Sima Lozanić

A Knight of Serbian Science

Serbian Academy of Science and Arts


Sima
Lozanić
175

Gallery of the Serbian Academy of Sciences and Arts

161

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Sima Lozanić

A Knight of Serbian Science

BELGRADE 2024

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Foreword

ON THE OCCASION OF THE 175th ANNIVERSARY OF SIMA LOZANIĆ'S birth, the Serbian Academy of Sciences and Arts (SASA) dedicated the year 2023 to him. The commemoration of the anniversary includes a scientific conference featuring a collection of papers, a monograph on Sima Lozanić's life and work, and an exhibition at the Gallery of SASA accompanied by a catalogue.

Sima Lozanić, one of the most important Serbian scientists at the turn of the 19th and 20th centuries, was recognised and awarded during his lifetime. He was the rector of the Great School, the first rector of the University of Belgrade, president of the Academy of Sciences in two terms, a minister, and deputy in London. However, following his death, he quickly fell into oblivion and remained almost unknown to our public. Unlike other prominent Serbian scientists of the 19th century, such as Pančić, Cvijić, Žujović, and Mihailo Petrović Alas, whose numerous students wrote extensively about them after their deaths, praising their teachers, Sima Lozanić had only one successor, his son Milivoje Lozanić, who taught chemistry for half a century but left no writings about his father. Lozanić's descendants live abroad, but they, too, apart from a few letters and photographs, do not possess any material or other memories of their famous ancestor.

The exhibition dedicated to Sima Lozanić encompasses his educational, pedagogical, and scientific endeavours, as well as his professional and political work – all aspects of his long and fruitful life, one might say. However, a significant segment of his life is missing: his family, social, and even scientific life. It remains unknown how his private life was organised, how close he was to his nearest relatives, and when he met and socialised with friends and colleagues. In a time without modern technology, written correspondence was the most important source of information. Unfortunately, his correspondence and personal archive have not been preserved. We know that he frequently travelled abroad, participated in scientific and professional meetings, and traversed Serbia as a member of the Serbian Agricultural Society. However, nothing was recorded about all this. That large part

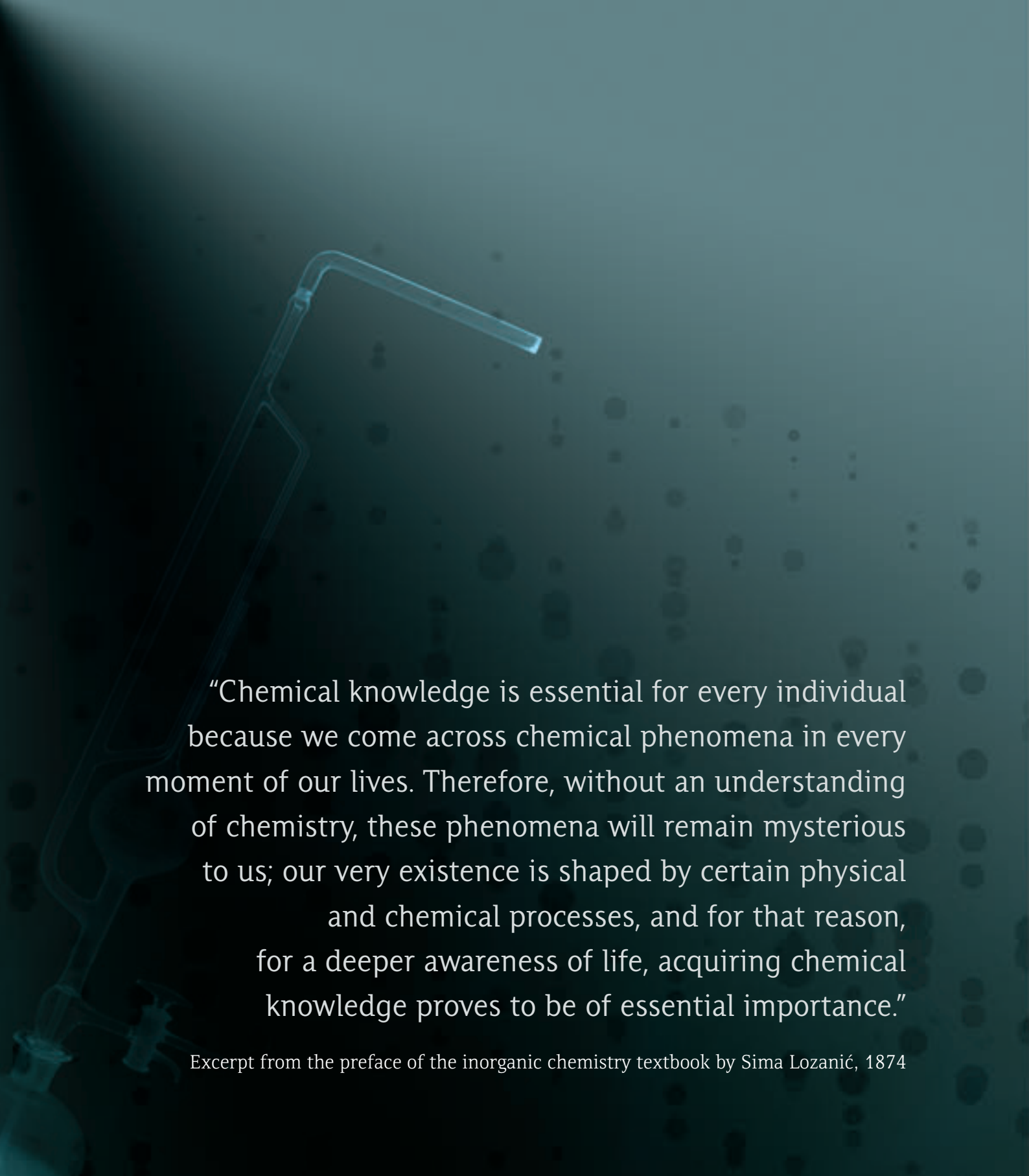
of his life remains unknown. We do not even have complete information about his education, nor do we know what diplomas he obtained in Zurich and Berlin. The question arises: how did he occupy his time when not at the Great School or at political functions, which happened several times in the period between 1895 and 1905?

Lozanić's life, as known to us today, is primarily documented in his books, works, and articles, mostly in archival materials preserved primarily in the State Archives of Serbia and the SASA Archives. The Museum of Chemistry at the Faculty of Chemistry also preserves equipment from his laboratory, including apparatus, utensils, glassware, and bottles with reagents. Among the surviving documents are his correspondence with various ministries, for which he conducted analyses as a state examiner of ores and flawed money (several hundred letters with requests for analysis and Lozanić's replies containing the results). Interestingly, there is also a documentation regarding an attempt to establish the first sugar factory. These are the only remaining records.

Nevertheless, Lozanić's work in science, profession, pedagogy, the popularisation of science and technology, politics, and wars is so extensive that it could fill the large gallery of the Serbian Academy of Sciences, and it would take several days to see everything he wrote and accomplished.

We hope that visitors of the exhibition will gain insight into the greatness of this scientist who, through his endeavours in science and profession, as well as the patriotism demonstrated in politics and wars, left a significant impact on our science and culture.

Uroš Predić, *Sima Lozanić*, oil on canvas, 1922
(Faculty of Chemistry, Belgrade)



"Chemical knowledge is essential for every individual because we come across chemical phenomena in every moment of our lives. Therefore, without an understanding of chemistry, these phenomena will remain mysterious to us; our very existence is shaped by certain physical and chemical processes, and for that reason, for a deeper awareness of life, acquiring chemical knowledge proves to be of essential importance."

Excerpt from the preface of the inorganic chemistry textbook by Sima Lozanić, 1874

Biography

SIMA LOZANIĆ (1847–1935)

SIMA LOZANIĆ, THE MOST SIGNIFICANT SERBIAN CHEMIST, SCIENTIST, professor, president of the Serbian Academy of Sciences, first rector of the University of Belgrade, minister of economy and foreign affairs, diplomat and an active participant in all the wars of his time, stands among the pleiad of famous personalities from the last decades of the 19th and the first decades of the 20th century. In addition to the scientific work which left a deep mark in European science, Lozanić invested his scientific and professional knowledge, statesmanship and pedagogical skills in the progress of Serbia and the well-being of his people.

He was born on the 24th of February 1847 in Belgrade. After completing elementary school and gymnasium, he graduated from the Faculty of Law at Belgrade's Great School, then pursued studies in natural sciences in Zurich and Berlin. After spending four years abroad, he returned to Serbia. In the autumn of 1872, he joined the Department of Chemistry at the Great School, where he directed the development of chemistry in Serbia. Educated in European centres where the new chemistry of the 19th century was created, Lozanić brought to Serbia new knowledge, modern textbooks, research and scientific work.

He taught chemistry at the Great School and the University until 1924, except for the period between 1894 and 1905 when he temporarily left the Great School to engage in political work (serving as Minister of Economy three times, Minister of Foreign Affairs, and MP in London), but he did not leave his scientific and professional pursuits.

Lozanić's work and activities were not limited only to the Chemical Institute, but had great importance for the development of the University as a whole. As the rector of the Great School, in 1890, he began working on its reorganisation into a University, and as the president of the Founding Committee for the Establishment of the University and its first rector (1905), he established the university organisation and teaching.

With the arrival of Sima Lozanić at the Great School, a new period in the development of chemistry in Serbia began. The path to modern chemistry

was paved by the textbooks he wrote in the mid-1870s (covering inorganic chemistry, organic chemistry, and chemical technology). Through these textbooks, new theories arrived in Serbia almost at the same time as in many more developed European countries. The inorganic chemistry textbook from 1880 is the first textbook outside Russia at the time to mention Mendeleev's periodic system of elements, whereas the organic chemistry textbook stands out as one of the earliest to include structural formulas and a new classification of organic compounds.

Through his scientific endeavours, Lozanić has earned a place among the most prolific Serbian scientists. In a career spanning fifty years, Lozanić published, without the aid of collaborators and assistants, over 200 scientific and professional papers, covering all fields of chemistry (organic, inorganic, analytical and theoretical). His major contributions are in the field of organic chemistry, particularly in the area of electrosyntheses. Lozanić's organic syntheses, where he synthesised and characterised a large number of previously unknown substances, continue to be cited to this day. Electrosyntheses, reactions conducted under the influence of a silent electric discharge, resonated the most. Some of his experiments, conducted half a century prior to the famous 1953 Miller experiment (S. Miller), anticipated the synthesis of amino acids, the building blocks of proteins, from a mixture of simple gases by passing the electric spark through them. The greatest recognition for Lozanić's electrosynthesis came from Alexander Oparin in his book *Origin of Life on the Earth* (1957).

Lozanić's research work was shaped by the circumstances in which he lived. In Serbia during that period, scientific pursuits held little significance compared to the analyses of the country's natural resources, mineral and drinking water, ores, minerals, and agricultural products. He was the first to expertly and systematically analyse the mineral waters of Serbian spas, highlighting their healing properties and their importance for future tourism. Among his notable analytical works are the discovery and analsyis of three new minerals: milošin, alexandrolite, and avalite. He also analysed the previously untested water from Belgrade's fountains and, upon discovering that the drinking water was of poor quality, urged the authorities to construct a new water supply system and restore the existing networks. As the only chemist in Serbia during the 1870s and 1880s, he had to undertake tasks in analytical chemistry that, in more developed countries, would have been handled by expert technicians.

