

Fathi Habashi

My trips to

Austria



2015

My Trips to Austria

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

worked at the Extractive Metallurgical Research Division of Anaconda Company in Tucson, Arizona, before joining Laval in 1970. His research was mainly directed towards organizing the unit operations in extractive metallurgy and putting them into a historical perspective.

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*To Nadia,
Hani, and Hatem
with love*

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- Volume 1: General Principles (422 pages), 1969 (reprinted 1980) (out of print), Gordon & Breach Science Publishers.
 - Volume 2: Hydrometallurgy (468 pages), 1970 (reprinted 1980) (out of print), Gordon & Breach Science Publishers.
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Preface

De Re Metallica. A Metallurgist on the Move 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. The book 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 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	

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

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

Fathi Habashi

Fathi.Habashi@arul.ulaval.ca

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Chapter 1

Historical Introduction

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Figure 1.1: Flag of Austria.

EARLY HISTORY

The Celts occupied the region that is known today as Austria. The Kingdom of Noricum dates from ca. 800 to 400 BC. This subsequently became incorporated into the Roman Empire. Numerous settlements were built by the Romans, for example, legion camps of Vindobona (Vienna). East of Vienna was the town of Carnuntum, the largest Roman city in what is now Austria. The most important Roman settlement was that at Carnuntum. Later, in the 6th century, another Celto-Germanic people, the Bavarii occupied these lands until it fell under the Frankish Empire in the 9th century. Around 800 AD Charlemagne established there a military post.



Figure 1.2: Austria, the Danube, and neighbours.

THE BABENBERGS

In the 10th century, an eastern military post bordering Hungary was established as the March of the East, or Austria, ruled by the Margraves of Babenberg. They were the ruling noble family of Austria from 976 to 1248 originally from present-day Bavaria. Leopold I (?–994) was count of the Eastern March which grew into the duchy of Austria. He was succeeded by Leopold II (1050–1095) who founded Melk Monastery (Figures 1.3–1.5) in 1089, then Leopold III (1073–1136) (Figure 1.6) who declined the crown in 1125. He founded in 1114 Klosterneuburg monastery (Figure 1.7–1.9) earned for him his surname “the Pious”, and canonization. He was succeeded by Leopold IV who died in Bavaria unexpectedly and was succeeded by his brother Heinrich II (1107–1177) (Figure 1.10).



Figure 1.3: Melk Monastery founded in 1089.

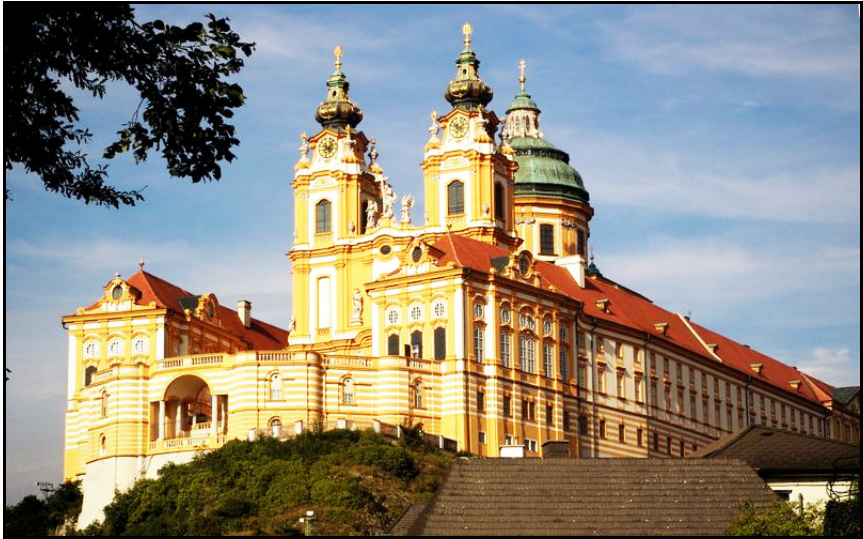


Figure 1.4: Melk Monastery founded in 1089.



Figure 1.5: Inside Melk Monastery.



Figure 1.6: Leopold III (1073–1136).



Figure 1.7: Klosterneuburg Monastery founded in 1114.



Figure 1.8: Klosterneuburg Monastery.



Figure 1.9: Inside Klosterneuburg Monastery.



Figure 1.10: Heinrich II (1107–1177).

Other than his father, who resided in Klosterneuburg for most of the time, Heinrich II moved his residence to Vienna in 1145. Since then, Vienna has remained the capital of the country. Also in 1147, St. Stephen's Cathedral (Figure 1.11) was completed. Heinrich II was succeeded by Leopold V (1157–1194), followed by Frederick I (1175–1198), and Leopold VI (1176–1230). After some years of struggle known as the Interregnum, the Duchies of Austria and Styria fell to Ottokar II of Bohemia (1233–1278) (Figure 1.12) who married Leopold VI's daughter. Ottokar was a lawmaker and builder. Amongst his achievements was the founding of the Hofburg Palace in Vienna. He had no male heir.



Figure 1.11: St. Stephen's Cathedral completed in 1147.



Figure 1.12: Ottokar II of Bohemia (1233–1278).

THE HABSBURGS

In 1273 Austria came under the rule of the Rudolf I of Habsburg (1218–1291) (Figure 1.13). The 15th and early 16th centuries saw considerable extension of the Habsburg territories through diplomatic means and marriage ties to include Spain, the Netherlands and parts of Italy.

Duke Rudolf IV (1339–1365) (Figure 1.14) founded the University of Vienna (Figure 1.15) in 1365 the year when he died suddenly in Milan at the age of 26. In 1410 a rich silver–copper deposit was discovered in Schwaz in Tyrol. From 1450 to 1530 the region became the largest silver and copper producer in Central Europe and Schwaz became the second largest city in Austria after Vienna. About 20 000 people were operating the mine, which comprised 300 galleries.



Figure 1.13: Rudolf I (1218–1291) founder of Habsburg dynasty [Stained glass in town hall in Olomouc, Czech Republic].



Figure 1.14: Duke Rudolf IV (1339–1365).



Figure 1.15: University of Vienna new building on Ringstraße.

In 1521 the Emperor Charles V (1500–1558) (Figure 1.16) split the dynasty, bestowing the hereditary Austrian lands on his brother, Ferdinand I (1521–1564). By 1526 Ferdinand had also inherited the kingdoms of Bohemia, and Hungary after the Battle of Mohács which partitioned the latter. The 16th century saw the spread of the Reformation through the Austrian lands.



Figure 1.16: Emperor Charles V (1500–1558).

From around 1600, the Habsburg policy of re-catholicization was to eventually lead to the Thirty Years' War (1618–1648), initially a protestant–catholic struggle. However it was also a struggle for power in central Europe, particularly the French opposition to the consolidation of power by the Habsburg Holy Roman Empire.

When the Spanish line of the Habsburgs died out in 1700, it precipitated the War of Spanish Succession (1701–1714) between the Habsburgs and King Louis XIV of France. Subsequently in 1713 Austria gained control of the Spanish Netherlands, Naples, and Lombardy. These acquisitions together with conquests in the Balkans gave Austria its greatest territorial extent.

MARIA THERESA

In 1713 the Pragmatic Sanction was issued by Holy Roman Emperor Charles VI to ensure that the hereditary possessions of the Habsburgs could be inherited by a daughter. When he died he was succeeded by his daughter, Maria Theresa (1717–1780) (Figure 1.17). This led to the War of Austrian Succession (1740–1748) and the Seven Years' War (1756–1763) because the German Kings did not accept a woman to be on the throne. Subsequently Austria lost Silesia to Prussia. These Silesian Wars initiated a long standing tension between Austria and Prussia over imperial policy.

Maria Theresa effectively reigned as Empress through her husband, Franz Stephen of Lorraine (1708–1765) (Figure 1.18) and they therefore founded the new dynasty of Habsburg–Lorraine. They had 16 children, thirteen of whom survived infancy, and two dozens grandchildren. (Figure 1.19). Her youngest daughter, Maria Antonia (1755–1793), married in 1770 Louis, Dauphin of France who became Louis XVI, by proxy in Vienna, now called Marie-Antoinette. She and her husband were executed during the French Revolution.



Figure 1.17: Empress Maria Theresa (1717–1780).



Figure 1.18: Franz of Lorraine (1708–1765).



Figure 1.19: Maria Theresa and family.

During her reign she founded in 1763 a School of Mines in Schemnitz in Upper Hungary, Selmečbánya in Hungarian, in what is now Banská Štiavnica in the Slovak Republic. She also initiated extensive reforms such as taxation of the nobility, who never before had to pay taxes. She ordered that all children of both genders from the ages of six to twelve had to attend school. She also permitted non-Catholics to attend university and allowed the introduction of secular subjects such as law, which influenced the decline of theology as the main foundation of university education.

Maria Theresa invited the distinguished medical doctor Gerhard van Swieten from Holland to reform the education system in Austria. He founded the Vienna General Hospital. On his recommendation after studying the problem of infant mortality in Austria she issued a decree that autopsies would be mandatory for all hospital deaths. She also introduced inoculation of children after the smallpox epidemic of 1767. When her husband died in 1765, the reforms were continued by her son, Joseph II (1741–1790). However his brother, Leopold II (1747–1792), who succeeded him, was more conservative.

FRANZ II

Franz II (1768–1835) (Figure 1.20), grandson of Maria Theresa, succeeded Leopold II. He found himself at war with France in the prelude to the Napoleonic Wars. In 1805, Napoleon then won a major battle against the Austrians at Austerlitz [today Slavkov in Moravia in the Czech Republic] a suburb of Brno, and 120 km from Vienna (Figure 1.21). This forced the Austrians to make peace. As a result, Franz II declared in 1806 the end of the Holy Roman Empire of the German Nation.



Figure 1.20: Franz II (1768–1835).



Figure 1.21: The Battle of Austerlitz, a suburb of Brno in the Austrian Empire, and 120 km from Vienna.

After Austerlitz, Napoleon's Grande Armée defeated the Prussians at the Battle of Jena [October 14, 1806] and the Russians at the Battle of Friedland [June 14, 1807] 40 km southeast of Königsberg, now Kaliningrad. After his campaign in the Iberian Peninsula Napoleon then started his Austrian campaign. In the two-day battle at Aspern (21–22 May 1809) (Figures 1.22–1.23), Napoleon was repulsed but not defeated although the casualties were heavy on both sides. One month later, the French made a second attempt to cross the Danube where Napoleon gained a decisive victory over the Austrians at the Battle of Wagram on July 5, 1809 and forced the Austrians to sue for peace. France imposed harsh terms and Austria had to pay a large indemnity. The peace treaty was signed in Schönbrunn palace and Napoleon left Vienna on October 16.

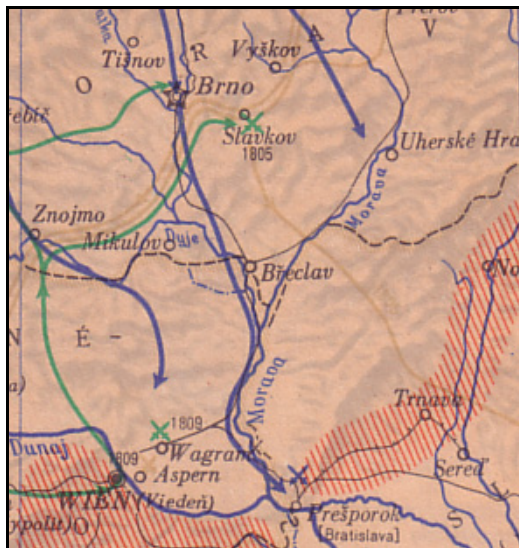



Figure 1.22: Location map of Brno, Austerlitz [Slavkov], Wagram, Aspern, and Vienna [Wien]. Battles marked by .

EMPEROR NAPOLEON

Napoleon I had declared himself Emperor of France (Figure 1.24) in May 1804 and was busy re-organizing much of the lands of the Holy Roman Empire. He then decided to have a heir for his Empire. He divorced Joséphine de Beauharnais, who could not bear him a son, and began searching for a new empress from one of the leading royal families of Europe. He married Marie-Louise (1791–1847), Franz's daughter. The marriage was concluded by proxy on March 11, 1810 at the Augustinian Church, Vienna (Figure 1.25). Napoleon was represented by Archduke Charles, the bride's uncle.



Figure 1.23: Monument at Aspern for the Austrian casualties.

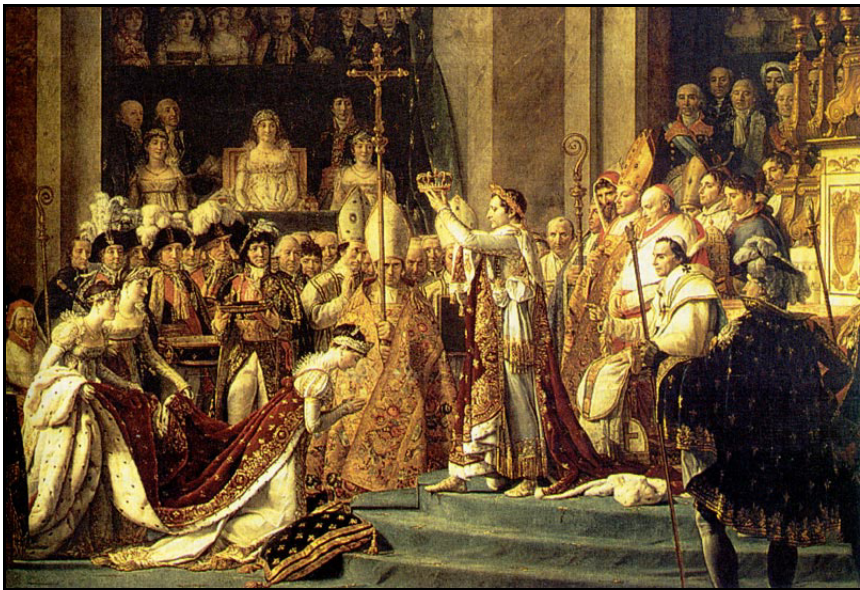


Figure 1.24: Napoleon the Emperor.

The excitement surrounding the wedding ushered in a period of peace and friendship between France and Austria, who had been at war for the last two decades. The people of Vienna, who hated Napoleon only months

before, were suddenly in full praise of the French Emperor. Marie Louise gave birth to a son in 1811. End of May 1812 Napoleon started his Russian campaign that ended disastrously for France. He returned to France in December then started a German campaign few months later. Austria joined the opposition to France. Napoleon was decisively defeated in Leipzig on October 19, 1813.



Figure 1.25: Wedding of Marie Louise (1791–1847) in 1810. A painting by French artist Georges Rouget (1781–1869).

On January 25, 1814 Napoleon left Paris to lead a hastily formed army to face an Allied army on the way to invade France from the north. When Paris was captured, the Senate deposed the Emperor on April 3 who then abdicated on April 11, was exiled to Elba, and Marie Louise returned to Vienna. Napoleon then suddenly escaped from Elba and returned to France. He resumed power for hundred days: March–July, 1815 but was defeated for the last time at the Battle of Waterloo and was exiled to Saint Helena in

October 1815. In 19 years, April 1796–18 June 1815, Napoleon fought 105 battles.

CONGRESS OF VIENNA, 1815

While Napoleon was fighting one battle after another in Europe, a congress was being held in Vienna for six months from September 1814 to June 1815 at the Chancellery on Ballhausplatz (Figures 1.26–1.27) to settle the many issues arising from the French Revolutionary Wars, the Napoleonic Wars, and the dissolution of the Holy Roman Empire. Virtually every state in Europe had a delegation in Vienna – more than 200 states and princely houses were represented. In addition, there were representatives of cities, corporations, religious organizations (for instance, abbeys) and special interest groups, e.g., a delegation representing German publishers, demanding a copyright law and freedom of the press. The congress was chaired by Austrian statesman Klemens Wenzel von Metternich (Figure 1.28). The Congress was noted for its lavish entertainment, brilliant receptions, and social activities as well.

Actually negotiations were under way in May 1814 after the defeat of Napoleon at Leipzig and his exile in Elba then his return to France. It was during this congress that news of Napoleon's defeat in Waterloo arrived. The Congress settlement formed the framework for European international politics until the outbreak of the World War I in 1914.



Figure 1.26: Chancellery on Ballhausplatz in Vienna.



Figure 1.27: Congress of Vienna, 1815.



Figure 1.28: Klemens Wenzel von Metternich.

Beethoven and the Congress of Vienna

In 1803 Beethoven (1770–1827) (Figure 1.29) in Vienna started working on his third symphony (opus 55) which he dedicated to the First Consul Bonaparte who was welcomed by the German sympathizers when he invaded the German states in 1792. He was thought of as reformer of the mediocre system of the hundreds of tyrants composing the German independent states. But, when in 1804 he crowned himself emperor he lost this sympathy and was considered not different from the other tyrants. It is said that Beethoven became disappointed when he heard this news and tore the front sheet of his musical manuscript and changed the title to “Sinfonia Eroica.” The symphony was first publicly performed in Vienna on April 7, 1805.

In the same year, Beethoven produced his only opera, *Fidelio*. First performance took place in Vienna on November 20, 1805. The opera is a great work describing the desire of mankind for freedom. The plot is simple and its scenes are depressing (Figures 1.30–1.31), contrary to the other operas at that time which usually included extravagances and colourful dances.



