (Figure 2.105).
- A treasure chest showing the lock mechanism (Figure 2.106).
- A full description of the construction of Eiffel Tower. Gustave Eiffel had decided that wrought iron and not Bessemer steel was the material that would provide the necessary combination of strength, flexibility, durability and affordability to make his design a reality. He used 7 000 tonnes wrought-iron for what was to be the tallest structure in the world in 1889 on the hundredth anniversary of the French Revolution. Naturally, there was also underground foundation to support the structure. Each of the more than 18 000 parts used to build the tower was assembled in pieces measuring about five metres each and weighing no more than three tonnes. Every day, the finished iron pieces arrived at the building site by horse-drawn wagons from the shop on the outskirts of Paris.



**Figure 2.104:** An old bellow for blowing air in a blast furnace.



**Figure 2.105:** Model of Bourdon forging hammer from Creusot plant (1840).



**Figure 2.106:** A treasure chest showing the lock mechanism.

## Musée de l'École de Nancy

The Musée de l'École de Nancy is devoted to the École de Nancy, an Art Nouveau movement founded in 1901 by Émile Gallé and others in Nancy. The museum, opened in 1964, contains works by all the major Art Nouveau artists of Nancy, which was one of the major centres of the movement in Europe (Figures 2.107–2.113).



**Figure 2.107:** Examples from École de Nancy.



**Figure 2.108:** Examples from École de Nancy.



**Figure 2.109:** Examples from École de Nancy.



Figure 2.110: Examples from École de Nancy.



Figure 2.111: Examples from École de Nancy.



**Figure 2.112:** Examples from École de Nancy.



**Figure 2.113:** Examples from École de Nancy.

## **Institut National Polytechnique de Lorraine**

The Institut National Polytechnique de Lorraine is a federation of seven schools:

- L'École Nationale Supérieure d'Agronomie et des Industries Alimentaires (founded in 1892).
- L'École Nationale Supérieure d'Électricité et de Mécanique (founded in 1900).
- L'École Nationale Supérieure de Géologie et de Prospection Minière (founded in 1908).
- L'École Nationale Supérieure des Industries Chimiques (founded in 1887).
- L'École Nationale Supérieure de Métallurgie et de l'Industrie des Mines (founded in 1908).
- École Européenne d'Ingénieurs en Génie des Matériaux (founded in 1991).
- École Supérieure d'Ingénieurs des Techniques de l'Industrie (founded in 1991).

In addition there are:

- Unité de Formation et de Recherche en Génie des Systèmes Industriels (founded in 1985).
- Five Departments common to the schools:
  - Département de coopération et des échanges internationaux
  - Département de gestion
  - Département d'informatique
  - Département de langues
  - Département de perfectionnement des ingénieurs et des cadres.
- Six specialized centres for higher education:
  - Exploration et valorisation des ressources minérales
  - Techniques minières
  - Transport et distribution de l'énergie électrique
  - Industrie alimentaires
  - Procédés pour l'industrie chimique
  - Accueil et mise à niveau des étudiants étrangers.
- Twenty-eight research laboratories, which accommodate 572 research professors and are axed along nine sectors as follows:
  - Sciences de la terre
  - Industries chimiques

- Métallurgie et sciences des matériaux
- Génie des systèmes industriels
- Mécanique des terrains
- Énergétique mécanique
- Électronique, électrotechnique, automatique
- Informatique
- Agro-alimentaire

## École Nationale Supérieure de Géologie Appliquée et de Prospection Minière

The School was founded in 1908 by René Nicklès (1859–1917) as the Institut de Géologie de Nancy. In 1938, when Marcel Roubault (1905–1974) (Figure 2.114) was appointed Director, he transformed it into École supérieure de géologie appliquée et de prospection minière. In the 1940s, he did work on the extraction of uranium for the Atomic Energy Commission.