Aware of the agriculture's role in the overall economic development of the country, Lozanić invested a large portion of his energy and time in solv-

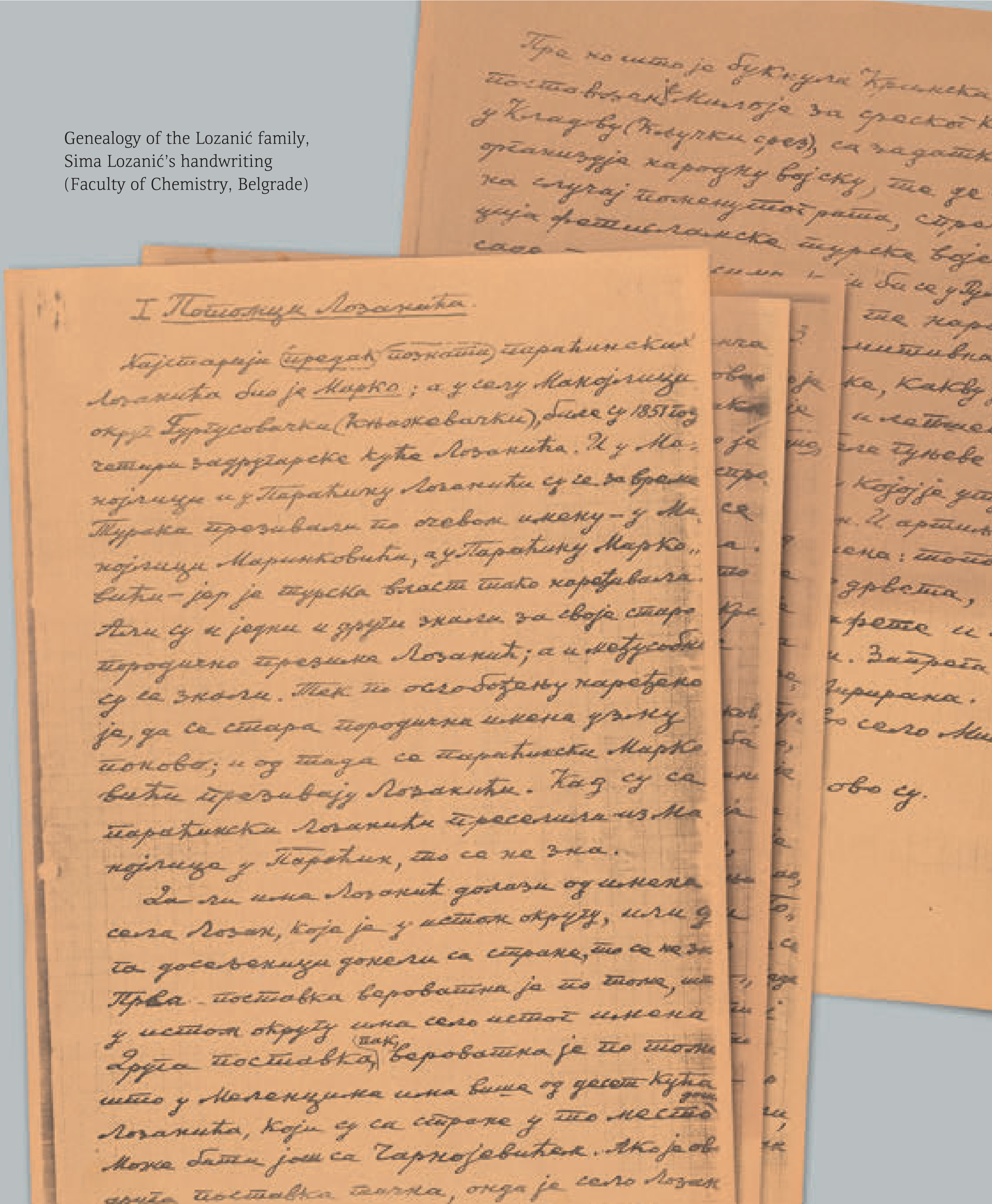
ing agrarian issues and strengthening the nation's economy. In the late 19th century, he was engaged in the improvement of the stagnant domestic economy by advocating the introduction of artificial fertilisers, the establishment of the Faculty of Agriculture to address agrarian problems on a scientific level, and the creation of institutions that would contribute to the rapid economic growth and industrialisation of the country. As Minister of Economy (1897–1899), Lozanić crafted an ambitious plan for the rapid development of many economic branches and the industrialisation of the country. With his clearly formulated and elaborated economic laws, notably the Law on Supporting Domestic Industry, he encouraged the growth of small businesses and their transformation into joint-stock companies, the introduction of modern technical equipment, and an increase in the number of employed workers. At the beginning of the 20th century, Lozanić tried to introduce artificial fertilisers in agriculture, organising vegetation experiments in the districts of Pomoravlje, Posavina, and Podunavlje. Despite the significant increases in yield shown by the experiment results, Lozanić's ideas were not accepted. Many of his initiatives were realised much later, as he was often ahead of his time, proposing projects for which the professional community was not yet prepared.

Lozanić actively participated in all the wars of his time. In the first Serbian-Turkish war in 1876, together with Ljubomir Klerić, he made and placed underwater mines on the Danube to prevent Turkish ships from Vidin from reaching our coast. Then he assisted the Timok-Morava Infantry Division, under the command of General Mikhail Chernyaev, in laying mines in the Đunis Gorge and the surrounding areas. By activating the mines in the gorge, the Turkish cavalry was prevented from crossing the bridge which our army was using for retreat. For that feat, Lozanić was awarded the Order of the Takovo Cross, and for his overall participation in this war, he received the Silver Medal for Courage and the Veteran's Memorial. In the First World War, following the retreat across Albania, Lozanić actively engaged in diplomacy. In late 1917, as a member of the Serbian mission, he stayed in the United States of America to provide material aid and political support to our country. Some of his proposals to the American administration and the Minister of Economy were implemented after the war.

At the age of 25, Lozanić became a member of the Serbian Learned Society (1872), later the Serbian Royal Academy (1890), where he served as president twice (1899, 1903). He published 45 papers in the academy's publications.

Sima Lozanić with his wife
(Faculty of Chemistry, Belgrade)

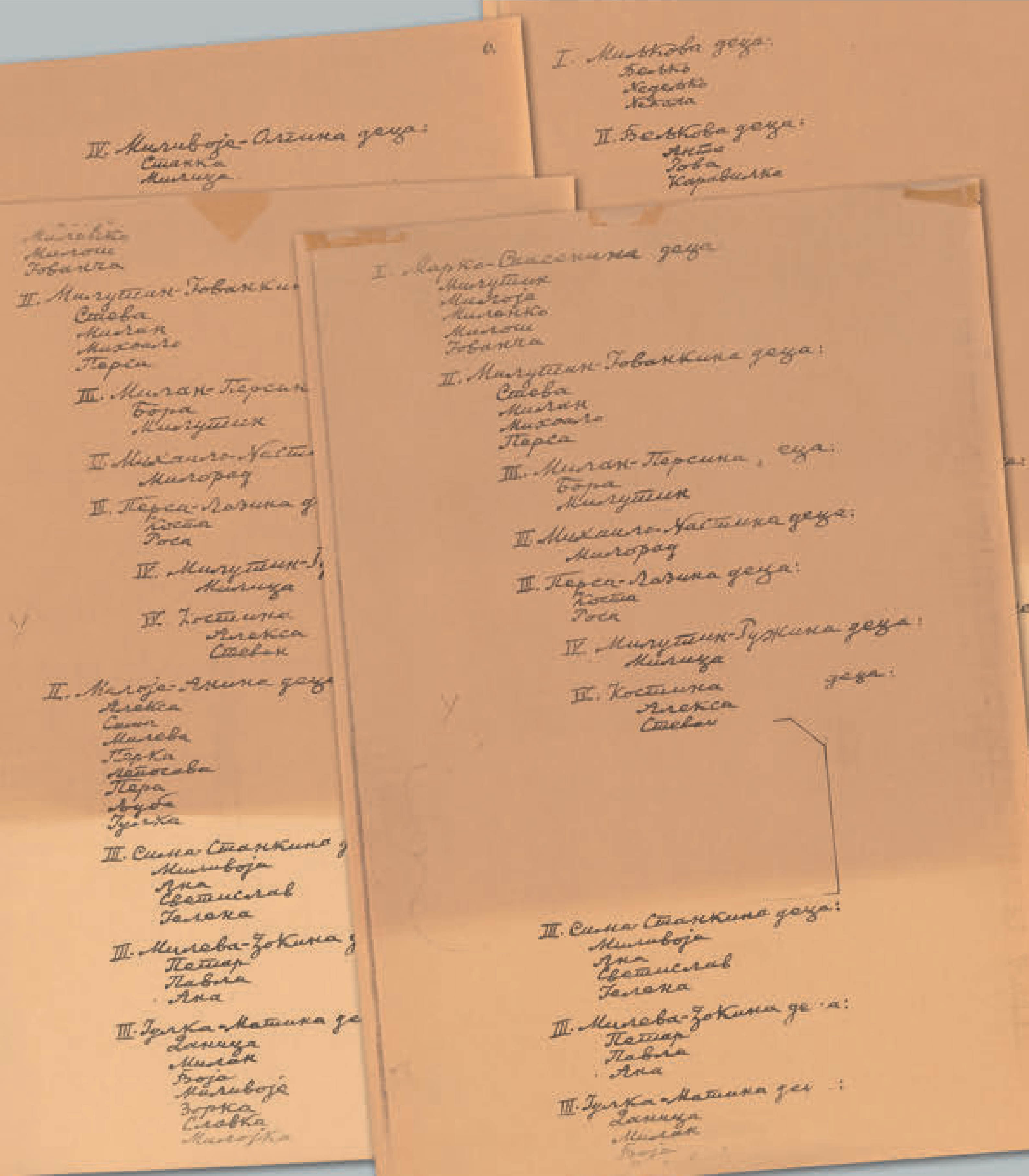
Genealogy of the Lozanić family,
Sima Lozanić's handwriting
(Faculty of Chemistry, Belgrade)

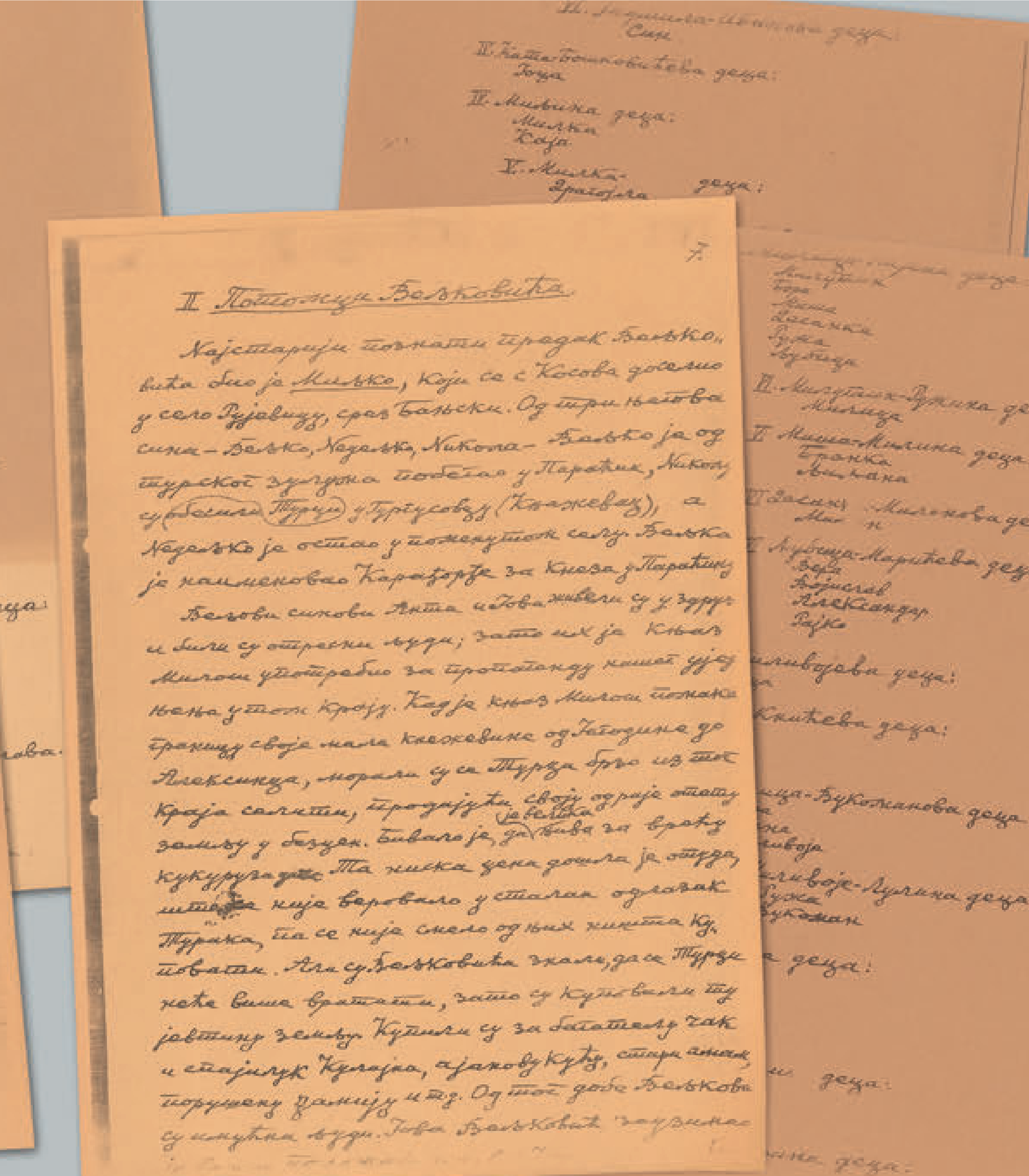


I Потомци Лозанића.

Најстарији (презак познати) параћински Лозанић био је Марко; а у селу Макојлици, окруж. Гургусовачки (Књажевачки), беле су 1851 год. четири задругарске куће Лозанића. И у Макојлици и у Параћину Лозанићи су се за време Турака презивали по очевом имену – у Макојлици Маринковићи, а у Параћину Марковићи – јер је турска власт тако наређивала. Али су и једни и други знали за своје старо породично презиме Лозанић; а и међусобно су се знали. Тек по ослобођењу наређено је, да се стара породична имена узму поново; и од тада се параћински Марковићи презивају Лозанићи. Кад су се параћински Лозанићи преселили из Макојлице у Параћин, то се не зна.