Figure 1.29: Ludwig van Beethoven (1770–1827). **Figure 1.30:** Depressing scene from *Fidelio*.

Florestan, a fighter of despotism in 18th-century Spain, has been thrown in jail by his enemy Pizarro the Governor of the prison. Florestan’s wife, Leonore, disguises herself as a young man, takes the name Fidelio, and becomes the chief jailer’s assistant. In the dungeon she helps digging the grave destined for her husband. When Pizarro arrives with dagger in his hand, Fidelio threatens to kill him with her pistol. At that moment the

prime minister arrives on an inspection mission of the prison and Pizarro had to go to receive him. By an edict of the prime minister the prisoners are released. When he learns the story of Florestan's ordeal, the prime minister orders Pizarro arrested.



Figure 1.31: Depressing scene from *Fidelio*.

In this work, Beethoven has described the eternal struggle of man for freedom, the defiance of all tyrants, and the proclamation of liberty, tolerance, and human dignity. The Prisoners' Chorus is one of the most eloquent musical songs in praise of joy to freedom ever written.

Group. *Oh, what a pleasure to be in fresh air!
One can only here breathe freely,
Only here is life,
The jail is a tomb.*

One inmate. *We have confidence in God's help,
Hope is whispering softly to me,
We will be free, we will have peace.*

Group. *Oh hope! Help! What a luck!
Oh freedom, oh freedom, will it come back?*

One inmate. *Speak quietly,
We are watched.*

Group. *Speak quietly, speak quietly.*

It was during the Congress of Vienna that *Fidelio* was being performed at the Opera House. Two empresses, the King of Prussia, and nearly all the nobles who were taking part in the Congress, attended. Beethoven was not only an exceptional composer but also a man of great ideals who expressed social justice in his music. His liberal ideas are well represented in other masterpieces: *Prometheus*, *Eroica*, *Egmont*, and *Wellington's Victory*. But, in

spite of all the miseries that he suffered, he concluded his life by *Ode to Joy* in his Choral Symphony based on Schiller's poem. In this symphony he emphasized the universal brotherhood of man through joy. "O friends, not these tones, but let us rather sing more pleasant and joyful ones."

DUAL MONARCHY WITH HUNGARY

Following the Congress of Vienna which restored order to Europe following the Napoleonic Wars, Austria became part of the German Confederation till the Austro-Prussian war of 1866. In the 19th century nationalist movements within the empire became increasingly evident, and could no longer be overlooked. After numerous uprisings of the Hungarians against the Hapsburg rule, a constitutional compromise called "Ausgleich," i.e., equalization was made in 1867. The empire was divided into two monarchies: the Austrian and the Hungarian, that became known as the Austro-Hungarian Monarchy, symbolized by the double-headed eagle (Figure 1.32) and abbreviated K.K., which stands for Kaiserlich-Königlich, i.e., Imperial-Kingdom.

FERDINAND I

Franz II was succeeded by his son Ferdinand I (1793–1875) who was incapable of ruling because of his mental deficiency. He abdicated in 1848 and was succeeded by his nephew Franz Josef.



Figure 1.32: The double-headed eagle on the royal palace.



Figure 1.33: Austrian Empire, 1914.



Figure 1.34: Ethnic structure of the Empire.

FRANZ JOSEF

Franz Josef (1830–1916) (Figure 1.35) married Elisabeth of Bavaria (1837–1898) in 1854, who was assassinated in 1898.



Figure 1.35: Franz Josef and Elisabeth.

WORLD WAR I

The assassination of the Austrian heir to the throne Archduke Franz Ferdinand in 1914 in Sarajevo, and the ensuing events resulted in World War I. The loss of the war resulted in the collapse of the empire and the Habsburg monarchy in 1918. The non-German ethnic groups broke away leaving Austria's current boundaries as German Austria, which was proclaimed a republic.

ANNEXATION WITH GERMANY

Unrest continued during the economic misery of the Great Depression and Austrian Nazism became a new destabilizing factor. Faced with grow-

ing opposition from the left and the extreme right, Austrian Chancellor Engelbert Dollfuss (1892–1934) (Figure 1.36) dissolved parliament and ruled by decree. On February 12, 1934, backed by the army and the Heimwehr (Home Defence League), he banned opposing political parties. In May 1934 he established one party system known as The Patriotic Front. This frustrated the ambitions of those who wished unification with Germany, leading to his assassination on July 25, 1934.



Figure 1.36: Engelbert Dollfuss (1892–1934). **Figure 1.37:** Kurt von Schuschnigg (1897–1977).

His successor Kurt von Schuschnigg (1897–1977) (Figure 1.37) maintained the ban on pro-Hitler activities. When he called for a plebiscite on Austrian independence in 1938, Hitler demanded and received his resignation on March 11, 1938. The Anschluss (annexation) was accomplished when German troops occupied Austria on March 12, who met celebrating crowds. A Nazi government was formed, headed by Nazi puppet Arthur Seyss-Inquart (1892–1946) as Chancellor. A referendum on April 10 approved of the annexation with a majority of 99.73% and Schuschnigg ended up in a concentration camp.

WORLD WAR II

After World War II, Austrian Republic was established in 1945 and partitioned by USA, United Kingdom, France, and the former USSR (Figure 1.38) until 1955 when it became an independent state (Figures 1.39–1.40).



Figure 1.38: Partitioned Austria into 4 zones in 1945–1955.



Figure 1.39: Independent Austria today.



Figure 1.40: Federal provinces and their capitals.

Table 1.1: Visits to Austria.

Dates	Cities visited	Purpose of visit
May 1955	Vienna	Cultural visit
	Graz	Cultural visit
	Salzburg	Cultural visit
	Linz/Donau	Three months at Stickstoffwerke [now Linz Chemie]
	St. Florian	Excursion in Wachau Valley
	Mauthausen	Cultural visit
	Leonding	Cultural visit
May 1956–June 1959	Vösendorf	Three months at the petroleum refinery
	Vienna	Studying at Technische Hochschule
	Salzburg	Cultural visit
	Graz	Benzoic acid plant
June 1959–September 1960	Vienna	Post-doctoral Fellowship at University of Vienna
	Linz/Donau	Two weeks working at Stickstoffwerke
	Salzkammergut	Excursion by Stickstoffwerke
September 1962–January 1963	Vienna	<ul style="list-style-type: none"> • Waiting for visa to Canada • Lecture at Technische Hochschule
	Eisenberg/ Iron Museum	Prof. Erich Schwarz-Bergkamp in Leoben
	Seckau in Styria	Cultural visit
	Vienna	Prof. Richard Kieffer, TH Wien
1971	Vienna	Prof. Hermann Schmid
June 1973	Vienna	Cultural visit
	Steyr	Prof. Hermann Schmid
September 1997	Vienna	Technische Universität Wien [Lecture]
September 1999	Graz	Cultural visit
	Leoben	Montan-Universität Library
October 2005	Schwaz	Cultural Heritage symposium
	Hall	Cultural Heritage symposium
	Innsbruck	Cultural visit

Chapter 2

Vienna

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Saint Stefan Cathedral	31	Schönbrunn.....	88
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Imperial Treasury.....	39	Technische Hochschule Wien	96
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Imperial Crypt.....	44	Chemistry Institute at the	
Maria Christina	46	University of Vienna	109
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Arsenal.....	63		

The medieval city Vienna was surrounded by walls now the 1st District (Figures 2.1–2.2). Emperor Franz Josef I ordered the demolition of the walls, in order to build an imperial boulevard now known as Ringstraße (Figures 2.3–2.5). The work was completed in 1890.



Figure 2.1: Old picture of Vienna showing the city wall.



Figure 2.2: Old map of Vienna showing the city wall.

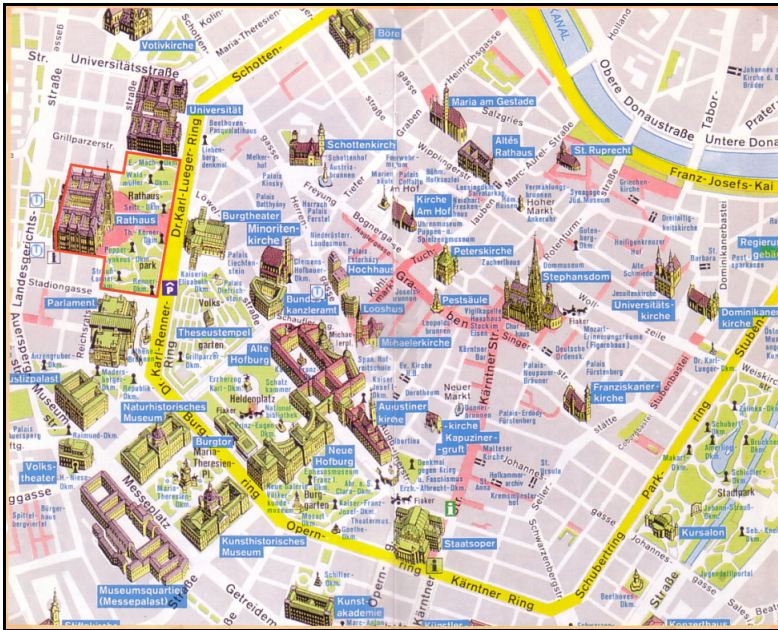


Figure 2.3: Map of the First District in Vienna showing the Ringstraße in yellow.

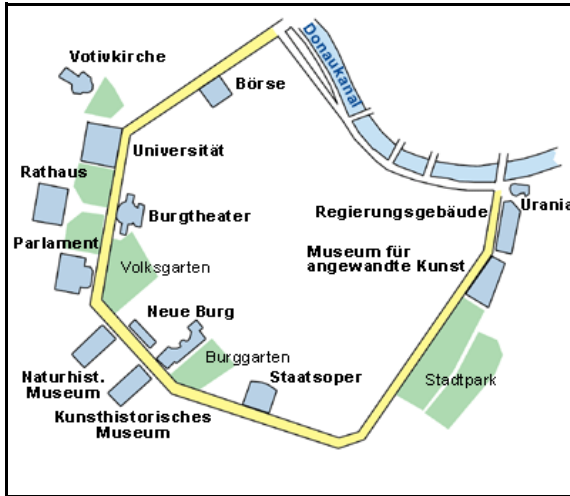


Figure 2.4: Ringstraße and the major landmarks of Vienna.



Figure 2.5: Tram on Ringstraße.

RAILWAY STATIONS

There are five railway stations (Figure 2.6): North Station leads to Brno in Moravia, Franz Josef Station leads to Prague in Bohemia, West Station leads to Salzburg and Munich, South Station leads to Graz. The East Station leading to Hungary has been closed and the South Station is being replaced by the Central Station on Landstraße Hauptstraße under construction.



Figure 2.6: Vienna Railway stations.

SAINT STEFAN CATHEDRAL



Figure 2.7: General view of Vienna showing St. Stefan Cathedral. Total height 138 m.



Figure 2.8: Inside St. Stefan Cathedral.



Figure 2.9: Inside St. Stefan Cathedral.



Figure 2.10: Saint Karl's Cathedral designed by Fischer von Erlach (1656–1723).



Figure 2.11: Saint Karl's Cathedral detail.

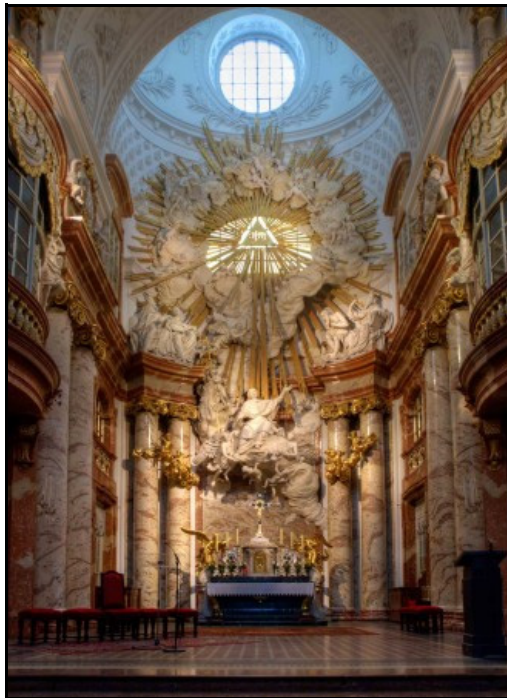


Figure 2.12: Interior of Saint Karl's Cathedral.



Figure 2.15: Michaeler gate.



Figure 2.16: Michaeler Platz.

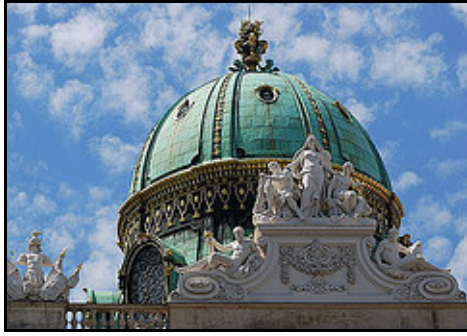


Figure 2.17: Hofburg.



Figure 2.18: Entrance to Royal palace from Michaeler Platz.



Figure 2.19: Royal Palace [Hofburg].



Figure 2.20: Royal Palace details.



Figure 2.21: Staircase in Royal Palace.

IMPERIAL TREASURY

The Imperial Treasury (German: Schatzkammer) (Figures 2.23–2.24) at the Hofburg contains a valuable collection of secular and ecclesiastical treasures covering over a thousand years of European history. It includes a collection of rare treasures that were compiled by the Habsburg over the course of centuries, including the Imperial Crown, Orb, and Sceptre of Austria, and the Imperial Regalia of the Emperors and Kings of the Holy Roman Empire, including their crowns.



Figure 2.22: Franz I in Hofburg courtyard.



Figure 2.23: Entrance to the Imperial Treasury.



Figure 2.24: Crowns of the Holy Roman Empire.



Figure 2.25: Austrian National Library with statue of Josef II.

AUSTRIAN NATIONAL LIBRARY

The National Library (Figures 2.25–2.28) was originally the private library of the Austrian emperors founded by Duke Albert III (1349–1395).

Many collections were added later, for example, the 15 000 books belonging to Prince Eugène and the collection of Mary of Burgundy when she married Maximilian I, Holy Roman Emperor (1459–1519). The papyrus collection contains about 180 000 objects from the period between that of the 15th century BC and the 16th century AD was the private collection of Austrian Archduke Rainer, who gave it to Emperor Franz Josef I in 1899. The collection includes also records on clay tablets, stone tablets, leathers, and textiles. After the collapse of the empire the library became the National Library in 1920.



Figure 2.26: Inside the Austrian National Library.



Figure 2.27: Inside the Austrian National Library.



Figure 2.28: Inside the Austrian National Library.

IMPERIAL CRYPT

Imperial Crypt [German: Kaiser Gruft] (Figures 2.29–2.31) is a burial chamber beneath the Capuchin Church and monastery founded in 1618 and located on the Neuer Markt square near the Hofburg Palace. It has been the principal place of entombment for members of the House of Habsburg.



Figure 2.29: Capuchin Church where the Austrian royal family is buried.



Figure 2.30: Inside the Imperial Crypt.



Figure 2.31: Tomb of Maria Theresa.

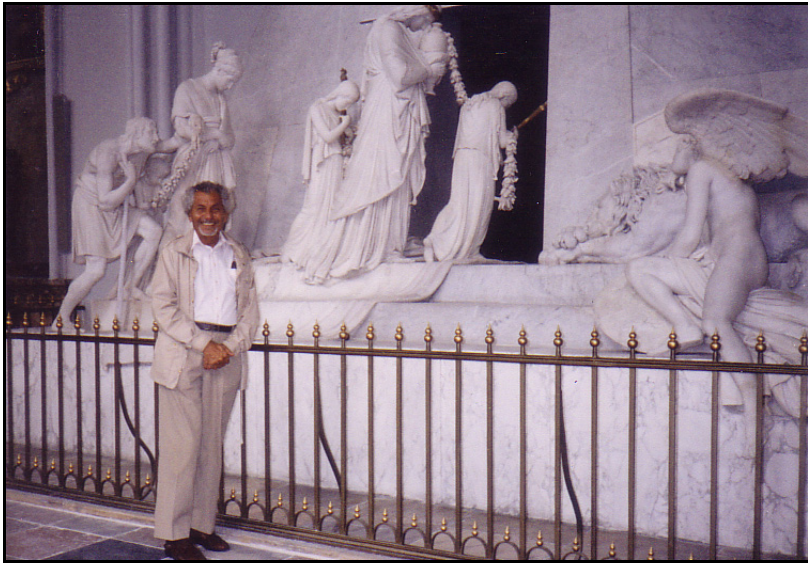


Figure 2.32: Maria Christina (1742–1798) tomb. Photo by Nadia Habashi, 1997.

MARIA CHRISTINA

Maria Christina (1742–1798) was a daughter of Maria Theresa and Francis I. She was the Regent (governor) of the Austrian Netherlands in 1781–1793. Her tomb is in Vienna Old City (Figure 2.32).



Figure 2.33: Houses of Parliament on Ringstraße.



Figure 2.34: Athena in front of the Parliament building.