**Figure 2.114:** Marcel Roubault (1905–1974).

The School of Geology has about 400 students and is headed by Prof. Durand. There are five research laboratories of which the Laboratoire Environnement et Minéralurgie is directed by Jean M. Cases and is composed of five groups:

- Physicochimie des Surfaces (J. M. Cases)
- Coagulation–Floculation (J. Y. Bottero)
- Automatisation des Procédés Industriels (J. Ragot)
- Minéralurgie Appliquée (R. Houot)
- Hydrométallurgie et Pyrovalorisation (Pierre Blazy)

Host [1980]: Dr. Michel Ammou-Chokrum a student of Prof. Pierre Blazy at the Centre des Recherches sur la Valorisation des Minerais. He studied electrochemistry of chalcopyrite and the recovery of nickel from laterite. He is a specialist on high-temperature X-ray diffraction.

Host [1994]; Dr. Ibrahim Gaballah. Ph.D. Thesis by M. Djona entitled “Nouveau procédé pour la récupération de Co. Ni. Mo. et V à partir des catalyseurs usés” (Figures 2.115–2.116). The visit included a presentation entitled “Environmental Issues in the Metallurgical Industry” (Figure 2.117).

Host [1995]: Dr. Ibrahim Gaballah. Ph.D. Thesis by M. Kanari (Figures 2.118–2.119).



**Figure 2.115:** Thesis examination. Second from right: Prof. Houat, Dean of the Faculty, next F. Habashi, next Dr. Adjemian. Photo by Nadia Habashi, 1994.



**Figure 2.116:** Successful candidate Dr. Maurice Djona. From right: F. Habashi, M. Djona, I. Gaballah. Photo by Nadia Habashi, 1994.



*L.E.M.*  
*Laboratoire Environnement et Minéralurgie*



*Séminaires  
des Laboratoires de l' I.L.G*

*ENVIRONMENTAL ISSUES  
IN THE METALLURGICAL  
INDUSTRY,  
PROGRESS AND PROBLEMS*

Dr. Fathi Habashi  
Départ. de Mines et Métallurgie  
Université de Laval, Québec

Jeudi 6 Janvier 1994 à 10 heures

Annexe ENSG, VANDOEUVRE  
Bâtiment D, Salle D1

Rue du Doyen Roubaud, B.P. 40,  
54501 Vandœuvre Cedex - FRANCE

Tél: (33) 83 50 30 30  
Fax: (33) 83 57 54 04

**Figure 2.117:** Announcement for a lecture.



**Figure 2.118:** Successful candidate Dr. Kanari [3rd from left]. Photo by Nadia Habashi, 1995.



**Figure 2.119:** Examining Committee. From left: I. Gaballah, Manuel Coelho (from Lisbon), Prof. Colson (from Dijon), F. Habashi. Photo by Nadia Habashi, 1995.

## BACCARAT

Baccarat is about 60 km south-east of Nancy, famous of the many glass shop offering magnificent jewellery and chandeliers (Figures 2.120–2.122).



**Figure 2.120:** En route to Baccarat [photo by I. Gaballah, 1995].



**Figure 2.121:** En route to Baccarat [photo by Nadia Habashi, 1995].

## STRASBOURG

Strasbourg (German: Straßburg) is the capital and principal city of Alsace (Figure 2.123), home of General Jean-Baptiste Kléber (1753–1800) (Figure 2.124), who accompanied Napoleon in the Egyptian Campaign in 1798–1799. When Napoleon left Egypt to return to Paris, he appointed Kléber as commander of the French forces. He was assassinated in Cairo in 1800.



**Figure 2.122:** A crystal glass store in Baccarat.



**Figure 2.123:** View of Strasbourg showing the Cathedral.

It is situated on the Ill River (Figure 2.125) where it flows into the Rhine on the border with Germany, across from the German town Kehl. The city is situated in the Upper Rhine Plain, approximately 20 km east of the Vosges Mountains and 25 km west of the Black Forest.



**Figure 2.124:** Monument to General Jean Baptiste Kléber (1753–1800) accompanied Napoleon in the Egyptian Campaign and was assassinated in Egypt.