Да ли име Лозанић долази од имена села Лозан, које је у истом округу, или да га досељеници донели са стране, то се не зна. Прва постовка вероватна је по томе, што у истом округу има село истог имена. Друга поставка (пак) вероватна је по томе што у Моленцима има више од десет кућа Лозанића, који су са стране у то место дошли. Може бити још са Чарнојевићем. Ако је друга поставка тачна, онда је село Лозан


6.
IV. Миливоја-Олгина деца:
Станка
Милица
I. Милкова деца:
Недељко
Никола
II. Бошкова деца:
Анто
Јова
I. Марко-Спасенина деца
Милутин
Милоја
Миланко
Милош
Јованча
II. Милутин-Јованкина деца:
Стева
Милан
Михаило
Перса
III. Милан-Персина деца:
Бора
Милутин
III. Михаило-Настина деца:
Милорад
III. Перса-Лазина деца:
Коста
Роса
IV. Милутин-Ружина деца:
Милица
IV. Костина деца:
Алекса
Стеван
II. Милоја-Анина деца
Алекса
Сима
Милева
Јулка
Пера
Љуба
III. Сима-Станкина деца:
Миливоје
Ана
Светислав
Јелена
III. Милева-Јокина деца:
Петар
Павле
Ана
III. Јулка-Матина деца:
Даница
Милан
Миливоје
Зорка
Славка



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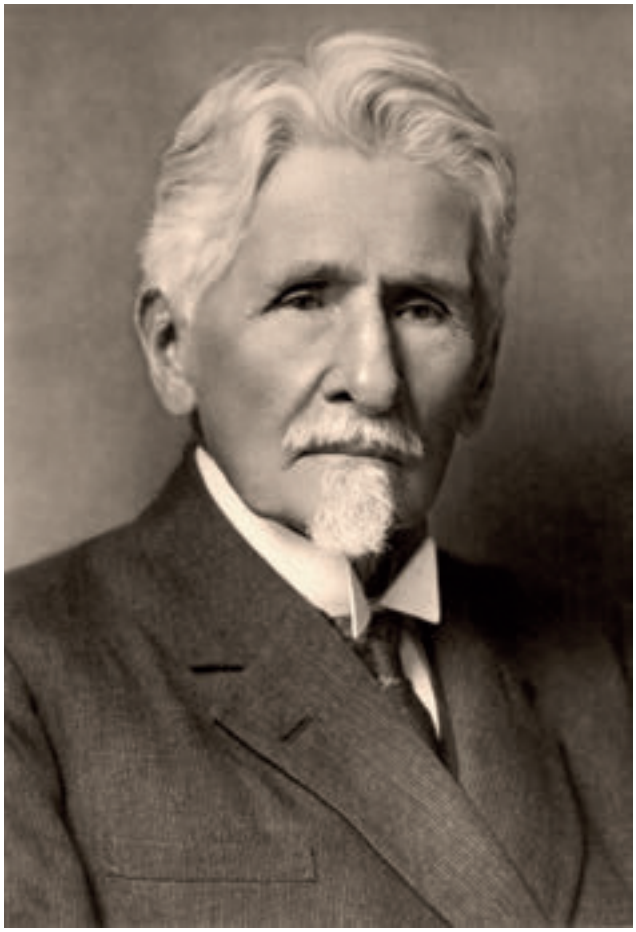
II Потомци Бељковића

Најстарији познати предак Бељковића био је Миљко, који се с Косова доселио у село Рујевицу, срез бањски. Од три његова сина — Бељка, Недељка, Никола — Бељко је од турског зулума побегао у Параћин, Николу су убили Турци у Гргусовцу (Књажевац), а Недељко је остао у поменутом селу. Бељка је наименовао Карађорђе за кнеза у Параћину.

Бељкови синови Анта и Јова живели су у задрузи и били су отресни људи; зато их је кнез Милош употребио за пропаганду нашег утицаја у том крају. Кад је кнез Милош померио границу своје мале кнежевине од Јагодине до Алексинца, морали су се Турци брзо из тог краја селити, продајући своја имања и земљу у безцен. Бивало је, да је велика њива за врећу кукуруза. Та ниска цена дошла је отуда што се није веровало у стални одлазак Турака, па се није смело од њих ништа куповати. Али су Бељковићи знали, да се Турци неће више вратити, зато су куповали ту јевтину земљу. Купили су за багателу чак и спахилук Кулаџића, а јакову кућу, стари амам, порушену џамију и т.д. Од тог доба Бељкови су имућни људи. Јова Бељковић заузимао

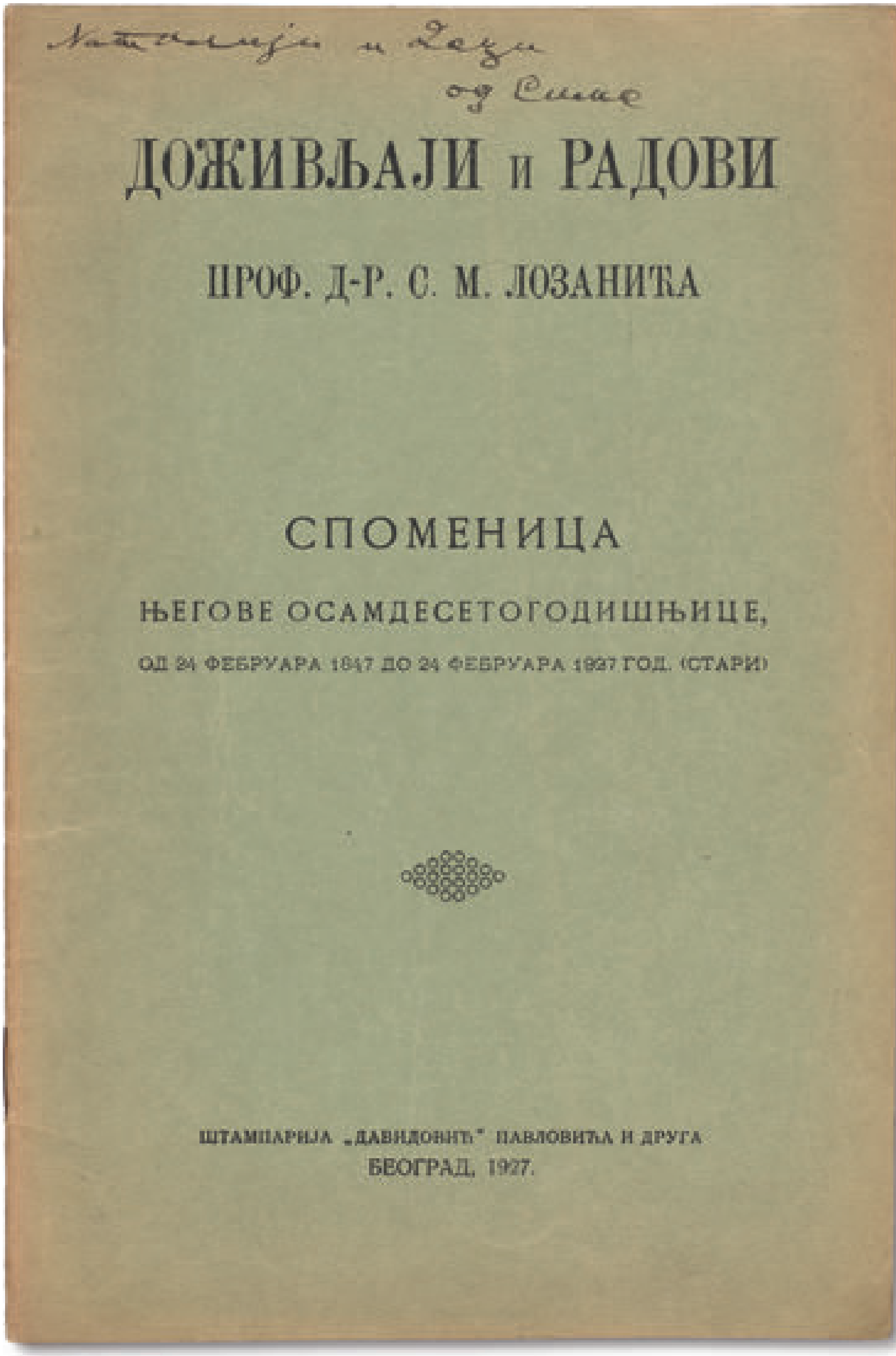
Sima Lozanić at the University
(Faculty of Chemistry, Belgrade)

From the family album
(Faculty of Chemistry, Belgrade)



Sima Lozanić, 1927
(SASA Library)

S. Lozanić, *Experiences and Works of Prof. Dr S. M. Lozanić: Memorial Book on the Occasion of His Eightieth Birthday*, 1927
(Faculty of Chemistry, Belgrade)



Наталији и Зоји
од Симе

ДОЖИВЉАЈИ и РАДОВИ

ПРОФ. Д-Р. С. М. ЛОЗАНИЋА

СПОМЕНИЦА

ЊЕГОВЕ ОСАМДЕСЕТОГОДИШЊИЦЕ,

ОД 24 ФЕБРУАРА 1847 ДО 24 ФЕБРУАРА 1927 ГОД. (СТАРИ)

ШТАМПАРИЈА „ДАВИДОВИЋ" ПАВЛОВИЋА И ДРУГА
БЕОГРАД, 1927.

From the family album
(Faculty of Chemistry, Belgrade)

Eulogy on Sima Lozanić, *Zemljoradnička zadruga*, 14th July 1935
(Faculty of Chemistry, Belgrade)

† Сима Лозанић

некадашњи активни, а до своје смрти почасни претседник Главног савеза српских земљорадничких задруга

Ретки су људи који уз свој рад на научном пољу, у кабинету или лабораторију, уђу у јавни политички и социјални живот и постигну и на једном и другом пољу свог рада успехе какве је постигао Сима Лозанић. Нису ту у питању успеси који доносе славу онима који их постижу, већ они који по свом дејству у животу једног народа остављају трајне и вредне утиске. То су они успеси који се постижу мукотрпним радом, самопрегором и пожртвованошћу. Покојни Сима Лозанић је отац наше хемије. Као професор Велике школе у Београду, он се здушно залаже за популарисање те науке која се толико примењује у индустрији, пољопривреди и рударству. Лозанић се не задржава само на поучавању других. Он врши анализу наших руда, пијаће и минералне воде, фосилног угљења, метеорита, шећерне репе, вина итд. Такав рад, примена науке у животу и привреди навели су нашег научника да се заинтересује за привредна питања своје земље. Његови научни радови су многобројни и познати широм целог света. Они су му међу нашим домаћим научницима прибавили једно од првих места, тако да он неколико година врши дужност ректора Универзитета. Стране научне установе и удружења одале су му признање тиме што су га изабрале својим почасним чланом.

Сима Лозанић
рођ. 27 фебр. 1847 — † 7 јула 1935

Доиста, Лозанић би био велик човек да је био само научник. Али он је био и истакнути јавни радник који узима учешћа у решавању свих социјалних и економских питања Србије крајем 19 века. Лозанићева активност и познавање привредних питања учинили су да је 1894 године постао министар народне привреде, а затим исте године и министар иностраних дела. Као културан и разуман човек Лозанић је осетио и схватио потребе српског сељачког народа. Он је пригрлио задружну идеју која руководи његовим радом. Он је као министар народне привреде 1898 године спровео кроз Скупштину Закон о земљорадничким и занатским задругама који и данас важи. Лозанић је задругарству ударио правне основе. Због свог преданог рада на задружном пољу Лозанић је постао и члан прве управе Главног савеза српских земљорадничких задруга. Он је био претседник нашег Главног савеза пуних 20 година и за то време није на име дневнице примио ниједног динара. На седнице је долазио увек први и за читавих двадесет година није изостао ни од једне конференције. Његов рад у српском земљорадничком задругарству оставио је видан траг за собом. Због својих заслуга на задружном пољу Лозанић је именован почасним претседником нашег Савеза, што је остао све до своје смрти.

Због дубоке старости, готово деведесетогодишњак, Лозанић се последњих година повукао из јавног живота. Ипак он је будним оком пратио развитак нашег задружног покрета, све док се његово око није угасило.

Какво је Лозанић имао схватање о задругарству види се најбоље из његова говора на III конгресу у Јагодини 1898 год. када је изјавио да у задругарству види нов фактор који ће оснажити и унапредити нашу пољопривреду и на тај начин извршити преображај у животу и раду нашег земљорадника. Време које је посвећено задругарству сматра за најмилије и најплодније у свом животу.

У историји нашег задругарства покојни Лозанић јесте и остаје једна од најважнијих и најзаслужнијих личности.

Данашње покољење гледа у њему узор пожртвованог радника и задругара. Али пре свега треба да носи у себи исту веру у своје идеале, коју је и он носио, кад је говорио: „Ја имам веру да ће Србија бити срећна, кад цела наша земља буде покривена задругама."