Figure 2.35: Monument to Maria Theresa (1717–1780) and her ministers. The monument stands between the Natural History Museum and the Art Gallery.



Figure 2.36: Monument to Maria Theresa. Photo by Nadia Habashi, 1997.



Figure 2.37: Details of monument to Maria Theresa.



Figure 2.38: Museum of Natural History and one of the four fountains.



Figure 2.39: Fountain around Maria Theresa monument, 1956.



Figure 2.40: Fountain around Maria Theresa monument, 1956.



Figure 2.41: Museum of Natural History.



Figure 2.42: Inside Museum of Natural History.



Figure 2.43: Art Gallery.

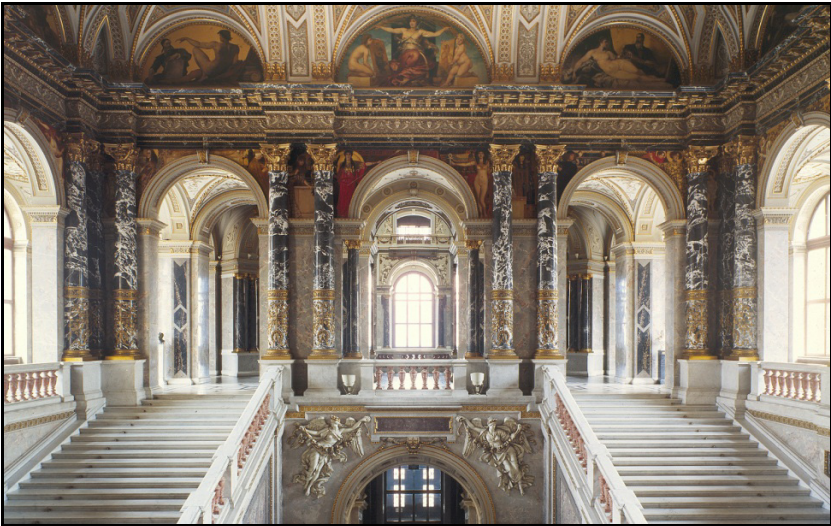


Figure 2.44: Inside the Art Gallery.



Figure 2.45: State Opera House.



Figure 2.46: Inside State Opera House.

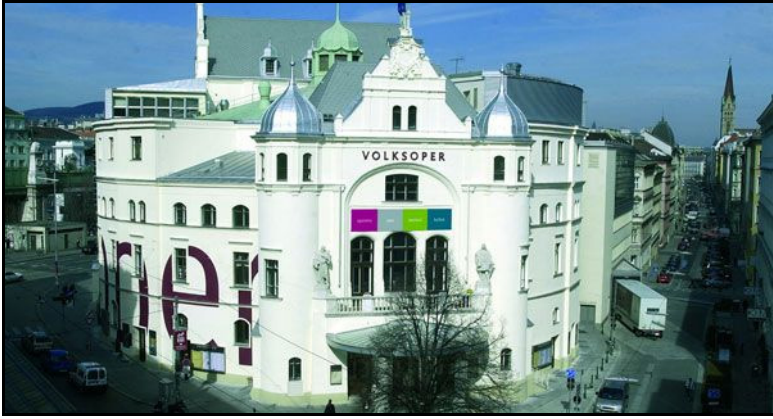


Figure 2.47: People's Opera House [Volksoper] for performing operettas.



Figure 2.48: Concert Hall.



Figure 2.49: Music Union Hall [Musikvereinsaal].



Figure 2.50: Inside Musikvereinsaal with its gilded statues.



Figure 2.51: Gilded statues inside Musikvereinsaal.

THEATER AN DER WIEN

Ludwig van Beethoven was resident composer at Theater an der Wien (Figure 2.52) from 1803 until 1805. *Fidelio* was premiered there as did several Beethoven symphonies and concertos as well as Johann Strauß's "Die Fledermaus" and Franz Lehár's "The Merry Widow."



Figure 2.52: Theater an der Wien.



Figure 2.53: Imperial Theatre.

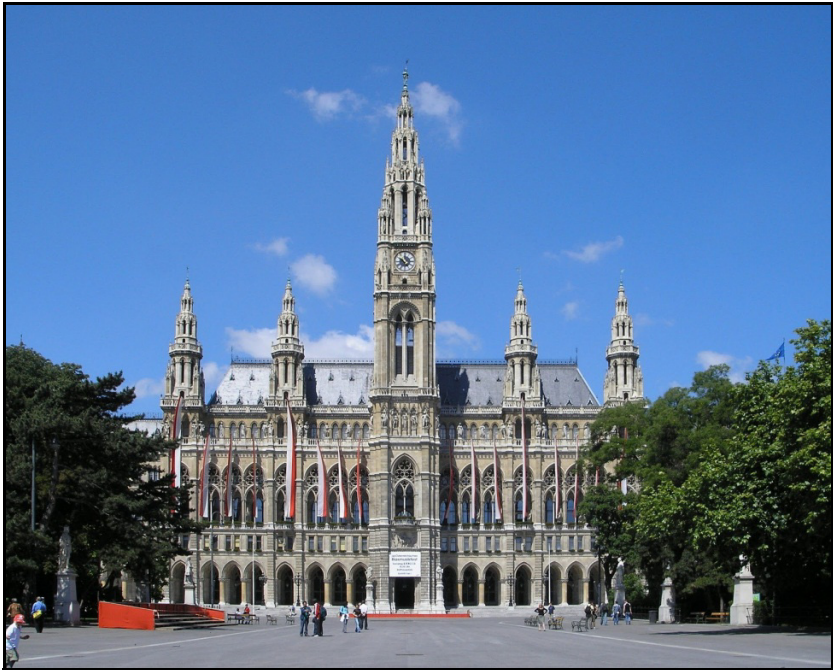


Figure 2.54: City Hall [Rathaus] built between 1872 and 1883.



Figure 2.55: Inside Rathaus.



Figure 2.56: Emperor Karl V in Helden Platz.



Figure 2.57: Prince Eugene of Savoy (1663–1736) repulsed the Ottoman Turks at the Siege of Vienna in 1683.



Figure 2.58: Emperor Joseph II.



Figure 2.59: Monument to Field Marshal Josef Radetzky von Radetz (1766–1858) on Ringstraße to whom Johann Strauß [Father] (1804–1849) wrote the Radetzky March in 1848.



Figure 2.60: Field Marshal Karl Philipp Fürst zu Schwarzenberg (1771–1820) defeated Napoleon at the Battle of Leipzig in 1814.



Figure 2.61: Monument to Admiral Wilhelm von Tegetthoff (1827–1871). Column is 11m high + 3.5 m bronze statue of the admiral. Praterstern, Vienna.

ARSENAL

The Military History Museum (Figures 2.62–2.63) focuses on Austrian military history from the 16th century to 1945 and has one of the world's largest collections of bronze cannons. It is located in Vienna's Arsenal, in the Landstraße district, not far from the Belvedere palace. It was constructed between 1850 and 1856.

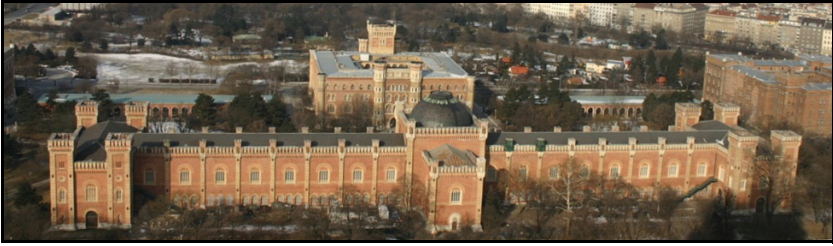


Figure 2.62: Military History Museum.



Figure 2.63: Main gate of Military History Museum.



Figure 2.64: Fountain in Mikhaeler Square.



Figure 2.65: Fountain in Mikhaeler Square.



Figure 2.66: Athena fountain in front of parliament.



Figure 2.67: Donner fountain in Europa Square.



Figure 2.68: Graben Street with the trinity monument.



Figure 2.69: Mozart in Burg Garden.



Figure 2.70: Johannes Brahms on Ringstraße.



Figure 2.71: Franz Schubert in City Park [Stadtspark].



Figure 2.72: Johann Strauß Jr. in City Park [Stadtpark]. Photo by Nadia Habashi, 1997.



Figure 2.73: Johann Strauß [Son] (1825–1899) composed over 500 waltzes, polkas, and other types of dance music, as well as several operettas and a ballet. His most famous works include *The Blue Danube*, *Kaiser-Walzer* and *Tales from the Vienna Woods* and among his operettas, *Die Fledermaus* and *Der Zigeunerbaron*.



Figure 2.74: City Park [Stadtspark].



Figure 2.75: Goethe on Ringstraße.



Figure 2.76: Johann Christoph Friedrich von Schiller.



Figure 2.77: Playwright Ferdinand Raimund (1790–1836) on Ringstraße.



Figure 2.78: Monument to Austrian poet Franz Grillpazer (1791–1872) in Volksgarten.

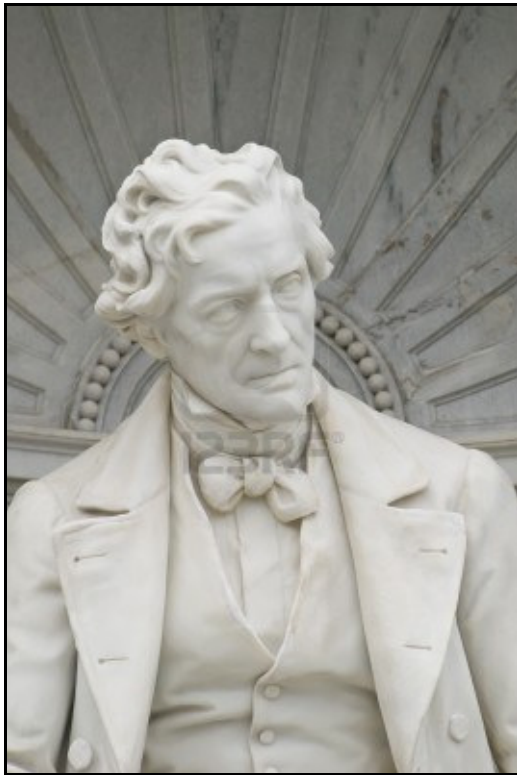


Figure 2.79: Monument to Franz Grillpazer (1791–1872) [details].



Figure 2.80: Monument to Grillpazer [details].



Figure 2.81: Monument to Grillpazer [details].



Figure 2.82: Monument to Grillpazer [details].

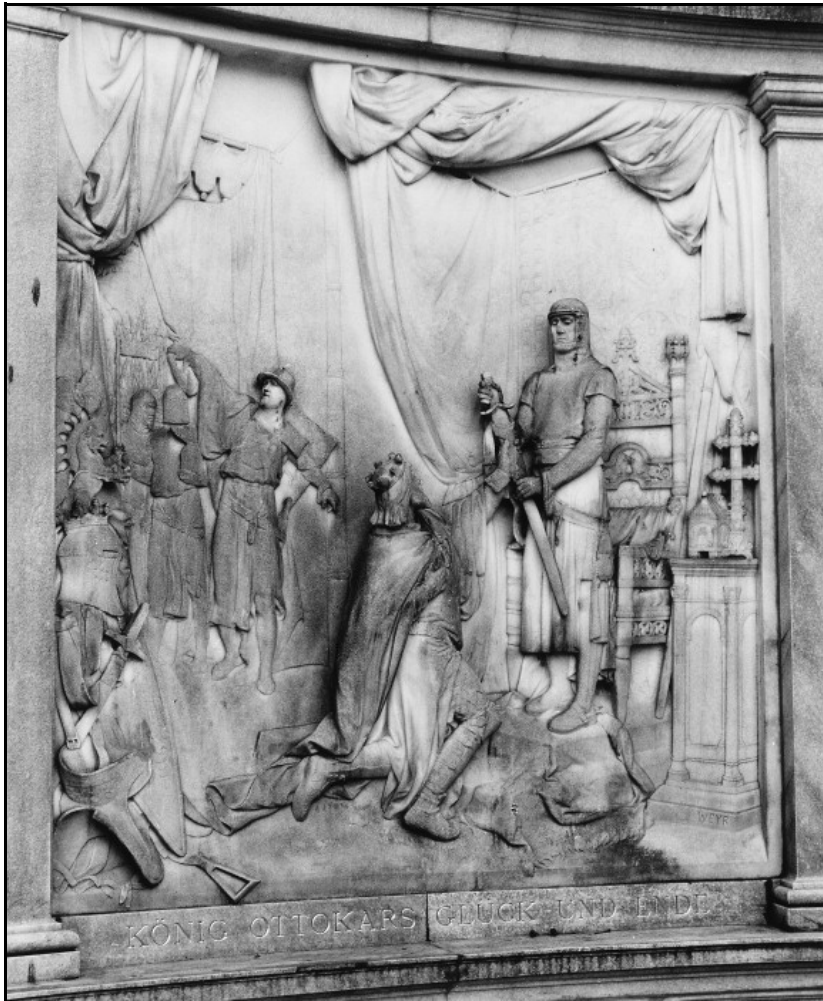


Figure 2.83: Monument to Grillpazer [details].



Figure 2.84: Monument to Grillpazer [details].



Figure 2.85: Monument to Queen Elisabeth of Bavaria (1837–1898) in Burg Garden.

ALBERTINA

Albertina Art Gallery (Figures 2.86–2.90) possesses the world's most comprehensive collection of graphic material. The collection was founded in 1786 by Maria Theresa's son-in-law, Duke Albrecht of Saxony-Tescha (1738–1822).



Figure 2.86: Albertina Art Gallery.



Figure 2.87: Albertina.



Figure 2.88: Albertina Art Gallery with statue of Albrecht.



Figure 2.89: Details from Albertina.



Figure 2.90: Duke Albrecht at Albertina.



Figure 2.91: Soviet monument for the liberation of Vienna during World War II. A Russian tank was there in 1955 but was removed later.



Figure 2.92: Monument in front of the main building of the University of Vienna for Johann Andreas Liebenberg (1627–1683) Mayor of Vienna.



Figure 2.93: Main building of the University of Vienna.



Figure 2.94: University of Vienna Distinguished Professors' Gallery.



Figure 2.95: Physics Professor Josef Loschmidt (1821–1895).



Figure 2.96: Physics Professor Josef Stefan (1835–1893).



Figure 2.97: Between Doppler [left] and Schrödinger [right].

SCHÖNBRUNN

From the 18th century to 1918, Schönbrunn was the summer residence of the Habsburg emperors. It was designed by the architect Fischer von Erlach. It was there that Napoleon signed the peace treaty in October 1809 after his victory at Wagram Battle in July 1809.



Figure 2.98: Entrance to Schönbrunn palace.



Figure 2.99: Schönbrunn palace.



Figure 2.100: Inside Schönbrunn palace.



Figure 2.101: The Gloriette as seen from the balcony of Schönbrunn palace.



Figure 2.102: Gloriette in Schönbrunn palace garden.



Figure 2.103: Details of Gloriette.



Figure 2.104: Details of Gloriette.



Figure 2.105: Entrance to Schönbrunn palace gardens.



Figure 2.106: Schönbrunn garden.

BELVEDERE

The Belvedere palace (Figures 2.107–2.110) was a summer residence for Prince Eugene of Savoy (1663–1736), commander-in-chief in successful conclusion of a series of wars against the Ottoman Empire, now a museum and art gallery.



Figure 2.107: Entrance to Belvedere Palace.



Figure 2.108: Belvedere palace.



Figure 2.109: Belvedere palace garden.



Figure 2.110: Inside Belvedere Palace.



Figure 2.111: Founders of the Republic: Jacob Reumann, Victor Adler, and Ferdinand Hanusch.



Figure 2.112: Karl-Marx Hof municipal housing built by the Social Democratic Party between 1927 and 1930 for working class families. It is over one kilometre in length and spans four tram stops. It was the scene of battle during the 1934 civil war between the Nazi and the anti-Nazi.



Figure 2.113: Karl-Marx Hof.



Figure 2.114: Headquarters of the International Atomic Energy Agency.

TECHNISCHE HOCHSCHULE WIEN

Technische Hochschule Wien (Figure 2.115), now Technische Universität Wien, was founded as Polytechnische Institut Wien after the closing of the Vienna Congress of 1815 and the exile of Napoleon. First director Johann Josef Ritter von Prechtel (1778–1854). A postage stamp was issued to commemorate its 150th anniversary of its foundation (Figure 2.116).



Figure 2.115: A 25-Schilling silver coin issued in 1965 commemorating 150 years foundation of the Technische Hochschule showing silhouette of its first director Direktor Johann Josef Ritter von Prechtel.



Figure 2.116: Austrian postage stamp issued in 1965 commemorating 150 years foundation of the Technische Hochschule.

