

Fathi Habashi

My trips in the

Balkan



My Trips in the Balkans

Volume derived from



Fathi Habashi

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

2015

The Book

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

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



The Author

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

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*To Nadia,
Hani, and Hatem
with love*

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Technical

- F. Habashi, *Principles of Extractive Metallurgy*:
- 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.
 - Volume 3: Pyrometallurgy (493 pages), 1986 (reprinted 1992) (out of print), Gordon & Breach Science Publishers.
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- F. Habashi, *Researches on Rare Earths. History and Technology*, 2008, 125 pages.
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- F. Habashi, *Pressure Hydrometallurgy*, 2014, 242 pages.
- F. Habashi, *De Re Metallica. A Metallurgist on the Move*, 7 volumes, 2015, 5523 pages.

Historical

- F. Habashi (editor), *Gellert's Metallurgic Chymistry*, 1998, 500 pages.
- F. Habashi, D. Hendrickner, C. Gignac, *Mining and Metallurgy on Postage Stamps*, 1999, 335 pages.
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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.

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Chapter 1

Albania

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Figure 1.1: Flag of Albania.

INTRODUCTION

After attending the Balkan Metallurgical Conference in Bucharest in June 2009 I planned to visit colleagues at the University of Tirana. It was thought that it would be a short trip Bucharest–Tirana but to my surprise there was no direct connection and must go to Vienna first and from there get the connection to Tirana (Figure 1.2). Strangely enough, Albania is known to her people as Shqipëria (Figures 1.3–1.4). Also, there was another Albania located on the Caspian Sea mentioned by the ancient Roman writers (Figure 1.5). The Albanian language is entirely distinct from the tongues spoken by the neighbouring nationalities. It is believed that the Albanians are the descendants of the aboriginal settlers of the Balkan Peninsula.



Figure 1.2: Albania and her neighbours.

HISTORICAL INTRODUCTION

The lands comprising modern-day Albania were incorporated into the Roman Empire as part of the province of Illyricum (Figure 1.6). Since the 1st and 2nd century AD, Christianity had become the established religion in Byzantium, Ottoman supremacy in the west Balkan region began in 1385. By the 15th century, the Ottomans ruled most of the Balkan Peninsula. Their rule in part of Albania was briefly interrupted in the 15th century, when Gjergj Kastrioti Skanderbeg, an Albanian who had served as an Ottoman military officer, renounced Ottoman service, allied with some Albanian chiefs and fought off Turkish rule from 1443–1478. Albania was fully re-occupied by the Ottomans in 1478.



Figure 1.3: An Albanian stamp from the Communist era.



Figure 1.4: A recent Albanian stamp.



Figure 1.5: The other Albania mentioned by Roman writers.



Figure 1.7: Skanderbeg postage on stamp during Italian occupation of Albania.

On November 28, 1443, Skanderbeg saw his opportunity to rebel during a battle against the Hungarians in Niš. He switched sides along with 300 other Albanians serving in the Ottoman army. After a long trek to Albania he eventually captured Krujë. After capturing the castle, Skanderbeg abjured Islam. He raised the flag with the Double-headed eagle, an ancient symbol of the Holy Roman Empire and the Byzantine Empire.

Following the capture of Krujë, Skanderbeg built fortresses and organized a mobile defence force. In the summer of 1444, in the field of Torvioll, the united Albanian armies under Skanderbeg faced the Ottomans. His victory echoed across Europe because this was one of the few times that an Ottoman army was defeated. Christianity in the Balkans was dealt a fatal blow after the Fall of Constantinople in 1453. In 1466 Sultan Mehmed II led an army into Albania and laid siege to Krujë. After several months he failed to take Kruja. During that period, however, Skanderbeg felt ill and died. After his death an Ottoman army captured Albania.

Skanderbeg has been credited with being the main reason for delaying Ottoman expansion into Western Europe. Monuments in Albania and outside were constructed honouring the memory of Skanderbeg. The palace in Rome in which Skanderbeg resided in 1466–1467 still bears his name. A statue in the city is dedicated to him. The square where the statue resides is named Piazza Albania.

In 2006, a statue of Skanderbeg was unveiled on the grounds of St. Paul's Albanian Catholic Community in Rochester Hills, Michigan. Monuments or statues of Skanderbeg have also been erected in: Skopje, Debar, Pristina, Geneva, Brussels and various locales throughout southern Italy.

Independence

After many uprisings against the Ottomans, Albania finally got her independence in 1912. She achieved a degree of statehood after World War I, in part because of the diplomatic intercession of the United States. Unable to survive a predatory environment without a foreign protector, Albania became the object of tensions between Italy and the Kingdom of Serbs, Croats, and Slovenes, which both sought to dominate the country. Mussolini's (Figure 1.8) forces overthrew King Zog (Figure 1.9) when Italy invaded Albania in 1939. Albania was later occupied by the Germans until finally Tirana was liberated by the partisans on 17 November 1944.



Figure 1.8: King Ahmed Zog (1895–1961).



Figure 1.9: Benito Mussolini (1883–1945).

TIRANA

Tirana was founded in 1614 by Sulejman Pasha, and became Albania's capital city in 1920. The Main Square comprises a monument to Skanderbeg (Figure 1.10), the Historical Museum (Figures 1.11–1.12), and the National Library (Figure 1.13).



Figure 1.10: Skanderbeg in the Main Square of Tirana, June 2009.



Figure 1.11: In front of the Historical Museum, June 2009.



Figure 1.12: Details of the mural of the Historical Museum.



Figure 1.13: The National Library in Tirana Main Square.



Figure 1.14: Modern boutiques in Tirana.

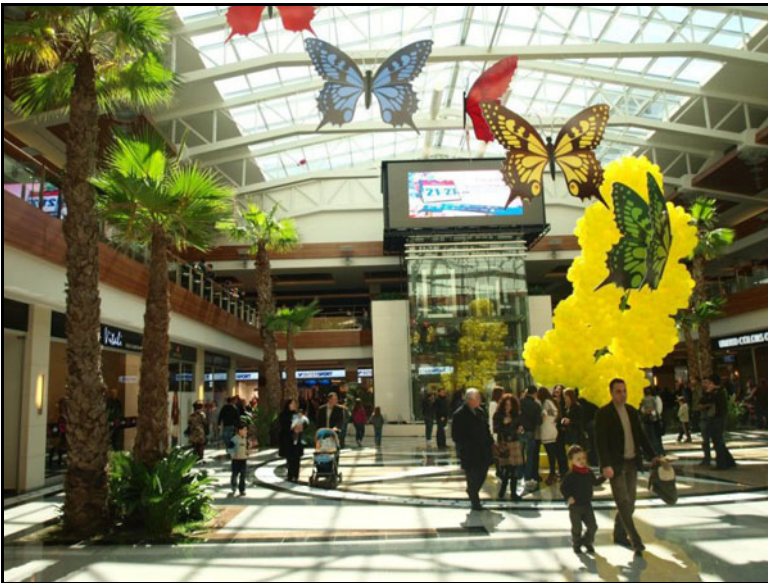


Figure 1.15: Modern boutiques in Tirana.



Figure 1.16: Modern boutiques in Tirana.



Figure 1.17: University of Tirana.

Polytechnic University of Tirana

University of Tirana was the first university in Albania when it was founded in 1957 by joining together five existing institutes of higher education. The building is an old Italian architecture build in the late 1930s as military academy (Figure 1.17). Between 1985 and 1992 it was called Enver Hoxha University after the First Secretary of the Communist Albanian Party of Labour. Initially it comprised ten faculties, but in 1991 it was broken up into the Polytechnic University which was formed of the engineering faculties, and the main University of Tirana which comprised the seven remaining faculties covering humanities, economics, natural science and medicine. The Polytechnic University has approximately 10 000 students.

KRUJË AND DURRËS

Krujë

Krujë (Figures 1.21–1.22) is the home town of Eskanderbeg. It is famous for its Castle on top of the hill, Eskanderbeg Museum (Figure 1.23), and the multitude of souvenir shops in the Bazar leading to the Castle (Figure 1.24).



Figure 1.18: Meeting mineral processing faculty members, June 2009.



Figure 1.19: Mineral processing faculty members, June 2009.



Figure 1.20: Government offices square.

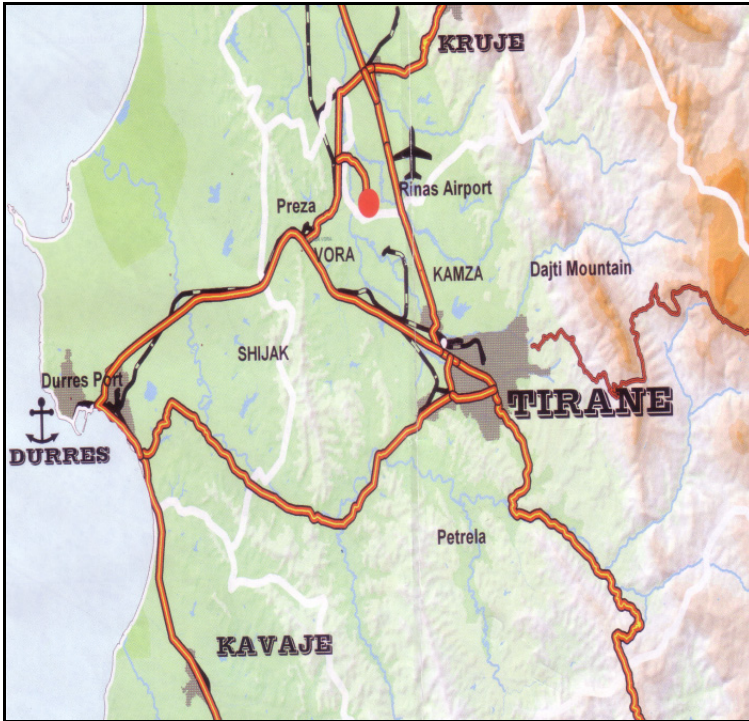


Figure 1.21: Map showing the location of Krujë 32 km north of Tirana and Durrës the beach city and port.



Figure 1.22: View of Krujë.



Figure 1.23: Remains of the Castle and Skanderbeg Museum.



Figure 1.24: Souvenir shops in the Bazar.

Durrës

Durrës is one of the oldest towns in Albania, was colonized by the Greeks in 627 BC. Today it is a modern city with pleasant beaches (Figures 1.25–1.26). There is a Roman amphitheatre claimed to be the largest in the Balkans (Figure 1.27).



Figure 1.25: The Adriatic resort Durrës.



Figure 1.26: On the beach, June 2009.



Figure 1.27: Remains of the Roman amphitheatre.

Chapter 2

Bosnia and Herzegovina¹

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Figure 2.1: Flag of Bosnia and Herzegovina.

HISTORY

Introduction

Bosnia was populated by the Illyrians who were defeated by the Roman emperor Tiberius in 9 AD. After the Romans, the Goths settled the area, followed by the Slavs in the 7th century settling in what is now Bosnia and Herzegovina and the surrounding lands. More South Slavs came in a second wave. In the late 9th century the Bosnians were Christianized. The Bosnian Church was independent and considered heretical by both the Roman Catholic and the Eastern Orthodox Churches mainly for political reasons. The Church had its own bishop and used the Slavic language in liturgy. The Church was mainly composed of monks in scattered monastic houses.

¹ Visit took place in 2014 after the International October Conference in Bor Lake, Serbia.

In 1448, the ruler and nobleman Stjepan Kosača (1404–1466) (Figure 2.2) was given the title Herzog, meaning Grand Duke in German, by the Holy Roman Emperor Frederick III. Since then he called his land Herzegovina. His daughter Catherine (1425–1478) (Figure 2.3) married in 1446 Stephen Thomas, the son of King Stephen Ostoja of Bosnia. As a result, the ties between the Bosnian royal house and Bosnia’s nobility was strengthened and the country was called Bosnia and Herzegovina (Figure 2.4).



Figure 2.2: Ruler of Herzegovina Stjepan Kosača (1404–1466).

Figure 2.3: Queen Catherine of Bosnia (1425–1478).



Figure 2.4: Bosnia and Herzegovina and her neighbours.

Ottoman invasion

The Ottomans under Sultan Murad defeated the Serbs at the Battle of Kosovo (Figure 2.5) in 1389 but the Sultan lost his life in the battle. The Battle of Kosovo is seen as a symbol of Serbian patriotism.



Figure 2.5: Kosovo.

The Ottomans founded Sarajevo and Mostar in the 1450s, then conquered Bosnia in 1463. The Ottomans brought Islam to the region. A significant number of Sephardi Jews arrived following their expulsion from Spain in the late 15th century. Some of the Bosnian persecuted by both the Roman Catholic and Eastern Orthodox churches converted to Islam.

Austrian invasion

After numerous revolts and widespread peasant uprising, Prince Eugene of the Habsburg Monarchy conquered Sarajevo in 1697. Austria-Hungary's occupation came in 1878, and complete annexation followed in 1908. A state of relative stability was reached soon enough and Austro-Hungarian authorities were able to embark on a number of social and administrative reforms. This lasted up until World War I, after which it became part of the Kingdom of Yugoslavia.

Assassination of the Crown Prince

Just before 10 a.m. on Sunday June 28, 1914, the Archduke Franz Ferdinand of Austria (1875–1914) and his wife Sophie (1863–1914) (Figure 2.6), Duchess of Hohenberg, arrived in Sarajevo by train. In the front car of the procession into the city were the mayor of Sarajevo and the city's Commissioner of Police. In the second car were Franz Ferdinand and Sophie. The car's top was rolled back in order to allow the crowds a view of its occupants. Conspirators lined the route along the Appel Quay near Latin Bridge (Figures 2.7–2.8). At 10:15, when the six-car procession passed the central police station, one of the conspirators threw a hand grenade at the Archduke's car. The driver accelerated when he saw the object flying towards him, and the bomb exploded under the fourth car. Two of the occupants, were seriously wounded.

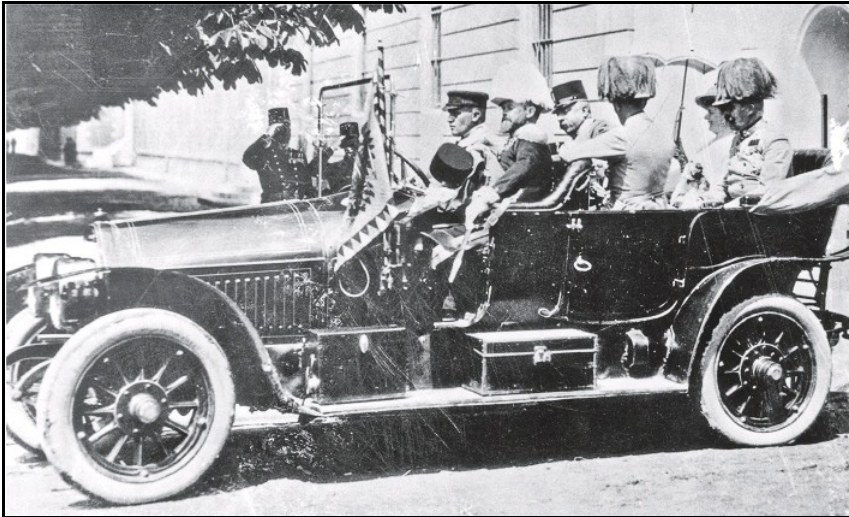


Figure 2.6: Archduke Franz Ferdinand of Austria and his wife Sophie in Sarajevo just before their assassination.



Figure 2.7: Latin Bridge on Miljacka River.



Figure 2.8: Latin Bridge on Miljacka River [photo by Fathi Habashi, 2014].

After visiting the City Hall, Franz Ferdinand decided to cancel the program and to go to the Sarajevo Hospital to visit the victims. On the way, the driver took a right turn into Franz Josef Street. A Yugoslav, Gavrilo Princip, a member of Young Bosnia who was standing, stepped forward and fired twice into the car (Figures 2.9–2.11). Franz Ferdinand and Sophie died while being driven to the Governor's residence for medical treatment; it was not yet 11:00 am¹. Princip was only 19 years old and, according to Austrian law, he received a prison sentence. He died in prison of tuberculosis. He is considered a hero by the Serbs and was buried in a special chapel in the cemetery in Sarajevo. This is not the first time that there was assassination of members of the Austrian royal family. In 1898, Empress Elizabeth, wife of Franz Josef, was assassinated by an Italian anarchist while on a trip to Geneva.

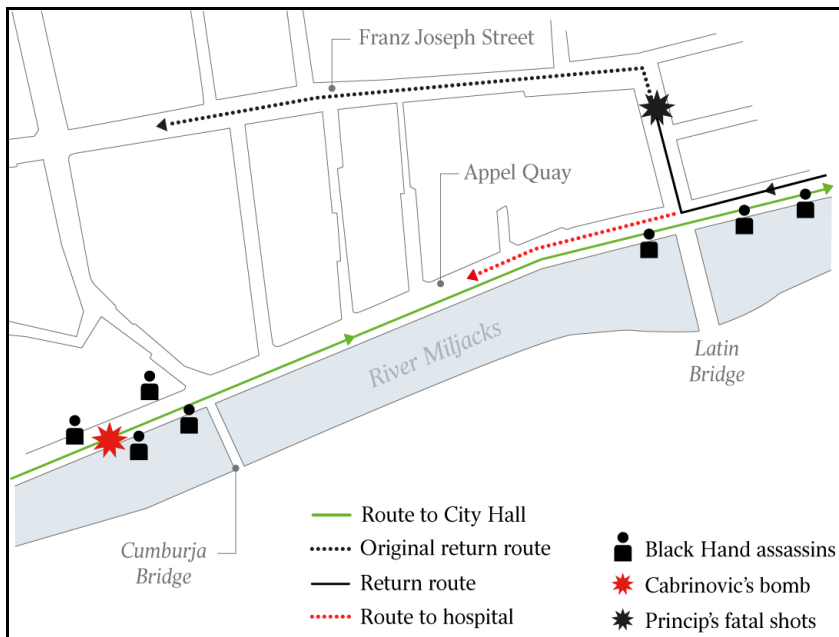


Figure 2.9: Assassination of Crown Prince of the Austrian Empire and his wife at the Latin Bridge in Sarajevo.

¹ The Archduke's wife was a Czech countess and was treated as a commoner at the Austrian court. Emperor Franz Josef had only consented to her marriage on the condition that their descendants would never ascend the throne. The Archduke and Duchess were interred at Artstetten Castle because his wife could not be buried at the Imperial Crypt. The castle is in Wachau district and belongs to countess family.



Figure 2.10: Archduke Franz Ferdinand of Austria and his wife Sophie on an Austrian stamp marking the date of assassination.



Figure 2.11: Plaque commemorating the place of the assassination of Archduke Franz and his wife.

World War I — One hundred years ago¹

World War I (July 28, 1914–November 11, 1918) started as a result of the assassination of the Archduke and his wife. The Archduke was sent by Emperor Franz Josef to observe the military manoeuvres in Bosnia. The assassination was not the cause of the war but only the spark that started the war. It became known later that the assassination was planned with the knowledge and approval of the Russian ambassador and the Russian military attaché in Belgrade.