"When we take into consideration that public schools should be organised to train all members of the society they belong to, then it will be clear to us why it is necessary to teach physics, chemistry, physiology, mathematics, zoology, botany, mineralogy, etc. in pedagogical schools. Furthermore, there is also methodology which facilitates the teaching of writing, reading and arithmetic. Knowledge of the aforementioned natural sciences is the basis for a good teacher, with pedagogy and methodology following afterwards. I do not know what method a teacher could employ in teaching any subject without a solid understanding thereof."

Excerpt from Lozanić's letter to the Minister of Education, Berlin 1871

Education

EDUCATION IS A CRUCIAL PERIOD IN EVERY PERSON'S LIFE, OFTEN shaping their future careers. Sima Lozanić's education was anything but ordinary. He attended schools in various locations across Serbia, yet detailed information about his education remains elusive.

Due to his father's postings, Lozanić completed his primary education in multiple locations across Serbia, in Kladovo, Paraćin, and Belgrade, and pursued a gymnasium in Negotin, Zaječar, Belgrade and Kragujevac. As the schools, curriculum and textbooks were not uniform, students who changed schools faced considerable challenges. This is evident in the preserved certificates from the Negotin and Zaječar semi-gymnasiums, where Sima Lozanić and Nikola Pašić were classmates. Both students consistently excelled, achieving better grades with each passing class.

Upon completing gymnasium, Sima Lozanić enrolled at the Faculty of Law of the Great School in Belgrade (1864–1868). During that period, faculties were not strictly divided into academic disciplines, hence Lozanić pursued not only legal sciences but also undertook Mihailo Rašković's chemistry course, as well as natural sciences course, covering botany, zoology and mineralogy (*jestastvenica*) instructed by Josif Pančić.

After graduating from the Faculty of Law as an excellent student, he had the right to request a scholarship for further studies abroad. In his scholarship application, Lozanić expressed his desire to pursue studies in political and economic sciences, focusing specifically on agricultural economy. However, the educational authorities did not respond to his request, but instead they awarded him a scholarship to study pedagogy in Küsnacht, Switzerland.

The ambitious Lozanić, who arrived in Zurich in the autumn of 1868, was not satisfied with just learning pedagogy. He thirsted for knowledge, and in his first year, he enrolled in various subjects: at the University of Zurich, he studied experimental chemical physiology and the physiology of the senses. Additionally, at the Federal Polytechnic School, he attended classes in experimental physics, 19th-century history, political economy

and international law. While preparing for an exam in the physiology of the senses using a chemistry textbook, he developed an interest in chemistry. Consequently, he spent the following semester in the laboratories of the renowned German chemist Johannes Wislicenus (1835–1902) and eventually devoted himself completely to chemistry. In the spring of 1869, he initially enrolled at the Pedagogical School but continued to attend lectures in other subjects. Lozanić refrained from admitting to the Serbian authorities that his primary interest lay in chemistry rather than pedagogy. In his reports, which he was obligated to send to the Minister of Education every two months, he omitted any mention of chemistry and avoided providing detailed information about other subjects.

From his later autobiography, we learn that in the second year of his studies, he dedicated himself to studying chemistry. After spending two years in Zurich, he requested a transfer to Berlin, where he studied and worked in the laboratory of August Wilhelm von Hofmann (1818–1892), one of the leading chemists of the period. Lozanić skillfully avoided mentioning his studies in chemistry, leading the Minister of Education to believe he was focusing on pedagogy. In his reports to the minister, Lozanić mentioned attending lectures in natural sciences, justifying it by the necessity for a modern pedagogue to acquire a good knowledge of basic natural sciences. It was only after Lozanić published his first scientific paper in a renowned German journal and became a member of the German Chemical Society that he finally dared to admit he was studying chemistry, subsequently requesting an extension of his scholarship.

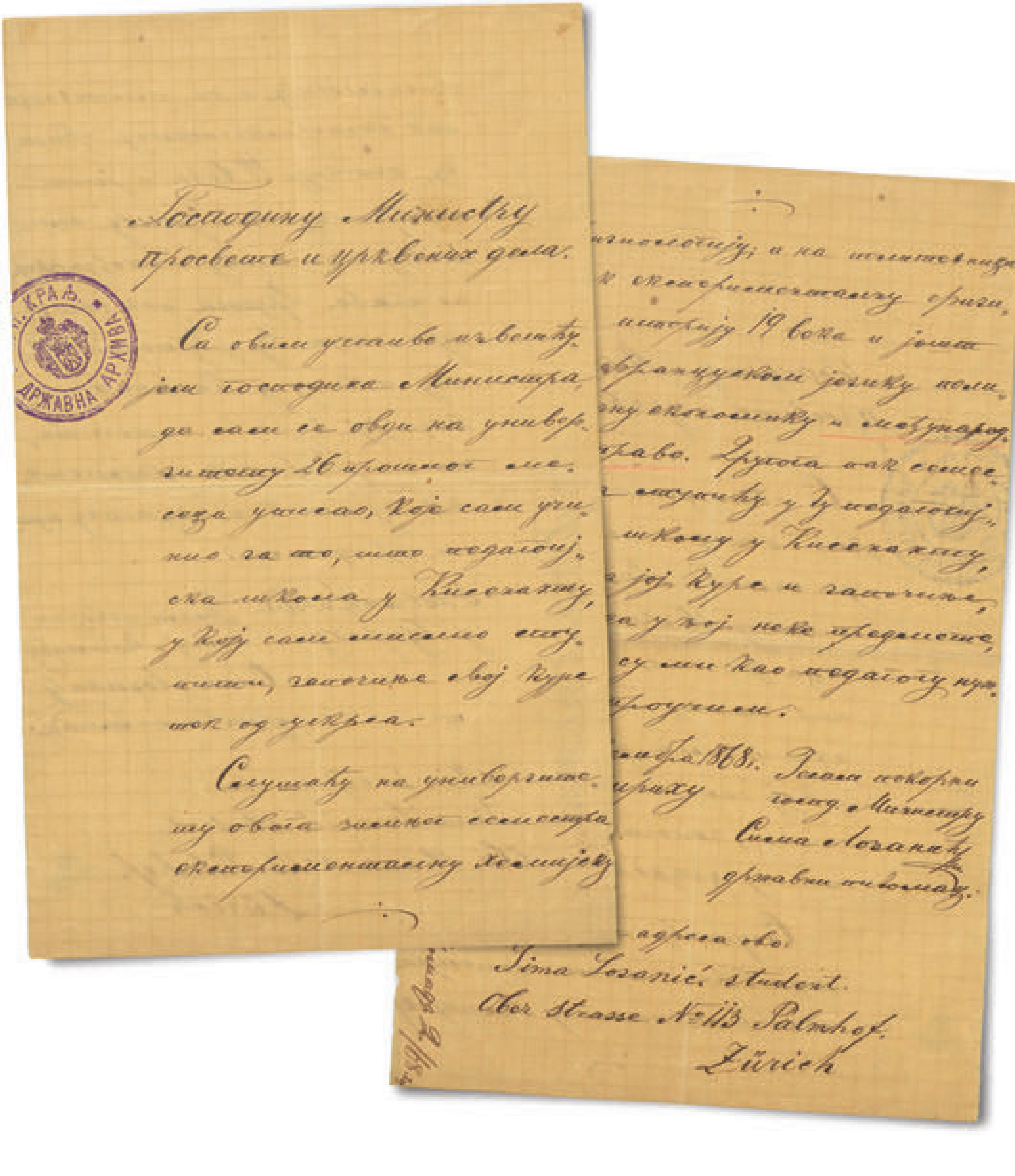
After spending four years studying abroad, Lozanić returned to Belgrade in the summer of 1872. In the autumn of the same year, he was elected professor of chemistry and chemical technology at the Great School.

Sima Lozanić
(SASA Library)

Students' grades at the
Zaječar Semi-gymnasium
in the year 1860/61
(State Archives of Serbia)

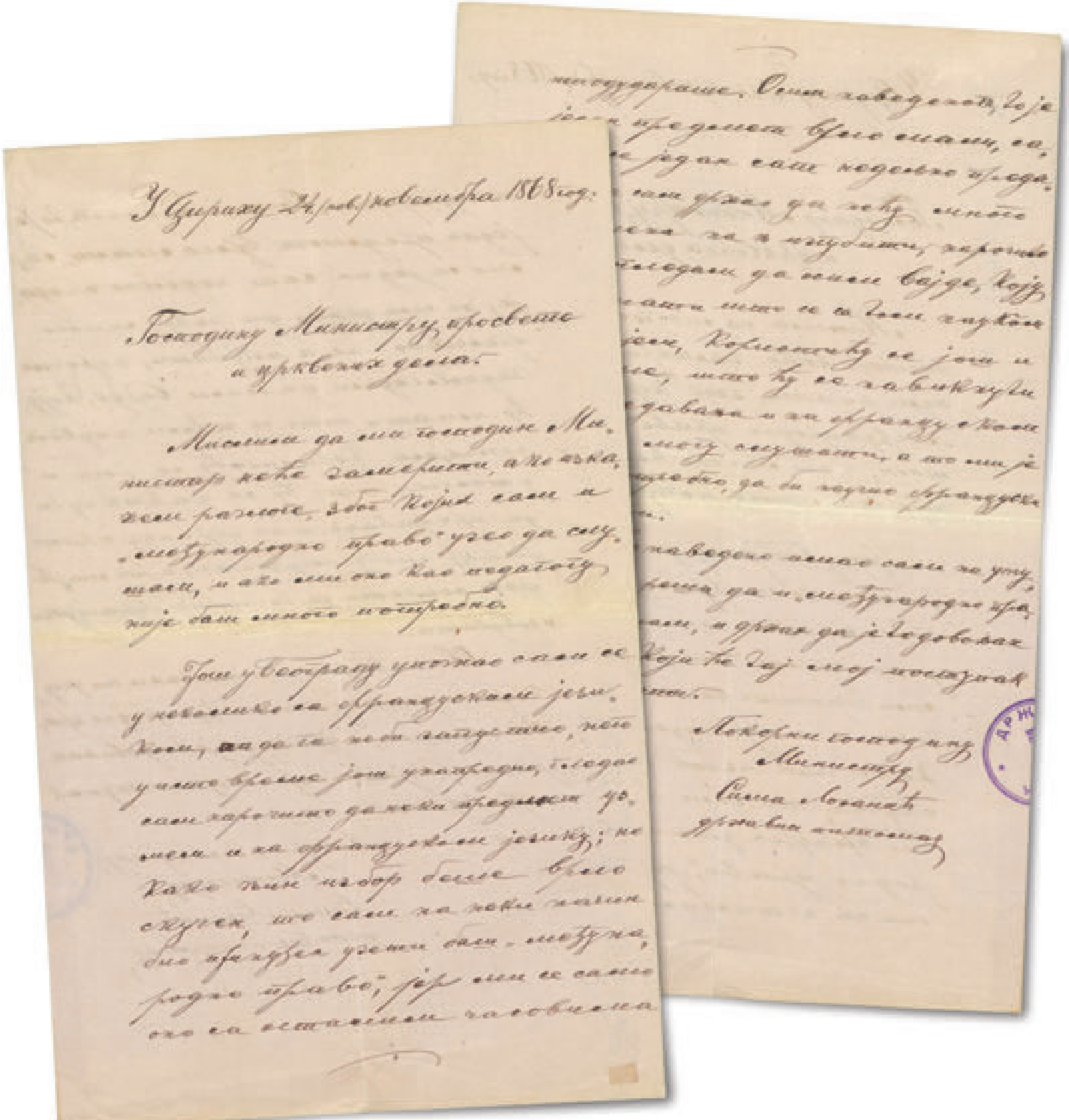
Zurich, 1902
(ETH-Bibliothek Zürich, Bildarchiv / public domain)

Sima Lozanić's letter to the Minister of Education from Zurich, dated 5th November 1868, informing him of his enrollment at the University of Zurich due to being late for enrollment at the Pedagogical School in Küsnacht, which begins in the spring
(State Archives of Serbia)


Господину Министру
просвете и црквених дела.

Сима Лозанић
државни питомац.