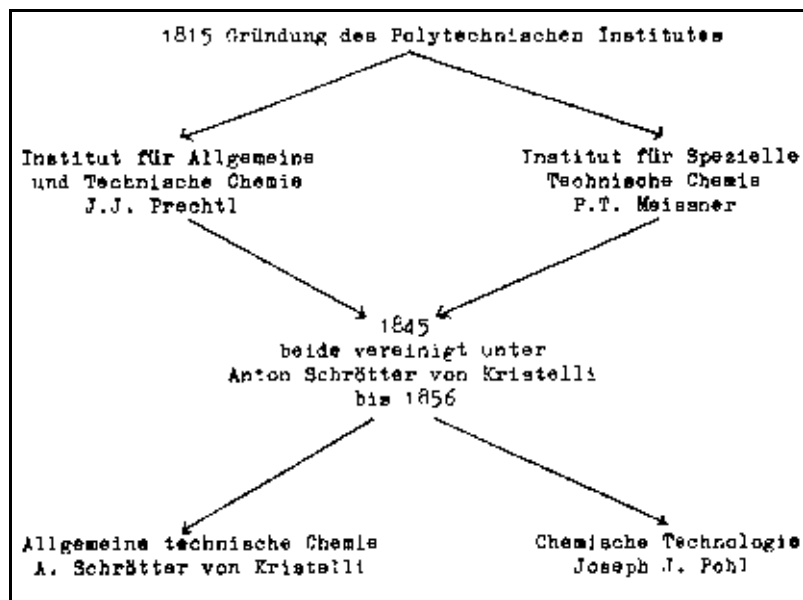


Figure 2.117: Chemical technology at the Polytechnic 1815–1856.

TECHNICAL CHEMISTRY

The Polytechnic (Figure 2.117) when founded in 1815 had two institutes for technical chemistry: Institute for General Technical Chemistry and Institute for Special Technical Chemistry. These were combined in 1845 but separated again in 1856 into three institutes (Figure 2.118):

- Institute of Inorganic Chemical Technology
- Institute in Organic Chemical Technology
- Institute of General Technical Chemistry

Institute of General Technical Chemistry was divided in 1894 into two specialised departments: General Chemistry and Analytical Chemistry, which later were subdivided into many specialities (Figure 2.119).

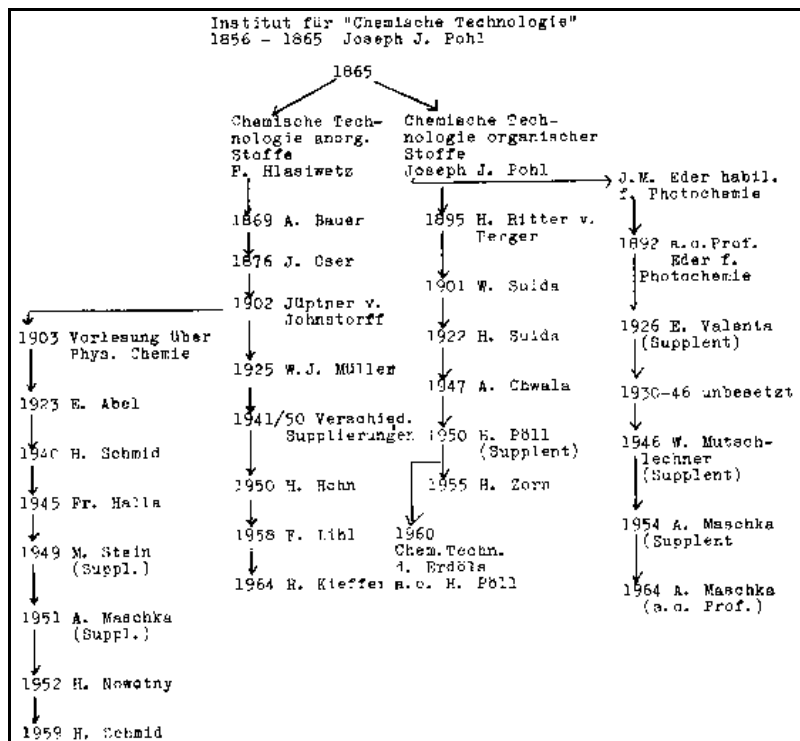


Figure 2.118: Divisions of Institute of Chemical Technology in 1856.

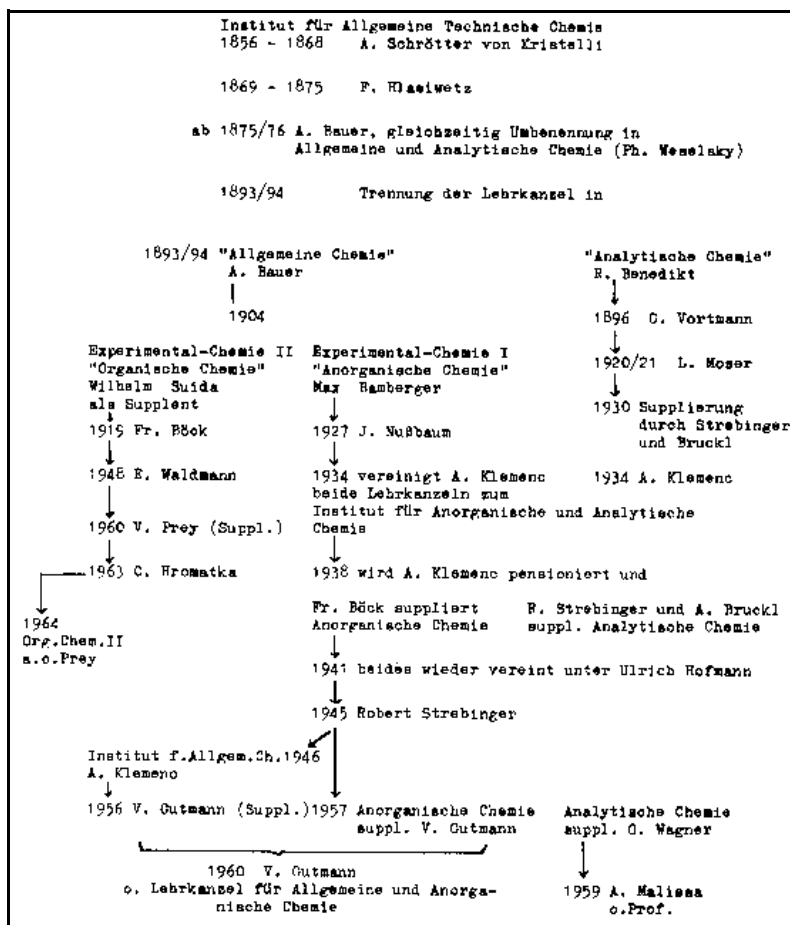


Figure 2.119: Institute of General Technical Chemistry.



Figure 2.120: Main building of Technische Hochschule in Karlsplatz.



Figure 2.121: Technische Universität Wien, Library.

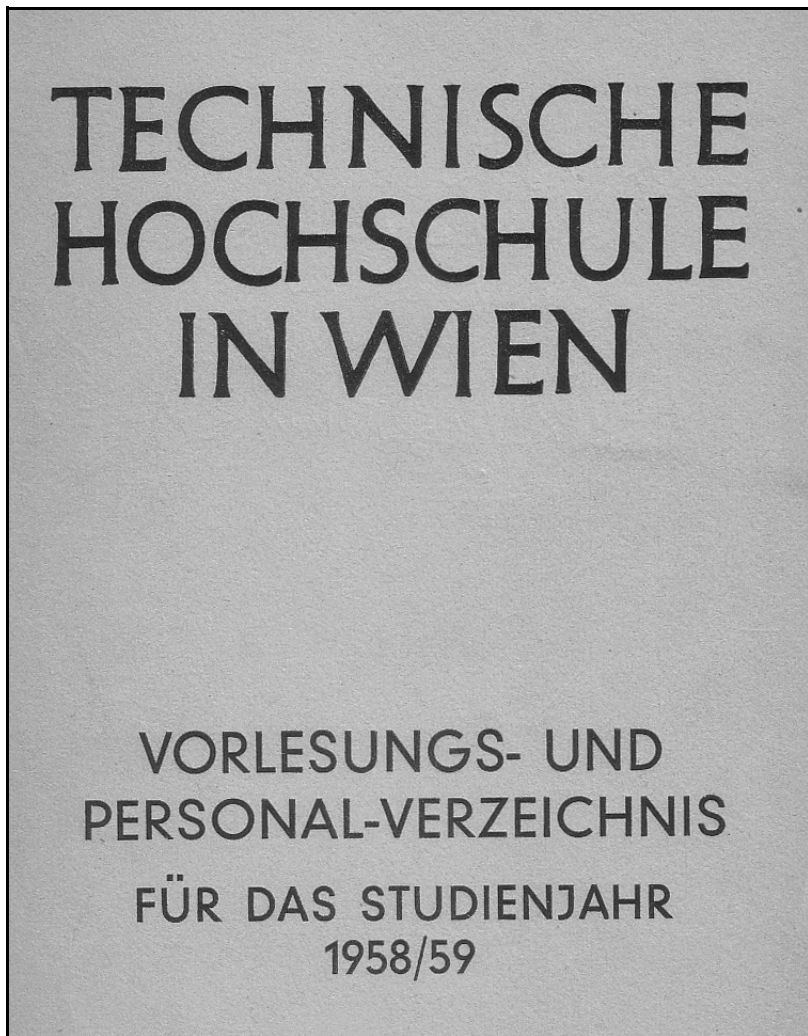


Figure 2.122: TH catalogue for 1958–1959.



Figure 2.123: Hans Hohn Professor of Inorganic Chemical Technology and his secretary Frau Sigl, 1957.



Figure 2.124: Speaking to Prof. Hans Hohn while Prof. Franz Lihl listens, 1957.

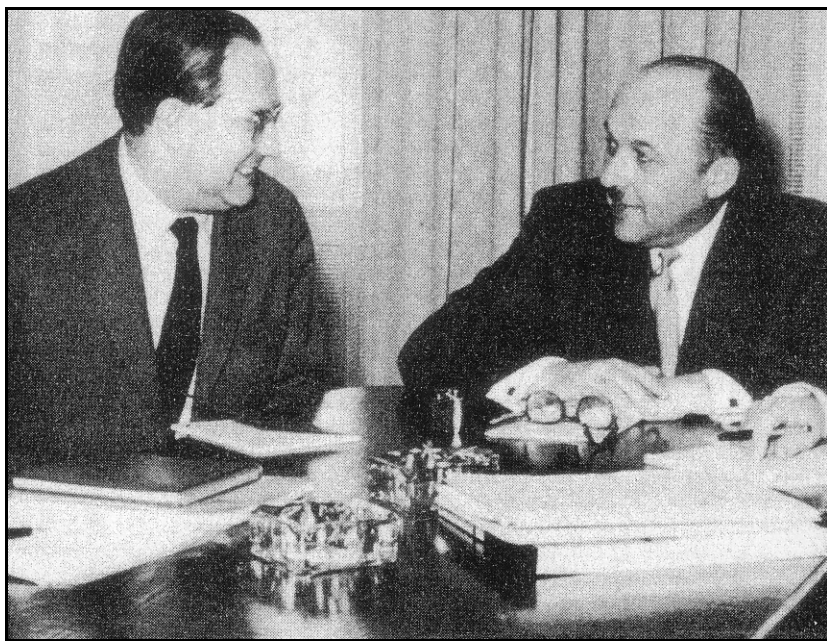


Figure 2.125: In 1959, Prof. Hans Hohn [left] became Director of Stickstoffwerke in Linz, later known as Linz Chemie.

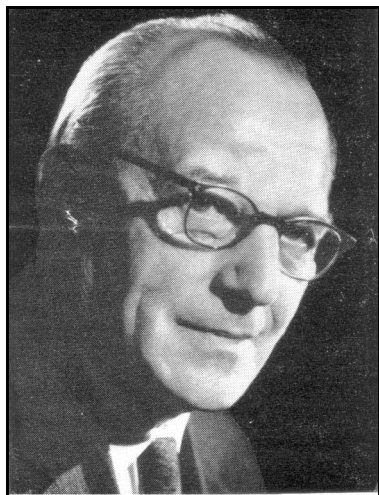


Figure 2.126: Kurt Peters (1897–1978), Professor of Chemical Engineering.



Figure 2.127: Viktor Gutmann (1921–1998), Professor of Inorganic Chemistry.



Figure 2.128: Dr. Gerhardt Jangg (1927–), Assistant in Institute of Inorganic Chemical Technology. **Figure 2.129:** A Viennese artist cut this black paper in two minutes while dining in a restaurant, Vienna 1956.

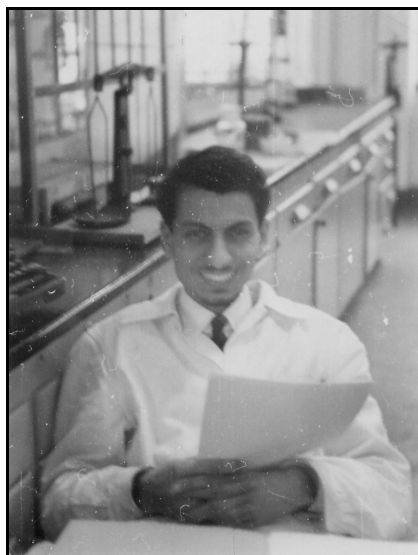


Figure 2.130: In the laboratory.

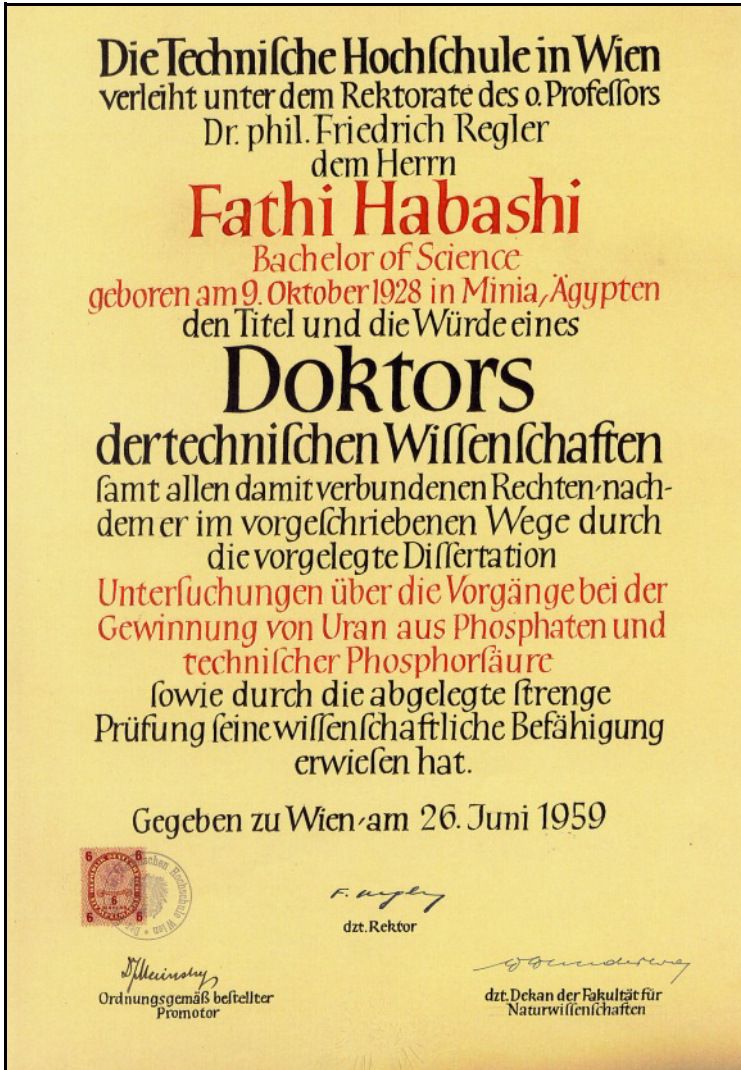


Figure 2.131: Doctorate 1959.

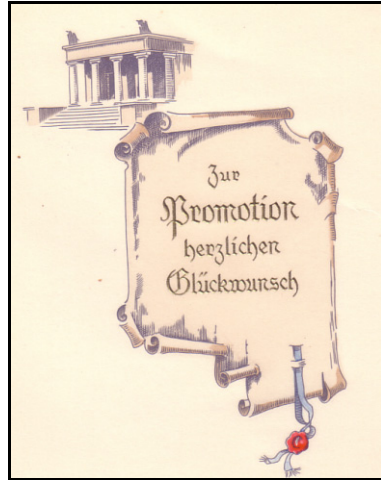


Figure 2.132: Congratulations from friends and relatives.

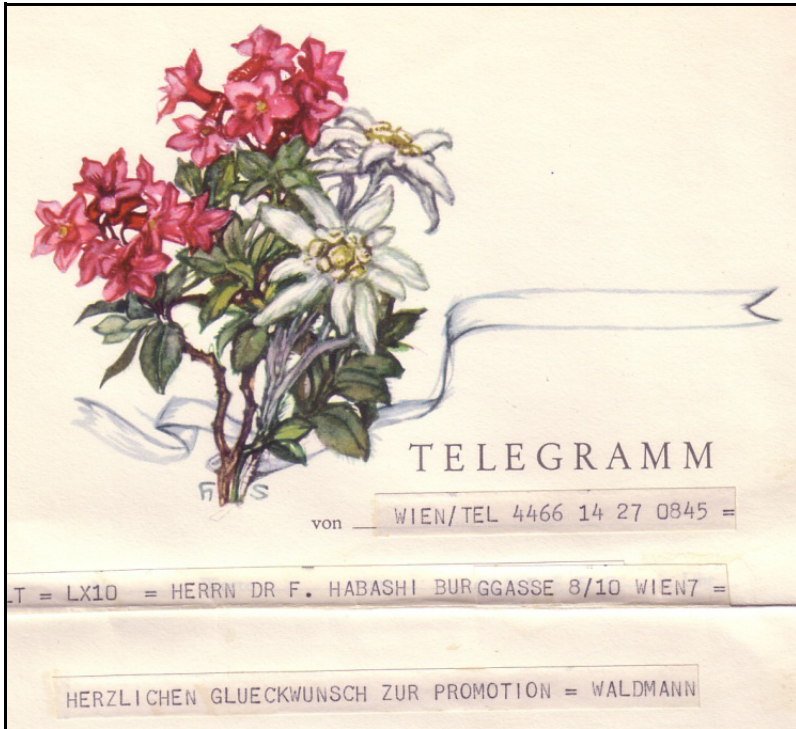


Figure 2.133: Congratulations from Prof Waldmann.