At that time, empires were competing to exploit the underdeveloped countries to form colonies. The South Slavs were under the occupation of the Austrians while they felt that they are more associated with the Russians. They have the same Orthodox religion and the same Slavic ethnic origin. In 1878, Serbia's monarchs King Milan I Obrenović maintained close relations with Austria-Hungary. In 1903, Serbian military officers stormed the Serbian Royal Palace, killed King Alexander I Obrenović and his wife, and installed Peter I of the House of Karađorđević as the new king. The new dynasty was friendly to Russia and less friendly to Austria-Hungary.

German statesmen claimed that they were a superior nation and had the divine right to civilize the world. People wanted freedom and democracy. There was a growth of nationalism like the Communists in Russia, the Black Hand in Serbia, the Young Turks in Turkey, etc. There were alliances and treaties between the great powers: England, France, and Russia formed a block [the Allies] against Austria, Germany, and Italy [the Axis].

In 1908–1909, the Austrian Empire announced the annexation of Bosnia and Herzegovina, territories formally within the sovereignty of the Ottoman Empire. In 1912–1913, the Balkan League (Serbia, Greece, Montenegro and Bulgaria) were in war against the Ottomans. The unilateral action of Austria coincided with Bulgaria's declaration of independence from the Ottoman Empire. The combined armies of the Balkan states captured almost all remaining European territories of the Ottoman Empire. Despite its success, Bulgaria was dissatisfied over the division of Macedonia. It attacked its former allies in June 1913. Serbian and Greek armies repulsed the Bulgarian offensive and entered Bulgaria. With Bulgaria having previously engaged in territorial disputes with Romania, provoked Romanian intervention. When Romanian troops approached the capital Sofia, Bulgaria had to cede portions of its gains to Serbia, Greece, and Romania.

On top of that, people were fed up with emperors and empires and they had enough of repression. During the diplomatic crisis that preceded World War I, there was a misperception of Germany that Britain would remain neutral. It was the decisions taken by statesmen and generals during the cri-

¹ The visit to Sarajevo took place in October 2014.

sis that started the war. It was thought that it will be a short war but many things happened which prolonged it to take four years. Japan seized German possessions in the Pacific and East Asia. Kingdom of Italy negotiated secretly with France and Great Britain for territory if victorious, then entered the war on the side of the Allies in May 1915. Italians drove deep into Austrian territory and was compensated with South Tyrol when the Allies claimed victory.

It was a war in trenches, poisonous gas, hand grenades, and finally airplanes were used. Important events during the war were the participation of USA in April 1917, the Russian Revolution in October 1917, and the synthesis of ammonia in Germany. More than 9 million combatants and 7 million civilians died as a result of the war.

It was Woodrow Wilson (1856–1924) (Figure 2.12), president of the United States from 1913 to 1921, who showed democracy to European powers, and this was the end of the great empires. Result of the war was the dismembering of Russian, Ottoman, German, and Austrian empires (Figures 2.13–2.14). The League of Nations was formed with the aim of preventing any repetition of such a conflict.

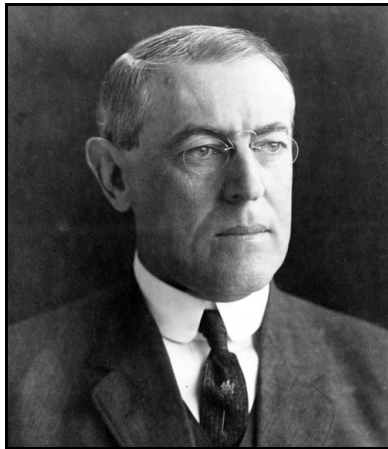


Figure 2.12: Woodrow Wilson (1856–1924).

Kingdom of Yugoslavia

Following World War I, Bosnia was incorporated into the South Slav kingdom of Serbs, Croats, and Slovenes and renamed Yugoslavia. Serbo-Croat tension over the structure of the state was evident. An agreement in 1939 encouraged what was a partition of Bosnia between Croatia and Serbia. However, politicians shifted their attention to the rising threat posed by Nazi Germany. Yugoslavia was invaded by Germany on April 6, 1941.



Figure 2.13: Europe before World War I.

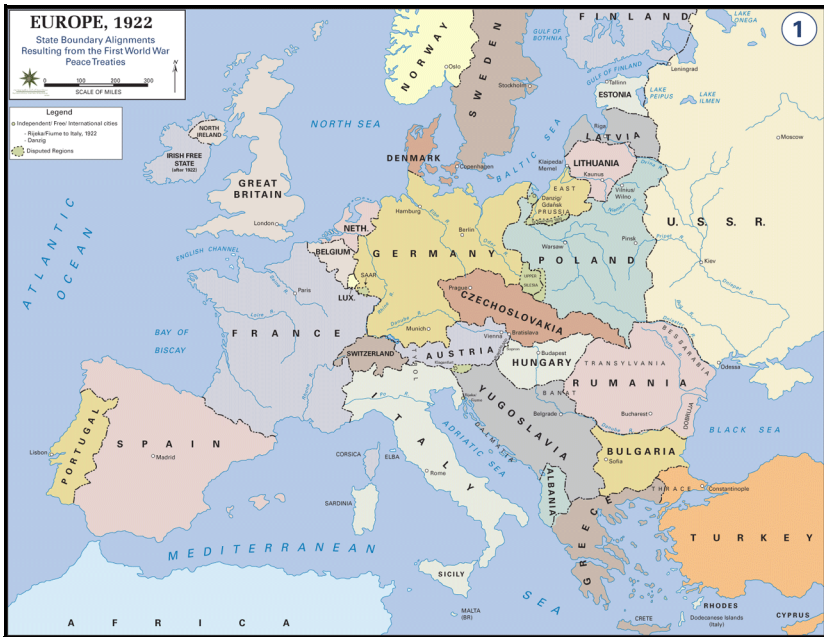


Figure 2.14: Europe after World War I.

World War II

In 1941, Bosnia and Herzegovina were made part of Nazi-controlled Croatia. During occupation widespread persecution and genocide took place. The Jewish population was nearly exterminated. Bosnian and Herzegovinian resistance fighters fought a guerrilla war against the Croatian Fascists. At the end of the war, Bosnia and Herzegovina were reunited into a single state as one of the six republics of the newly established Communist Yugoslavia under Marshal Tito.

Independence

When Tito died in 1980 and with growing economic dissatisfaction and the fall of the iron curtain over the next decade, Yugoslavia began to fall apart. The country proclaimed independence in 1992, which was followed by the Bosnian War, lasting until late 1995.

In July 1995, killing of more than 8 000 Bosnians, mainly men and boys, in and around the town of Srebrenica took place. The killing was perpetrated by units of the Army of Republika Srpska. The forcible transfer of between 25 000 and 30 000 Bosnian women, children, and elderly accompanied the massacre. In 2004, in a unanimous ruling, the International Criminal Tribunal for the former Yugoslavia located in The Hague ruled that the massacre of the enclave's male inhabitants constituted genocide. Radovan Karadžić (Figure 2.15), former President of Republika Srpska, and Ratko Mladić (Figure 2.16), former Chief of Staff of the Army, were charged with war crimes.

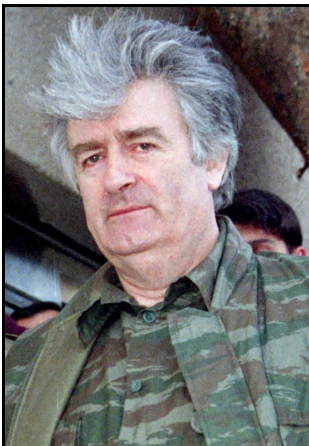


Figure 2.15: Radovan Karadžić.



Figure 2.16: Ratko Mladić.

After the war, Bosnia and Herzegovina formed a Federation of Bosnia and Herzegovina and the Republika Srpska, as well as the district of Brčko (Figures 2.17–2.18). The National Assembly and the Government of Republika Srpska are based in Banja Luka, but the capital city is Sarajevo. In Serbian, *Republika Srpska* means “Serbian Republic.”

Flag

The flag of the country has a triangle which stands for the three constituent peoples: Muslim Bosnians are the largest group, Orthodox Serbs second, and Catholic Croats third. The flag also represents the map of the country which looks like a triangle. The stars, representing Europe. The flag features colours often associated with neutrality and peace — white, blue, and yellow.



Figure 2.17: Republika Srpska in Bosnia and Herzegovina (1991–1992).



Figure 2.18: Bosnia and Herzegovina today.

SARAJEVO

The name Sarajevo is from Turkish *Plains of Saray* [Saray is Turkish means Palace]. It is surrounded by the Dinaric Alps and situated along the Miljacka River (Figures 2.19–2.32). It is the capital and largest city of Bosnia and Herzegovina, with a population of about 400 000 [2014].



Figure 2.19: Sarajevo Airport. 2014.



Figure 2.20: In Hotel Boutique, 2014.



Figure 2.21: In Hotel Boutique, 2014.



Figure 2.22: Map of Sarajevo. Baščaršija is the Old Town.



Figure 2.23: General view of Sarajevo and the Miljacka River.



Figure 2.24: In time of election campaign, 2014.



Figure 2.25: Faculty of Fine Arts.



Figure 2.26: National Theatre.



Figure 2.27: Modern building in Sarajevo.



Figure 2.28: A main street in Sarajevo where the monument to war is the front [see below].



Figure 2.29: The monument to war.



Figure 2.30: Entrance to a Bank.



Figure 2.31: Statue of Emperor Franz Josef (1830–1916) was hidden in one of the buildings in Sarajevo.



Figure 2.32: On a street in Sarajevo.

City Hall

The City Hall (Figure 2.33) was built in 1894 during the Austrian Empire in Moorish style. The façade is coloured red and yellow. Archduke Franz Ferdinand of Austria arrived at the building before the assassination in 1914 (Figures 2.34–2.35). In 1949 it was given to the National and University Library. It was badly destroyed during the war in 1991 but recently restored (Figure 2.36–2.37).



Figure 2.33: City Hall.



Figure 2.34: Archduke Franz Ferdinand of Austria leaving the building.

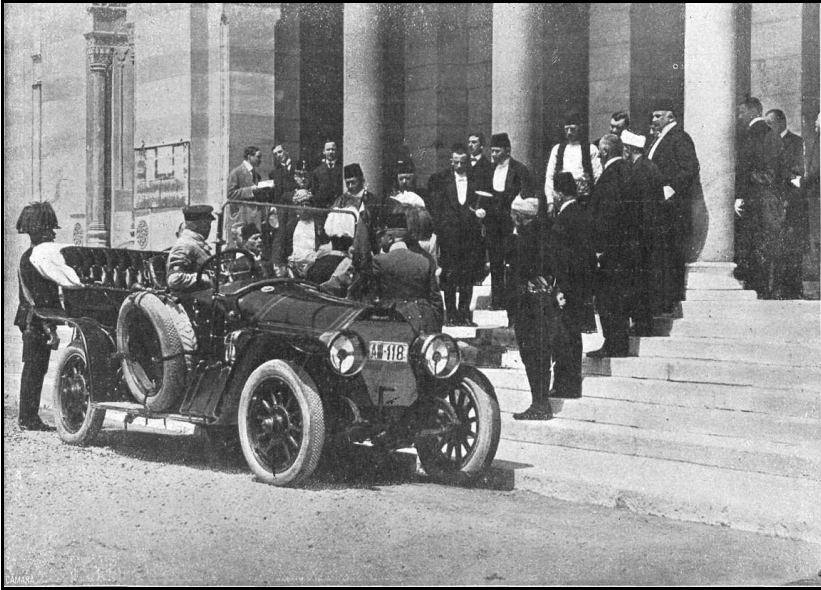


Figure 2.35: Archduke Franz Ferdinand of Austria leaving the building.



Figure 2.36: The City Hall was badly destroyed during the war in 1991.



Figure 2.37: City Hall now a library.



Figure 2.38: The Assassination Museum.

Assassination Museum

The Assassination Museum (Figures 2.38–2.41) is next to the Latin Bridge where the Archduke and his wife were assassinated in 1914. It contains the story of assassination, the old photos of the archduke's visit, wax statues of the couple, the car they used, their subsequent funeral, and Gavrilo Princip's court case.



Figure 2.39: Wax models of the couple.

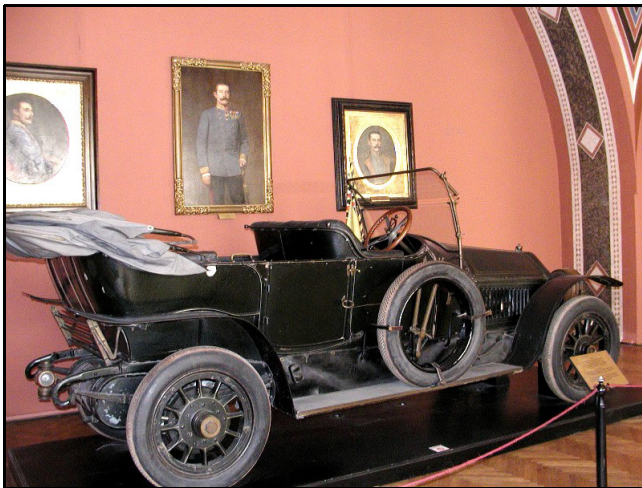


Figure 2.40: The car used by the royal couple during assassination.



Figure 2.41: Inside the Museum.

Baščaršija

The Old Town, known as Baščaršija (Figures 2.42–2.51), is a large open-air shopping area full of people, shops, and restaurants.



Figure 2.42: Bašćaršija is the Old Town.



Figure 2.43: Streets in the Old Town.



Figure 2.44: The fountain in the Old Town.



Figure 2.45: Old Town.



Figure 2.46: Old Town.



Figure 2.47: Old Town.



Figure 2.48: Old Town.



Figure 2.49: Old Town.



Figure 2.50: Old Town.



Figure 2.51: The old flag of Sarajevo.

Gazi Husrev-beg

Gazi Husrev-beg [Ghāzī Khuṣrow Beg] (1480–1541) was the Ottoman Governor of Bosnia. He is known for his major contribution to the improvement of Sarajevo and his construction of many buildings such as the mosque or the medresa. The Library was recently renovated (Figure 2.52).



Figure 2.52: Renovated Library of Gazi Husrev Beg.

Tašlihan

Tašlihan was built by Gazi Husrev-beys around 1540 as an inn for travelling merchants. It could hold up to 90 guests, their goods, and their horses. It was on fire several times, the last time in 1879 it was completely destroyed (Figure 2.53). Its ruins is near Hotel Europa (Figure 2.54–2.57) in the Old Town.



Figure 2.53: A poster describing the ruins.



Figure 2.54: Tašlihan ruins near Hotel Europa in the Old Town, 2014.



Figure 2.55: Tašlihan ruins, 2014.



Figure 2.56: Entrance to Tašlihan ruins made a shopping centre.



Figure 2.57: Modern shopping centre.

Srebrenica Museum

Srebrenica is a small town in Bosnia, about 5 hours drive from Sarajevo, where a massacre took place in 1995. Approximately 8 000 Bosnians, mainly boys and men, were killed by the Serbian army and a few hundred Russian volunteers. Total 11 000 people were killed in Bosnia and Herzegovina in Bosnia War from 1992 to 1995. A museum in Sarajevo relates this massacre (Figures 2.58–2.61).



Figure 2.58: A visit to Srebrenica Exhibition, 2014.



Figure 2.59: On a bridge on Miljacka River.



Figure 2.60: A street on the other side of Miljacka River [details in Figure 2.61].



Figure 2.61: A street in Sarajevo.

BLAGAJ¹

Blagaj is a village on the road to Mostar on Buna River (Figures 2.62–2.64). The Old Blagaj Fort on the hill above Blagaj, was the seat of Herzegovinian nobleman, Stjepan Vukčić, and the birthplace of Queen Katarina. When the Turks invaded the region in 1466, Katerina had to flee to Dubrovnik and then to Rome. The Blagaj Tekija (Figure 2.65–2.68) was built around 1520 by the Ottomans and contains a Dervish monastery.

¹ The trip from Sarajevo to Mostar was undertaken in a car with a guide with a stop over at Blagaj.



Figure 2.62: Location of Sarajevo, Blagaj, and Mostar.



Figure 2.63: Blagaj on the Buna River.



Figure 2.64: Blagaj on the Buna River.



Figure 2.65: Blagaj Tekija.

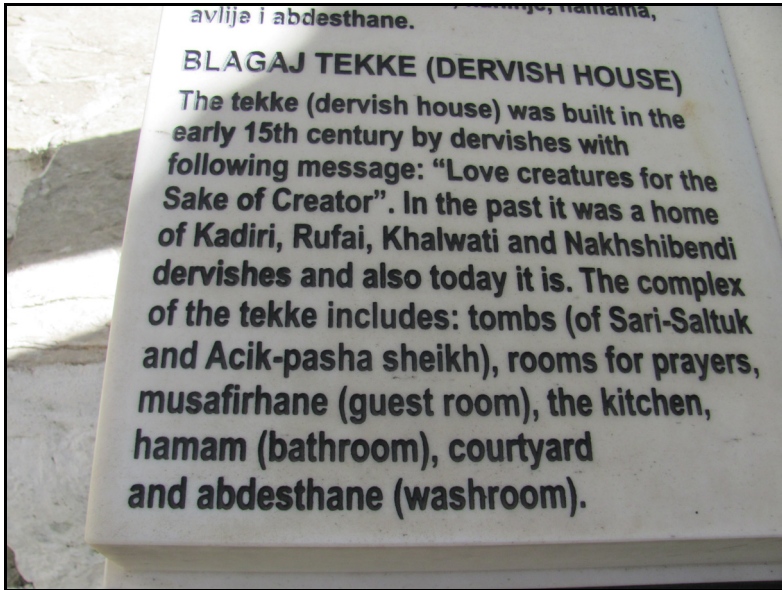


Figure 2.66: Blagaj Tekija.



Figure 2.67: Blagaj Tekija.



Figure 2.68: Inside mosque in the Tekija.

MOSTAR

Mostar (Figures 2.69–2.71) is an old city situated on the Neretva River and was named after the bridge keepers who in the medieval times guarded the Stari Most (Old Bridge) (Figures 2.72–2.73). The bridge was built by the Ottomans in the 16th century, designed by an apprentice of the architect Mimar Sinan.



Figure 2.69: Mostar on Neretva River.



Figure 2.70: Souvenir shops in Mostar.



Figure 2.71: Road in Mostar, 2014.



Figure 2.72: Mostar Bridge.



Figure 2.73: Mostar Bridge.

Between 1992 and 1993, after Bosnia and Herzegovina declared independence from Yugoslavia, the town was subject to an 18-month siege, was bombed, and the bridge and many buildings were destroyed (Figure 2.74).



Figure 2.74: With our guide in front of a building destroyed during the war.

Chapter 3

Bulgaria

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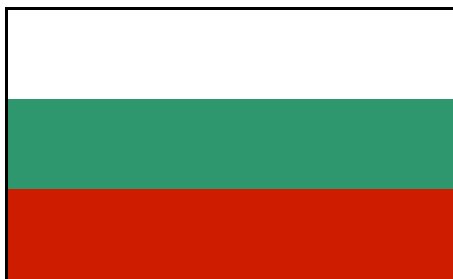


Figure 3.1: Flag of Bulgaria.