адреса ово:
Sima Lozanić student.
Ober Strasse No 13 Palmhof.
Zürich

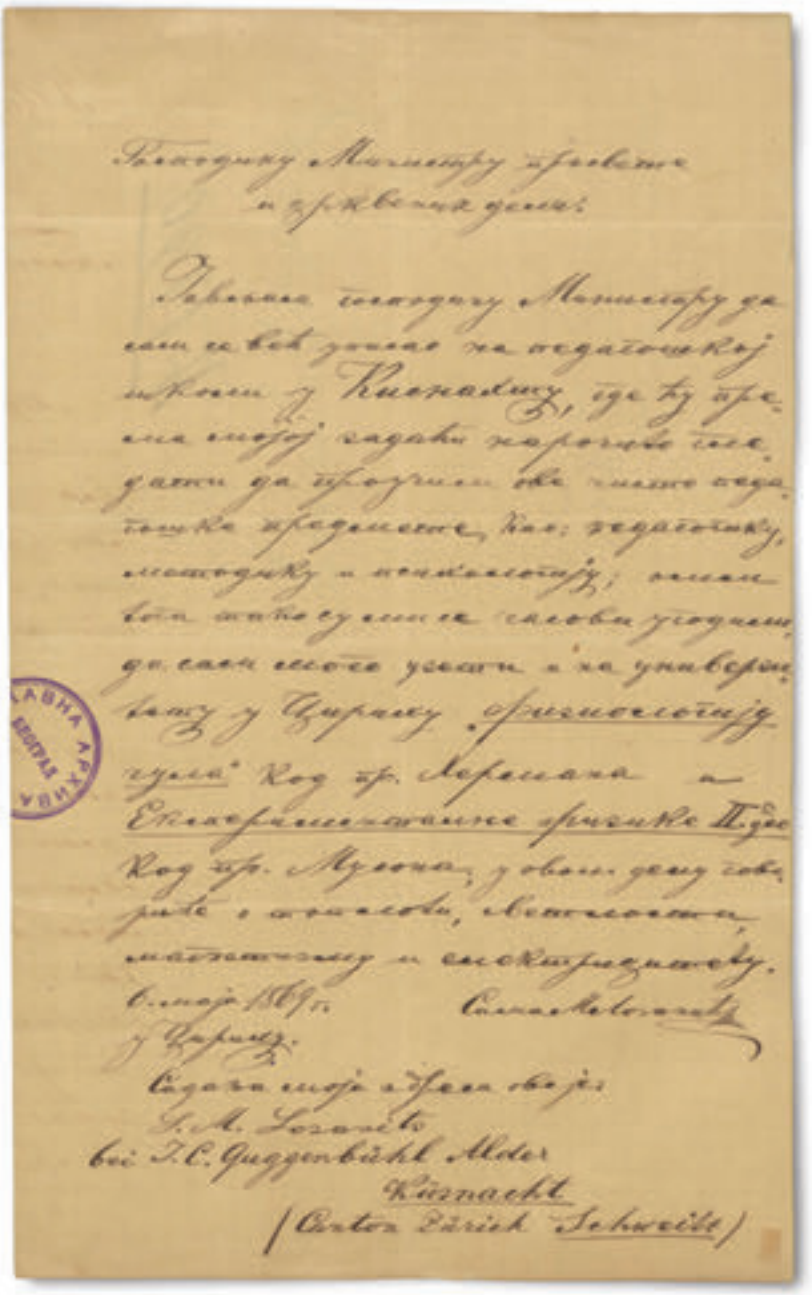

У Цириху 24/ (нов.)/ новембра 1868 год.

Господину Министру просвете и црквених дела.

Sima Lozanić's letter from Zurich to the Minister of Education, dated 24th November 1868, in which he explains the reasons for taking law courses at the University of Zurich (State Archives of Serbia)

Chemistry Building at the Polytechnic School in Zurich, 1905
(ETH - Bibliothek Zürich, Bildarchiv / public domain)

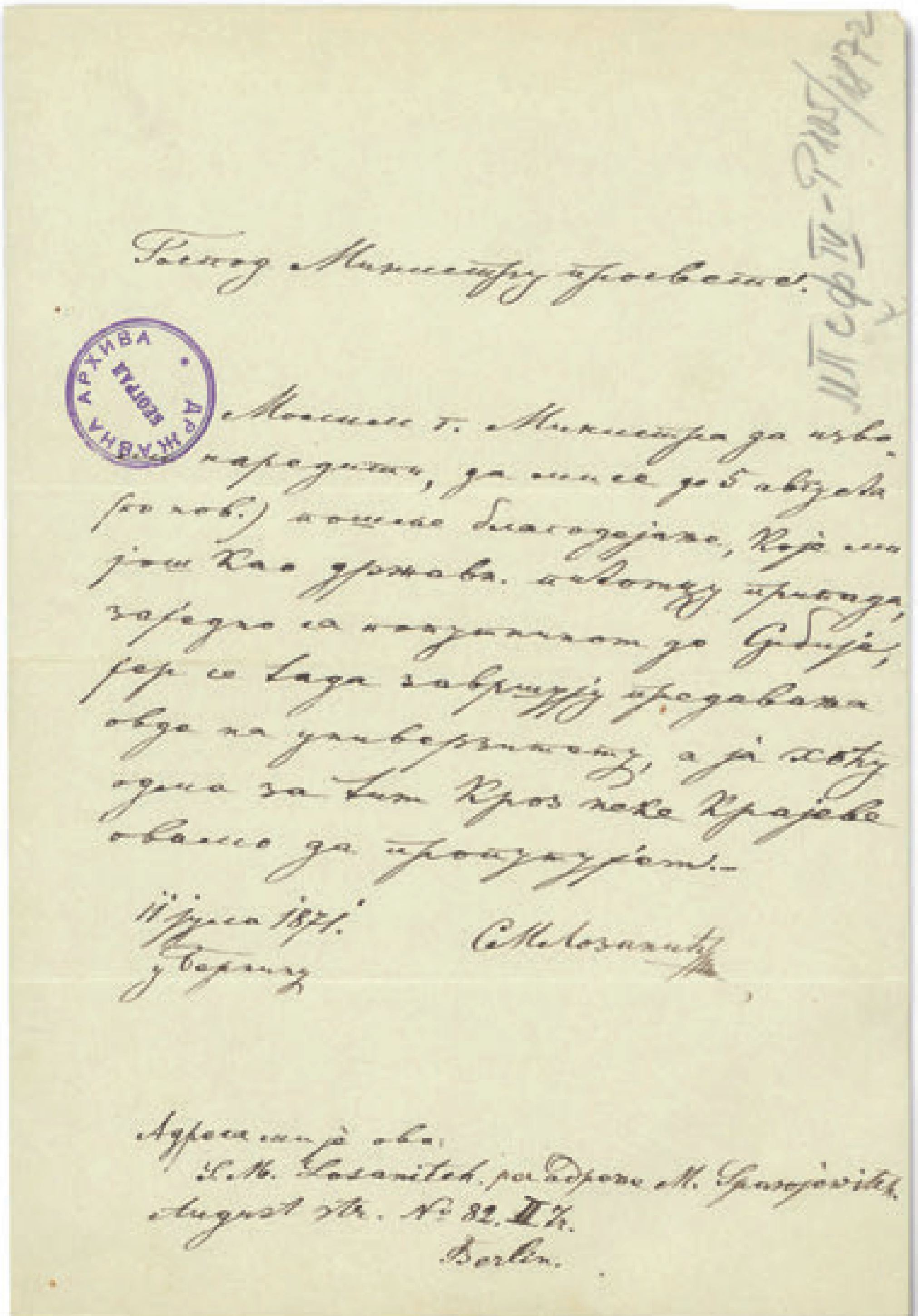
Chemical laboratory of the Polytechnic School in Zurich
(Wellcome Library, London)



Sima Lozanić's letter from Zurich to the Minister of Education, dated 6th May 1869, in which he informs him that he has enrolled at the Pedagogical School in Küsnacht, but that he is also taking some additional courses at the University of Zurich (State Archives of Serbia)

Sima Lozanić's letter from Berlin to the Minister of Education, dated 11th July 1871,
in which he requests the minister to arrange for a scholarship to be sent to him,
along with travel expenses to Serbia by the 5th of August,
because the lectures at the University will conclude by then
(State Archives of Serbia)

Berlin, Humboldt University, 1890
(Library of Congress, Washington / public domain)


Господину Министру просвете.

Молим г. Министра да изволи наредити, да ми се до 5 августа (по нов.) пошље благодејање, које ми још као држав. питомцу припада, заједно са подпорином до Србије, јер се тада завршују предавања овде на универзитету, а ја хоћу одмах за тим кроз неке крајеве овамо да пропутујем.–

11 јула 1871.
у Берлину

С. М. Лозанић

Адреса моја ова:
S. M. Losanitch, par adresse M. Spasojevitch,
August str. № 82. III/4.
Berlin.

Chemical laboratory of the Higher Technical School in Zurich
(Public domain)

Sima Lozanić's letter to the Minister of Education from Berlin informing him that he has been studying chemistry for some time, as evident from the paper he published in the journal of the German Chemical Society. He requests an extension of his scholarship for another year
(State Archives of Serbia)

Госп. Министру просвете
и црквених дела.

Свршетком овога семестра излази ми рок моме бављењу на страни. Ја сам се од неког времена занимао студијама са изучавањем хемије, о чему се може г. Министар уверити из мог рада, који је штампан у листу овдашњег немачког хемијског друштва. — Да би студију хемије како ваља довршио, нужно ми је да још једну годину дана овамо останем, јер сам намеран, да за то време и јаван испит из тих предмета положим. — Из наведених разлога молим госп. Министра, да ми рок бављења на страни, још на једну годину продужи.

26. јула 1871.
у Берлину.

С. М. Лозанић

University Square and the Great Market in Belgrade (Courtesy of Miloš Jurišić)

Mihailo Rašković's chemistry scripts
(Faculty of Chemistry, Belgrade)

смешемъ ова гаса на сунчаној светлости, једине се са праскомъ. Подобна се праска дава, кадъ смешу ова гаса сунчанимъ зрацима изложимо. У мраку не прависе ово једињење. Код светлости једињење бива произвођ, као што је ово доказано.

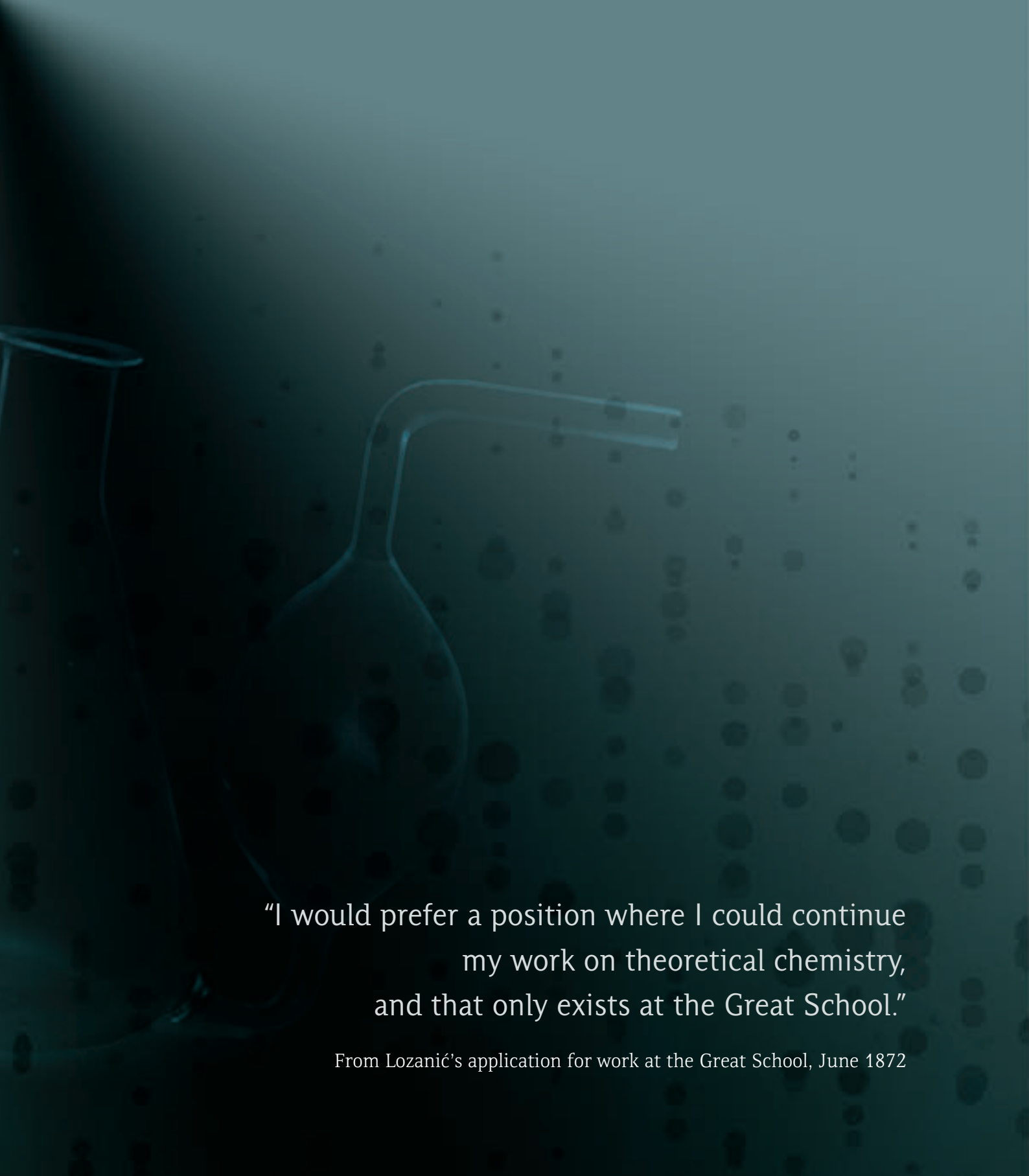
Часовиту хлороводоничну киселину добијамо одъ кухинске соли и енглеске сумпорне киселине. Растварањемъ воде ослобођавасе водоникъ.