Figure 2.134: Prof. Richard Kieffer in 1969.

Die Gesellschaft Österreichischer Chemiker

lädt Sie herzlich ein
zu einem Vortrag
mit dem Titel

RECENT ADVANCES IN PRESSURE HYDROMETALLURGY

Vortragender:

Fathi Habashi
Professor of Extractive Metallurgy
at Laval University in Quebec City, Canada

Zeit: Dienstag, dem 16. September 1997, 17^h c.t.
Ort: Hörsaal der TN-Fakultät, Chemie-Turm, 1. Stock
Getreidemarkt 9, A-1060 Wien

Abstract:

Pressure hydrometallurgy has made significant progress in the past few years. The treatment of bauxite to produce pure alumina is still the largest pressure leaching operation in terms of the tonnage of raw materials treated; it is also the oldest. It was pioneered by the Austrian Chemist Karl Josef Bayer (1847 - 1904) while working in Saint Petersburg in Russia from 1887 to 1894. The next application of pressure leaching took place in the 1950's in nickel production followed by the acid leaching of zinc sulfide concentrates in the 1980's. The application of this technology to liberate gold from pyrite and arsenopyrite concentrates so that it can be leached effectively by cyanide solution can be considered as a milestone in the recent history of hydrometallurgy. There has been extensive research aimed toward applying this technology to copper sulfide concentrates, but still no industrial plant is operating at present. It is believed that this will be the future step toward solving the problems of the copper industry. This review summarizes some of these achievements.

Figure 2.135: Invitation to a seminar held at the Austrian Chemical Society in 1997.



Figure 2.136: Meeting with colleagues in 1997. Extreme right is Prof. Peter Ettmeyer who organized a seminar at the Austrian Chemical Society. Photo by Nadia Habashi.



Figure 2.137: Participants at the seminar.

CHEMISTRY INSTITUTE AT THE UNIVERSITY OF VIENNA

Chemistry at the University of Vienna was taught in 1870 as part of the Medical Faculty. The massive building on Währingerstraße–Botzmann-gasse (Figure 2.138) constructed in 1909 houses the Department of Chemistry, Department of Physics, and the Radium Research Institute. One of the most renowned scientists in these days was Carl Auer von Welsbach (1858–1929) (Figures 2.139–2.142), a pioneer in the field of inorganic-chemical research. After his graduation from the University of Heidelberg, he taught at the University of Vienna. In the course of his studies, he invented the gas mantle, the flint stone — and the osmium lamp — predecessor of the currently used wolfram lamp. He also discovered the rare earth elements praseodymium and neodymium.



Figure 2.138: Chemistry and Physics departments of the University of Vienna. Entrance to the Radium Research Institute at Boltzmannngasse [Photo by Fathi Habashi, 1960].

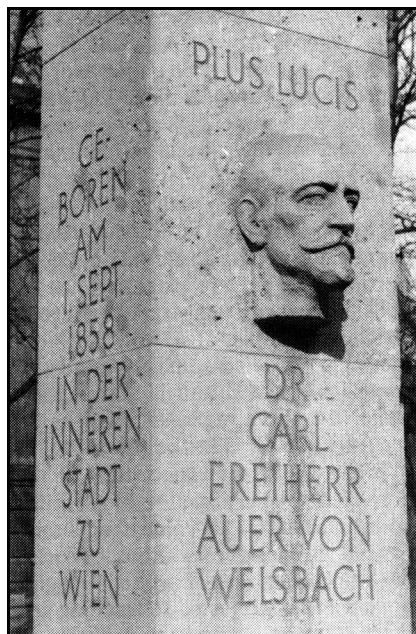


Figure 2.139: Details of the monument "Plus Lucis" commemorating Auer's achievements.

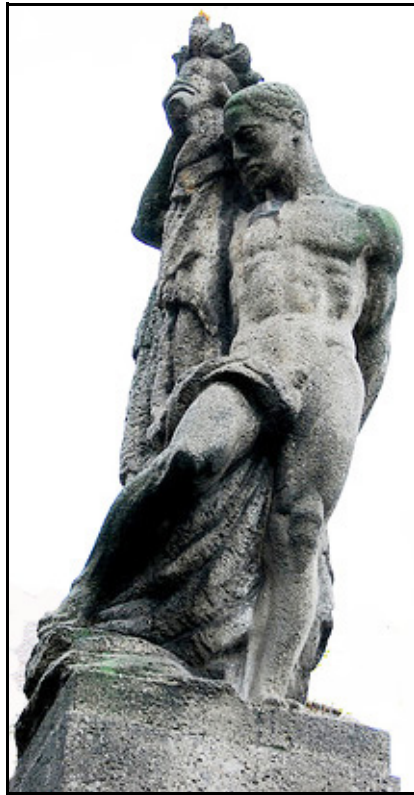


Figure 2.140: The top of Plus Lucis monument.



Figure 2.141: A 20-Schilling bill with Carl Auer's portrait.



Figure 2.142: A commemorative 25-Schilling silver coin with Carl Auer's Portrait.

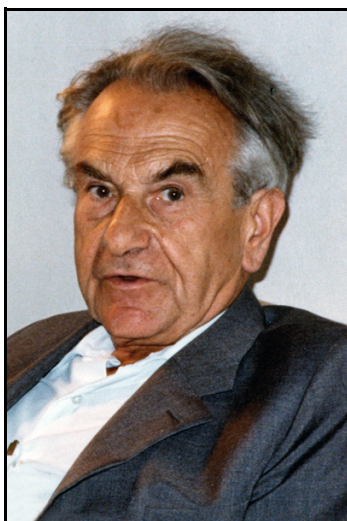


Figure 2.143: Engelbert Broda (1920–1983).

The Physical Chemistry Department was headed by Professor Hans Novotny (1911–1996). The Department included a group working on radiochemistry under Professor Engelbert Broda (1910–1983) (Figure 2.143) and his assistant Thomas Schönfeld (Figures 2.144–2.148). A research project financed by the International Atomic Energy Agency was on the measurement of radioactivity in the biosphere. This was an important topic because of the atomic bombs being tested by the United States and the former Soviet Union which resulted in radioactive fallout. Two research papers were published:

- F. Habashi, T. Schönfeld, "Feststellung der Freisetzung frischer Spaltprodukte in der Biosphäre durch Gammaskpektrometrie," *Atompraxis* 6, 414–415 (1960).
- K. Liebscher, F. Habashi, T. Schönfeld, "Beobachtungen über das Verhalten von Spaltprodukten in Oberflächenwassern," *Atompraxis* 7, 94–100 (1961).



Figure 2.144: Entrance to Chemistry Department of the University of Vienna at 42 Währingerstraße [Photo by Fathi Habashi, 1960].

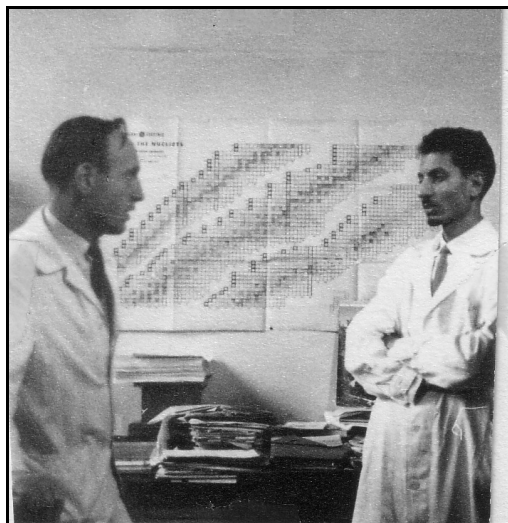


Figure 2.145: Discussion with project director Dozent Thomas Schönfeld, 1960.



Figure 2.146: Doing radiochemical separations, 1960.

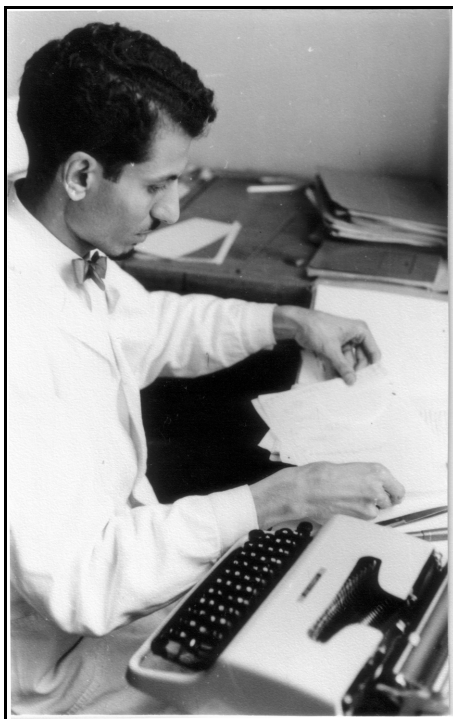


Figure 2.147: Preparation of report, 1960.

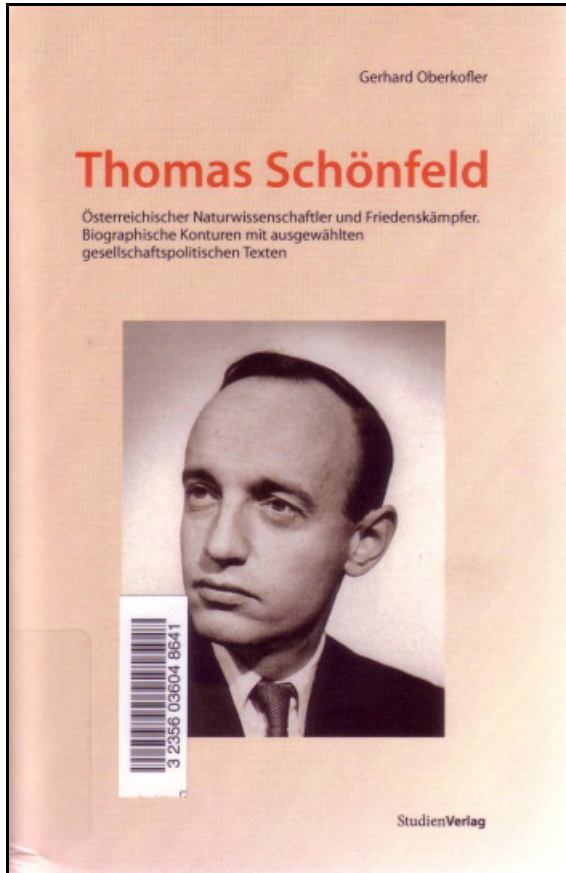


Figure 2.148: Professor Thomas Schönfeld (1923–2008).

VIENNA WOODS

Grinzing (Figures 2.149–2.150), a suburb in Vienna Woods reached by tram, is a popular place for drinking wine. Kahlenberg, in the north of Vienna, is another mountain nearby popular for hiking and to have a good view of the city and the Danube (Figure 2.151).



Figure 2.149: Grinzing.



Figure 2.150: Restaurants in Grinzing.



Figure 2.15t: Vienna and the Danube from Kahlenberg.

Chapter 3

Linz an der Donau

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		VÖEST	127
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Linz (Figures 3.1–3.2), the capital of Nieder-Österreich, is almost half way between Vienna and Salzburg. It is the home of the music composer Anton Bruckner (1824–1896) (Figure 3.3), who played the organ at the Cathedral [Dom] (Figure 3.4) and the poet Adalbert Stifter (1805–1868) (Figure 3.5). Another important inhabitant of the city was Johannes Kepler (1571–1630) (Figure 3.6), who spent several years of his life in the city teaching mathematics. Incidentally, Adolf Hitler was born in the border town of Braunau am Inn but moved to Linz in his childhood. Hitler spent most of his youth in the Linz area, from 1898 until 1907, when he left for Vienna.



Figure 3.1: Linz an der Donau. The right hand side of the river is Ufer, which was occupied by the Russians till 1955.

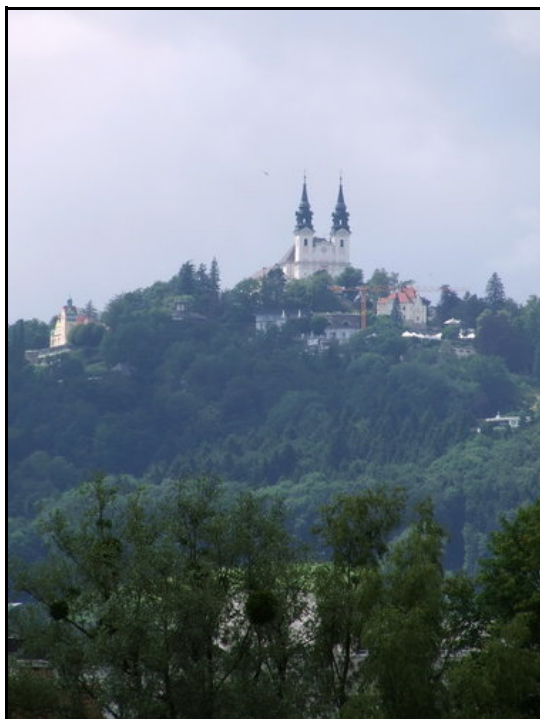


Figure 3.2: Pöstlingberg Church at the top of the mountain.

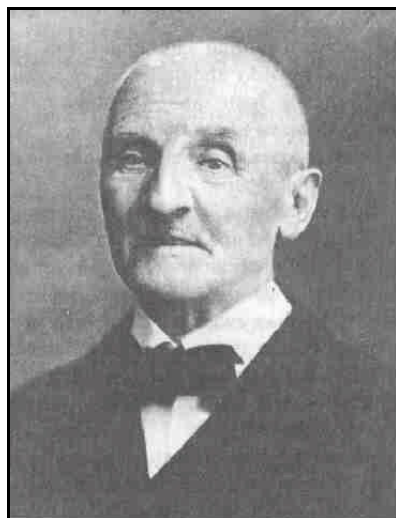


Figure 3.3: Anton Bruckner (1824–1896).



Figure 3.4: The Cathedral [Dom].



Figure 3.5: Adalbert Stifter (1805–1868).



Figure 3.6: Johannes Kepler (1571–1630).



Figure 3.7: Main street [Landstraße Hauptstraße].

TRINITY COLUMN

Trinity column [German: Dreifaltigkeitssäule] (Figures 3.8–3.9) is a 20-m pillar of marble in the Main Square carved in 1723 to commemorate the town's deliverance from plague.



Figure 3.8: Main square with the Trinity Column.



Figure 3.9: Trinity column.

ÖSTERREICHISCHER STICKSTOFFWERKE

I spent summer of 1955 working at the Stickstoffwerke — Austria's major chemical plant (Figures 3.10–3.12). It changed name recently to Chemie Linz. The Inorganic Department produces ammonia, nitric acid, fertilizers, sulfuric acid, while the Organic Department produces synthetic resins. It is a nationalized industry. Director of Inorganic Technology: Dr. Weinrotter, Director of Chemical Laboratory: Dr. Wolfgang Leithe.



Figure 3.10: Summer students at Stickstoffwerke, 1955.



Figure 3.11: With friends from Stickstoffwerke, 1955.



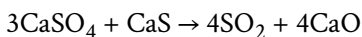
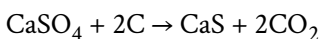
Figure 3.12: With friends from Stickstoffwerke, 1955.

Excursions

The engineers organized an excursion to the nearby mountains (Figures 3.13–3.15) and a visit to Saint Florian Monastery (see below). Incidentally, the enzian flower grows only in this region (Figure 3.16). A special visit to the nearby steel plant was also organized (see below).

Müller–Kühne Process

A unique operation at Stickstoffwerke is the Müller–Kühne plant to produce SO_2 and cement by heating gypsum with coal and clay in a rotary kiln at $1\,250\text{ }^\circ\text{C}$. Sulfur dioxide generated is used to make sulfuric acid while the solid product is crushed and ground and used as cement. The reactions involved:



Calcium sulfide is only an intermediate product. The overall reaction is:





Figure 3.13: Excursion with Dr. Alfred Schmidt and secretary, 1955.



Figure 3.14: Excursion with engineers from Stickstoffwerke, 1955.



Figure 3.15: With engineers in the Austrian Alps, 1955.

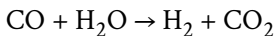
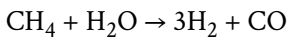
Calcium oxide then reacts with clay to form aluminum silicate cement. The process was meant to get rid of gypsum generated during the manufacture of phosphoric acid from phosphate rock. Incidentally the inventor Wolf Johannes Müller (1874–1941) was director of the Institute of Inorganic Chemical Technology at the Technische Hochschule in Vienna from 1925 to 1941. Guide: Dr. Alfred Schmidt.