HISTORICAL INTRODUCTION

The Bulgars, a semi-nomadic Turkic people, originally from Central Asia, formed in 632 AD under the leadership of Khan Kubrat an independent state called Great Bulgaria, situated around Azov Sea and Caspian Sea. Pressure from the Khazars led migration of some to the northeast to form a new state called Volga Bulgaria (around the confluence of the Volga and Kama Rivers) and others migrated towards the west coast of the Black Sea where the Thracians lived (Figure 3.2). The Volga Bulgar lasted until the 13th century while the Black Sea migrants formed Bulgaria of today.



Figure 3.2: Migration of the Bulgars.

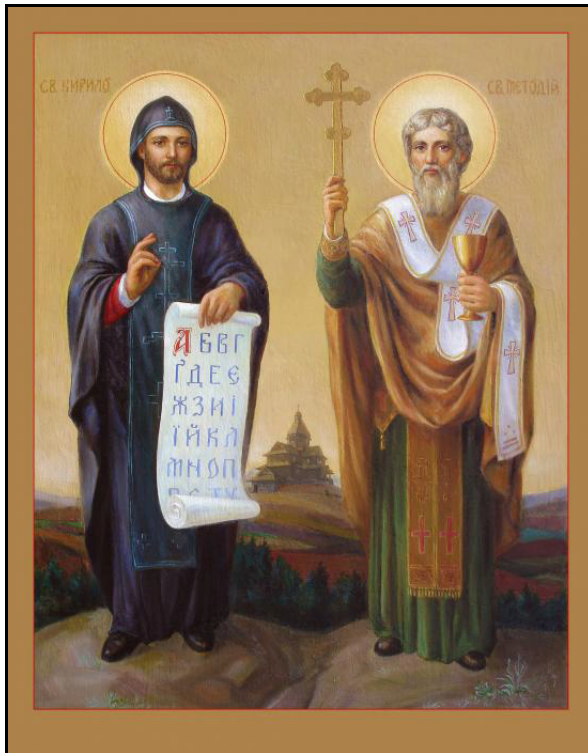


Figure 3.3: Saints Cyril and Methodius, two Byzantine Greek brothers born in Thessaloniki in the 9th century.

Bulgaria became a major European power in the 9th and the 10th centuries. Under Boris I (852–889), the Cyrillic alphabet invented by the monks Saints Cyril and Methodius (Figure 3.3) became the basis for further cultural development. During the rule of Simeon I the Great (Figure 3.4) from 893 to 927, Bulgaria stretched from the Carpathian Mountains to the Adriatic (Figure 3.5). Bulgaria was ruled by the Byzantine Empire from 1018 to 1185 and the Ottoman Empire from 1396 to 1878. During these five centuries, Bulgaria's political and cultural identity was almost obliterated.



Figure 3.4: Simeon I the Great ruled from 893 to 927.

Vasil Levski (1837–1873) (Figure 3.6) was a Bulgarian revolutionary who wanted to liberate his country from Ottoman rule. Born in Karlovo, in central Bulgaria, he became an Orthodox monk before emigrating to join the Bulgarian Legions in Serbia. After working as a teacher in Bulgarian lands, he established a network of revolutionary committees. Ottoman authorities captured and executed him by hanging in Sofia.

The conflict between the Eastern Orthodox coalition led by Tsar Alexander II of the Russian Empire and the Ottomans led to the Russo-Turkish War (1877–1878) in which the Turks were defeated. The Treaty of San Stefano set up an autonomous Bulgaria. Alexander II is considered the liberator of Bulgaria and his statue stands in the centre of Sofia (Figures 3.7–3.8). Bulgaria was proclaimed a kingdom in 1908, during the reign of Ferdinand I (1861–1948) (Figure 3.9).



Figure 3.5: Settlement of the Bulgars in the 9th century.



Figure 3.6: Vasil Levski (1837–1873).



Figure 3.7: Russian Tsar Alexander II facing the Bulgarian Parliament in Sofia.



Figure 3.8: Details under Alexander's monument.



Figure 3.9: Ferdinand I ruled from 1887 to 1918.

During World War I, Ferdinand abdicated in favour of his eldest son who became Tsar Boris III on 3 October 1918. After World War II, Bulgaria became a communist state and part of the Eastern Bloc. In 1990, after the Revolutions of 1989, the Communist party gave up its monopoly on power.



Figure 3.10: Present Bulgaria and her neighbours showing the Danube River as the border with Romania.



Figure 3.11: Bulgaria.

Table 3.1: Visits to Bulgaria.

Dates	Cities visited	Purpose
October 9–11, 1980	Sofia	Higher Institute of Chemical Technology
October 19–November 8, 1987	Sofia Plovdiv Varna–Devnia	Higher Institute of Chemical Technology Metallurgical industry Chemical complex
October 14–19, 2010	Sofia Blagoevgrad	Saint Rila College of Mines American University

First contact with Bulgarian scientists

In summer 1968 while working in Tucson, Arizona, for the Anaconda Company Research Department, I was sent to Worcester, Massachusetts to attend the Second International Conference on Thermal Analysis. There, I met Dr. Dimitar Rustshev, Professor at the Higher Institute of Chemical Technology in Sofia. We soon became friends because he was unable to communicate in English and was pleased that I could speak with him in German. That week coincided with the Soviet invasion of Prague. My friend was unable to explain the situation when we heard it on the radio at the hotel. We stayed in contact and used to exchange New Year's greetings every season.

In May 1977, Professor Rustshev wrote to me proposing establishing bilateral cooperation between Bulgaria and Canada. I translated his German letter into English and channelled it to the National Research Council in Ottawa [now Natural Sciences & Engineering Research Council, abbreviated INSERC]. I was advised to write to the Ministry of Foreign Affairs. After a number of years when no response was received, suddenly the

NSERC brochure for grants appeared with Bulgaria included among the countries with which Canada has signed an exchange agreement.

When Rustshev was informed of the approval of our proposal he immediately sent to me an invitation to visit his Institute through Marin Marinov, Director of the International Department at the Bulgarian Ministry of Education. I tentatively agreed that I would do this after my visit to Warsaw in May 1979 to attend the International Mineral Processing Congress. In Warsaw I tried to reach Prof. Rustshev by telephone to confirm time of my arrival but without success. As a result, I had to cancel the visit. Plans, however, were made to postpone the visit to the next year.

BULGARIA 1980

During a visit to Rome attending the International Conference on Complex Sulfides in October 1980 I got visa to Bulgaria from the Embassy in Rome and travelled to Sofia October 9 leaving October 11. Incidentally, I was not permitted to enter the Embassy building and had to apply for the visa standing outside in the street in front of the iron gate. In Sofia airport, I was received by Prof. Rustshev.

Higher Institute of Chemical Technology

This Institute of Chemical Technology is located in Darvenitza, a suburb of Sofia. Professor Rustshev was responsible for the program of my visit. He is a specialist on the chemistry of coal and most of his work is done using differential thermal analysis and thermogravimetric methods. He is the author of a Russian textbook on the Chemistry of Coal and a co-author of another text in Bulgarian on a related topic.

The Department of Non-ferrous Metals is headed by Professor Christoffer Vasilev, author of a Bulgarian textbook on Hydrometallurgy (published in 1980) and another book on The Metallurgy of the Rare Metals, also in Bulgarian, published in 1974. Prof. Vasilev is assisted by Dozent George Haralampiev and Dozent Violetta Ivanova (she was on a trip to Czechoslovakia during my visit). Dozent Haralampiev is known for his slag fuming process. Mrs. Haralampiev (Dr. Diana Galabova) is also a Dozent in the Chemistry Department, she spent a year with Prof. Barrer in London and she is specialized in zeolites for gas absorption, e.g., enrichment of oxygen in the air. She acted as a translator during the meeting.

The Department of Inorganic Chemical Technology is headed by Prof. Nikolai Videnov; he is one of the top scientists in Bulgaria. He spoke little English and French but fluent German. Beside his Chair at the Institute, he has an office at the State Planning Committee where a meeting with him was held.

Like any other Eastern European country, university buildings in Sofia are out of date, laboratories are poorly equipped, and the atmosphere in general is depressing. Thanks to Prof. Rustschev and his wife (Dozent in the Economics Faculty), both spoke fluent German.

State Planning Committee

This governmental organization is located at Dondukov Boulevard in the centre of Sofia. A meeting was held with Professor Videnov who was in charge of putting into commercial scale a process for treating the low-grade iron ores of Bulgaria. The ore is complex; it analyzed 30% Fe (as hematite, limonite, and siderite), 0.7 Pb (as hydroxide and carbonate), 18–20% BaSO₄, 7% Mn, 0.17% Cu, 8% SiO₂, 20–25 g/t Ag, 2 g/t Hg, and some MgO. The process under consideration involved numerous beneficiation steps to separate the barite followed by nitric acid leaching to recover the non-ferrous metals leaving behind an iron concentrate relatively free of impurities.

Bulgarian Academy of Sciences

In December 1981 I received a letter from Academician Angel Balevski, President of the Bulgarian Academy of Sciences with an Appeal of the Academies of Sciences of the Socialist Countries to support the idea of setting up an International Committee of Scientists to work against the danger of nuclear catastrophe.

Children of the World Park

The Park is located in the outskirts of the city (Figure 3.12). It was organized by UNESCO in which each country contributed a bell; it was opened in 1979 on the occasion of the Children's Year.

BULGARIA 1987

Sofia

This visit took place during my sabbatical year in October–November 1987 and was accompanied by my wife. We spent three weeks in Bulgaria from October 19 to November 8, 1987. We stayed at Hotel Moskva (Figure 3.13) in front of the Russian Embassy and a short walk to the Embassy of Cuba. It was always funny for us to look up the extensive menu in the restaurant but only one item was available. There was no receipts given by the waiters and every time a bottle of water was purchased at a different price depending who was serving. We cannot forget the elevators in the hotel

which were out of control — we were never able to reach our floor the way we wanted.



Figure 3.12: Bell Garden.

Higher Institute of Chemical Technology, Sofia

This Institute is the equivalent of a technical university (Figure 3.14). It has 5 000 student enrolment and divided into three faculties: Organic Technology, Inorganic Technology, and Metallurgy. Each faculty is divided into departments, e.g., cement, ceramics, glass, polymers, pulp and paper, textiles, nonferrous metals, inorganic substances, etc. I was guest of the Inorganic Technology Faculty and the Nonferrous metallurgy Department.

Meetings were held with Vice Rector for International Collaboration Dr. Ewa Sokolova (studied organic chemistry at Dresden), Vice Rector for Academic Affairs Prof. George Kharalampiev (done work on slag fuming), and Prof. Nikolai Videnov, Deputy Minister for Industry and Professor of inorganic technology (he was very sick and I heard that he passed away during my visit), and his assistant Dr. Ing. Steffan Shoumkov. Prof Aleksandur Asenov who was Rector and from whom the invitation to Bulgaria was received is now with the Ministry of Higher Education.



Figure 3.13: Hotel Moskva.



Figure 3.14: Higher Institute of Chemical Technology, Sofia.

At the Department of Nonferrous Metallurgy meetings were held with Prof. Christof Vasilev (still hanging Stalin's portrait in his office) who was chairman, now retired, his assistant Dozent Dr. Violeta Karolova, and one of his students Nicolay Popov. Also, in other sessions the following participated: Dozent Dinko Kunev (Spent a year in Ottawa at the National Research Council, Applied Chemistry), Tatiana Genevska, and Wtadystowa Stefanow. Main work is conducted on catalysed cementation using metallic zinc.

At the Department of Technology Inorganic Substances meetings were held with: Dozent Yontcho Pelovski who was in charge of my visit (Figure 3.15), Prof. Ivan Dombalov, Dozent Ivan Gruncharov and Dr. Darinka Bojinova. Main work: evaluation of phosphogypsum as a material of construction (regardless of its radioactivity), precipitation of hydroxides of fine particle size, utilization of pyrite cinder, and recovery of aluminum from clay. There is no bauxite in Bulgaria and importing of alumina is not possible because of lack of foreign currency.



Figure 3.15: With Dozent Yontcho Pelovski at home, 1987.

Convention Centre

A convention centre was recently constructed (Figure 3.16).



Figure 3.16: Convention Centre.

Plovdiv

Plovdiv, the second largest city in Bulgaria after Sofia, is also one of the oldest. It was originally a Thracian settlement by the name of Eumolpias, named after the Thracian king Eumolpos. Philip II of Macedon conquered

the area in 342–341 BC and re-named it Philippoupolis. A Roman coliseum, Ethnographic Museum, and a monument to Khan Krum are city landmarks (Figures 3.17–3.19).



Figure 3.17: Roman coliseum.



Figure 3.18: Ethnographic Museum.



Figure 3.19: Monument to Khan Krum who ruled from 803 to 814.

Research Institute for Nonferrous Metals

The Research Institute for Nonferrous Metals (founded in 1965) is the equivalent to Canada Centre for Energy and Mineral Technology (CANMET) in Ottawa but on a small scale. It has 400 workers which include 35 engineers and 35 technicians. It is composed of three departments:

- Nonferrous Metals: Hydro- and Pyrometallurgy
- Metallurgy of Rare, Noble, and Precious Metals
- Secondary Metals and Pollution Abatement.

There is also a unit working on automation, another on economics, and a third on the preparation of very pure materials for the electronic industry. Hosts: Nikola Shopov, Director and Ivan Enchev, Assistant Director, specialized in electrowinning of zinc.

Nonferrous Metals Plant

Named “Dimitar Blagoev” after a Bulgarian national hero (founder of the Bulgarian Communist Party in 1891). It is a lead–zinc plant, slag fuming (Waelz Process) cadmium and bismuth recovery. Plant built in 1961, Rus-

sian design, badly needs modernization. There is another similar plant in Bulgaria, 100 km away from Plovdiv at Kurdjaly built in 1954 also by the Russians. It is strange to have such planning although most the concentrates for both plants are imported. No satisfactory explanation could be obtained other than it was a political decision made by two different governments at two different periods. Plant Director: Dobrev. Guides: Mrs. Zlatka Stoiceva, Ivaylo Gregorav and Ing. C. Halkov.

Research Department, Dimitar Blagoev Plant

Director: Dr. Korudanav discussed the chemical and metallurgical industry in Bulgaria. Mentioned the nitrogeous fertilizers plant at Stara Zagora phosphatic and chemicals at Devnia, Dimitrograd, and Vratsa, copper flash smelter at Srednogoria (northwest of Sofia), and the petroleum industry in Burgas and Pleven on the Black Sea. Steel industry is located at Kremikovsky near Sofia.

Varna–Devnia

Devnia is a short distance from the important Black Sea resort Varna. Varna was named Stalin for a short period of its history. In the centre of town, I was shown the granite pedestal on which once stood the huge statue of Stalin.

Chemical Complex

At Davnia, acids, alkalies, and phosphatic fertilizers are produced by conventional methods. The nitrophosphate plant built by Stamicarbon was shut down and dismantled due to corrosion problems. A meeting was held with senior researchers and the director Todor Pavlov Todorov.

BULGARIA 2010

The visit took place on October 14–19 after attending the International October Conference in Kladovo, Serbia. Although Sofia is a short trip from Belgrade yet there was no direct flights and I had to fly via Vienna. Hosts: Professor Vladko Panayotov and his wife Professor Marinela Panayotova. The visit coincided with Professor Vladko Panayotov receiving the Order of Bulgaria at the Presidential Palace.

Land marks in Sofia are the Alexander Nevsky Cathedral (Figures 3.20–3.21), the Russian Church (Figures 3.22–3.23), and other buildings like the Parliament and the theatre (Figures 3.24–3.26).



Figure 3.20: Alexander Nevsky Cathedral.



Figure 3.21: With Professor Irena Grigorova in front of Sofia Cathedral.



Figure 3.22: Russian Church.



Figure 3.23: With Professor Ivan Nishkov in front of the Russian Church.



Figure 3.24: Theatre.




Figure 3.25: Liberty monument.



Figure 3.26: Sofia lion.

Saint Ivan Rilski School of Mines

The Technical University of Sofia was founded in 1945. It included Faculty of Mining and Geology which later was named after the patron Saint of the Bulgarian people Saint Ivan of Rila. A lecture was delivered there (Figure 3.27).



ПОКАНА

на 15.10.2010 г. от 11.00 ч. в МГУ „Св. Иван Рилски“-Минен Факултет, зала 220


проф. ФАТИ ХАБАШИ от Университета Лавал - Квебек, Канада

ЩЕ ИЗНЕСЕ ЛЕКЦИЯ НА ТЕМА:

**„СЪВРЕМЕННИ НАСОКИ В ИЗВЛИЧАНЕТО НА МЕТАЛИ
ОТ РУДИ И ОТПАДЪЦИ“**

Проф. Хабаш е световно известен учен в областта на обогатяването и рециклирането на суровини, металургията, опазването на околната среда. Гост-професор на повече от 20 чуждестранни университета. Автор и редактор на повече от 30 научни книги и над 200 научни стагии.

Посещението на проф. Хабаш в България е по покана на члена на Европейския парламент проф. д.т.н. инж. Владко Панайотов, катедра ОРС.



ЗАПОВЯДАЙТЕ !

Figure 3.27: Announcement for lecture.

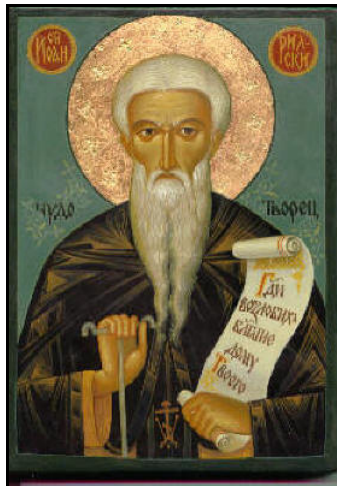


Figure 3.28: Saint Rila.

Monastery of Saint Ivan of Rila

The Monastery of Saint Ivan of Rila is the largest Eastern Orthodox monastery in Bulgaria located few hours drive from Sofia (Figures 3.28–3.32).



Figure 3.29: Rila in 1987.



Figure 3.30: Entrance to Monastery, 2010.



Figure 3.31: Rila Monastery.



Figure 3.32: Church.

Quartz Collection Museum

The Natural History Museum has an excellent collection of Brazilian quartz which include giant crystals donated by a Bulgarian scientist who lived in Brazil (Figure 3.33).



Figure 3.33: Natural History Museum.

National Museum

The National Museum was the Palace of the former Bulgarian President (Figures 3.34–3.36). It has special displays of History of Fashion and Gold from Thrace (Figures 3.37–3.40).



Figure 3.34: National Museum.



Figure 3.35: National Museum with guide Dr. Marinela Panayotova.



Figure 3.36: National Museum.



Figure 3.37: Thracian gold in the Museum.



Figure 3.38: Thracian gold in the Museum.



Figure 3.39: Thracian gold.



Figure 3.40: Thracian gold.

Blagoevgrad

Blagoevgrad is a short drive from Sofia. A session was held at the American University where I gave a lecture, “Extractive Metallurgy. Past, Present, and Future” to general public organized by Professor Vladko Panayotov and interpreted by Professor Marinela Panayotova (Figure 3.41).



Figure 3.41: The Panayotovs arranging for the presentation.

Presidential Palace

A ceremony was held on October 18, 2011 at the Presidential Palace in downtown Sofia (Figures 3.42–3.45) to honour Professor Vladko Panayotov for his achievements.