Хлорнатријумъ { Хлоръ ——— Хлороводонична киселина.
{ Natrijumъ ——— Natronъ
Енглеска сумпор. { вода { Кисеоникъ
на киселина { Водоникъ
{ Сумпорна киселина ——— сумпорокисели Natronъ.

$$NaCl + HO.SO_3 = NaO.SO_3 + HCl.$$

Хлороводоничну киселину вадимо у сувомъ звону надъ живомъ.

Хлороводонична киселина гасъ је безъ боје, на ваздуху пра[illegible], у суву маглу. На сувомъ ваздуху не прависе ова магла. Атмосферски ваздухъ има неку одређену количину водене паре кој се са хлороводоничномъ киселиномъ једини, ово једињење прави мале капље одъ водене паре, скупљасе у нику фину капљицу, кој ову маглу праве. Хлороводонична се киселина лако у води раствара. На температури 0° раствара вода 500 свезака. Повишењемъ се температуромъ умањава растворљивость тако нпр. на температури 20° раствара вода само 480 свезака. Растварањемъ хлороводоничне киселине у води бива напрасно, као што ћемо доцније показати. Кад подъ стаклено звоно, на живомъ са чистомъ хлорово[доничномъ киселиномъ] часомъ напуњено, што поржемъ смо [illegible] живомъ напуњену, са предострожно [illegible] звоно са живомъ да жива са стакломъ у додиру остане [illegible] воде. Кадъ сада [illegible] звоно одигнемо, жива пада као



"I would prefer a position where I could continue
my work on theoretical chemistry,
and that only exists at the Great School."

From Lozanić's application for work at the Great School, June 1872

The Great School

SIMA LOZANIĆ TAUGHT CHEMISTRY AND CHEMICAL TECHNOLOGY at the Great School from the time he was elected as a teacher in the autumn of 1872 until the beginning of 1894 when he temporarily left his profession to devote himself to politics. Those two decades at the Great School represent the most significant and fruitful period of Lozanić's life. With his diverse scientific work and modern textbooks, he left the most significant mark on chemistry during that period. He published the largest number of scientific papers between the 1870s and the late 1890s. Even his most important work, electrosynthesis, was started at the Great School in the late 19th century. Later, at the University, he continued to publish papers on electrosynthesis and several papers on organic chemistry, which were also a continuation of the work begun at the Great School.

Apart from Lozanić's scientific contributions, which left a lasting impact on the European public through numerous citations in the most renowned journals and books, he published all his textbooks while working at the Great School. His textbooks are among the top university textbook literature not only of his time; many of their contents remain relevant to this day. In the 1870s and 1880s, Lozanić introduced new theories and new knowledge through textbooks on inorganic and organic chemistry. In terms of their content, these textbooks can be compared with those from the largest European universities at that time. At the Great School, Lozanić taught inorganic and organic chemistry, analytical chemistry, and chemical technology, and his election as rector of the Great School in 1890 was of great importance for its further development and its transition to university status.

Sima Lozanić was not destined to work continuously in the peace and quiet of his chemical laboratory. Already in the first years of his career, wars interrupted university teaching several times (1876–1878, 1885), and he actively participated in each war. Wars in the 19th century did not last long, but political duties separated Lozanić from both academia and scientific work for more than a decade (1894–1905). In the meantime, he taught chemistry at the Great School as a part-time professor for a little over a year (1896–1897).

Employment and work at the Great School

After completing his four-year studies abroad, Lozanić returned to Serbia in the summer of 1872. He brought back with him the knowledge he had acquired at the largest European schools in Zurich and Berlin: modern teaching methods with inseparable laboratory work, contenporary textbooks, and a focus on scientific research, as a mandatory part of European university education.

Young and self-confident, Lozanić was aware of his values and advantages over Mihailo Rašković, who was then the professor of chemistry at the Great School. Lozanić believed that the time had come to modernise and transform the teaching of chemistry. This is evident in his letter to the Minister of Education in the summer of 1872, wherein he sought employment and proposed himself for a position at the Great School: "I would prefer a position where I could continue my work on theoretical chemistry, and that only exists at the Great School." During this period, theoretical chemistry referred to scientific work, while practical chemistry referred to applied chemistry work.

At that time, there was no hint that 45-year-old Mihailo Rašković, who had gained a great reputation in Serbia for his work in applied chemistry, would leave his position as Chair. From Lozanić's letter, it can be inferred that in the meantime he had discussions with some of the professors regarding his employment, perhaps with the rector Josif Pančić, as he later warmly recommended Lozanić for a professorship in chemistry. These conversations may have sparked the idea of hiring an additional teacher to the Department of Chemistry, aside from Rašković.

With the sudden death of Mihailo Rašković at the beginning of October 1872, the Department of Chemistry became vacant, presenting an opportunity for Sima Lozanić to be employed at the Great School. The day after Rašković's funeral, Rector Pančić wrote to the Minister of Education that the Department of Chemistry remained vacant, but that "we have a qualified chemist for that position in the person of Sima Lozanić, who, I hope, will eventually catch up to the deceased in terms of knowledge and routine". He recommended the minister to immediately appoint Lozanić as a substitute chemistry teacher to ensure that no teaching time would be lost, and he held a session at the Great School that day and obtained the consent of the other professors regarding Lozanić's selection as a teacher.

At the proposal of the Minister of Education, the prince appointed Sima Lozanić as a substitute (trainee professor) of chemistry and chemical technology at the Great School, and on the 11th of November, Lozanić took

the oath of allegiance to Prince Milan Obrenović. Thus, at the age of 25, Sima Lozanić became a chemistry teacher at the Great School. After a little more than a year of work as a substitute, on the 25th of January 1874, Lozanić was elected full professor of chemistry. Sima Lozanić taught at the Great School for twenty years, with interruptions during the wars.

In 1873, the curriculum underwent revision, resulting in the transfer of chemistry from the Technical Faculty to the Department of Mathematics and Natural Sciences within the Faculty of Philosophy, where it became a professional subject. Chemistry was also studied by the students of the Technical Faculty (without exercises). Lozanić taught chemistry to first-year students, delivering six lessons per week. In the first semester, the focus was on inorganic chemistry, and organic chemistry in the second semester. He taught chemical technology and analytical chemistry to third-year students, conducting three classes per week. Student exercises were an integral part of the curriculum, and the chemistry laboratory was accessible all day so that students could engage in practical work whenever they were not attending lectures.

With Sima Lozanić's arrival at the Department of Chemistry, the teaching of modern chemistry commenced, adopting methods taught in major European scientific centres where Lozanić was educated. Instead of the outdated theories previously taught, Lozanić introduced new ones that had only been incorporated into textbook literature by a few of the most prominent European chemists. Through textbooks, he introduced modern terminology and nomenclature into the chemical language.

The Institute of Chemistry, which at the time of Lozanić's arrival at the Great School was located in the rear part of the Captain Miša's Edifice, was a large chemical laboratory where Rašković gave lectures and which simultaneously served as a laboratory for student exercises and a workshop for various analyses that he conducted for the state. Lozanić divided this laboratory into four smaller premises: a small professor's laboratory, a large student laboratory, a room for collections and apparatus, and a chemistry professor's office.

Sima Lozanić inherited the chemical laboratory from Mihailo Rašković (1827–1872), the first chemistry professor in Serbia. Rašković taught chemistry and chemical technology at the Lyceum (1853–1863) and at the Great School (1863–1872). Following his election as a professor in the autumn of 1853, Rašković immediately established a chemical laboratory on the ground floor of Princess Ljubica's Konak, where the Lyceum was located. He began to equip it with numerous and expensive apparatus. In 1857,

Rašković ordered ten tables and twelve chairs, thereby creating twelve student workstations. This number of workstations remained unchanged, even as the Lyceum evolved into the Great School and later expanded into a University. When the Lyceum transformed into the Great School in 1863, it relocated to the Captain Miša's Edifice. In the rear part of this building, a separate structure was built to house the chemical laboratory. This spacious premise served both as a space for student exercises and as Rašković's laboratory for conducting various analyses in his capacity as a state examiner of ores and flawed money.

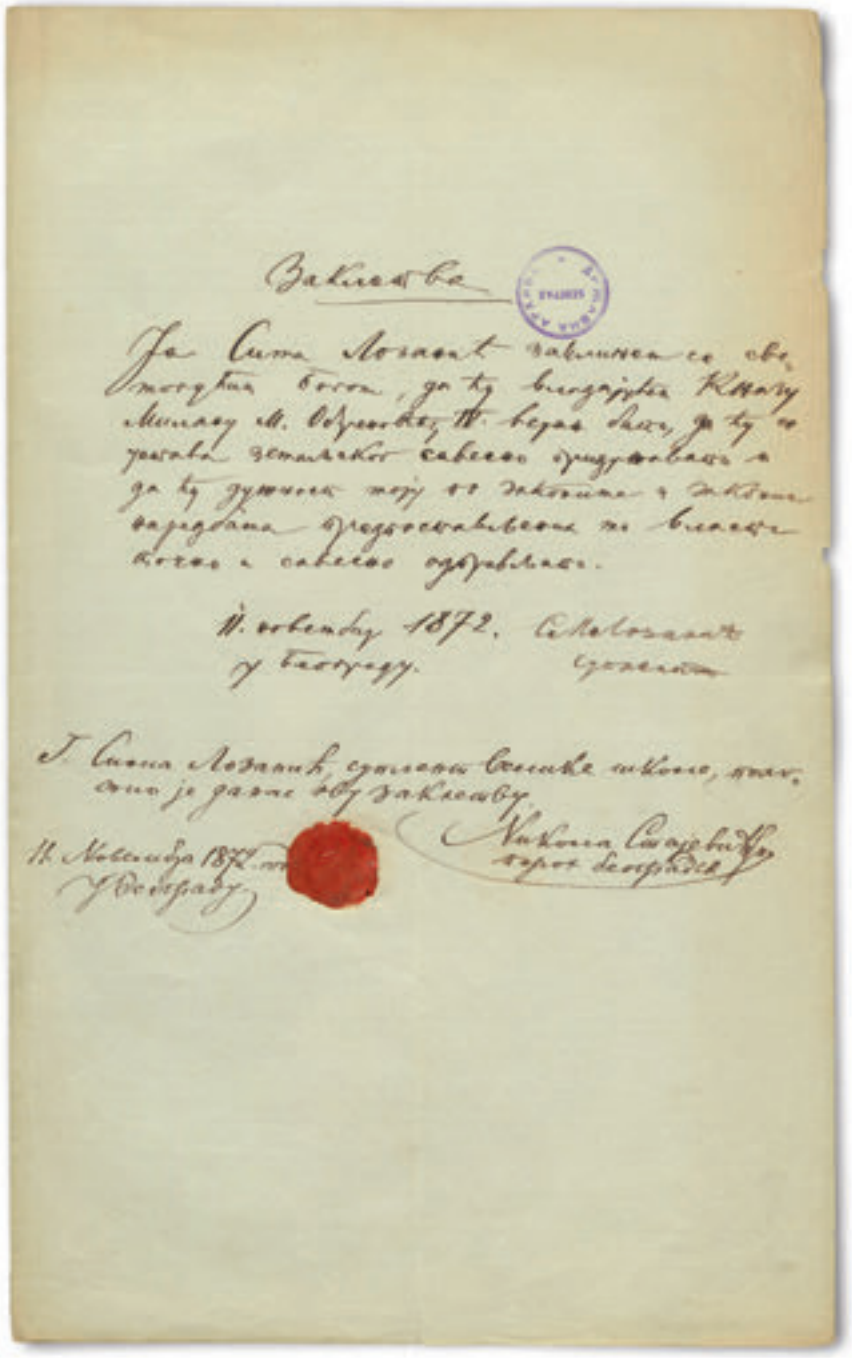
Sima Lozanić succeeded the laboratory in 1872. It was already well supplied, and in a few years Lozanić additionally supplied the laboratory with modern equipment, installed digestors in the laboratory and classroom, acquired a gas apparatus and installed gas installations to the worktables, as well as water from the Delijska česma fountain in Knez Mihailova Street. Practical student work became a mandatory part of the course, allowing students interested in chemistry to continue working in the laboratory throughout all four years of study, even after completing the lectures in the first year.

In October 1890, Sima Lozanić, the rector of the Great School, notified the Minister of Education that, during the session held on the 2nd of October, the Academic Council had decided it was imperative to transform the Great School into a university as soon as possible and expressed hope that this "cultural need of our country could be achieved within the year". Specifically, the plan was to pass a law on the transformation of the Great School into a university at the next National Assembly. During the same session, a committee was established with the task of formulating a project for the transformation of the Great School into a university. The committee was also tasked with articulating a comprehensive plan for the university's organisation. However, the issue of the university was not resolved until 15 years later, when the University Law was finally adopted in 1905.