**Figure 2.125:** Strasbourg on the River Ill.

## CÔTE D'AZUR



**Figure 2.126:** Map showing the Côte d'Azur.

## Nice

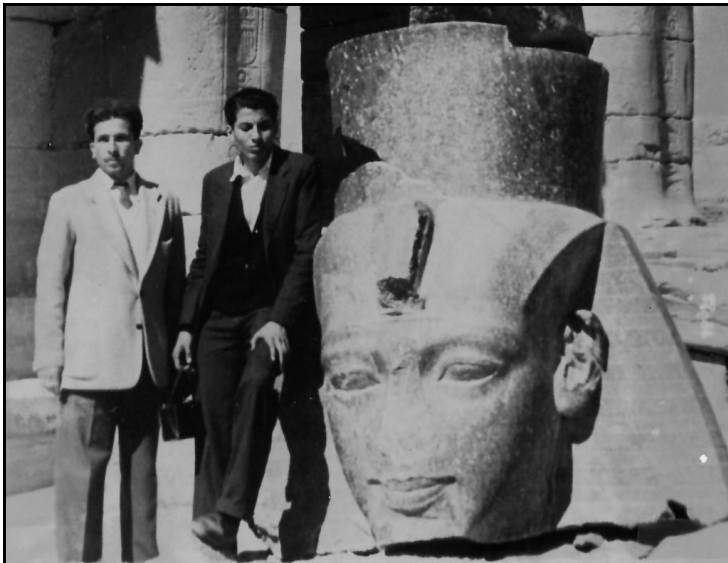
Côte d'Azur comprises the southern shore of France with Monaco, Nice, Cannes, and Toulon. Nice (Figures ) is home to Nice Côte d'Azur Airport, France's third-busiest airport after Paris–Charles-de-Gaulle and Paris–Orly. The trip to Nice took place in January 2000 to visit a school mate and friend from the University of Cairo who retired in Cagnes, a suburb of Nice (Figures 2.127–2.129).



**Figure 2.127:** Nice.



**Figure 2.128:** With Konstantin Paparodites in Cagnes, a suburb of Nice, January 2000.



**Figure 2.129:** With Konstantin Paparodites in Luxor, 1949.

## Monaco

We drove to Monaco to visit the Casino at Monte Carlo (Figures 2.130–2.135). The Casino was the first in Europe and was built in 1863 during the reign of Napoleon III. Cannes is famous for its Film Festivals.

The history of Monaco goes back the Grimaldi family from the Republic of Genoa since the time of the Crusades. In 1395, the Grimaldis took possession of Monaco, which they then ruled as a condominium. Under the Treaty of Vienna of 1815, Monaco was a protectorate of the Kingdom of Sardinia. In 1861, its sovereignty was recognized by France. In 1869, the principality stopped collecting tax from its residents thanks to the success of its casino.



Figure 2.130: Map of Côte d'Azur showing Nice and Monaco.



Figure 2.131: Flag of Monaco.



Figure 2.132: Principality of Monaco.



Figure 2.133: Principality of Monaco.



**Figure 2.134:** Monte Carlo Casino.



**Figure 2.135:** Palais Royal.

Monaco is the seat of Oceanographic Institute founded in 1906 by Prince Albert I of Monaco (1848–1922). An impressive white-stone structure overlooking the Mediterranean Sea from a height of 90 metres (Figure

2.136). Prince Albert I was both a scholar and a humanist, defender of peace and patron of the arts and sciences. He dedicated much of his life to the study of the sea and oceans. Jacques-Yves Cousteau (1910–1997) was elected Director of the Institute in 1957.



**Figure 2.136:** Oceanographic Institute.

## Villefranche

Villefranche is a suburb of Nice. We stopped by during a Mediterranean cruise in October 2008 (Figures 2.137–2.139).



Figure 2.137: Villefranche.



Figure 2.138: Villefranche in 2008.



**Figure 2.139:** Fortifications at Villefranche.

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