Figure 3.42: Coat of Arms of Bulgaria.



Figure 3.43: Entrance to the Presidential Palace.



Figure 3.44: Inside the Palace.



Figure 3.45: Professor Vladko Panayotov [right] received the Order of Bulgaria from the President of Bulgaria [centre].

Interview

Interview with Sofia newspaper *Mir* regarding pollution and the mining industry took place after the ceremony (Figure 3.46).

CULTURE

Folk dances

Bulgarian folk music and folk dances are magnificent and colourful (Figures 3.47–3.50).

ФАТХИ ХАБАШИ, ЕКСПЕРТ ПО ХИДРОМЕТАЛУРГИЯ ОТ УНИВЕРСИТЕТА В ЛАВАЛ, КАНАДА

Хидрометалургията е бъдещето в добива на цветни метали

■ Алтернатива на щанцината технология се търси от 50 години, но безуспешно

Рая Атанасова
raya.atanasova@kissia.bg

Проф. Хабаши, какви са плюсовете на хидрометалургията и какво струва тя спрямо по-стария метод?

Аз работя върху хидрометалургичното издълчаване на метали от руди. Това е издълчаване чрез разтвори метали на метала, независимо от какво ще бъде то - дали от руда, дали от отпадъци. Предимствата на хидрометалургията спрямо пирометалургията са, че е насочена точно към сулфидните руди, които са широко разпространени в България. Тя е единственият начин, по който се получава сярна и серен диоксид, тъй се улавя и се пребръща в сярна киселина, тя трябва да се съхранява, транспортира по специални начини. Обикновено газовете, които съдържат серен диоксид, имат силен жълък, арсен и други опасни компоненти. Друго предимство на хидрометалургията е ефективно използване на топлинната енергия. В пирометалургията се използва много скъпо оборудване не само за усъвяване на топлината, но и за улавяне на прахови частици. Пирометалургичният метод, който е добър чрез нагриване, трябва да започнете с много големи количества, което означава много скъпа



ОБИЧКА МИШЕЛ ГРОН

ВИДИТКА

зрешки и нежизнрване. Трябва по-точно да се прави мониторинг на хвостохранилищата, за да се коррирират зрешките нагриве. В Румъния преди няколко години също се разляха щанци, в Гъана (Южна Америка) имахме подобен инцидент, но всичко това са човешки зрешки. В Южна Франция близо до Марсел например пък има голям завод за производството на алуминий. Там 11 км трябва отвежда червените упакци в Средиземно море. Железният хидрокси (рждата, т.е. червените упакци) не е отровен. Например други отпадъци, които не са толкова токсични като фосфориса в Маройд, се бърват в Атлантическия океан и се отливат от Богите. Но ако нямате друг начин, за да се отървете от отпадъците, това трябва да стане в хвостохранилище с възможна на съответните мерки за сигурност. В Квебек имахме най-големите хвостохранилища за железен хидрокси т.нар. червена тина, отпадък от производството на алуминий във формата на не червена каша както в Уеар, а в твърда форма.

Как бихте коментирали използването на щанцината технология за добив на злато? Този метод е от особена важност в България за опазване на околната среда. Има ли алтернатива?

Щанцината технология се използва за издълчаване на злато повече от 100 г. Всеки знае, че щанцирот е токсичен, но при подходящо об-

разход на суровини, цената на системата технологията забви от местоположението.

В кои страни този метод се прилага и как работи той?

Съвременната хидрометалургия е започнала в Канада през 50-те години на миналия век. Сега е широко използвана в Чили, Австралия, Южна Африка и Русия. Рециклирането в Европа е по-развито, отколкото в Северна Америка и Австралия. Причините са две. Една от тях е, че в Европа са забърти повечето мини, обособителни и металургични предприятия. Втората е по-стриктното законодателство по отношение опазването на околната среда. Докато в Северна Америка има все още работещи, разбиващи се мини, освен това няма необходимост от суровини, които да се добият от отпадъци.

Как хидрометалургичният метод да добие по-голяма популярност у нас?

Като специалист по хидрометалургия мога да изпратя много свои книги, да боя конференци и курсове с млади преподаватели и спус-

Фатих Хабаши е роден в Елшепт и е на 82 години. Забрврял е илюмина инженерство бакалавърската степен в Университета в Каиро. Работил е няколко години в промишлеността. След това получава стипендия и пет години учи в Техническото училище във Виена, където става и доктор. През 1960 г. получава стипендия за студийпурска специализация в Канада. Работил известно време в ОАЩ. Работил е в изследователския отряд в "Анкокорд" - най-голямата минна компания в света.

дентите. Курсовете ще бъдат безплатни. Аз бях в България преди 23 години по програма за обмен на преподаватели България-Канада и въздам огромните промени и ви поздравявам за напредъка. София сега изглежда като всеки добър европейски град, не както преди 20 години - хотели, ресторанти, всичко е добре. Посещението бе голям опит за мен, научих, че комунистическата система не работи. Сега участвах в конференция за минно дело и металургия в Сърбия и преход да гоода в София след толкова години по покана на проф. Владко Панайотов, с когото се познаваме повече от 15 години.

Какво е приложението на автоклавиите?

Автоклавиите са всъщност тендери под налягане с доломината на вагон. Хидрометалургията е

съвременна технология за издълчаване с реактивни в автоклав под налягане и повишена температура. Според мен трябва да има малки учебни автоклави в университетите, за да могат изследователите да разработват технологията, да я подобрят, след това да отиде на поурпромишлените експерименти и по този начин да се покаже на промишлеността, че това е бъдещето в производството. Хидрометалургията е методът на бъдещето за производството на цветни метали, защото на практиката в България се развива основно цветната металургия.

В България има много хвостохранилища. Какви са методите за поддржкване на сигурността, за да няма аварии както в Уеар?

Инцидентите като този са много трагични, но това са човешки

уцие на работниците и опазване на всички правила на безопасност, няма опасност от инциденти. Всъщност технологичен контрол да не се изпускат щанци и сравнително лесен - добива се варно мляко и с еден електрор се мерат киселинността на седиата. Използвателите разпорти са много развирани.

Отговор на въпроса дали има алтернатива на щанцината технология се търси от 50 години, но безуспешно. Все още щанциното издълчаване е най-доброт.

Все още специална в областта на големите горивни инсталации. Има ли нови методи за намалване на емисиите и преобрвратване на замърсяването на въздуха от ТЕЦ?

Всъщност това не е технологичен проблем, технологията е налична и отпадна работи добре. В земните комини има сертифициращи инсталации, в които се улавят серният диоксид и праховите частици. Това е само въпрос на пари и инфестияции. Ако пътят за въведрогна диоксид, това е друга тема. Улавянето му е почти невъзможно.

Figure 3.46: Newspaper clip.



Figure 3.47: Folk dance.



Figure 3.48: Folk dance.



Figure 3.49: Folk dance.



Figure 3.50: Folk dancers.

Rose Valley

The Rose Valley (Figures 3.51–3.54) is 60 km north of Plovdiv just south of the Balkan Mountains. It is famous for its rose-growing industry that has been cultivated there for centuries, and produces 85% of the world's rose oil. Each year, festivals are held celebrating roses. The picking season is May–June. During this period, the area gives off a pleasant scent and is covered with multi-coloured flowers. The flowers are carefully cut one by one and laid in baskets which are then sent to the distilleries where the essential oils are recovered for making perfumes.



Figure 3.51: A scene in Rose Valley.



Figure 3.52: Collecting roses.



Figure 3.53: Roses to be delivered for distilleries.



Figure 3.54: Souvenir vials containing rose perfume.

Chapter 4

Croatia¹

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Figure 4.1: Flag of Croatia.

HISTORICAL BACKGROUND

The Croats arrived to the Balkan Peninsula at the beginning of the 7th century. In 9 AD the territory of today's Croatia became part of the Roman Empire. Emperor Diocletian built a large palace in Split when he retired in AD 305. In the first half of the 7th century the region was invaded by the Avars who destroyed almost all Roman towns. Survivors retreated to the islands and mountains. The city of Dubrovnik was founded by such survivors. Tomislav (Figure 4.3) united the Croats of Dalmatia and the Slavs of Pannonia and became their first king in 910 until he died in 928 AD.

¹ See also Serbia (Chapter 7).



Figure 4.2: Map of Croatia showing the capital city Zagreb and Sisak in the southeast where the Ottomans were defeated in 1593.

The Venetians gained control over most of Dalmatia by 1428, with exception of the city-state of Dubrovnik which became independent. In 1527, faced with Ottoman conquest the Croatian Parliament elected Ferdinand I of the House of Habsburg to the Croatian throne. The Ottomans advanced in the Croatian territory until they were defeated in 1593 at the Battle of Sisak. After the Austro-Hungarian Compromise of 1867 the kingdoms of Croatia and Slavonia¹ [the eastern part of present Croatia] were united. After the 1878 Treaty of Berlin, Austria–Hungary occupied Bosnia and Herzegovina. In 1918, after World War I, Croatia was included in the short-lived State of Slovenes, Croats, and Serbs that declared independence from Austria–Hungary and co-founded the Kingdom of Yugoslavia.

¹ Not to be confused with Slovakia [capital Bratislava] and Slovenia [capital Ljubljana].

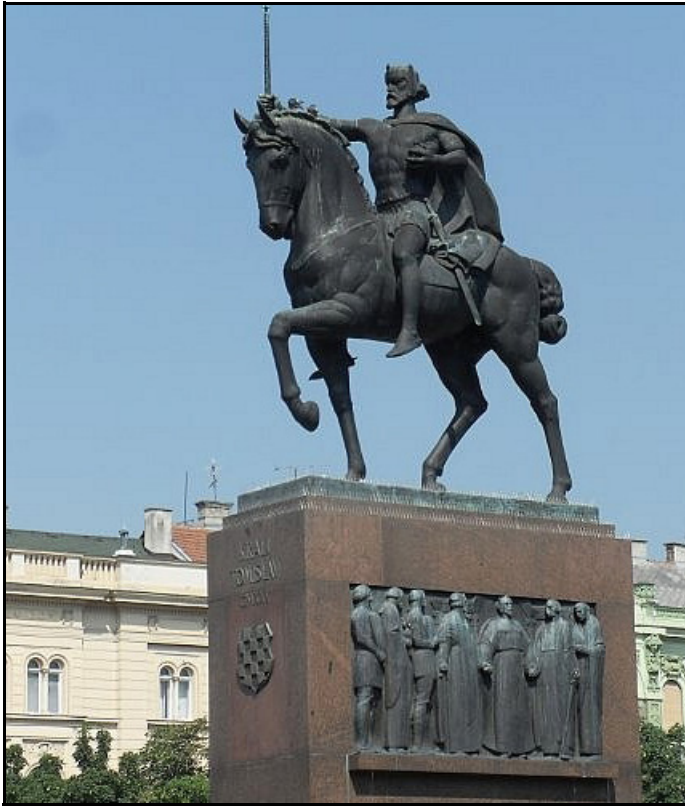


Figure 4.3: Tomislav, first Croatian king, ruled from 910 to 928.

In 1941, during World War II, Yugoslavia was occupied by Germany and Italy. A Croatian state briefly existed as a fascist state. After the war, she became a founding member and a federal constituent of Yugoslavia, a socialist state. In June 1991, Croatia declared independence, which came into effect on 8 October of the same year. Its capital and largest city is Zagreb. Croatia's Adriatic Sea coast contains more than a thousand islands. The country's population is 4.29 million of Roman Catholic faith.

ZAGREB

Zagreb was known during the Austrian Empire by the name Agram. It is the capital of Croatia in the former Yugoslavia. The city is rich in classical and modern buildings (Figures 4.4–4.7), and a number of churches, e.g., St. Mark Church (Figure 4.8). The main square has the monument of Croatia's first king Tomislav (Figures 4.11–4.12).



Figure 4.4: Palace Hotel.



Figure 4.5: Historic buildings.



Figure 4.6: Art gallery.



Figure 4.7: National Theatre.



Figure 4.8: St. Mark Church.



Figure 4.9: Modern building.



Figure 4.10: Modern building.



Figure 4.11: Zagreb main square.

Technical Museum

The museum (Figure 4.13) was founded in 1954 and it maintains an old steam engine dating from the mid-19th century. Nikola Tesla (1856–1943), (Figure 4.14) best known for developing the modern alternating current electrical supply system, was born an ethnic Serb in the village of Smiljan

(now part of Gospić), in the Austrian Empire (modern-day Croatia), Tesla was a subject of the Austrian Empire by birth and later became an American citizen. His name is given to at least one street and his work is displayed in the Technical Museum.



Figure 4.12: Zagreb main square with monument of King Tomislav.



Figure 4.13: Technical Museum.

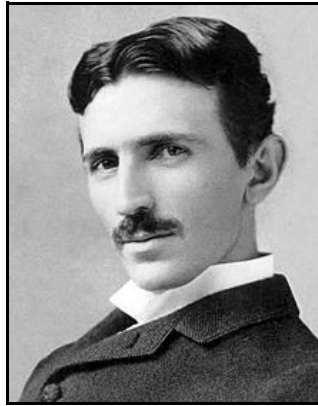


Figure 4.14: Nikola Tesla (1856–1943).

ICSOBA

In October 2003 ICSOBA conference took place in Zagreb (Figure 4.15). ICSOBA is the acronym for the International Committee for the Study of Bauxite, Alumina, and Aluminum.



Figure 4.15: Meeting of ICSOBA at the Croatia Academy of Sciences. Dr. Olga Lahodny-Sarc, Conference Chair, 2003.

ICSOBA was established during the Cold War in 1963 at the initiative of Miroslav Karsulin (1904–1984) at the Croatian Academy of Sciences and

Arts (Figure 4.16). Zagreb is the seat of its council. Its secretariat is at the Hungarian Mining and Metallurgical Society in Budapest. The task of this organization is to stimulate and encourage scientific and technological investigations and industrial development in the field of bauxite, alumina, and aluminum production from primary and secondary sources including environmental aspects of the industry.

The 24th Symposium was organized on 10–11 October 2003 on the occasion of the 40th Anniversary of foundation of ISCOBA and took place at the Croatian Academy of Sciences. The materials of Congress and Symposia are published in English in the scientific periodical of ICSOBA “Travaux.” ICSOBA has organized symposia and congresses in Zagreb, Budapest, Milan, Leoben, Banská Bystrica [former Czechoslovakia], Dubrovnik [former Yugoslavia], Kingston, [Jamaica], Cagliari [Italy], Tihany [Hungary] Tapolca [Hungary] Balatonfüred [Hungary] Delphi [Greece] Tehran, Saint Petersburg, Athens, Montreal, Poços de Caldas [Brazil], Vienna, Nice, and recently in India and China.



Figure 4.16: Croatian Academy of Sciences and Arts in Zagreb.

The statue in front of the Academy building is that of Josip Juraj Strossmayer (1815–1905) (Figure 4.17), a Croatian politician of German descent and Roman Catholic bishop (Figure 4.18). He was instrumental in the founding of the Yugoslav Academy of Sciences and Arts in 1867, as well as the re-establishment of the University of Zagreb in 1874. He initiated the

building of the Academy Palace (completed in 1880) and set up The Gallery of Old Masters (1884) in Zagreb.

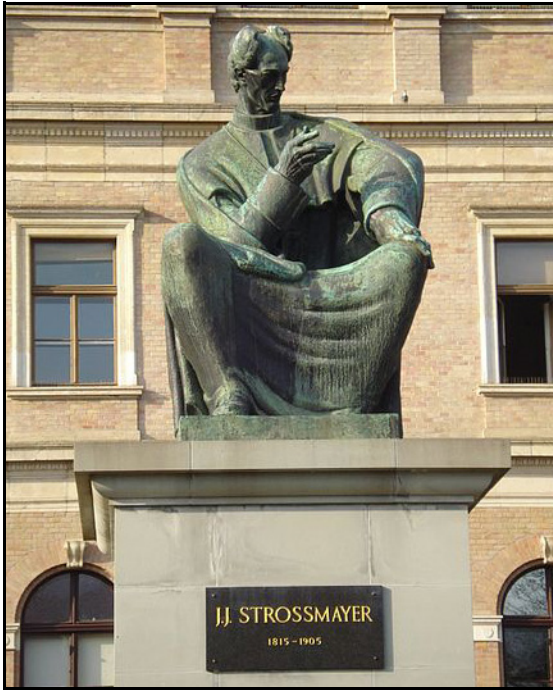


Figure 4.17: Monument to Bishop Josip Juraj Strossmayer.



Figure 4.18: Bishop Josip Juraj Strossmayer (1815–1905).



Figure 4.19: Interior of the Croatian Academy of Sciences and Arts.



Figure 4.20: At the Croatia Academy of Sciences. Photo by Nadia Habashi, 2003.

Chapter 5

Greece

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Figure 5.1: Flag of Greece.



Figure 5.2: Map of Greece.



Figure 5.3: Athens — Piraeus.

Table 5.1: Visits to Greece.

Dates	City	Purpose of visit
May 1956	Piraeus	From Alexandria by boat en route to Vienna
October 1980	Athens	From Kuwait en route to Madrid
October 1987	Athens	Visiting Polytechnic University

PIRAEUS

The port of Piraeus is the chief port in Greece, the largest passenger port in Europe, and the third largest in the world. From there I took the train in May 1956 to Belgrade then Vienna. In October 1980, I made a short stop in Athens, but my main visit was in October 1987 to visit the Polytechnic University.

ATHENS

Athens is one of the world's oldest cities, centre for the arts, learning, and philosophy. Its most famous heritage is the Acropolis — an ancient citadel located on a high rocky hill above the city containing the remains of several ancient buildings of great architectural and historic significance, the most famous being the Parthenon and the Erechtheion, which is an ancient temple on the north side of the Acropolis (Figures 5.4–5.8).

In the Period 9th–10th centuries, Greece was part of the Byzantine Empire. In 1458, she was conquered by the Ottomans and entered a long period of decline until she became independent in 1834. During World War II (1941–1944), Greece came under the German occupation. A military dictatorship took power in 1967–1974.



Figure 5.4: The Acropolis dominating Athens.



Figure 5.5: Acropolis.

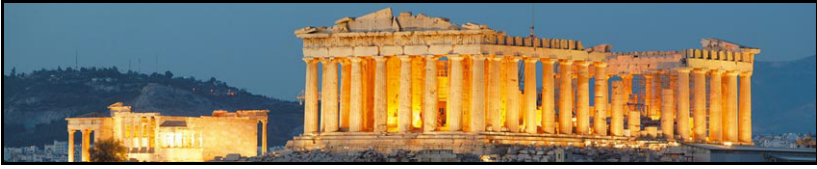


Figure 5.6: Acropolis at night.



Figure 5.7: The Erechtheum, built between 421 and 405 BC.

National Archaeological Museum

The National Archaeological Museum (Figure) contains a vast collection of antiquities and artefacts that cover a period of more than 5 000 years (Figures 5.9–5.11).



Figure 5.8: The Porch of the Maidens at the Erechtheum.



Figure 5.9: National Archaeological Museum.



Figure 5.10: Inside the National Archaeological Museum.



Figure 5.11: Greek mythology: Aphrodite, Pan and Eros.