In January 1894, Lozanić left the Great School and held various political positions for the next 10 years. Between 1896 and 1897, when he was not engaged in political duties, Lozanić taught at the Great School as a part-time professor. Initially, upon his first appointment as Minister of Economy in early 1894, he intended to return to the Great School after completing his ministerial duties. However, he was appointed minister for a second term, and this duty was extended until June 1895. Meanwhile, Dr Marko Leko, a well-known chemist and head of the State Chemical Laboratory, was selected as a part-time professor of chemistry at the Great School.

In August 1896, Lozanić offered to the Minister of Education to teach chemistry for free at the Great School. The minister accepted the offer, Leko was dismissed, and Lozanić began teaching chemistry at the Great School as a part-time professor for a little over a year, until he was once again appointed as Minister of Economy in October 1897.

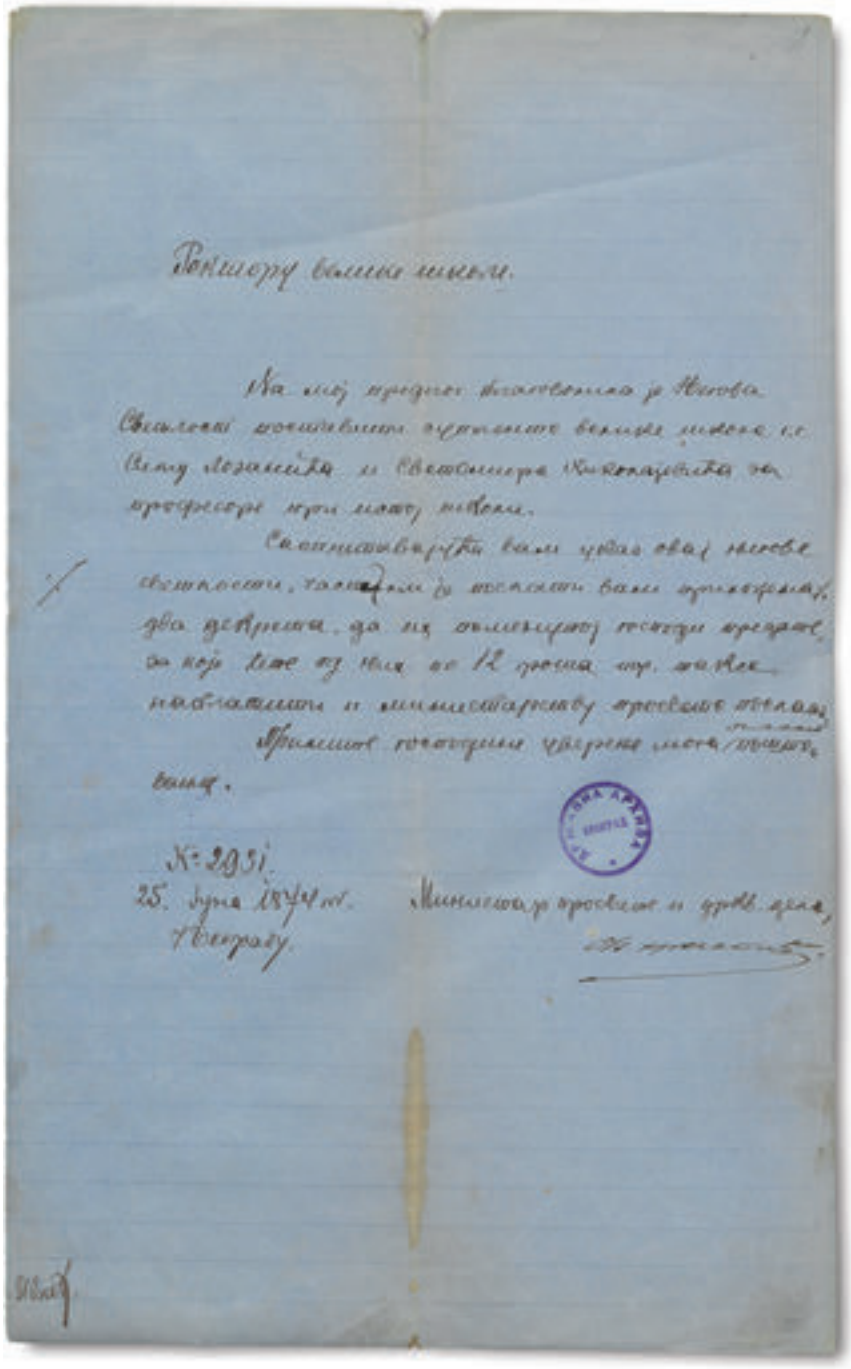
During Lozanić's absence from the Great School, in the period from 1894 to 1900, significant reforms took place aimed at improving and enhancing teaching methods so that the Great School could be more easily transformed into a university. Many departments at the Great School embraced these reforms by introducing new subjects to improve teaching. However, the Department of Chemisty lacked full professors or associate professors, who were the only ones with voting rights in councils and relevant bodies, hence the reforms and the newly enacted law were not used to develop and modernise chemistry teaching. Although proposals were made to divide the Department of Chemistry into two departments, there were no teachers in the Academic Council of the Great School to discuss them. Lozanić himself, despite being outside the Great School, submitted a proposal for the division of the Department of Chemistry, in which he suggested that the Department of Chemistry be divided into a department for inorganic chemistry with chemical technology and a department for organic chemistry with biological chemistry. He expressed his willingness to lead the Department of Inorganic Chemistry with General Chemistry and Chemical Technology. In addition to this proposal, Lozanić suggested a new division for the Faculty of Philosophy, as well as a revised classification of natural sciences. According to his proposal, natural and mathematical sciences would be divided into three groups: mathematics, natural sciences (*jestastvenica*), and physical-chemical sciences. None of the proposals were accepted, and the Department of Chemistry remained undivided both at the University and later between the two wars.



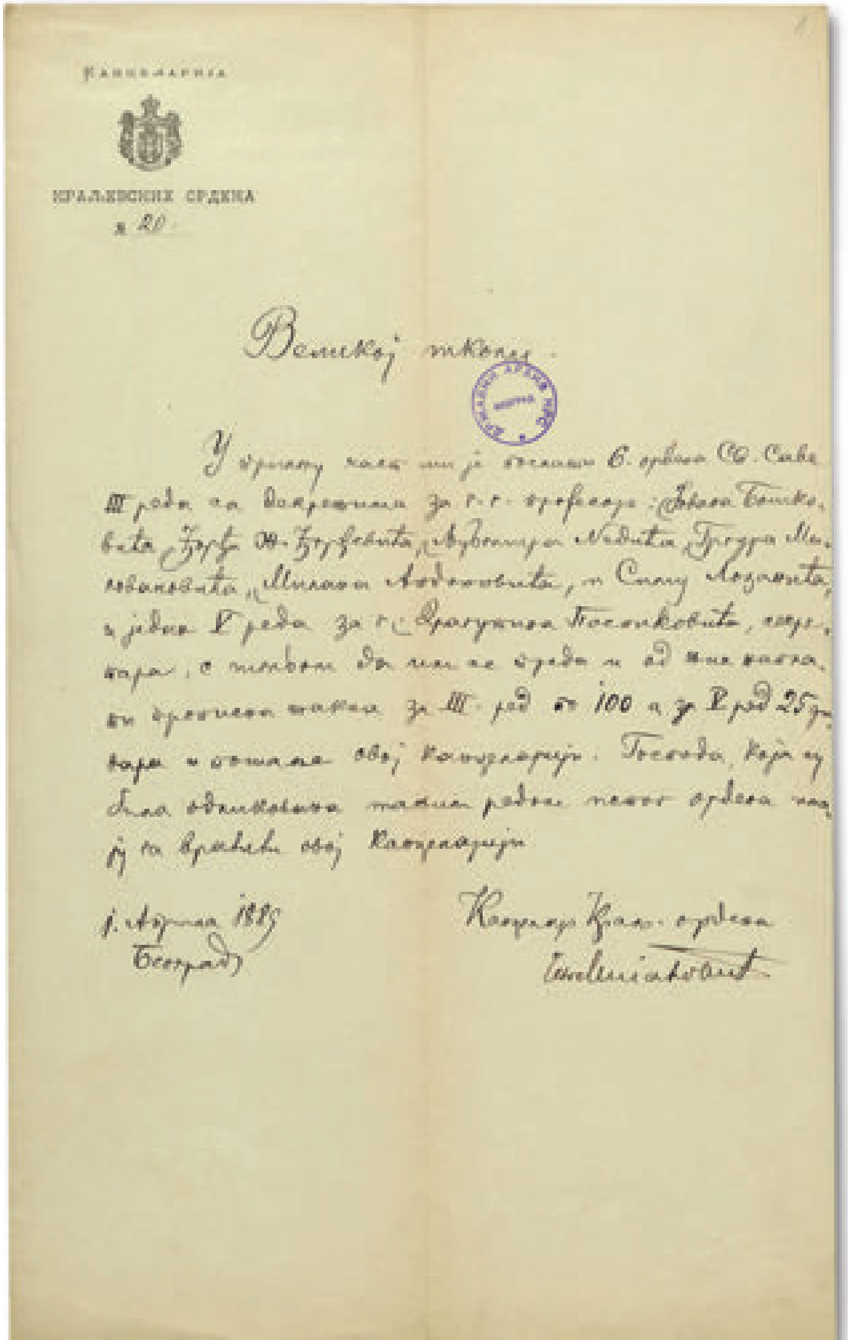
Sima Lozanić's oath to Prince Milan Obrenović on 11th November 1872, during employment at the Great School (State Archives of Serbia)

Sima Lozanić
(Faculty of Chemistry, Belgrade)

The Great School, late 19th century (Courtesy of Miloš Jurišić)



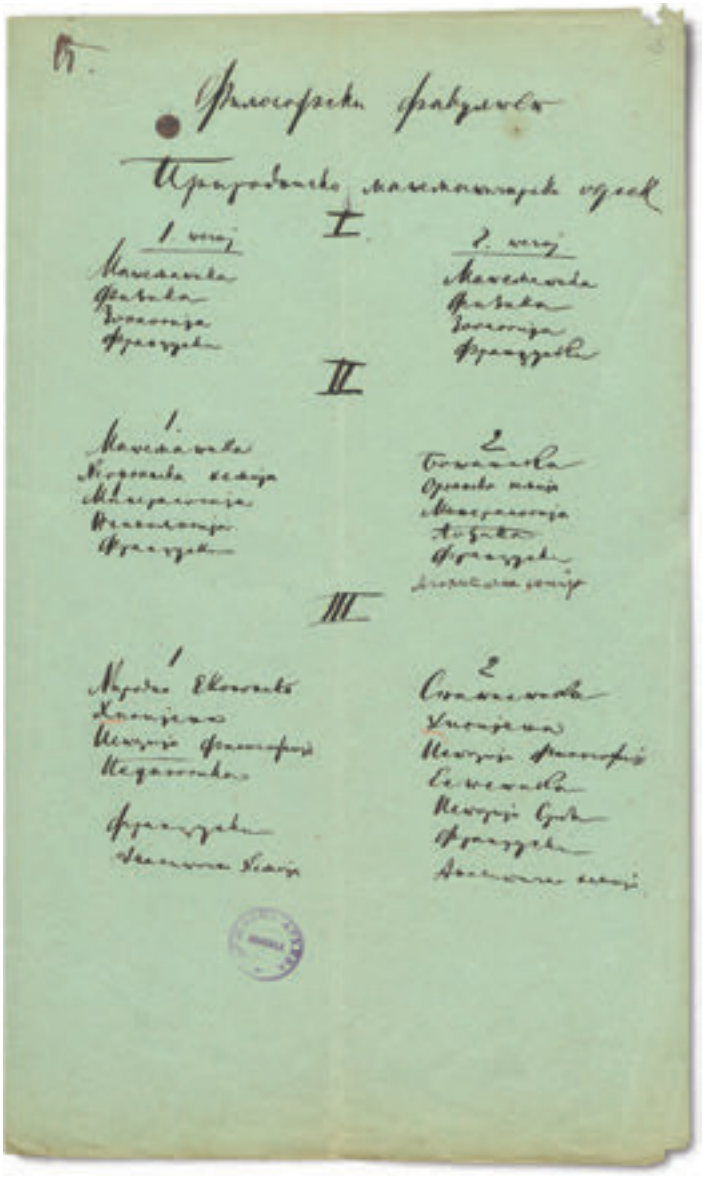
Decree by which Sima Lozanić and Svetomir Nikolajević were appointed as professors at the Great School on 25th June 1874 (State Archives of Serbia)