Figure 3.16: Enzian flower.

VÖEST

Vereinigte Österreichischer Eisen- und Stahlwerke known by the acronym VÖEST was Austria's largest steel plant. It is located in Linz next door to Stickstoffwerke. The two plants are related because coke oven gas generated in VÖEST is used to produce hydrogen for ammonia synthesis at Stickstoffwerke:



Carbon dioxide is removed by water under pressure.

It was in VÖEST in 1954 that the LD process for steelmaking was invented. LD stands for Linzer Düsenverfahren, i.e., Linz lance technology. In this process oxygen was introduced through a lance in the converter to transform pig iron into steel (Figure 3.17). At that time it was a revolution in the steel industry because it was for the first time oxygen was used in large scale in metallurgical plants. The process had the advantage of conducting the transformation in a shorter time than Bessemer process and the ability to consume large amounts of scrap, but had the disadvantage of being noisy and polluting due to the red fumes of iron oxide generated. The pollution problem was solved later by installing dust capturing systems. The plant was visited in 1955 and in 1960.

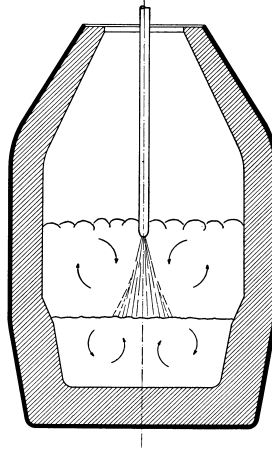


Figure 3.17: LD process.

SAINT FLORIAN ABBEY

Saint Florian Abbey (Figures 3.18–3.22) is 20 km outside Linz is a large monastery dedicated to St. Florian, who was a Roman official and Christian martyr who was executed by drowning in the Enns River around 304 AD. Because of his death in water he is the patron saint of protection against flood and fire. His grave lies under the church. It is also where Anton Bruckner is buried. The first Abbey was built over the site of his grave around 800. The present building dates from about 1686. The visit was organized in 1955 by the management of Stickstoffwerke.



Figure 3.18: Saint Florian Abbey.



Figure 3.19: Entrance to Saint Florian Abbey.



Figure 3.20: Library of Saint Florian Abbey.

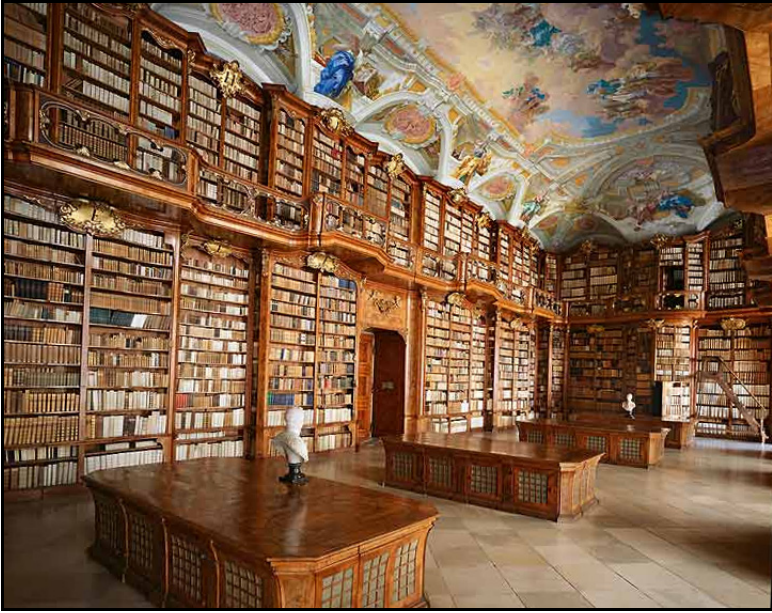


Figure 3.21: Library of Saint Florian Abbey.



Figure 3.22: One of the galleries in Saint Florian Abbey.

Chapter 4

Mauthausen

Mauthausen Concentration Camp (Figures 4.1–4.3) is 20 km east of Linz founded immediately after the Anschluss in 1938 and lasted till the end of World War II. The site was chosen for a slave labour camp because of the nearby granite quarry where inmates used to work daily to supply granite needed for the reconstruction of major German towns. It expanded over time to become one of the largest labour camp complexes in German-controlled Europe. In January 1945, the camp contained about 85 000 inmates. The death toll estimated between 123 000 and 320 000. Mauthausen was mostly used for educated people and members of the higher social classes in countries subjugated by the Nazi regime during World War II.

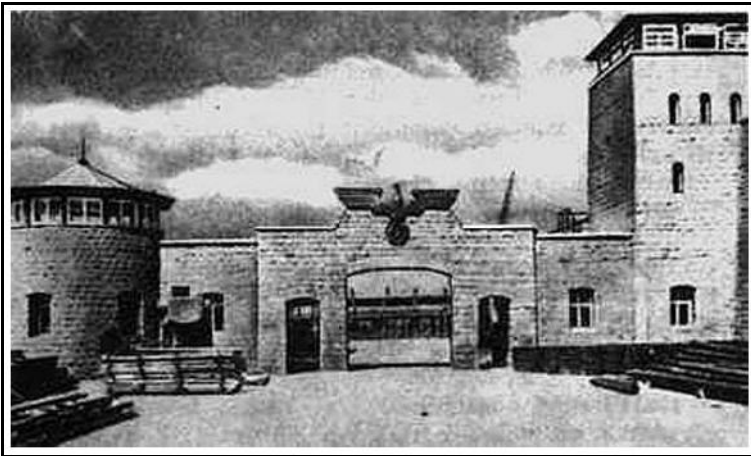


Figure 4.1: Entrance.



Figure 4.2: Furnaces.



Figure 4.3: Stairs.

When the inmates were totally exhausted after having worked in the quarries for 12 hours a day, or if they were too ill or too weak to work, they were then transferred to the sick barrack where they were killed by lethal injection and cremated in the local crematorium. In 1940, gas chambers were constructed and used on a regular basis. On May 5, 1945 Mauthausen was liberated by a squad of US Army.

Chapter 5

Leonding

Leonding is very close to Linz and offers a beautiful view of the Alps. From 1898 to 1905 Adolf Hitler lived there where he attended the local primary school and later a grammar school in nearby Linz. The graves of his parents Alois and Klara are there (Figure 5.1). It was Dr. Hermann Rudorfer from Stickstoffwerke who drove me with his family to this town in 1955.



Figure 5.1: Grave of Hitler's parents.

Chapter 6

Graz

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Graz (Figures 6.1–6.5) is the second largest city in Austria after Vienna and the capital of Styria (Steiermark). It is a university city situated on the Mur River about 200 km southwest of Vienna. The University of Graz was founded in 1585 by Archduke Karl II (1540–1590). The Archduke had 20 000 Protestant books burned in the square and succeeded in returning Styria to the authority of the Holy See. Johannes Kepler (1571–1630) was a professor of mathematics there before moving to Prague when Lutherans were banned from the city. Erwin Schrödinger was briefly chancellor in 1936.



Figure 6.1: Graz and the Clock Tower.



Figure 6.2: Main Square in Old City with monument of Archduke Johann [see below] and the Clock Tower.



Figure 6.3: Clock Tower — symbol of Graz.



Figure 6.4: University of Graz.



Figure 6.5: Graz Opera House.

From the earlier part of the 15th century, Graz was the residence of the younger branch of the Habsburgs, which succeeded to the imperial throne in 1619 in the person of Emperor Ferdinand II, who moved the capital to Vienna. Following the defeat of Austria by Napoleonic forces at the Battle of Wagram in 1809, the fortifications were demolished using explosives, as

stipulated in the Peace of Schönbrunn of the same year. The bell tower and the civic clock tower were spared after the people of Graz paid a ransom for their preservation.

Archduke Johann (1782–1859) (Figure 6.6) was son of Holy Roman Emperor Leopold II. After a long military career he settled in Graz and became interested in education. He founded in 1811 the Joanneum Museum in Graz, the predecessor of Graz University of Technology and in 1840 he founded the *Berg- und Hüttenmännische Lehranstalt* in Vordernberg, which became in 1849 the Mining University of Leoben. He was in love with a Styrian girl but the Emperor did not approve his marriage because of her un noble status. His devotion to her was a subject of a famous love song: “Wo i geh und steh, tut mir mein Herz so Weh...” [Translation: Wherever I go, I have pain in my heart].



Figure 6.6: Monument to Archduke Johann (1782–1859).

Fritz Pregl (1869–1930) (Figure 6.7), Professor of Chemistry at the University of Graz, received the Nobel Prize for chemistry in 1923 for his work in organic microanalysis. His father was Slovene-speaking and his mother German-speaking.



Figure 6.7: Austrian postage stamp issued in honour of Fritz Pregl (1869–1930), Professor of Chemistry at the University of Graz, Nobel prize winner for chemistry in 1923.

ARMOURY MUSEUM

Graz is home to the world's largest historical collection of medieval weaponry (Figures 6.8–6.12). It holds approximately 32 000 pieces of weaponry, tools, suits of armour for battle and ones for parades.



Figure 6.8: Entrance to Graz Armoury.



Figure 6.9: Graz Armoury.

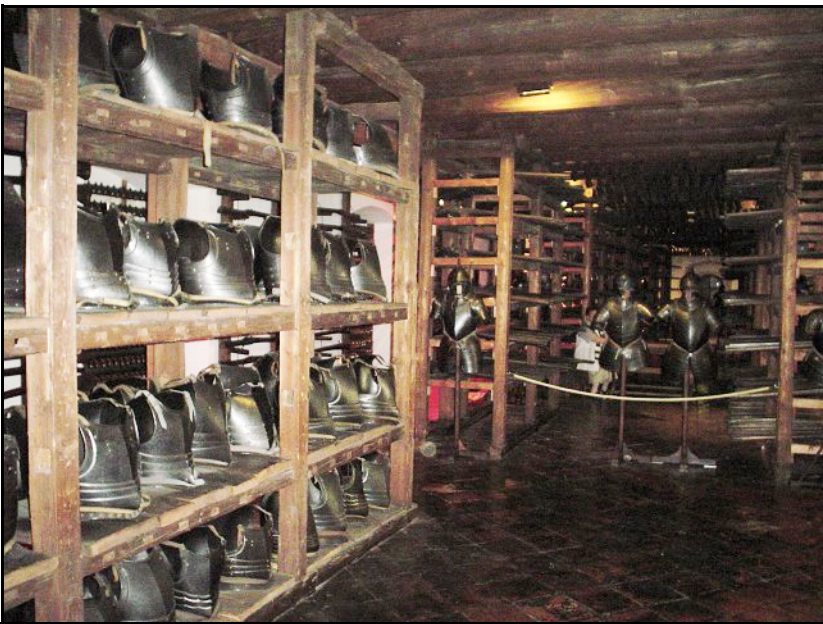


Figure 6.10: Graz Armoury.

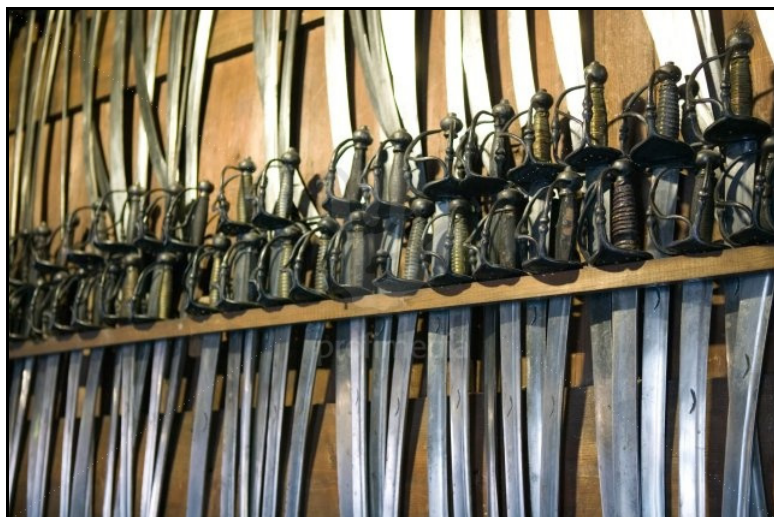


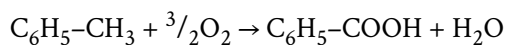
Figure 6.11: Collection of swords in Graz Armoury.



Figure 6.12: A collection of spears in Graz Armoury.

Benzoic acid plant

A plant for the catalytic oxidation of toluene to produce benzoic acid was visited in 1956 at the invitation of its owner whom I met in BSAF in Ludwigshafen in 1955:



Chapter 7

Leoben

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LEOBEN

Leoben (Figures 7.1–7.2) by the Mur River, 40 km northwest of Graz is a university city.



Figure 7.1: Leoben Main Square.



Figure 7.2: A 13th-century well decorated house.

MONTAN UNIVERSITÄT

The University of Leoben (Figures 7.3–7.5) is the country's university for mining, metallurgy, and materials. It was founded in 1840 in Vorderberg — Austria's mining region. In 1848, Director Peter Tunner re-located the university to the nearby town of Leoben, where it is still located today. That year the university had only 48 students enrolled. Today more than 3 000 students are enrolled. Its Library is well equipped and include many books of historical value.



Figure 7.3: Montan Universität, Leoben.



Figure 7.4: Entrance hall Montan Universität.



Figure 7.5: With Dr. Lieselotte Jontes, Library Director. Photo by Nadia Habashi, 1999.

EISENERZ

At the Erzberg — the “ore mountain” near Leoben (Figure 7.6), the Styrian iron industry began as early as the 8th century AD. It is a spectacular mountain, carved into a series of giant steps by centuries of mining. At its

foot lies the town of Eisenerz. During the Roman Empire iron was produced from this region that was known at that time as Roman Province of Noricum. During its heyday, it was the centre of iron smelting but since 1945 the ore has been shipped out for smelting elsewhere.



Figure 7.6: Erzberg open-pit mine for iron ore near Leoben in Austria.

This was necessary because there was no possibility of growing grain in the vicinity, whereas thousands of people had to be fed. Thus, food, as well as charcoal for the furnaces, was transported to Eisenerz from afar. The house of highest mine official, the “Kammerhof,” is still in existence. A hunting lodge formerly used by Emperor Franz Joseph I is now a museum.

In the 13th century, however, important technical changes began to take place starting with the use of water power to work the bellows which provided air for the furnaces. As a consequence of the need for water, the furnaces and forges gradually moved down the valley and water wheels were constructed. Gradually, the scale of operations increased and by the

middle of the 16th century about 100 large forges were in operation in the region.

Production of raw iron reached about 12 000 tons per year, then fell during the 17th century due to a shortage of wood for charcoal, as well as problems of transportation. However, production increased later due to the introduction of the steam engine. Blast furnaces began to replace the older shaft furnaces in the 18th century, and the modern era arrived with the first Bessemer converter in 1863 and the first open hearth furnace in 1868. The visit was conducted in October 1962 in company of Professor Erich Schwarz-Bergkampf (1904–1996) (Figure 7.7) former Rector of the Montanistische Hochschule in Leoben and Professor of Physical Chemistry. He was the first president of Verein der Freunde des Radwerkes IV in Vordernberg.

Some 15 km west of Leoben is Donawitz. This centuries-old town of iron forging and steel production is the second centre of the United Austrian Iron and Steel Works [VÖEST, acronym for Vereinigte Österreichische Eisen- und Stahlwerke]. The first centre is in Linz in the north.

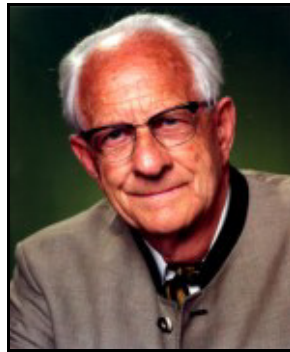


Figure 7.7: Professor Erich Schwarz-Bergkampf (1904–1996).

Approaching the town of Vordernberg, the centre of the Iron Trail, the visitor passes the “Friedau-Plant” where as late as 1880 the most important of the original “Radwerke,” i.e., water wheels was in operation which powered the bellows for the iron-making furnaces. In the centre of Vordernberg is another iron forge with a water wheel. This was formerly a training centre School for Mining and Smelting the forerunner of the present-day Mining University, now a museum (Figure 7.8). The charcoal furnace operated by water wheel which was in production until 1911, has been restored and is now an important museum.



Figure 7.8: Iron Museum housed in a building dated 1617.

The Iron Trail (Figure 7.9) ends at Steyr, for centuries the centre for iron goods. These were transported via Regensburg to the Baltic Sea and to Russia. Finally, at Linz on the Danube is the main steel works of VÖEST where the LD process was invented in 1955. Originally, LD was an abbreviation for Linzer Düsenverfahren, i.e., the Linz lance technology, but realizing that this was difficult for non-Germans to remember the abbreviation now refers to Linz–Donawitz process



Figure 7.9: Austrian Iron Road.