National Technical University

The National Technical University (Figure 5.12) was founded in 1836 immediately after Greece independence. The students struggled against the military dictatorship and the fight escalated after an unprecedented brutal attack by the police inside the campus and the arrest of several students. Host: Dr. Antony Kontopoulos, Head, Department of Mining and Metallurgy. Other faculty members: Yannes Paspaliars [bauxite], Iliana Halikia [kinetics], Stella Agatzini [bacterial leaching], and Manolis Zevgolis [ferro-nickel].



Figure 5.12: National Technical University.

Chapter 6

Romania

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Figure 6.1: Flag of Romania.

HISTORICAL INTRODUCTION

Dacia

Dacia (Figure 6.3), roughly the present-day Romania, was an important gold- and salt-producing region in ancient times. It was invaded in 107 AD by the Roman Emperor Trajan (53–117). The Romans exploited the rich ore deposits of Dacia. Gold and silver were plentiful in the Western Carpathians. Trajan brought to Rome over 165 tons of gold and 330 tons of silver. This is documented on Trajan Column in Rome (Figures 6.4–6.5).



Figure 6.2: Romania and her neighbours.

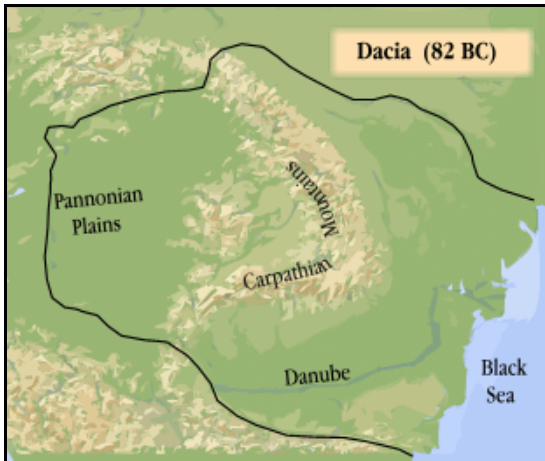


Figure 6.3: Dacia and the Carpathian Mountains in 82 BC.



Figure 6.4: Trajan Column in Rome.

The Romans founded the fortress of Cetatea Dambovitei on which site stands today Bucharest. The country remained under the control of the Byzantine emperors until it was overrun by the northern tribes. Dacia was then occupied by the migrating Goths, the Huns, the Avars, and then the Slavs.

Transylvania

The Magyars arrived there at the end of the 9th century. King Stephen I of Hungary firmly established control over Transylvania in 1003 but after the Battle of Mohács in 1526, Transylvania became part of the Ottoman Empire. The Habsburgs acquired the territory shortly after the Battle of Vienna in 1683 and became known by the German name *Siebenbürgen* meaning “seven fortresses,” in reference to the seven castles constructed there.

Walachia and Moldavia

The principalities of Walachia and Moldavia (Figure 6.6) arose in the 14th century. About 1417 Walachia came under the domination of the Turkish sultans, but the native princes continued to rule. The Southern part of Moldavia was called Basarabia named after the Basarabs, the ruling dynasty of Walachia that controlled that region in the 14th century.

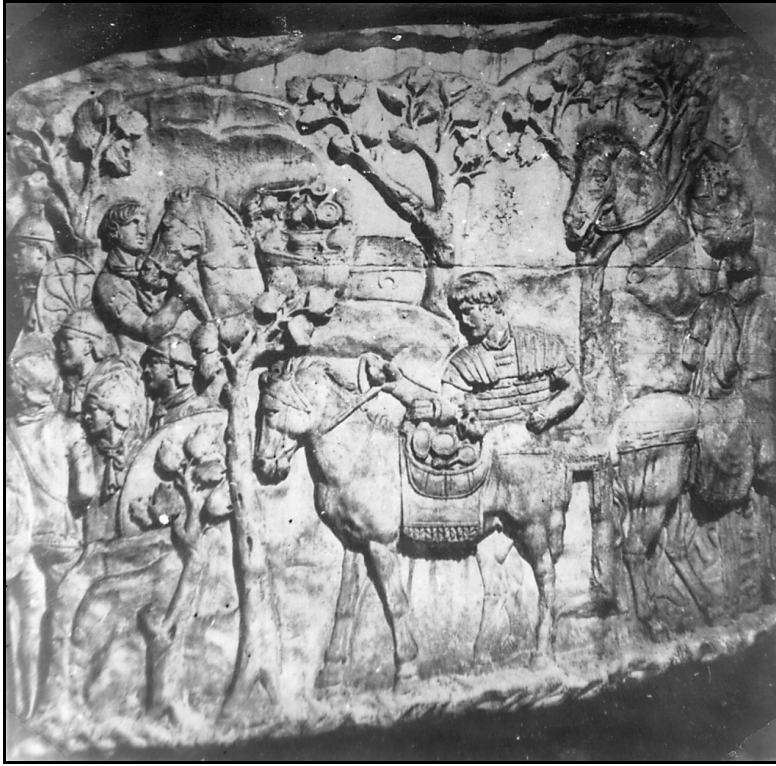


Figure 6.5: Part of Trajan Column in Rome showing the Dacian booty.



Figure 6.6: Romania in 1350. The principalities of Moldavia and Walachia before they fell under Ottoman control. The boundaries of present-day Romania are shown in a red.

As a result of various wars between Russia and the Ottoman Empire, control over the provinces changed several times during the 18th and the 19th centuries. During the war of 1768–1774, Russia occupied the two provinces but they were restored to Turkish control in return for the right to intervene in provincial affairs to protect Christian interests. After the Russo-Turkish War of 1828–1829, the provinces' independence from Turkish control; however, Russian influence was dominant. At the end of the Crimean War in 1856, Moldavia and Walachia were established as principalities and returned to Turkish control.

After the war with the Ottomans in 1812, the Russians annexed Basarabia since that part was under Ottoman control. The Russians started the Russification, assimilation, and native suppression.



Figure 6.7: Romania 1793–1812.

Kingdom of Romania

In 1859, what was left of the Principality of Moldavia, unified with the Principality of Walachia to form the Kingdom of Romania (Figure 6.8) with Alexandru Ioan Cuza (1820–1873) (Figure 6.9) as ruler and Bucharest as the new nation's capital. Cuza was a prominent figure of the Revolution of 1848 in Moldavia. He initiated a series of reforms that contributed to the modernization of Romanian society. The University of Bucharest was founded in 1864. Romania was awarded a small portion of land on the Black Sea coast by the Great Powers to stop Russia's advance towards Constantinople. Although Cuza did much to improve the lives of the peasantry, his land reform measures led to resentment among the landed class. This resentment

grew until, in the early morning of February 23, 1866, a band of military conspirators broke into the palace and compelled the prince to sign his abdication and leave the country. He was replaced by Prince Carol of the House of Hohenzollern-Sigmaringen (Figure 6.10).



Figure 6.8: Romania in 1861. The boundaries of present-day Romania are shown in red outline.



Figure 6.9: Alexandru Ioan Cuza (1820–1873).



Figure 6.10: King Carol I (1839–1914).

The western provinces Transylvania and the Banat were still controlled by the Austrians while the eastern province Bessarabia by the Russians (Figure 6.11).



Figure 6.11: Romania in 1878. Bessarabia held by Russia and Transylvania by Austria–Hungary.



Figure 6.12: King Ferdinand I of Romania (1865–1927).

World War I

Following defeat in World War I, Austria–Hungary disintegrated. The ethnic Romanian majority in Transylvania proclaimed Union with Romania and were united with Romania in 1919. King Ferdinand I of Romania (1865–1927) (Figure 6.12) was crowned in 1922 as King of all Romania.

World War II and after

During World War II Romania was under dictatorship of General Ion Antonescu who entered the war on the side of the Axis powers. On 20 August 1944 the Soviet Army entered Romania and Antonescu was arrested by King Michael I, who joined the Allies and declared war on Germany. On 31 August 1944, the Communists established themselves as the dominant force. After the war, Romania was forced to cede Basarabia as well as Northern Bucovina to the Soviet Union. Bucovina and Budjak were integrated into the Ukrainian SSR while the rest was integrated into the Moldovan SSR. The Moldovan SSR declared independence as the Republic of Moldova.

Soviet occupation following World War II led to the formation of a communist People's Republic in 1947, and the abdication of King Michael, who went into exile. After the negotiated retreat of Soviet troops, Romania, under the new leadership of Nicolae Ceaușescu, started to pursue independent policies, including the condemnation of the Soviet-led 1968 invasion of Czechoslovakia. As Romania's foreign debt sharply increased between 1977 and 1981, Ceaușescu imposed policies that impoverished Romanians. He greatly extended the authority of the police state. These led to a dramatic decrease in his popularity and culminated in his overthrow and execution in 1989.

Brâncoveanu

Constantin Brâncoveanu (1654–1714) (Figure 6.13) was Prince of Walachia between 1689 and 1714. A descendant of the Craiovești boyar family and related to Matei Basarab. He took steps in negotiating anti-Ottoman alliances first with the Habsburg Monarchy and then with Peter the Great in Russia.

Brâncoveanu was deposed from his throne in 1714 by Sultan Ahmed III, and brought under arrest to İstanbul, where he and his four sons were beheaded. In 1992 the Church declared him and his sons as saints and martyrs. Their feast day is August 16. Through his tragic death, Constantin Brâncoveanu became the hero of a series of Romanian folk ballads, as well as being depicted on some of Romania's official coinage. He was a great

patron of culture. The Constantin Brâncoveanu University is located in Pitești with subsidiaries in Brăila and Râmnicu Vâlcea.



Figure 6.13: Monument in Bucharest for Constantin Brâncoveanu (1654–1714).

School of Bridges and Highways, Mines and Architecture

The first educational establishment for training specialists was founded in 1864 in Bucharest under the name of “The School of Bridges and Highways, Mines and Architecture.” Later on, the school became known as “The National School of Bridges and Highways,” mining education being included as a specialization in the last two years of study.

In 1920, mining education in the country was re-organized by setting up mining engineering departments within the newly founded Polytechnic School of Bucharest and the Polytechnic at Timișoara. These departments were turned into faculties of Mining and Metallurgy in 1938. Between 1948–1957, higher education in mining was carried on by the Coal Institute at Petrosani, the Bucharest Institute of Mining Engineering, the Timișoara Institute of Mining Engineering, and the Ores Institute at Brad. In 1957, the entire mining education was brought together in Petrosani as the Mining Institute consisting of a Faculty of Mining Engineering and a Faculty of

Electro-Mechanical Engineering. In 1989, the Mining Institute became Technical University and in 1995 it became the University of Petrosani. Today, the University of Petrosani has three faculties:

- Faculty of Mining Engineering
- Faculty of Machines and Electromechanical Installations
- Faculty of Science

Table 6.1: Visits to Romania.

Dates	Cities visited	Purpose of visit
June 16–29, 2002	Bucharest	Research & Design Institute for Rare & Radio-active Metals
April 9–30, 2007	Bucharest	University of Bucharest
	Brashov	University of Transylvania
	Sibu	Cultural visit
	Siana	Cultural visit
June 8–22, 2009	Bucharest	Balkan Mineral Processing Conference

BUCHAREST

Bucharest is characterized by many attractive buildings (Figures 6.14–6.25).



Figure 6.14: General view of Bucharest streets.



Figure 6.15: General view of Bucharest streets.

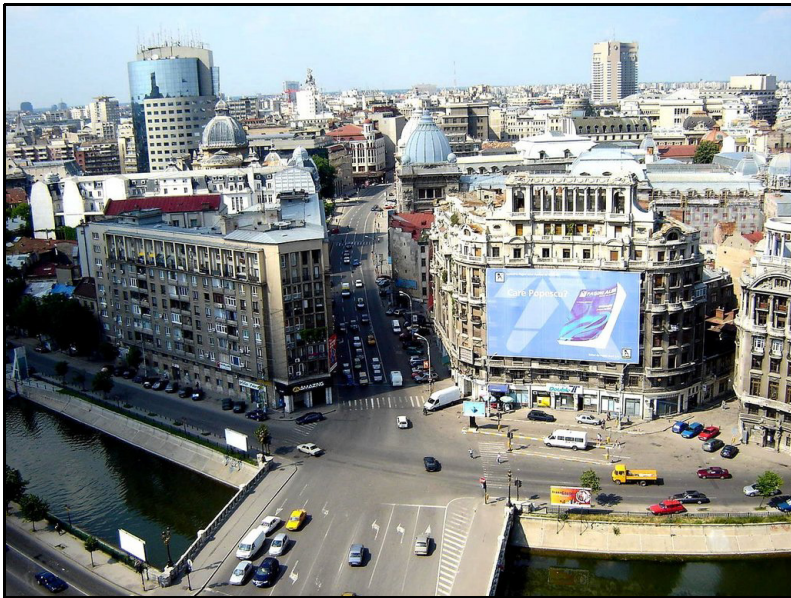


Figure 6.16: General view of Bucharest streets.



Figure 6.17: Many nice buildings in Bucharest. Photo by Fathi Habashi, 2009.



Figure 6.18: Many nice buildings in Bucharest. Photo by Nadia Habashi, 2009.



Figure 6.19: Many nice buildings in Bucharest. Photo by Fathi Habashi, 2009.



Figure 6.20: George Enescu Museum.



Figure 6.21: Many nice buildings in Bucharest.



Figure 6.22: Many nice buildings in Bucharest.



Figure 6.23: National Art Museum.



Figure 6.24: A monastery outside Bucharest. Photo by Dan Petre Georgescu, 2007.



Figure 6.25: In a shopping centre, 2009.

Government Palace

A major part of Bucharest's architecture is made up of buildings constructed during Nicolae Ceaușescu's Communist era. Significant portions of the historic centre of Bucharest were demolished in order to construct one of the largest buildings in the world, the Palace of the Parliament (then officially called the House of the Republic) (Figures 6.26–6.28).



Figure 6.26: Government Palace.

Village Museum

The Village Museum is an open-air ethnographic museum created in 1936 to describe traditional Romanian village life. It contains over two hundred authentic peasant farms and houses from all over Romania (Figures 6.29–6.31).



Figure 6.27: Government Palace.



Figure 6.28: Government Palace with Dan Petre Georgescu, 2002.



Figure 6.29: Entrance to the Village Museum with guide Liliana, 2002.



Figure 6.30: A church in the Village Museum, 2002.

National Museum of Romanian History

The National Museum of Romanian History (Figure 6.32) tells in detail the complex history of Romania and contains Romanian historical artefacts from prehistoric times up to modern times. The permanent displays include a plaster cast of the Trajan Column and the Romanian Crown Jewels.



Figure 6.31: Village Museum, 2002.



Figure 6.32: The National Museum of Romanian History.

Research & Design Institute for Rare & Radioactive Metals

The Institute was founded in 1961 to search methods for extraction of uranium and less common metals in Romania and in particular phosphate rock. Director: Dr. Dan Petre Georgescu (Figure 6.33).

Balkan Mineral Processing Conference, 2009

The organization of Balkan mineral processing engineers took place in Athens on September 30, 1971 when representatives from Bulgaria, Cyprus, Greece, Romania, Turkey, and Yugoslavia met and signed a protocol forming the International Association of Engineers of South-East European Countries. This seems to have been at the initiative of Professor Kiriak Kovachev, Rector of the University of Mining and Geology in Sofia and President of the Bulgarian Association of Mining, Geological, and Metallurgical Engineers. The first task of the Association was to organize conferences where engineers and academics from the Balkan countries could meet to present and discuss recent work on mineral processing.



Figure 6.33: Dan Petre Georgescu, Director, Research & Design Institute for Rare & Radioactive Metals. Photo by Nadia Habashi, 2002.

The First Balkan conference was convened in Varna and at the last session, the Balkan Scientific Committee for Mineral Processing Conferences was founded with Prof. Kovachev as President, Prof. George Tsailas [Greece], engineer Stanka Patraš [Romania], Prof. Zeki Dogan [Turkey], and Prof. Dušan Salatić [Yugoslavia] as members with the task to convene future conferences at three years intervals. In 2000, the name changed from Balkan Mineral Processing Conference to Balkan Mineral Processing Congress. A summary of these conferences is given in Table 6.2.

Table 6.2: Balkan conferences.

Dates	Location	Convener	Number of participants	Number of papers
November 12–15, 1973	Varna, Bulgaria	Kiriak Kovachev	170	32
October 18–19, 1977	Baia Mare, Romania	Stanka Patraš and Paraschiv Ilie	100	36
June 18–19, 1980	Belgrade, Yugoslavia	Dušan Salatić	125	40
September 11–13, 1984	İstanbul, Turkey	Zeki Dogan	250	31
October 9–11, 1989	Varna, Bulgaria	Kiriak Kovachev	[150]	[30]
September 18–22, 1995	Ohrid, Macedonia	M. Nilkolovski	143	75
May 26–30, 1997	Vatra Dornei, Romania	Paraschiv Ilie	250	135
September 13–18, 1999	Belgrade, Yugoslavia	Dušan Salatić	185	60
September 11–13, 2001	İstanbul, Turkey	Güven Onal	450	180
June 15–20, 2003	Varna, Bulgaria	Lubomir Kuzev	300	165
May 22–26, 2005	Durrës, Albania	Kimet Fetahu	292	98
June 10–14, 2007	Delphi, Greece	Georgios N. Anastassakis	191	240
June 14–17, 2009	Bucharest, Romania	Sanda Krausz	195	152



Figure 6.34: Prof. Sanda Krausz, University of Petrosani, Conference Chair person, and host. Photo by Nadia Habashi, 2009.

Language problem

From the beginning there was a language problem. At the first and second conferences Bulgarian papers were published in Bulgarian and Russian, Romanian papers in Romanian and French, Yugoslavian papers in English and French, and Turkish papers in English. At the third conference this problem was partially solved by having simultaneous translation of papers presented in the four official languages of the conference: English, French, Russian, and Serbian. It was only at the sixth conference that it was agreed to have English as the only official language.

Political problems

The third conference was originally scheduled on April 22–26, 1980 but had to be postponed to June because of the death of President Tito. This resulted in the cancellation of participation of many authors. At the fifth conference the number of participants declined greatly evidently because of the tense political situation in Eastern Europe which resulted in the collapse of the Soviet Union and the dismembering of Yugoslavia. Cyprus became divided between the Turks and the Greeks. Invitations to Croatian and Slovenian engineers were turned down considering themselves not Balkan although they were originally members of the former Yugoslavia.

As a result, the sixth conference took place six years after the fifth. Thanks to the initiative of Professor Güven Önal at the İstanbul Technical University who called for a meeting in İstanbul in January 1995 to discuss the issues. Decisions taken at the meeting included the use of English as an official language and extending invitations to mineral processing communities outside the Balkan countries. The year 1995 was therefore a turning point in the history of the Association. It was at the seventh conference that participants from Australia, Czech Republic, China, Germany, and Italy took part for the first time.

Due to the widespread destruction of the infrastructure in Yugoslavia during the 78 days NATO bombardment, the eighth conference planned to be held in Heceg Novi on the Adriatic was to be moved to Belgrade. Also, because of the international sanctions implemented towards air traffic carried in and out of Yugoslavia as well as the negative attitudes from some countries towards Yugoslavia, a large number of foreign authors were unable to attend. As a result only 60 papers were presented but 144 were printed in the proceedings volume.

The Balkan Academy

At the eighth conference, at the initiative of Professor Güven Önal, the Balkan Academy of Sciences on Mineral Technologies was created.



Figure 6.35: Delegates 2009.



Figure 6.36: Delegates 2009.



Figure 6.37: With Prof. Dušan Salatić from Belgrade.



Figure 6.38: Iranian delegation.

BRAȘOV

Brașov (Figures 6.39–6.48) was formerly known by the German name Kronstadt, which means “Crown City.” German colonists known as the

Transylvanian Saxons were invited by King Géza II of Hungary to develop towns, build mines, and cultivate the land of Transylvania at different stages between 1141 and 1162.



Figure 6.39: Driving with Dr. Sorin Chiorean from Bucharest to Braşov in 2007 [166 km].



Figure 6.40: General view of Braşov.



Figure 6.41: General view of Braşov.



Figure 6.42: Braşov main square.



Figure 6.43: Braşov main square.



Figure 6.44: Braşov main square.



Figure 6.45: Braşov main square.



Figure 6.46: Braşov main square.



Figure 6.47: Black Church built by the German community, was originally Catholic but became Lutheran after the Reformation.



Figure 6.48: Braşov main square.

Transylvania University

In 1971 the University of Braşov was founded by the merger of all higher education institutes. There were eight departments at the time: Faculty of Mechanical Engineering, Faculty of Manufacturing Engineering, Faculty of Forestry, Faculty of Wood Industry, Faculty of Mathematics and Computer Science, Faculty of Physics–Chemistry, Faculty of Natural and Agricultural Science, and the Faculty of Music. In 1989, the university changed its name to Transylvania University of Braşov (Figure 6.49).



Figure 6.49: Transylvania University of Braşov.

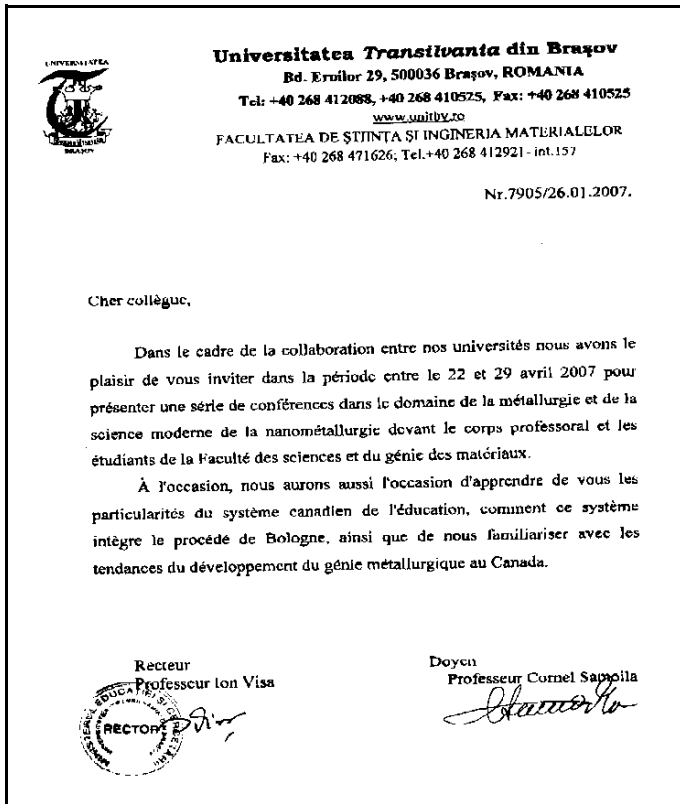


Figure 6.50: Invitation to visit Transylvania University.



Figure 6.51: Dean Cornel Samiola on my right and other members of Faculty of Engineering. Sorin Chiorean at the extreme left.

Bran Castle

Bran Castle (Figure 6.52) is situated in the immediate vicinity of Braşov, on the border between Transylvania and Walachia, commonly known as Dracula's Castle. It was built by the Saxons of Kronstadt (Braşov). The settlement of Bran began to develop nearby. In 1438–1442, the castle was used in defence against the Ottoman Empire, and later became a customs post on the mountain pass between Transylvania and Walachia. In 1920, the castle became a royal residence within the Kingdom of Romania. It was later seized by the communist regime with the expulsion of the royal family in 1948.



Figure 6.52: Bran Castle.

Vlad Tepes the Impaler (Dracula), Prince of Walachia, son of Vlad Dracul and Grandson of Mircea the Great, King of Walahia (1386–1418). Vlad Tepes introduced a very strict order in Walachia, strengthened the army, helped the trade with the neighbouring countries and was merciless towards those who went against him. He adopted a totalitarian leadership and fought against the Ottoman Empire scoring many victories.

SIBIU

Sibiu (Figures 6.53–6.55) is located in the centre of Romania, was formerly known by the German name Hermannstadt, between 1692 and 1791 was the capital of the Principality of Transylvania. It was designated a European Capital of Culture for the year 2007. It was in a gold mine there in

1782 when the Austrian mineralogist and mining engineer Franz-Joseph Müller von Reichenstein (1742–1826) (Figure 6.56) discovered the chemical element tellurium.



Figure 6.53: Large square.



Figure 6.54: City fortifications.



Figure 6.55: City tower.



Figure 6.56: Austrian postage stamp honouring Franz-Joseph Müller von Reichenstein (1742–1826).

Brukenthal Museum

Brukenthal Museum (Figure 6.57) is the palace of the former Habsburg Governor of Transylvania Samuel von Brukenthal (1721–1803) (Figure 6.58).



Figure 6.57: Brukenthal Museum.



Figure 6.58: Samuel von Brukenthal (1721–1803).

SINAIA

Sinaia is a mountain resort 50 km south of Braşov, named after Sinaia Monastery, around which it was built. The monastery in turn was named after the Biblical Mount Sinai. King Karol I built his summer home, Peleş Castle (Figure 6.59), near the town in the Carpathian Mountains between 1873 and 1914, now a museum.



Figure 6.59: Peleş Castle.

Chapter 7

Serbia

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Figure 7.1: Flag of Kingdom of Serbia.



Figure 7.2: Flag of Yugoslavia.



Figure 7.3: Flag of Serbia today.

HISTORICAL INTRODUCTION

Early history

What was known as Yugoslavia during the 20th century was part of the Roman Empire and was known as Illyricum (Figure 7.4). About 20 Roman emperors came from this region. In the 6th and 7th centuries Slavs settled in the Balkans and were Christianized in the 9th century.

- The split of the Roman Empire in the 4th century AD resulted in dividing the Balkans into Roman Catholic (west) and Byzantine Orthodox (east), roughly along today's Bosnian–Serbian border (Figures 7.5–7.6).



Figure 7.4: Yugoslavia was known as Illyricum during the Roman Empire.



Figure 7.5: Yugoslavia split between Eastern and Western Roman Empire.

- Stephen Dušan (ca. 1308–1355) (Figure 7.7) was the King of Serbia (from 1331) and Emperor of the Serbs and Greeks (from 1346) until his death. He managed to conquer a large part of Southeast Europe, and promoted the Serbian Church from an archbishopric to a patriarchate, finished the construction of the Visoki Dečani monastery and founded the Saint Archangels Monastery, among others. Under his rule Serbia reached its economical, political, and cultural peak. His death is seen as the end of resistance towards the advancing Ottoman Empire, and the subsequent fall of the Eastern Orthodox Church in the region. His crown is presently kept at the Cetinje Monastery, in Montenegro.

- The Islamic Ottomans invaded the region in the 14th century. The Ottoman victory at the Battle of Kosovo (1389) began five centuries of Islamic influence in Bosnia–Herzegovina and Serbia, further dividing the Balkans into Christian (north) and Muslim (south).



Figure 7.6: Yugoslavia as part of the Ottoman Empire.

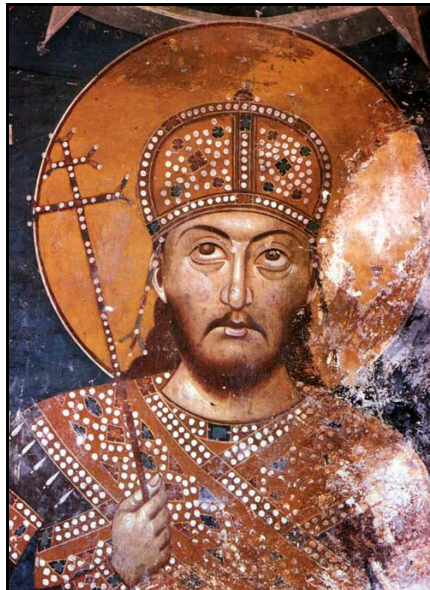


Figure 7.7: Stephen Dušan (ca. 1308–1355).

Ethnic mixing

Ethnic mixing (Figure 7.8) came in the 16th century when the Ottomans were threatening to overrun Europe, and the Hapsburgs in Austria wanted a buffer zone. The Hapsburgs encouraged Serbs who were fleeing from Ottoman invasions to settle along today's Croatian–Bosnian border. The Serbs stayed after the Ottomans had left, establishing homes in predominantly Croat communities.

After the Ottoman threat subsided in the late 17th century, Slovenia and Croatia became part of the Austrian Empire. The Ottomans stayed longer in the south and east (today's Bosnia–Herzegovina and Serbia) — making the cultures in these regions different. Yugoslavia had eight distinct peoples in six republics, with five languages, three religions (Orthodox, Catholic, and Muslim), and two alphabets (Roman and Cyrillic).



Figure 7.8: Major ethnic groups in Yugoslavia. Kosovo is mainly Albanians while Montenegro is mainly Serbs. Slovenia and Macedonia do not have important minorities.

Independence of Serbia

Independence from the Ottomans took many years to achieve through bloody uprisings and suppressions. Serbia's national hero is Đorđe Petrović (George Petrovich), known as Karadorđe, or Black George (1768–1817) (Figure 7.9) who in 1804–1813 led armies against the Ottomans in several battles. He was assassinated by the Turks.



Figure 7.9: Đorđe Petrović (1768–1817)



Figure 7.10: Miloš I (1780–1860).



Figure 7.11: King Milan I (1854–1901).

Serbia became an autonomous duchy within the Ottoman Empire in 1830 due to the efforts of Miloš Obrenović I (1780–1860) (Figure 7.10). The Principality got full independence in 1878 and its transformation into the Kingdom of Serbia in 1882 under Milan IV Obrenović. Milan IV ruled as Prince Milan IV from 1868 to 1882 and as King Milan I of Serbia (1854–

1901) (Figure 7.11) from 1882 to 1889.

Kragujevac was the first capital of modern Serbia from 1818 to 1839 before the king moved to Belgrade (see Figure 7.19).

Unification of the South Slavs

A movement for unification of the South Slavs was led by Serbia and was a major cause of World War I when a Serbian nationalist assassinated Austrian Archduke Franz Ferdinand and his wife in Sarajevo in Bosnia on June 28, 1914.



Figure 7.12: King Peter I (1844–1921).



Figure 7.13: King Alexander I (1888–1934).

World War I and the foundation of Yugoslavia¹

Austria declared war on Serbia, thus precipitating World War I. At the end of the war, the Austrian Empire was dismembered and in 1918 the Kingdom of Serbs, Croats, and Slovenes was formed by union of the State of Slovenes, Croats, and Serbs under Serbian King Peter I (1844–1921) (Figure 7.12). When he died, his son Alexander I (1888–1934) (Figure 7.13) ascended the throne. Ethnic problems broke out and King Alexander in 1929 proclaimed a dictatorship, dissolved the parliament, and changed the name of the kingdom to Yugoslavia (Figure 7.14). Yugoslavia is Slavic for South Slavs.

¹ For the origin of World War I and the assassination of Archduke Franz Ferdinand and his wife, see Bosnia.



Figure 7.14: Kingdom of Yugoslavia in 1929.



Figure 7.15: Peter II (1923–1970), third and last king of Yugoslavia.

World War II and establishing a Communist regime

Troubles with Croatian and Macedonian nationalists culminated. King Alexander I was assassinated in Marseilles while on an official visit to France. His son, Peter II (1923–1970) (Figure 7.15), succeeded under the

regency of Alexander's cousin, Prince Paul. During World War II in 1941 German troops, assisted by Bulgarian, Hungarian, and Italian forces, invaded Yugoslavia and divided the country.

Peter II established a government in exile in London and Yugoslav troops continued to resist in their mountain strongholds under the Communist Tito. In October 1944 the Germans were driven from Yugoslavia. The Soviet army entered Belgrade in March 1945, Marshal Tito became premier and a federal people's republic was proclaimed composed of: Serbia, Croatia, Macedonia, Montenegro, and Slovenia.

The Communist regime

Under Josip Broz Tito (1892–1980) (Figure 7.16), intellectual freedom was restricted. With his death in 1980, a collective leadership was established. In 1987, Slobodan Milošević (1941–2006) (Figure 7.17), a Serbian nationalist, became the Communist party leader and in 1989 became president. Serbia rescinded Kosovo's autonomy and sent in troops to suppress the protests of Kosovo's largely Albanian population. Slovenia and Croatia elected non-Communist governments in early 1990. Serbia and Montenegro were the only republics to retain Communist leadership.



Figure 7.16: Josip Broz Tito (1892–1980).



Figure 7.17: Slobodan Milošević (1941–2006).

The disintegration of Yugoslavia

The economic problems and ethnic divisions continued to deepen. After attempts by Serbia to impose its authority on the rest of the country,

Slovenia and Croatia declared their independence on June 25, 1991. Fighting immediately broke out as the federal army, controlled largely by Serbs, moved into Slovenia. In September 1991, Macedonia declared its independence, and Bosnia and Herzegovina in October.

In a campaign of “ethnic cleansing” carried out mostly by the Serbs, thousands of Muslims were killed, and many more fled Bosnia or were placed in Serb detention camps. In March 1999, following mounting repression of ethnic Albanians and the breakdown of negotiations between separatists and the Serbs, NATO began bombing military targets throughout Yugoslavia, and thousands of ethnic Albanians were forcibly deported from Kosovo by Yugoslav troops. In early 2001, Milošević and some of his associates in the former government were arrested on various charges and the former president was turned over to the War Crimes Tribunal in The Hague.

Serbia today

Figure 7.18 shows a map of Serbia today and Figure 7.19 shows the location of Bor, Kladovo, and Zaječar.



Figure 7.18: Serbia [including Kosovo] and her neighbours. The Danube is the border with Hungary and Romania.



Figure 7.19: Map of Serbia [including Kosovo] showing Belgrade, Kladovo on the extreme right, Bor, and Zajecar. Kragujevac was the first capital of modern Serbia (1818–1839).

Table 7.1: Visits to Serbia.

Dates	Cities visited	Purpose of visit
May 1956	Belgrade [Yugoslavia]	Cultural visit
April 2007	Belgrade Bor	University of Belgrade <ul style="list-style-type: none"> • University of Belgrade in Bor • Copper smelter
October 2010	Kladovo Bor Zaječar	International October Conference Mining & Metallurgy Museum <ul style="list-style-type: none"> • Felix Romulia ruins of Roman Emperor Galerius palace • Archaeological Museum Zaječar
October 2014	Bor Lake Bor Zaječar	International October Conference University of Belgrade in Bor <ul style="list-style-type: none"> • Felix Romulia ruins of Roman Emperor Galerius palace • Archaeological Museum Zaječar

BELGRADE

Belgrade (Figures 7.20–7.25) became the capital of the Kingdom of Serbia in 1839 and remained capital of Yugoslavia after World War II. It is now the capital of the Republic of Serbia. It lies on the Danube and Sava rivers.

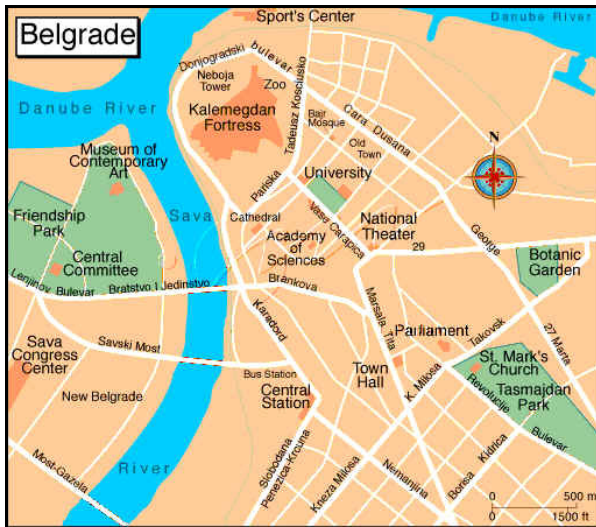


Figure 7.20: Map of Belgrade showing Kalemegdan Fortress overlooking the Danube and Sava rivers.



Figure 7.21: Belgrade railway station.



Figure 7.22: Republic square and Parliament building.



Figure 7.23: Monument to Prince Mihailo III (1823–assassinated in 1868) of Obrenović dynasty.



Figure 7.24: Art gallery.

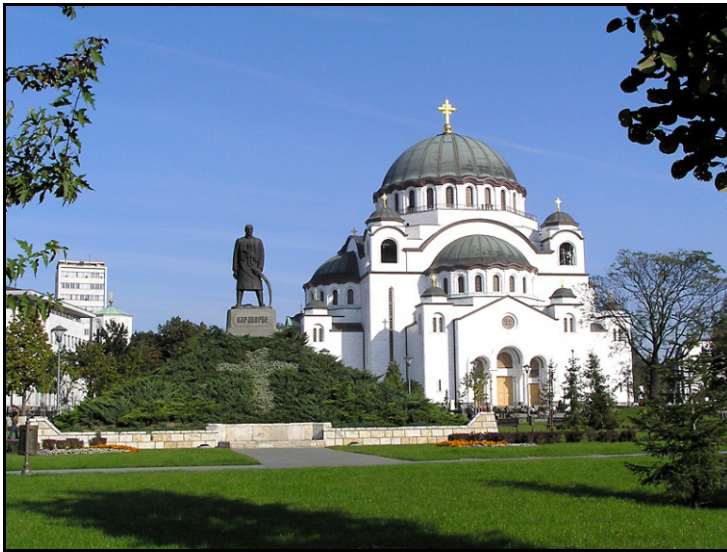


Figure 7.25: Eastern Orthodox Church with monument to national hero Duke Karadordje (Black George) (1768–1817).

Kalemegdan Fortress

Kalemegdan Fortress (Figures 7.26–7.31) is the origin of Belgrade. In 279 BC Singidun was founded by the Celts and was known to the Romans as Singidunum. For centuries the city population was concentrated within the walls of the fortress. In 535 Byzantine emperor Justinian I rebuilt the fortress. It changed hands many times between Hungarians, Bulgarians, and others until the Ottomans took it in 1521. Kalemegdan is a corrupted Ara-

bic/Turkish Qalat Almagd, i.e., the Fortress of Glory. In 1717 Prince Eugene of Savoy captured the city and it became the capital of the Kingdom of Serbia, a Habsburg Monarchy province, but it was returned to the Ottomans in 1791. After independence in 1841 Belgrade became the capital of the Principality of Serbia.



Figure 7.26: Entrance to Kalemegdan Fortress.



Figure 7.27: Entrance to Kalemegdan Fortress.