Chapter 8

Seckau

Seckau is 30 km southwest from Leoben and a short drive from Knittelfeld (Figure 8.1). The abbey church was built between 1143 and 1164 (Figures 8.2–8.5). For centuries it was the place of burial of the Austrian line of the Habsburgs (Figure 8.6). The Prince-Bishopric of Seckau was established in 1218 and since 1786 the see of the prince-bishop has been Graz.



Figure 8.1: Map of Styria showing the location of Graz, Leoben, and Seckau by Knittelfeld x.



Figure 8.2: Seckau Abbey.



Figure 8.3: Entrance to the Abbey.



Figure 8.4: Courtyard.



Figure 8.5: Inside the cathedral.



Figure 8.6: A Habsburg tomb.

Chapter 9

Vösendorf

Vösendorf (Figures 9.1–9.2) is a suburb of Vienna about 15 km south-west where a small petroleum refinery was erected in 1921 and dismantled in 1958. I spent the summer of 1956 working there and living in a Gasthaus nearby in Perchtoldsdorf.



Figure 9.1: Location of Vösendorf marked × at the centre bottom.

Chapter 10

Steyr

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Steyr (Figures 10.1–10.2) is situated on the Austrian Iron Trail at the confluence of the rivers Steyr and Enns, 30 km south of Linz. It is a manufacturing centre for rifles, tractors and automobiles. It is the home town of Hermann Schmid (1895–1979), former professor of physical chemistry at the University of Alexandria. His father Hermann Schmid (1870–1945) was a well-known artist in Steyr and his grandfather was a school principal also in Steyr.



Figure 10.1: General view of Steyr.



Figure 10.2: Artistic forged iron work dated 1642.



Figure 10.3: A former city gate.



Figure 10.4: Prof. Hermann Schmid and Frau Maria Schmid. Photo by Fathi Habashi in July 1973.



Figure 10.5: Prof. Hermann Schmid and wife Maria, 1971.



Figure 10.6: Prof. Hermann Schmid, 1973.



Figure 10.7: Johann Strauß, Sr., at the Museum of the City of Vienna, 1973.

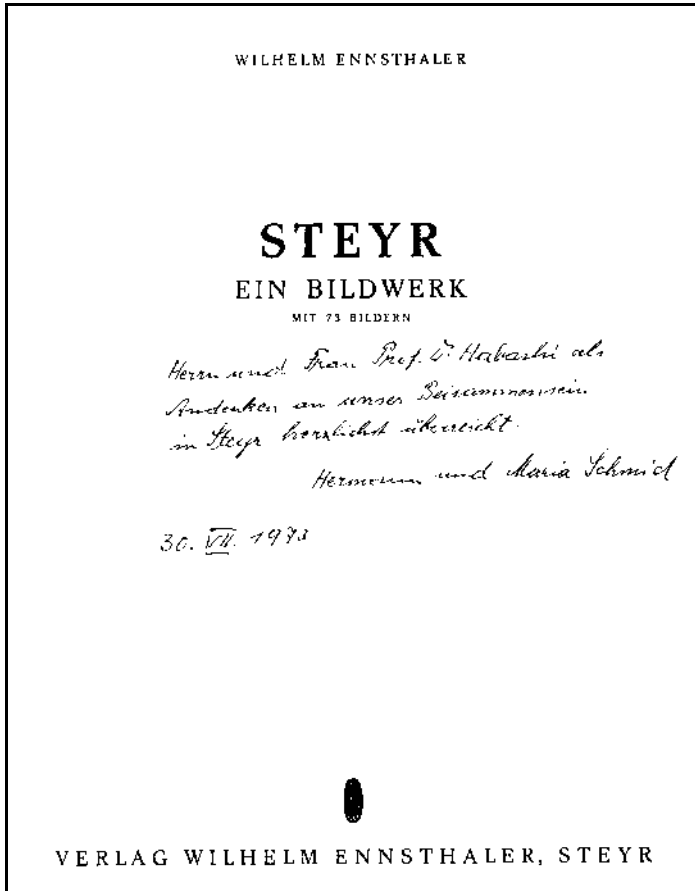


Figure 10.8: Book presented by Prof. Hermann Schmid on the occasion of my visit.



Figure 10.9: A plaque fixed on the birthplace of Hermann Schmid Sr.

<p style="text-align: center;">†</p> <p style="text-align: center;">Zur Erinnerung im Gebete an Herrn</p> <p>emer. o. Univ.-Prof. Dipl.-Ing. Dr. Hermann Schmid ehemaliger Vorstand des Institutes für Physikalische Chemie und ehemaliges Mitglied des akademischen Senates der Technischen Universität Wien, Inhaber des Wegschelderpreises der Akademie der Wissenschaften – Wien, Träger der Silbernen Tapferkeits- medaille, Signum laudis mit den Schwertern, Luftfahrerabzeichen des Weltkrieges 1914 – 1918, Mitglied mehrerer wissenschaftlicher Gesell- schaften des In- und Auslandes</p> <p>welcher am Mittwoch, 28. März 1979, um 10.40 Uhr nach langem, schwerem, mit Geduld ertrage- nem Leiden und Empfang der hl. Sakramente im 84. Lebens- jahre im Herrn entschlafen ist.</p> <p>So spricht der Herr: „Fürchte dich nicht, ich habe dich erlöst, ich habe dich bei deinem Namen gerufen, du bist mein.“ (Jes. 43/1)</p>	
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Figure 10.10: Death notice of Hermann Schmid (1895–1979).

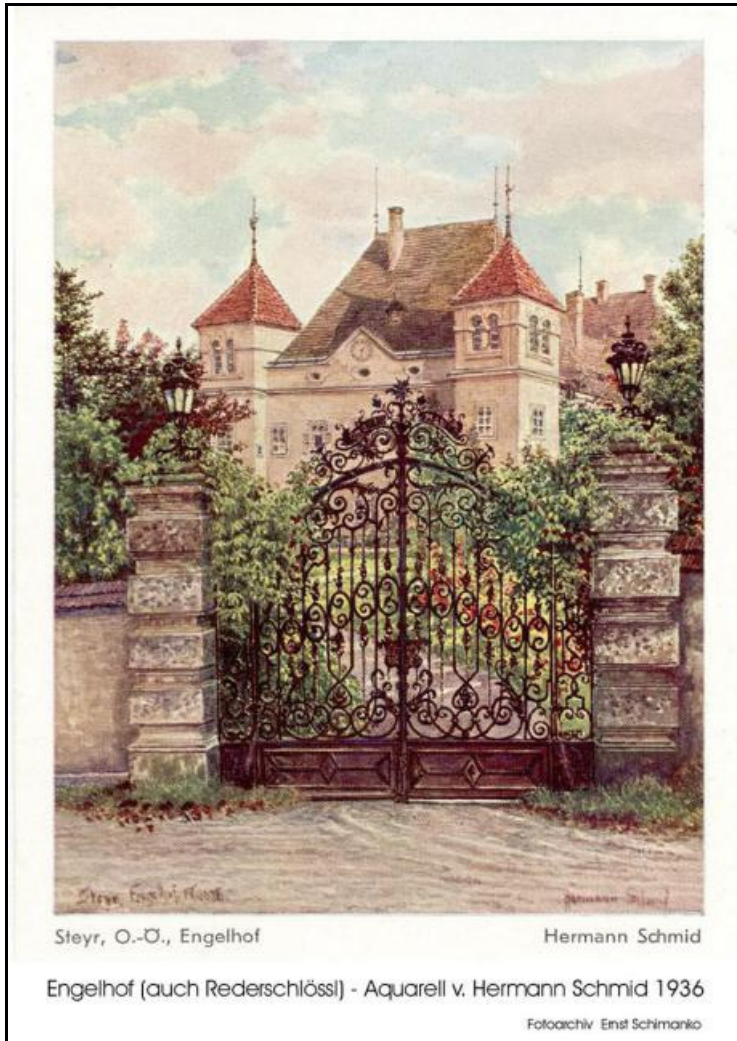


Figure 10.11: A postcard showing watercolour painting by Hermann Schmid Sr.

IRON MUSEUM

Steyr was a centre for manufacturing of ferrous articles. An old workshop has been preserved as a museum (Figures 10.12–10.15).



Figure 10.12: Iron Museum.



Figure 10.13: An artistic forged iron double eagle decorating the Iron Museum building.

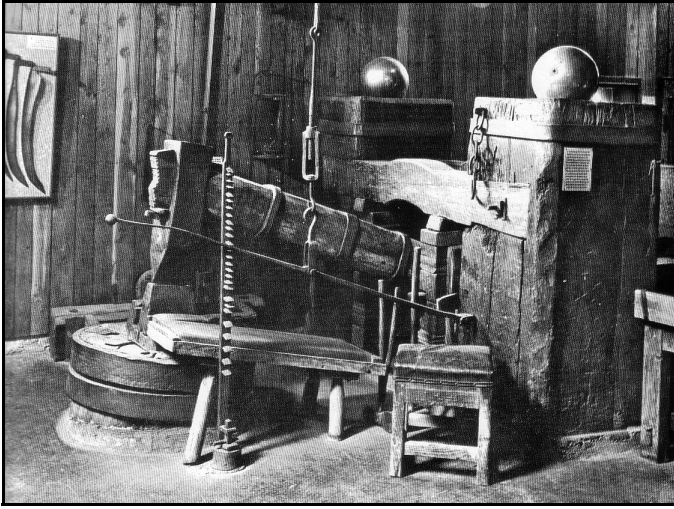


Figure 10.14: Hammer in the museum.



Figure 10.15: Smith tools.

JOSEF WERNDL

Josef Werndl (1831–1889) (Figure 10.16) was rifle manufacturer in Steyr who played an important role in World War I to supply weapons to the Austrian Army.



Figure 10.16: Monument to Josef Werndl (1831–1889).

Chapter 11

Salzburg

Salzburg (Figures 11.1–11.3) is on the banks of the Salzach River on the border with Bavaria at the northern boundary of the Alps. Literally Salzburg is “Salt Fortress.” It derives its name from the barges carrying salt on the river, which were subject to a toll in the 8th century, as was customary for many communities and cities on European rivers. The city’s fortress, was built in 1077 and expanded during the following centuries.



Figure 11.1: General view of Salzburg.



Figure 11.2: Salzburg castle.



Figure 11.3: Fountain.

Salzburg became independent from Bavaria in the late 14th century and became the seat of the Archbishopric of Salzburg, a prince-bishopric of the Holy Roman Empire. In 1731 the Bishop issued an Edict of Expulsion, directing all Protestants to recant their non-Catholic beliefs or be banished from the city. In 1805, Salzburg was annexed to the Austrian Empire, but was transferred back in 1809 to the Kingdom of Bavaria after Austria's defeat at Wagram. At the Congress of Vienna in 1815, it was definitively returned to Austria.

Salzburg is the birthplace of 18th-century composer Wolfgang Amadeus Mozart (1756–1791) (Figures 11.4–11.6).



Figure 11.4: Mozart's birth house.



Figure 11.5: Mozart monument.



Figure 11.6: Wolfgang Amadeus Mozart.

Chapter 12

Salzkammergut

Salzkammergut is a resort area that stretches from the City of Salzburg eastwards along the Austrian Alps to the peaks of the Dachstein Mountains. The main river of the region is the Traun, a tributary of the Danube. The name Salzkammergut literally means “Estate of the Salt Chamber” and derives from the Imperial Salt Chamber, the authority charged with running the salt mines of the Habsburg Monarchy. An excursion to Bad Ischl (Figures 12.1) was organized by the Stickstoffwerke in summer 1960.



Figure 12.1: Bad Ischl in Salzkammergut.

Chapter 13

Tyrol

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In 15 BC, the region of Tyrol was incorporated into the Roman Empire. In 553, the Germanic tribe of the Lombards invaded Italy and founded the Lombard Kingdom of Italy, which included the southern part of Tyrol. The northern part came under the influence of the Bavarii while the west was part of Alamannia. Thus, Tyrol was divided among three spheres of influence that met in the area of today's Bolzano. In 774, Charlemagne conquered the Lombard Kingdom of Italy. In 1363, Tyrol came under Duke Rudolf IV of the House of Habsburg. In 1386, Leopold III, Duke of Austria was defeated by the Old Swiss Confederacy and this was the first of a series of military conflicts between the county and its neighbours.

Following defeat by Napoleon in 1805, Austria was forced to cede Tyrol to the Kingdom of Bavaria. In 1808, Tyrol was integrated into South Bavaria, and Tyroleans were faced with the prospect of having to fight against Austrian troops. This led to insurrection on April 9, 1809 in Innsbruck. Few days later Bavarian and French Troops defeated the Austrian Army on the Bavarian front then seized Innsbruck. After the Austrian army was defeated by Napoleon at the Battle of Wagram, Tyrol was ceded to Bavaria. When news of the peace treaty reached Tyrol the Tyroleans and their leader, the freedom fighter Andreas Hofer (1767–1810) (Figure 13.1), felt betrayed by the emperor.



Figure 13.1: Andreas Hofer (1767–1810).

Tyrol was occupied, Hofer fled into the mountains, and on January 5, 1810 he was betrayed and denounced to the authorities. Napoleon ordered Hofer to be executed. Andreas Hofer is considered a Tyrolean hero today. Tyrol was integrated back to Austria at the Congress of Vienna in 1815. However, when Italy declared war against the Austro-Hungarian Empire in 1915, there was a conflict with Italians living in Tyrol. The decision, however, was politically motivated on the understanding that Italy will get Trieste and Dalmatia, as well as the part of German Tyrol. Italian troops occupied of all Tyrol, including Innsbruck. With the defeat of the Austro-Hungarian Monarchy, in World War I the southern part of Tyrol had to be ceded to the Kingdom of Italy.

With the rise of Fascism in Italy in the 1920s, Italianization of South Tyrol started. This included the exclusive use of Italian language in the public offices, the closure of the majority of the German schools, and giving incentives for immigrants from other Italian regions. After the alliance of Adolf Hitler with Benito Mussolini in 1939, both dictators agreed that the German-speaking population could emigrate to neighbouring Germany (including annexed Austria) or stay in Italy and accept their complete Italianization.

WORLD WAR II

At the end of World War II in 1945 the South Tyrolean People's Party was founded, mainly by those who had elected to stay in Italy after the agreement between Hitler and Mussolini. As the Allies had decided that the province should remain a part of Italy, an agreement was negotiated in 1946, recognizing the rights of the German minority. But as the Italians were the majority in the region, the self-government of the German minority became impossible and this culminated in terrorist acts. Eventually, the province received greater autonomy within Italy in 1972. Today, province of South Tyrol (Figures 13.2–13.4) is peaceful and a wealthy Italian province with good relations with the Austrian Tyrol.

INNSBRUCK

Innsbruck (Figures 13.5–13.14) is the capital city of Austrian Tyrol . It is located in the Inn Valley at the junction with the Wipptal which provides access to the Brenner Pass. The word *bruck* comes from the German word *Brücke* meaning “bridge,” which leads to “the bridge over the River Inn.” After World War II, Tyrol was governed by France until Austria regained independence in 1955.



Figure 13.2: Location of Bolzano/Bozen, capital of South Tyrol marked x.



Figure 13.3: Tyrol: North and East Tyrol are Austria. South Tyrol and Trentino are Italy.



Figure 13.4: Typical view in Austrian Tyrol.



Figure 13.5: River Inn.



Figure 13.6: Innsbruck main square.



Figure 13.7: Innsbruck main square with St. Anna's Column to celebrate the withdrawal of Bavarian troops in 1703. It has a statue of the Virgin Mary on a crescent moon on top.



Figure 13.8: General view of Innsbruck.



Figure 13.9: Innsbruck Hofburg, residence for Emperor Maximilian was built in 1460 and rebuilt by Maria Theresa from 1754–1773.



Figure 13.10: Maria Theresa Arch constructed to welcome the Empress to the city.



Figure 13.11: Decoration on top of the arch.



Figure 13.12: Fountain dedicated to Archduke Leopold V ruler of Tirol from 1619 to 1632.



Figure 13.13: Archduke Leopold V fountain details.



Figure 13.14: House decoration.

Hofkirche

Holy Roman Emperor Maximilian I (1459–1519) (Figure 13.15) ordered 40 larger than life-sized statues of his family members and others to be cast for his grave in Innsbruck Hofkirche or Court Church. The best artists of those days such as Albrecht Dürer were commissioned for this project. However, the project was never completed and only 28 were brought into being. Further, on his death-bed, the emperor expressed his wish to be buried in the Saint George's chapel in Wiener Neustadt near Vienna where he was born. This wish was fulfilled but the statues were too heavy to be transported to Vienna. It was his grand son Ferdinand I (1503–1564) (Figure 13.16) who built an empty tomb in the Hofkirche for his grand father with the bronze statues of Maximilian ancestors and two wives guard the tomb (Figures 13.17–13.22). In 1823 the remains of the Tyrolean freedom fighter Andreas Hofer were also buried in the mausoleum.



Figure 13.15: Maximilian I (1459–1519).



Figure 13.16: Ferdinand I (1503–1564).