Figure 7.28: Entrance to Kalemegdan Fortress. Photo by Prof. Dušan Salatić, 2007.



Figure 7.29: View of the Fortress walls.



Figure 7.30: View from the Fortress.



Figure 7.31: On top of the Fortress.

University of Belgrade

University of Belgrade was founded in 1808 during the revolutionary period.



Figure 7.32: With faculty members of Department of Metallurgy, 2007. On my right: Prof. Nadežda Čalić, and on my left: Prof. Dušan Salatić.



Figure 7.33: With faculty members of Department of Metallurgy, 2007.

BOR

Bor is a small mining town, has one of the largest copper mines in Europe. Copper mining in this area started in 1904 when French investors established the French Society of the Bor Mines headquartered in Paris. During World War II the Germans took over the operations. With the birth of the Republic of Yugoslavia after the war, the mines became a state enterprise. In the 1990s, the civil wars in Croatia and Bosnia resulted in the economic collapse.

After two unsuccessful attempts at privatization, the government decided to invest in Rudarsko Topionicki Basen Bor (RTB Bor Group). Reserves estimated at 319 million tonne of ore (0.5% Cu, 0.2 g/t Au and 36 g/t Mo) and more than 1 billion tonnes of estimated reserves at another deposit. The deposit is 1 300 m deep. Ore is concentrated by flotation at the Majdanpek concentrator, then sent to the reverberatory furnace at Bor smelter. Air pollution from the smelter was a serious problem. The smelter is being re-built employing flash technology and a new sulfuric acid plant. Figure 7.34 shows the old smelter and the tailings.



Figure 7.34: Bor smelter and tailings.

University of Belgrade in Bor

University of Belgrade in Bor (Figures 7.35–7.39) was established in 1961 with two departments: Mining and Metallurgy. More departments were added in 2002.



Figure 7.35: University of Belgrade in Bor.



Figure 7.36: With faculty members of Metallurgy Department, 2007. Second from left is dean. Dragana Živković on my left.



Figure 7.37: Entrance to the Faculty of Metallurgy, 2014.



Figure 7.38: Dean Milan Antonijević [corrosion chemist], 2014.



Figure 7.39: From left: Prof. Dragana Živković, Prof. Ljubisa Balanović, Dr. Vasily Lutayk, visitor from Russian Academy of Science, Ulan Ude, Fathi Habashi, and Prof. Saša Stajadinović, 2014.

Mining Museum

The museum contains a description of mining and metallurgy at Bor and a painting showing the copper smelter (Figure 7.40).



Figure 7.40: Painting showing the copper smelter in Bor, 2010.

National Archaeological Museum

The Museum (Figures 7.41–7.50) was founded in 1951. It contains the Roman artefacts discovered in the region and a model of the Palace built by the Roman Emperor Galerius.



Figure 7.41: Archaeological Museum.



Figure 7.42: Archaeological Museum, 2014.



Figure 7.43: Entrance to the Museum with Dragana Živković [left] and Aleksandra Mitovski [right], 2010.



Figure 7.44: Guide explaining at the Archaeological Museum, 2014.



Figure 7.45: Roman mosaic in the museum, 2010.



Figure 7.46: Inside the museum, 2010.



Figure 7.47: Model of Felix Romuliana, 2010.



Figure 7.48: Model of Felix Romuliana.



Figure 7.49: Inside the museum.



Figure 7.50: Inside the museum.

Turkish Museum

A house of a rich Turkish citizen is kept as museum (Figures 7.51–7.52).



Figure 7.51: Turkish Museum, 2014.



Figure 7.52: Turkish Museum, 2014.

KLADOVO

Kladovo on the Danube (Figures 7.53–7.54) faces Romania on the other side and was connected by a bridge constructed in 105 AD by Emperor Trajan as a supply route for the Roman legions fighting in Dacia. Roman memorial plaque “Tabula Traiana” commemorating the completion of Trajan’s military road is located on the Serbian side (Figure 7.55). In 1972, when the Iron Gate I Hydroelectric Power Station was built, the plaque was moved from its original location, and lifted to the present place.



Figure 7.53: The Danube is the natural border with Romania. The map shows the location of Kladovo.



Figure 7.54: The Danube at Kladovo is the narrowest part [150 m] and reaches a depth of 53 m.



Figure 7.55: Roman plaque commemorates Trajan's Bridge.

The wooden superstructure of the bridge was dismantled by Trajan's successor, Hadrian, in order to protect the empire from barbarian invasions from the North.

Iron Gates

The Iron Gates is a gorge on the Danube River (Figure 7.56) contains two hydroelectric dams, with two power stations. The construction of the joint Romanian–Yugoslavian project commenced in 1964. In 1972 the Iron Gate I Dam was opened, followed by Iron Gate II Dam in 1984. The construction of these dams caused a 35 m rise in the water level of the river near the dam. People were relocated and the settlements have been lost forever.

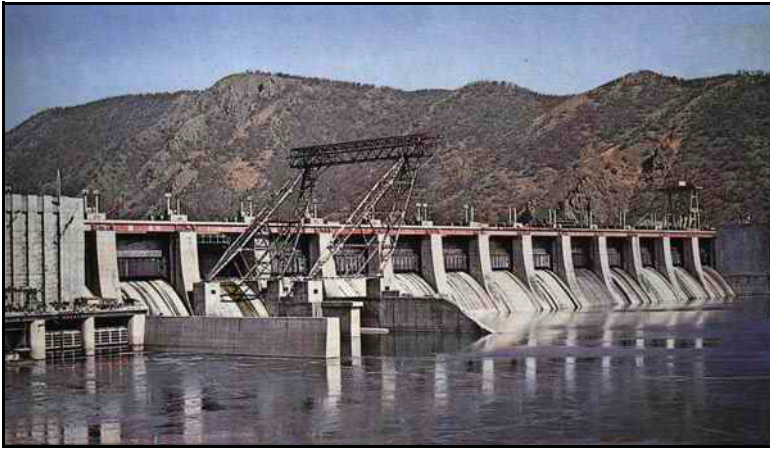


Figure 7.56: The joint Romanian–Yugoslavian project at Kladovo.

Archaeological Museum

Figures 7.57–7.59 show photos taken inside the museum.

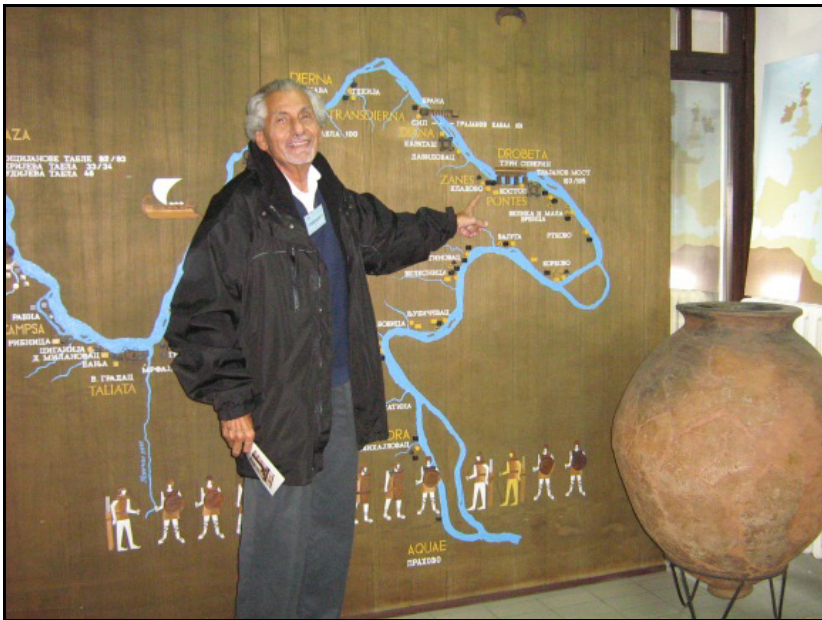


Figure 7.57: A map in Kladovo Museum showing the Danube changing direction at Kladovo.



Figure 7.58: Scene inside the museum.



Figure 7.59: Serbian girl during Roman time.

October Conference 2010

Serbian metallurgists organized their 42nd annual conference at Kladovo to discuss recent advances. At the conference I was invited to give a plenary lecture (Figures 7.60–7.62).



Figure 7.60: Some conference participants, 2010.

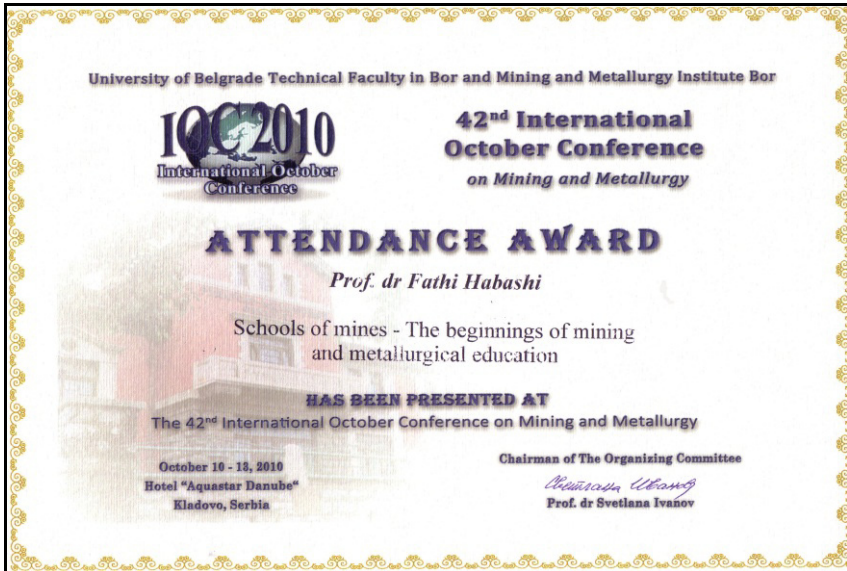


Figure 7.61: Certificate of attendance.

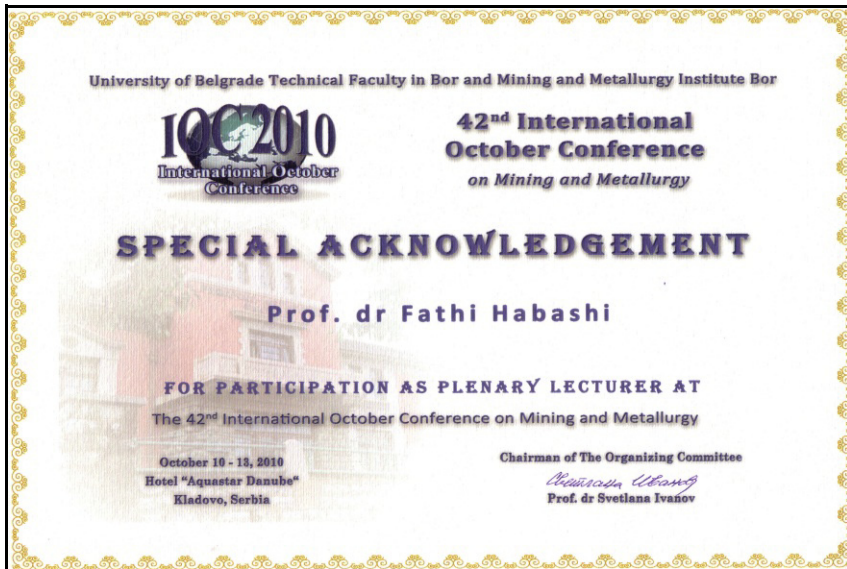


Figure 7.62: Acknowledgement.

BOR LAKE

October Conference 2014

The International October Conference took place in Bor Lake, which is 20 km from Bor. Bor Lake is a small village around an artificial lake (Figure 7.63) for a hydroelectric power station and containing Hotel Jezero (Figure 7.64), where the conference took place. All decorations are related to mining and metallurgy of copper (Figures 7.65–7.67). President of the Organizing Committee Prof. Nada Štrbac (Figure 7.70).



Figure 7.63: Bor Lake, 2014.



Figure 7.64: Hotel Jezero [4 stars], 2014.



Figure 7.65: Statue of a miner.



Figure 7.66: Mining cart.



Figure 7.67: A painting of anode furnace for copper.

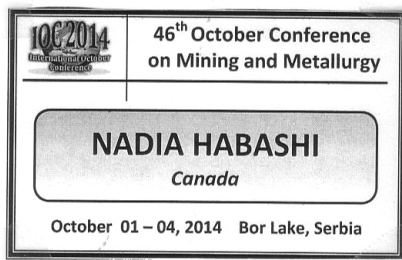
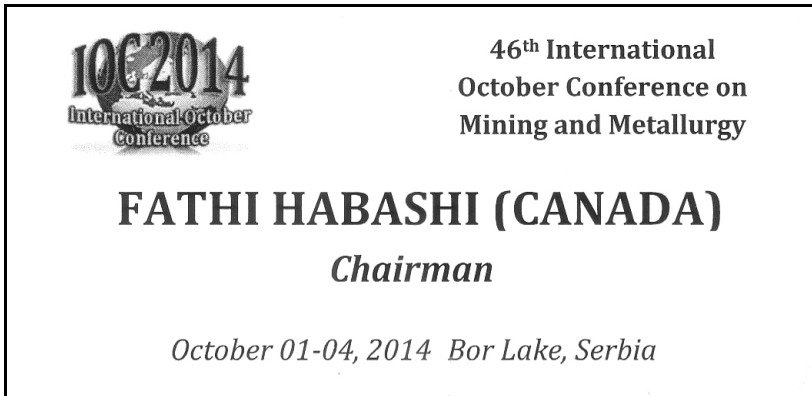


Figure 7.68: Conference badges.



Figure 7.69: Plenary speakers.



Figure 7.70: President of the Organizing Committee Prof. Nada Štrbac, second from left.



Figure 7.71: The conference.



Figure 7.72: Presenting a plenary lecture on the history of extractive metallurgy, 2014.

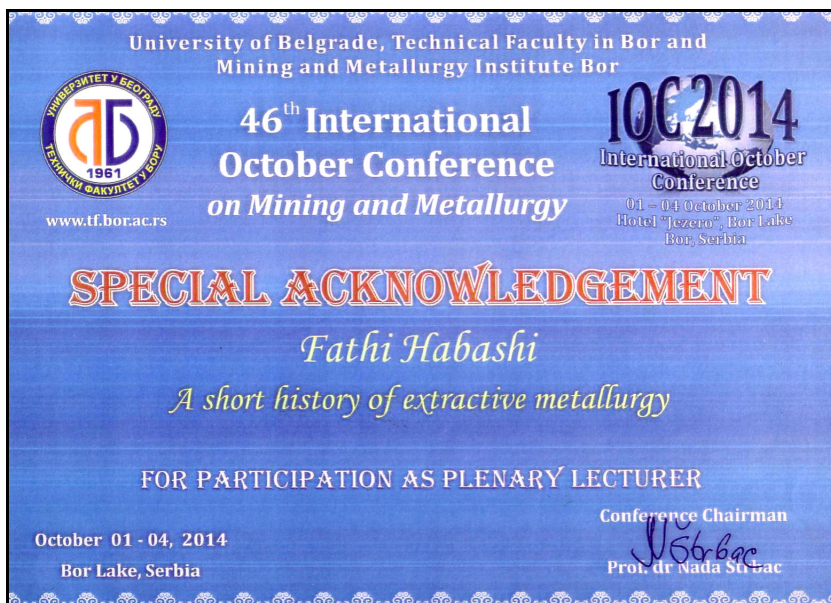


Figure 7.73: Special Acknowledgement.



Figure 7.74: In Hotel.



Figure 7.75: In Hotel.



Figure 7.76: Folk dancing in banquet.



Figure 7.77: Dinner at banquet.



Figure 7.78: With students and faculty members after the poster session.



Figure 7.79: From left: Prof. Boyan Biyanov, Chemical Technology, Plovdiv in Bulgaria, Prof. Essen Suleimenov, Kazakh British Technical University, Almaty, Fathi Habashi, Dr. Stoyan Gishi, Academy of Science, Sofia, and Graduate Student Rustom, Almaty.



Figure 7.80: Prof. Tomas Havlik, Dr. Andrea Miskufova, and Graduate student all from Košice, Slovakia.



Figure 7.81: Discussing the situation in Serbia with Dr. Nadežda Talijan, Academy of Engineering, Belgrade.

ZAJEČAR

Gamzigrad is a huge Roman complex of ruins called “Felix Romuliana” near the town of Zaječar in eastern Serbia (Figures 7.82–7.94). The Roman Emperor Galerius started construction in 289 AD to mark his birth place. Gamzigrad is a UNESCO World Heritage.



Figure 7.82: Entrance to Felix Romuliana.

Gaius Galerius Valerius Maximianus (ca. 260–311) (Figure 7.95), commonly known as Galerius, was Roman Emperor from 305 to 311. He was born on a small farm estate, on the site where he later built his palace, Felix Romuliana. His father was Thracian and his mother Romula was Dacian. He served with distinction as a soldier under Emperors Aurelian and Probus, and in 293 at the establishment of the Tetrarchy, was designated Caesar receiving in marriage Diocletian’s daughter Valeria and at the same time being entrusted with the care of the Illyrian provinces.

In 298, Galerius secured victories over the Sassanids and took Ctesiphon before returning to Roman territory. In his last years he relinquished his aspirations towards being the supreme emperor of the empire. He spent the remainder of his life ordering some important public works.



Figure 7.83: Discussion with resident archaeologist (2010).

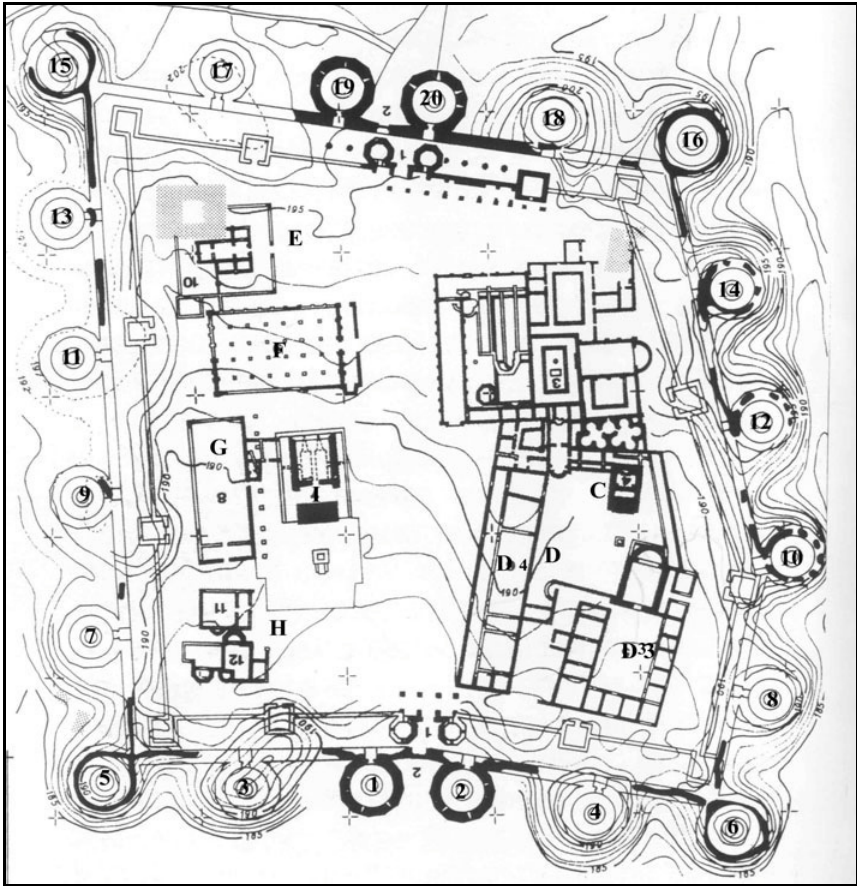


Figure 7.84: Plan of the site.



Figure 7.85: The actual site.



Figure 7.86: Ruins at Felix Romuliana.



Figure 7.87: Ruins at Felix Romuliana.



Figure 7.88: Ruins at Felix Romuliana.



Figure 7.89: Ruins at Felix Romuliana.



Figure 7.90: Ruins at Felix Romuliana.



Figure 7.91: Ruins at Felix Romuliana.



Figure 7.92: Ruins at Felix Romuliana.



Figure 7.93: Ruins of Roman Emperor Galerius palace. Photo by Prof. Dragana Živković, 2007.



Figure 7.94: Ruins at Felix Romuliana.



Figure 7.95: A Roman coin showing Emperor Galerius (ca. 260–311).

Chapter 8

Slovenia

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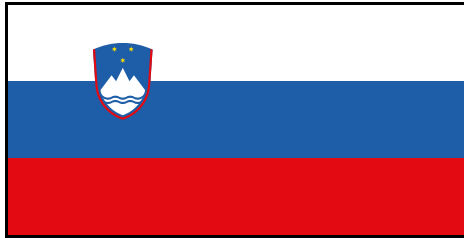


Figure 8.1: Flag of Slovenia.

The coat of arms of Slovenia features Mount Triglav, the highest peak in Slovenia. Below the white mountains are the waves of the Adriatic Sea that borders Slovenia. In the sky above the mountains, there is a constellation of stars to represent the Counts of Celje, who ruled Slovenia in the 14th and 15th centuries.



Figure 8.2: Slovenia and her neighbours.



Figure 8.3: Slovenia and the Idrija mercury mine.

HISTORICAL INTRODUCTION

In the Iron Age, present-day Slovenia was inhabited by Illyrian and Celtic tribes until the 1st century BC, when the Romans conquered the region and established the provinces of Pannonia and Noricum. The Romans established posts at Emona (Ljubljana), Poetovio (Ptuj) and Celeia (Celje), and constructed trade and military roads that ran across Slovene territory from Italy to Pannonia. Remains of Roman fortification in Ljubljana is shown in Figure 8.4. In the 5th and 6th centuries, the area was subject to invasions by the Huns and Germanic tribes. In 568, the Slavs from the East began to dominate the area, with aid from Avars. Charlemagne annexed the region in 803.

The Magyar invaded the Pannonian Plain in the late 9th century but Emperor Otto I conquered them in 955. Slovene territory was divided into a number of border regions of the Holy Roman Empire. In the late Middle Ages, the historic provinces of Carniola [now Slovenia], Styria, Carinthia, Gorizia, Trieste and Istria incorporated into the medieval German state. In the 14th century, most of the territory of Slovenia was taken over by the Habsburgs until the beginning of the 20th century. From 1809 to 1813, Ljubljana became known as Ljubljana when occupied by Napoleonic army and became the capital of the Illyrian Provinces.



Figure 8.4: Remains of Roman fortification in Ljubljana.



Figure 8.5: Monument dedicated to the French occupation of Ljubljana at the Revolution Square.

In exchange for joining the Allied Powers in the World War I, the Kingdom of Italy, was granted rule over much of the Slovene territories. After the Fascist takeover in Italy in 1922, they promoted a policy of Italianization. After the war in 1918, the Slovenes merged into Yugoslavia. During World War II, Slovenia was occupied and annexed by Germany, Italy, Hungary, and Croatia. Slovenes were forcibly deported to eastern Germany for potential Germanization or forced labour. In 1941 the National Liberation Front was organized to carry out a liberation struggle. After the war it was a founding member of the Socialist Federal Republic of Yugoslavia. In June 1991, Slovenia split from Yugoslavia and became an independent country.



Figure 8.6: Monument dedicated to the French occupation of Ljubljana, details.

LJUBLJANA

There was a Roman settlement known as Emona in what is now Ljubljana. When the Slav settled in this region they called it Ljubljana. In the Middle Ages, it became known by the German name Laibach (Figures 8.7–8.10), which was in official use until 1918.



Figure 8.7: Ljubljana River.



Figure 8.8: Bridge.

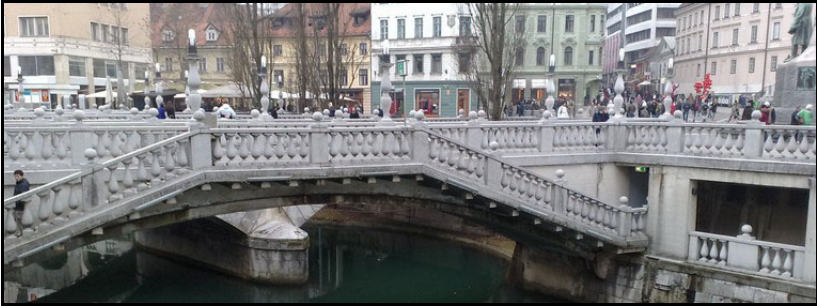


Figure 8.9: Bridge.



Figure 8.10: Opera House.

Ljubljana Castle

The Castle was a Roman fortification which was demolished and rebuilt in the 15th century to defend the empire against Ottoman invasion as well as peasant revolt. In the 17th and 18th centuries, the castle became an arsenal and a military hospital. The castle's Outlook Tower dates to 1848. Since the 1990s, the castle was used for cultural events.



Figure 8.11: Ljubljana castle.



Figure 8.12: Ljubljana castle.



Figure 8.13: Overlooking Ljubljana from the Castle. Photo by Prof. Vasili Gontarev. June 16–29, 2002..

Preseren Square

Preseren Square (Figure 8.14) is named after Slovene poet France Preseren (1800–1849) (Figure 8.15), who fell in love with Primicova Julija, daughter of a rich merchant (Figure 8.16) whose house was next door to his. However, because of different social status they were unable to get married.



Figure 8.14: Preseren Square named after Slovene poet France Preseren (1800–1849).



Figure 8.15: France Preseren (1800–1849).



Figure 8.16: Primicova Julija.

Valvasor

Johann Weichard Freiherr von Valvasor (1641–1693) (Figure 8.17) was a Carniolan nobleman, scientist, and a fellow of the Royal Society in London. After finishing a Jesuit school in Laibach he spent 14 years travelling abroad. Until the late 19th century, his writings represented the main source for older Slovenian history.

Laibach Congress

In 1821, from January 26 to May 12, Laibach [Ljubljana] hosted a congress which fixed European political borders after the Napoleonic Wars. At that time the three autocratic powers, Russia, Austria and Prussia, considered themselves responsible for the peace of Europe and had the right to intervene to suppress any revolutionary movement by which they might conceive that peace to be endangered. Emperors of Russia and Austria were present in person, and with them were diplomats including Metternich.



Figure 8.17: Monument to Valvasor.



Figure 8.18: Ursuline Church and Congress Square.

Earthquake

In 1895, Laibach suffered a serious earthquake which destroyed much of the city.

University of Ljubljana

The university of Ljubljana (Figure 8.19) was founded in 1810 under the named *Écoles centrales* by the French Imperial administration of the Illyrian Provinces. The university was disbanded in 1813, when the Austrian government regained control.



Figure 8.19: Administrative building of the University of Ljubljana which was originally the National Assembly.

Slovenian students were enrolled in universities of the Austro-Hungarian Empire. Unfavourable political circumstances prevented the establishment of the University until the fall of the Austro-Hungarian Empire. With the establishment of the State of Slovenes, Croats and Serbs in 1918, the founding of the university took place the same year.

Technical Museum of Slovenia

The Technical Museum of Slovenia (Figure 8.25) is located in the outskirts of Ljubljana occupying a former monastery. Collections include items related to forestry, woodworking, hunting, fishing, agriculture, textiles, printing, traffic, electrical engineering, and a water wheel.



Univerza v Ljubljani
Naravoslovnotehniška fakulteta
Oddelek za materiale in metalurgijo
Katedra za metalurško procesno tehniko

vabi na predavanje

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Quebec, Kanada (njegova biografija v prilogi) z
naslovom

NOV POGLED NA PERIODNI SISTEM

(kratek izveček v prilogi)

ki bo v petek, 21. junija 2002 ob 10. uri v
predavalnici P-11, Aškerčeva 12

Dekan NTF
Prof.dr. Jakob Lamut

Predstojnik oddelka za materiale in metalurgijo
doc. dr. Peter Fajfar

Predstojnik katedre za metalurško procesno tehniko
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NOVI POGLED NA PERIODNI SISTEM

Fathi Habashi
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Univerza Laval, Quebec, Kanada

Ko se znanost razvija, je zakonov vse manj, imajo pa večji pomen. V tem pogledu je predstavljal periodni zakon, ki je bil osnova periodnega sistema, velik korak naprej v razvoju kemije -- bil je podlaga za naravno razvrstitev elementov. Periodni sistem so kemiki razvili pred več kot 100 leti kot korelacijo med lastnostmi elementov. Z odkritjem notranje zgradbe atoma so ga kot naravni zakon priznali fiziki. Ko so strokovnjaki študirali kristalno zgradbo trdnin, so razumeli naravo kemičnih vezi in razvila se je teorija kovin, ki je postala bistveno orodje ne samo kemikov in fizikov ampak tudi metalurgov. Od 87 elementov, ki se nahajajo v naravi, jih je 63, t.j. okoli tritetrine označenih kot *kovine*, 16 kot *nekovine* in 9 kot *metaloide* (*polkovine*).

A NEW LOOK AT THE PERIODIC TABLE

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As science advances, its laws become fewer but of greater scope. In this respect the Periodic Law, which is the basis of the Periodic Table, represents a major step in the progress of chemistry - it affords the natural classification of the elements. The Periodic Table was developed by chemists more than one hundred years ago as a correlation for the properties of the elements. With the discovery of the internal structure of the atom, it became recognized by physicists as a natural law. When the crystalline structure of solids was studied, the nature of the chemical bonds was understood, and the theory of metals was put forward, it became an essential tool not only for chemists and physicists, but for metallurgists as well. Of the 87 naturally occurring elements, 63, i.e., about three fourth are described as *metals*, 16 as *nonmetals*, and 9 as *metalloids*.

Figure 8.20: Lecture at the University of Ljubljana, 2002.



FATHI HABASHI

Profesor za ekstraktivno metalurgijo na Univerzi Laval, Quebec, Kanada. Rojen je bil 1. 1928 v Minii, Egipt. Diplomiral je (B.Sc. Degree) na oddelku za kemijsko tehnologijo Univerze v Kairu (1949), doktoriral pa s področja anorganske kemijske tehnologije na Univerzi na Dunaju (1959), častna doktorata pa je dobil na Tehniški univerzi Oruro v Boliviji (1986) in Rudarskem inštitutu v St. Petersburgu v Rusiji (1993). Dobil je štipendijo kanadske vlade (1960-62), učil na Koledžu za tehniko in tehnologijo mineralnih surovin v Montani (1964-67), potem pa je služboval v raziskovalnem oddelku za ekstraktivno metalurgijo podjetja Anaconda v Tucsonu, Arizona, ZDA, predno je prišel 1. 1970 na Univerzo Laval. Bil je izvoljen za akademika Ruske akademije znanosti 1. 1994, bil je tudi ustanovni član Akademije frankofonskih inženirjev, član (Fellow) kanadskega Društva rudarjev, metalurgov in naftnih inženirjev (1998) ter dobil srebrno medaljo kanadskega društva metalurgov (CIM) 1. 1999. Njegova raziskovalna dejavnost je navdihovala željo razviti integralno razumevanje procesov v ekstraktivni metalurgiji in jih sistematično razvrstiti glede na zgodovinsko ozadje.

Bil je gostujoči profesor na Sovjetski akademiji znanosti v Leningradu (1977), na Nacionalni avtonomni univerzi v Meksiku (1980), na Kraljevem tehnološkem inštitutu v Stockholmu (1981), na Brazilskem nacionalnem svetu za znanost in tehnični razvoj (1982), na Akademiji Sinica v Pekingu (Bejingu) (1984), na Tehniški univerzi v Oruru, Bolivija (1986), na Visoki šoli za kemijsko tehnologijo v Sofiji (1987), na Centralni južni tehnološki univerzi v Changshui, Kitajska (1990), na Metalurški fakulteti v

Košicah, Českoslovaška (1991), na Kemijski šoli Zveze univerze v Rio de Janeiro in na Narodni univerzi v San Luisu, Argentini (1992), na Univerzi Sonora v Hermosillu, Mehika, Bandunški tehnološki univerzi, Univerzi Witwatersand v Johannesburgu in Univerzi v Port Elizabethu, Južna Afrika ter Severni katoliški univerzi v Antofagasti, Čile (1993), Centralni venezuelski univerzi v Caracasu (1997) in na Univerzi v Pretoriji (2000).

Predaval je v Narodnih laboratorijih za tehniko in industrijsko tehnologijo v Lizboni (1987), v Centru za raziskavo mineralnih surovin v Havanu (1987), na Transkem geološkem inštitutu v Teheranu (1994), na Univerzi v Kohiju, Japonska (1994), v Remirexu v Marakešu, Maroko (1995 in 1997), na Odboru za jedrske materiale v Qattamiji, Egipt (1995) in v Raziskovalnem centru za mineralne surovine, Rio de Janeiro (1996, 1997 in 2000). L. 1989 je bil izbran za eksperta pri Združenih narodih za razvojni program projekta kubanskih lateritov.

Napisal je *Principles of Extractive Metallurgy (Osnove ekstraktivne metalurgije)* v štirih delih (1969-1998), od katerih sta prva dva prevedena v ruščino in kitajščino; *Chalcopyrite - Its Chemistry and Metallurgy (1978) (Halkopirit - njegova kemija in metalurgija)*; pripravil avdio tečaj *Metallurgical Chemistry (1987)* za Ameriško kemijsko društvo; nadalje je napisal *Kinetics of Metallurgical Processes (1999) (Kinetika metalurških procesov)*, *Pollution Problems in the Minerals and Metallurgical Industries (1996) (Problemi onesnaževanja pri pridobivanju mineralnih surovin in v metalurgiji)*, *Textbook of Hydrometallurgy (1999) (Učebnik za hidrometalurgijo, 2. izdaja)*, *Extractive Metallurgy Today - Problems and Progress (2000) (Ekstraktivna metalurgija danes - problemi in napredek)*; je soavtor pri *Mineral Resources of the Arab Countries (1981) (Mineralne surovine v arabskih državah)* ter *Mining and Metallurgy on Postage stamps (1999) (Rudarstvo in metalurgija na poštnih znamkah)*; uredil je *Progress in Extractive Metallurgy (1973) (Razvoj ekstraktivne metalurgije)*, *A History of Metallurgy (1974) (Zgodovina metalurgije)*, *Handbook of Extractive Metallurgy (1997) (Priručnik ekstraktivne metalurgije)* v štirih zvezkih, *Alloys - Preparation, Properties, Applications (1998) (Zlitine - izdelava, lastnosti, uporaba)*, Gelleriovo *Metallurgical Chemistry (1998) (Metalurška kemija)* ter bil sourednik zbornika *Mednarodni simpozij o problemih uporabe kompleksnih rud (1995)*.

Figure 8.21: My CV in Slovenian, 2002.



Figure 8.22: Meeting with metallurgy faculty members. From left: Andrej Paulin, Vasil Gontarev, Jakob Lamut [Dean], and Fathi Habashi. Photo by Nadia Habashi, 2002.



Figure 8.23: Meeting of students and faculty members of the Metallurgy Department, 2002.



Figure 8.24: At home with Vasili Gontarev and family. Photo by Nadia Habashi, 2002.

IDRIJA

Idrija [Idria in German] (Figures 8.26–8.28) is 40 km west of Ljubljana. Mercury (Figures 8.29–8.33) was discovered there in 1497 and mining was taken over by the Austrian Government in 1580. From 1918 to 1943 it was under Italian occupation. In 2002 the mine was closed because of the pollution due to mercury although it still contained appreciable ore. It is now a museum.



Figure 8.25: Technical Museum of Slovenia.



Figure 8.26: General view of Idrija.



Figure 8.27: Idrija castle and Town Museum.



Figure 8.28: View inside the castle.



Figure 8.29: Entrance to mercury mine.



Figure 8.30: Cinnabar from Idrija.



Figure 8.31: Mine museum.



Figure 8.32: Mine museum.



Figure 8.33: Stamps issued in 1990 by former Yugoslavia commemorating 500 years the discovery of mercury in Idrija.

A School of Mines was established in Idrija by the Austrian authorities from 1763 to 1769 where the Italian natural scientist Giovanni Antonio Scopoli (1723–1788) (Figure 8.34) taught.



Figure 8.34: Giovanni Antonio Scopoli (1723–1788).

Cultural Heritage Symposium

The Cultural Heritage Symposium for Mining, Metallurgy was held in Idrija June 17–19, 2002 (Figure 8.35). The Mayor of Idrija attended the banquet (Figure 8.36).

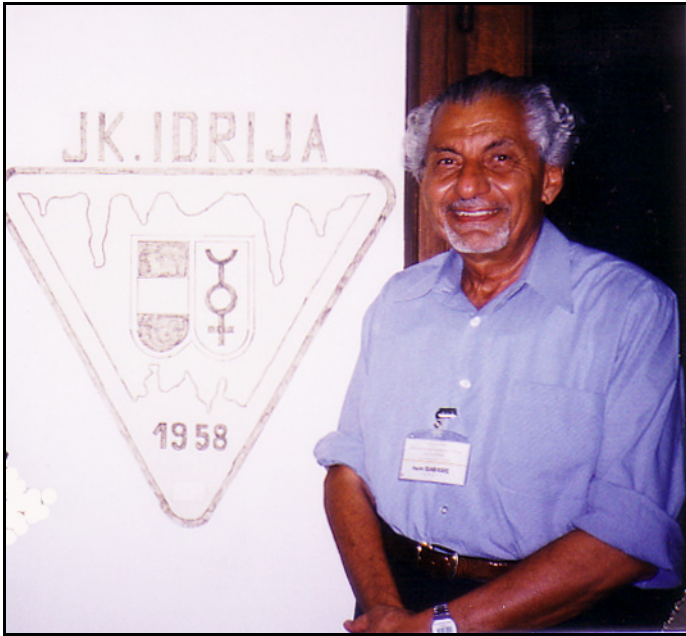


Figure 8.35: Cultural Heritage Symposium.



Figure 8.36: Mayor of Idrija and a Canadian student on an exchange program with Idrija.

LAKE BOHINJ

Lake Bohinj is located a short drive from Ljubljana (Figures 8.37–8.38).



Figure 8.37: Lake Bohinj.



Figure 8.38: Lake Bohinj with Vasilij and Ana Gontarev.

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