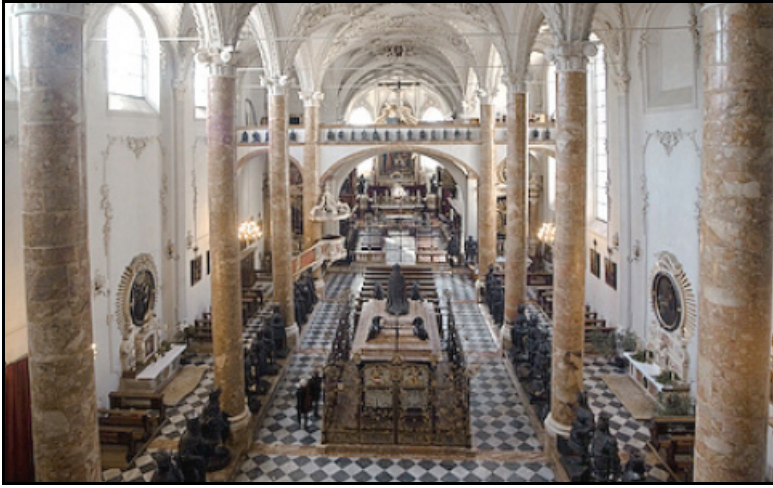


Figure 13.17: General view of the Court Church.

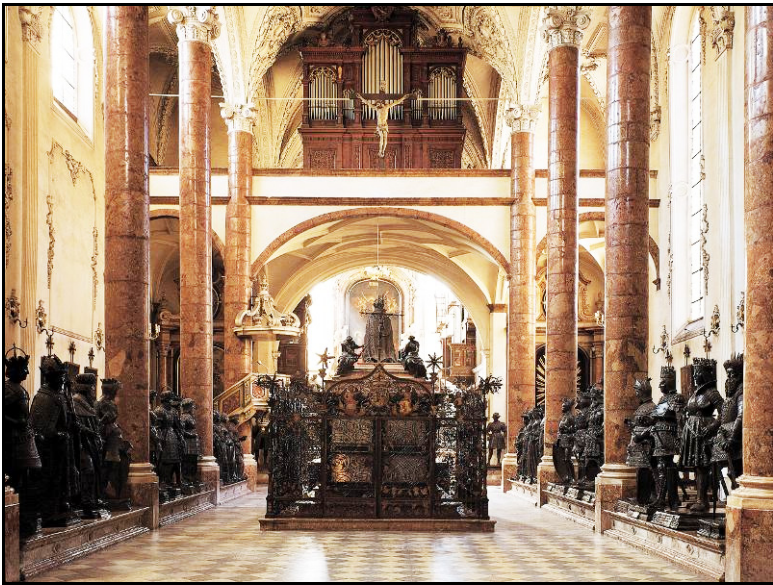


Figure 13.18: Another view of the Court Church.



Figure 13.19: Empty tomb of Holy Roman Emperor Maximilian I (1459–1519).



Figure 13.20: Bronze statues of Maximilian's ancestors.



Figure 13.21: Bronze statues of Maximilian's two wives.



Figure 13.22: Bronze statues of Maximilian's ancestors.

The Court Church also includes a magnificent organ that still functions to this day (Figure 13.23).



Figure 13.23: Court Church organ.

Ambras castle

Ambras Castle (Figure 13.24) is a palace on the hills near Innsbruck built in the 16th century on the spot of an earlier 10th-century castle. It served as the residence of Archduke Ferdinand II (1529–1595) (Figure 13.25) from 1563 to 1595. The Spanish Hall (Figure 13.26) contains portraits of the rulers of Tyrol. The Habsburg Portrait Gallery contains about 300 portraits from the 15th to the 19th century, including King Albrecht II, Emperor Maximilian I, Charles V and Ferdinand I, to the last emperor of the Holy Roman Empire, Franz II. Because of the various dynastic relations, the collection also shows members of other European dynasties. There are rooms of armour from the late 15th century, including several suits made for Archduke Ferdinand.

Golden Roof House

The Golden Roof House (Figures 13.27–13.29), now a museum, was built by Archduke Friedrich IV in the early 15th century as the residence for the Tyrolean sovereigns. Emperor Maximilian I (1459–1519) used to sit in the balcony to watch tournaments in the square below. There are paintings showing the emperor, his first wife Maria of Burgundy, and his second wife Bianca Maria Sforza of Milan.



Figure 13.24: Ambras Castle.



Figure 13.25: Archduke Ferdinand II (1529–1595).

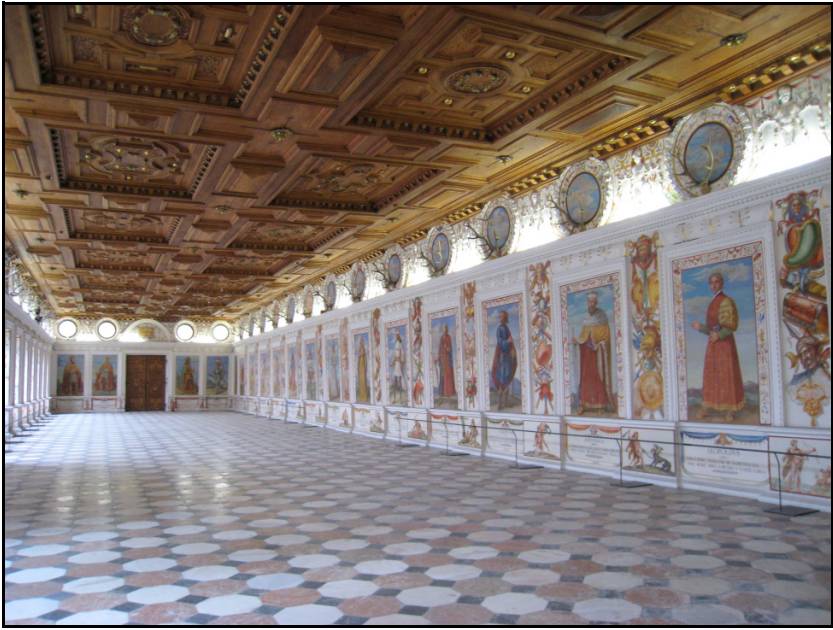


Figure 13.26: The Spanish Hall.



Figure 13.27: In front of Golden Roof House. Photo by Fathi Habashi, 2005.



Figure 13.28: Golden Roof House façade.



Figure 13.29: Golden Roof House balcony.

Grassmayr Bell Casting Museum

The Grassmayr Bell Casting (Figures 13.30–13.31) is a family business since 1599, now includes a museum.



Figure 13.30: Grassmayr Bell Casting Museum.



Figure 13.31: Grassmayr Bell Casting Museum.

Innsbruck Arsenal

Maximilian I had the Armoury (German: *Zeughaus*) (Figure 13.32) built in the early 1500s to store materiel for war. It also included a brass foundry. The location was chosen because of the nearby copper mines which had given rise to a flourishing arms industry. After the fall of the monarchy it was transformed into the Tyrolean State History Museum.



Figure 13.32: Innsbruck Armoury.

SCHWAZ

Schwaz, Tyrolean for Schwarz, i.e., Black, is an old silver town because of the black ore that became known as “schwarzite.” Schwaz, about 30 km east of Innsbruck (Figures 13.33–13.34), was the second largest town in Austria after Vienna during the Middle Ages because of its rich silver mines.



Figure 13.33: Location of Innsbruck and Schwaz.



Figure 13.34: General view of Schwaz.

SILVER MINES

A visit to the mine was made available (Figure 13.35).

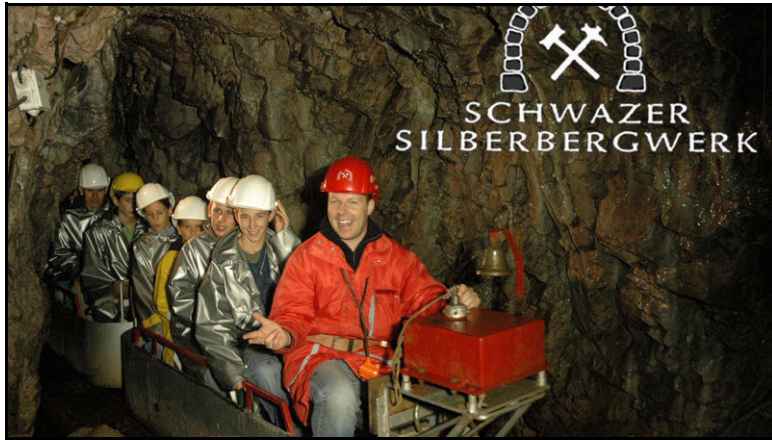


Figure 13.35: Visiting the mines.

Bergbuch

In 1556 the *Schwazer Bergbuch* was available as a hand-written manuscript with a number of coloured drawings; it was published for the first time in 1988. Only few pages of the book are devoted to technical aspects of ore treatment; the rest of the book, is devoted to the people operating the mine, who were about 20 000 working in about 300 galleries. Each job is described and illustrated, methods of supplying their needs such as food, clothes, tools, etc., and management of the working place. It is said that the book was written as a document for the forthcoming mining conference called “Synode” that was held in Schwaz in 1557.

The Book was made at a time when mining in Schwaz had already passed its peak and was going through a major crisis. Written by a high ranking official of the regional mining authority, the Mining Book was probably made to make the Emperor familiar with his richest resource, and to remind him of the role of mining for his economic and political interests, and to provide a comprehensive overview of the legal and safety aspects of mining in preparation of the mining conference in 1557. It was also intended as an incentive for new investors to buy shares. Typical illustrations from the book are shown below (Figures 13.36–13.39).

Cultural Heritage Symposium

It was at the 300 years old Benedictine Monastery Fiecht in Schwaz that the Eighth International Symposium on Cultural Heritage in Geosciences, Mining and Metallurgy was held in October 2005. The program included visits to the silver mine in Schwaz, the Mint in Hall, the Museum

of the Alpine Association in Innsbruck, a reception by the Mayor of Schwaz, a visit to the Benedictine Fiecht Monastery Museum, and a visit to Swarovski Crystal World.



Figure 13.36: Underground mining.



Figure 13.37: Assaying.



Figure 13.38: Mining.



Figure 13.39: Washing of ore.

Monastery Fiecht

Fiecht monastery (Figures 13.40–13.41) was built in 1706. After World War II it was occupied by French troops until Austria regained her independence in 1955. It has a large collection of old books, maps, and art work (Figure 13.42).



Figure 13.40: Fiecht monastery.



Figure 13.41: Fiecht monastery church.



Figure 13.42: A statue at the Monastery for Santa Barbara, the mining saint.

Swarovski

Incidentally, the Swarovski family resided in Schwaz in the late 1800s, when Daniel Swarovski (1862–1956) (Figures 13.43–13.44) began a career in crystal manufacture. He was born in Bohemia. His father was a Slovak glass cutter who owned a small glass factory where Daniel first learned the art of glass-cutting. He patented a machine in 1892 to cut jewellery stones to perfection and expanded the use of this technology to include cutting crystal chandelier pieces. He perfected the purity of leaded glass crystal to a state of flawless brilliance and became world famous for his art work (Figures 13.45–13.46).



Figure 13.43: Daniel Swarovski (1862–1956).



Figure 13.44: Swarovski's logo.



Figure 13.45: Swarovski chandelier.





Figure 13.46: Typical Swarovski products which can be found in practically every airport.



Figure 13.47: Conference delegates at the entrance to Swarovski's Museum.

HALL

Hall (Figures 13.48–13.52) is the Celtic word for salt. Salt was mined from 1244 to 1967, in what is known as the Halltal, German for Hall valley, 10 km north of the town Hall. Salt mining formed the main industry of the town and its surroundings. The salt was extracted by dissolution in water then separating the insoluble material by filtration. The brine thus created is transported in cast-iron pipes to the boiler in Hall. The salt produced was exported to Switzerland, the Black Forest, and the Rhine valley. Hall became the leading market and trading place in the northern parts of Tyrol.



Figure 13.48: View of Hall.



Figure 13.49: Promenade in Hall. Photo by Fathi Habashi, 2005.



Figure 13.50: Church.



Figure 13.51: Promenade in Hall, 2005.



Figure 13.52: Promenade in Hall, 2005.

The Mint

The Hasegg Castle in Hall was constructed soon after 1300, when Hall was rapidly becoming the centre of Tyrolean commerce and salt mining. The building was erected to protect the salt mines and the shipping industry. In 1477 the Archduke Sigismund (1427–1496) (Figure 13.53) from Tyrol had the mint transferred from Merano (South Tyrol) to the Castle to be in the vicinity of the silver mines of Schwaz. The Mint Tower (Figures 13.54–13.55) became the symbol of the town.



Figure 13.53: Archduke Sigismund (1427–1496).



Figure 13.54: On the way to the Mint, 2005.

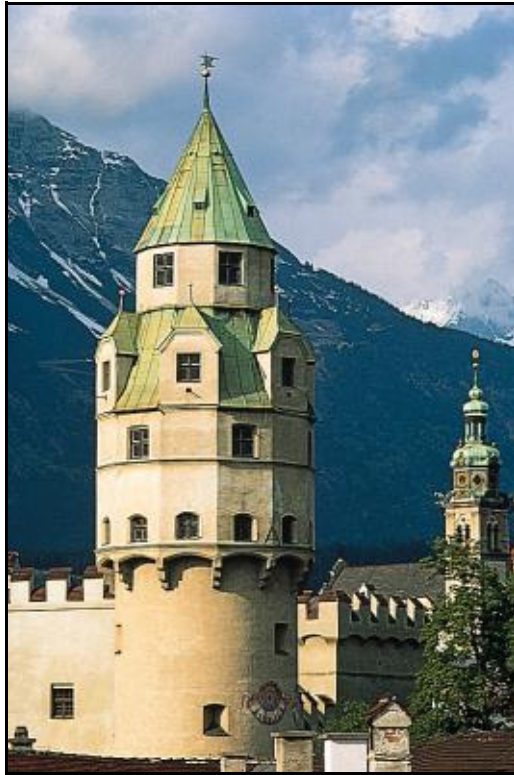


Figure 13.55: Mint tower.

It was there that the large silver coin, the “Gulden,” was first minted in 1486 to replace the gold coin (Figures 13.56–13.58). It became well known all over the world for over two centuries. In the 16th century the mint in Hall also introduced the first automated coining machine in the world. In the 15th and 16th century, Hall was one of the most important towns in the Habsburg Empire. This period also saw the construction of many of the churches, monasteries, and convents. The Habsburgs in Bohemia developed the coin later into the thaler that was the ancestor of the US dollar.

In 1487, Sigismund entered into a war with the Republic of Venice, which resulted in the dissatisfaction of the Tyroliennes. In 1490 he was compelled to hand over the authority to Archduke Maximilian I (1459–1519), who later became Holy Roman Emperor.



Figure 13.56: The 1486 Gulden.



Figure 13.57: Leopold's 1620 Gulden.



Figure 13.58: Maria Theresa 1780 Gulden.

The early methods of coining money were primitive (Figure 13.59). The metal was melted in a crucible and then poured on to a slab to cool. When still warm it was beaten out to form a thin plate which was cut up into blanks. The blank was heated until soft and then hammered against a die. Later, two dies were used, the pellet of hot metal being placed on the lower die and the upper die then hammered down upon it until an impression was produced on both faces of the coin. An artist or a craftsman would carve design on a thick disk of bronze; this was the obverse die which fitted into a pit sunk in the top face of an anvil. On the lower end of a square-faced bronze punch the man next carved another design; this was the reverse die. The tongs pulled the metal disk away, for it was now a finished coin.



Figure 13.59: An illustration in a book showing early minting technology. The young man standing is supposed to be Maximilian on a visit.

The Fuggers

Jakob Fugger (1459–1525) (Figure 13.60) was the son of Hans Fugger, a weaver who settled in Augsburg in the Holy Roman Empire in the late 15th century. He learned bookkeeping in Venice and at the death of his father he inherited the business of trading. Fugger expanded the family enterprise and became well-known throughout Europe. He used his fortune to lend money to its rulers. He often provided mercenary armies with monetary resources so they could wage war against one another. He took control of the silver mines in Tyrol in return for the money he loaned to Emperor Maximilian I.



Figure 13.60: Jakob Fugger.

Chapter 14

Culture

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NATIONAL DRESS

National dress know as Tracht (Figures 14.1–14.2).



Figure 14.1: National ladies dress.

FASCHING

The winter festival starts in Vienna after New Year’s celebrations that terminates end of February. Organizations hold get together parties in various localities the most elaborate is the Opernball in Vienna Opera House (Figure 14.3).



Figure 14.2: National men dress.



Figure 14.3: A typical Opernball.

SPECIALITIES

The Sachertorte (Figure 14.4) was created by young pastry chef Franz Sacher (1816–1907) in 1832 for Prince Metternich, the Austrian State

Chancellor. The Sachertorte and other recipes made him famous, and in time he ran several cafes and restaurants. Anna Sacher, later Franz's daughter in law, became manager of the Sacher Hotel in Vienna behind the Opera House.

Wiener Schnitzel (Figure 14.5) and Apfelstrudel (Figure 14.6) are typical Viennese. Incidentally, the sausage in Vienna is known as Frankfurter while in Frankfurt is known as Wiener Wurst.



Figure 14.4: Sachertorte.



Figure 14.5: Wiener Schnitzel.



Figure 14.6: Strudel.

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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

worked at the Extractive Metallurgical Research Division of Anaconda Company in Tucson, Arizona, before joining Laval in 1970. His research was mainly directed towards organizing the unit operations in extractive metallurgy and putting them into a historical perspective.