КАНЦЕЛАРИЈА
КРАЉЕВСКИХ ОРДЕНА
№ 20

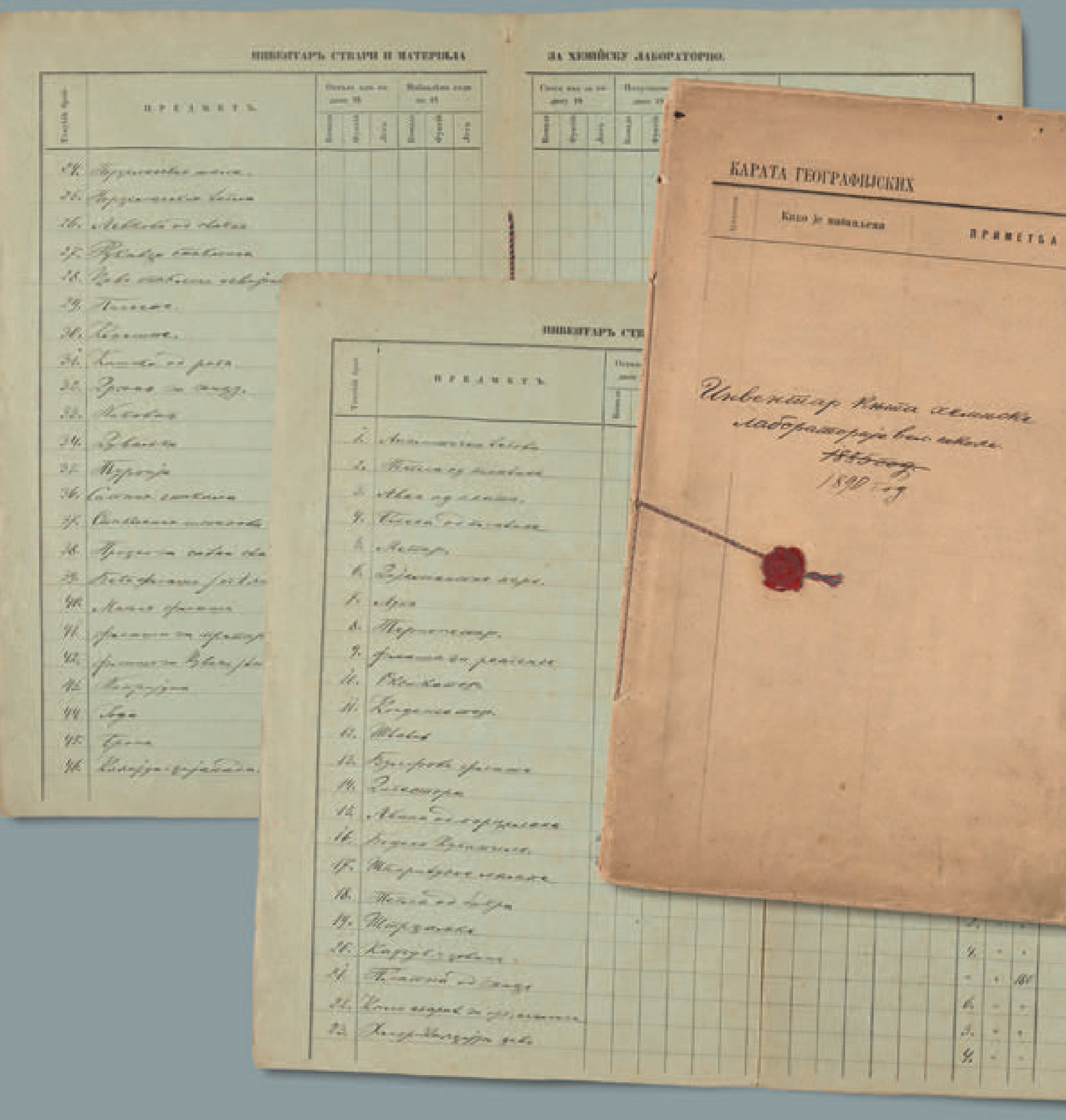
Великој школи.

Notification that Lozanić received the Order of St. Sava, 3rd class, in April 1889 (State Archives of Serbia)

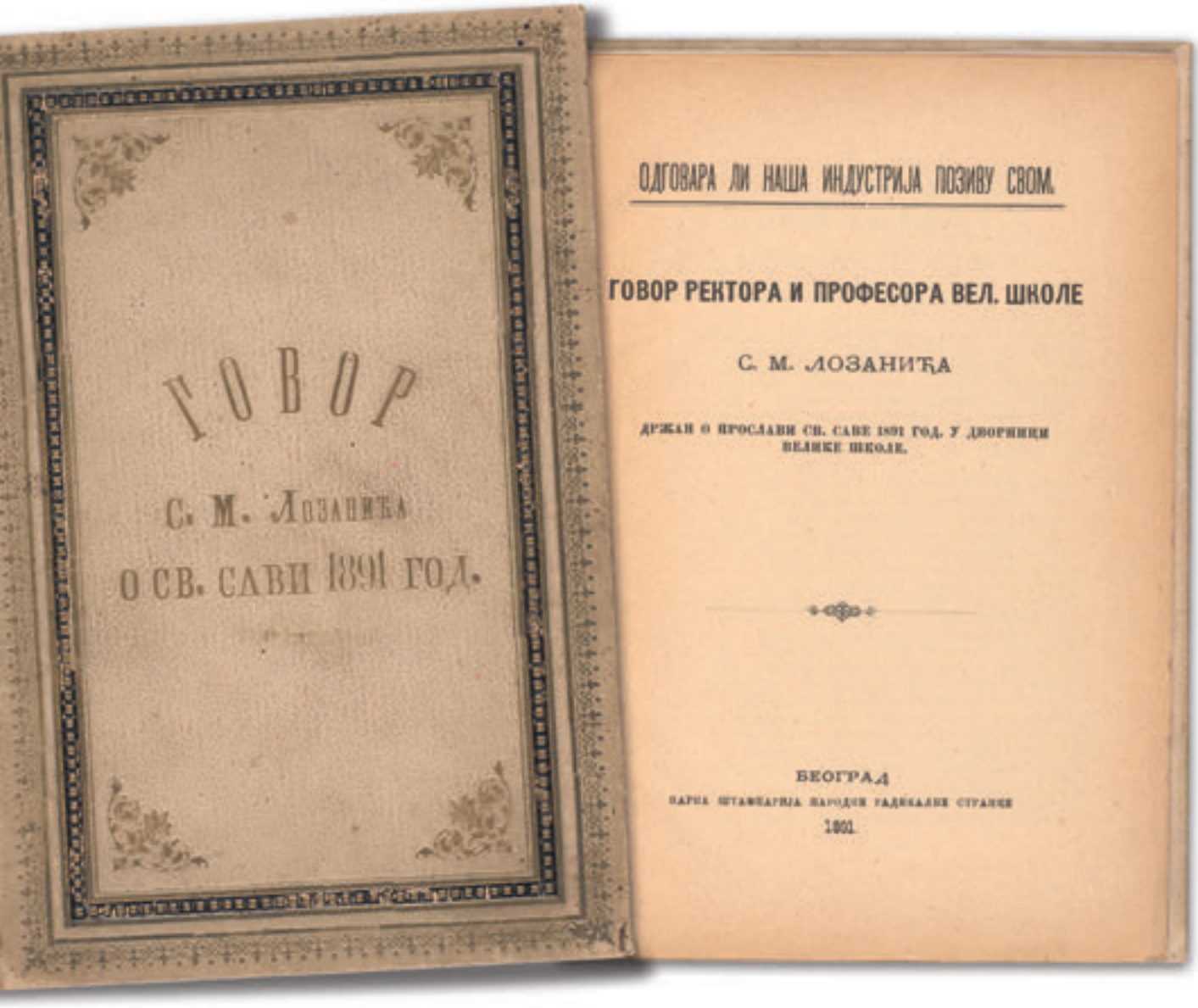


Natural Sciences and Mathematics Department of the Faculty of Philosophy, Course Schedule (State Archives of Serbia)

Inventory of books of the Chemical Laboratory of the Great School from 1890 (Faculty of Chemistry, Belgrade)


ИНВЕНТАРЪ СТВАРИ И МАТЕРИЈАЛА
ЗА ХЕМИЈСКУ ЛАБОРАТОРИЈУ.
ПРЕДМЕТЪ
КАРАТА ГЕОГРАФИЈСКИХ

Sima Lozanić's rector speech, 1891
(Faculty of Chemistry, Belgrade)


ГОВОР

С. М. Лозанића

О СВ. САВИ 1891 ГОД.

ОДГОВАРА ЛИ НАША ИНДУСТРИЈА ПОЗИВУ СВОМ.

ГОВОР РЕКТОРА И ПРОФЕСОРА ВЕЛ. ШКОЛЕ

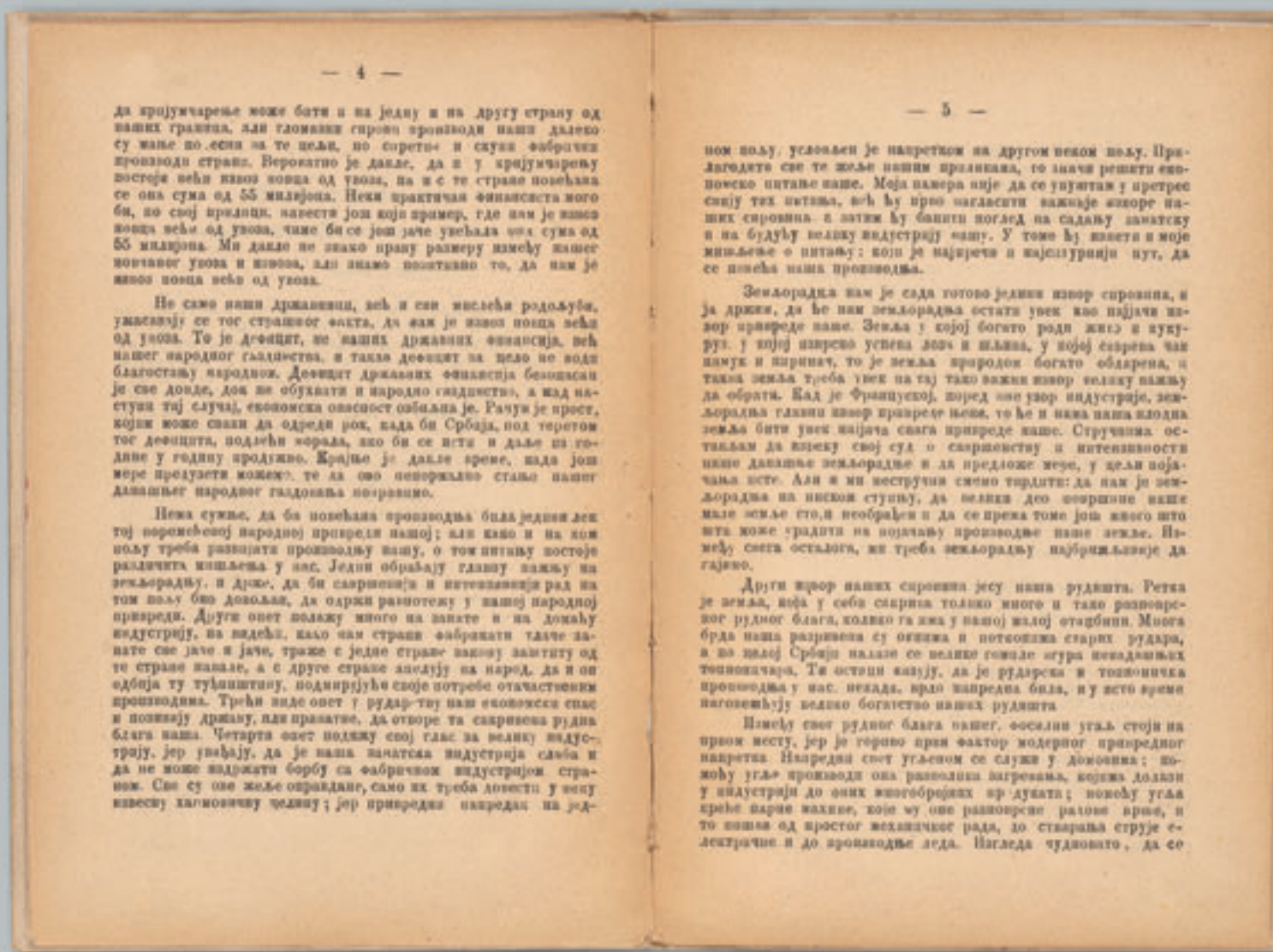
С. М. ЛОЗАНИЋА

ДРЖАН О ПРОСЛАВИ СВ. САВЕ 1891 ГОД. У ДВОРИШТУ ВЕЛИКЕ ШКОЛЕ.

БЕОГРАД

1891.

"A country where wheat and corn yield abundantly, where vines and plums thrive excellently, and even cotton and rice ripen, is a land richly endowed by nature, and such a country should pay great attention to this vital resource."



— 4 —

да прекуморске може бити и на једну и на другу страну од наших граница, али главнина сирови производи наши далеко су мање погодни за те циљеве, но сирети и скупи фабрички производи страни. Вероватно је дакле, да и у прекоморску постоје већи извоз поља од увоза, па и с те стране повећала се она сума од 55 милијона. Неки практичан финансиста много би, по свој прилици, навести још који пример, где нам је извоз поља већи од увоза, чиме би се још јаче увећала она сума од 55 милијона. Ми дакле не знамо праву размеру између нашег пољског увоза и извоза, али знамо позитивно то, да нам је извоз поља већи од увоза.

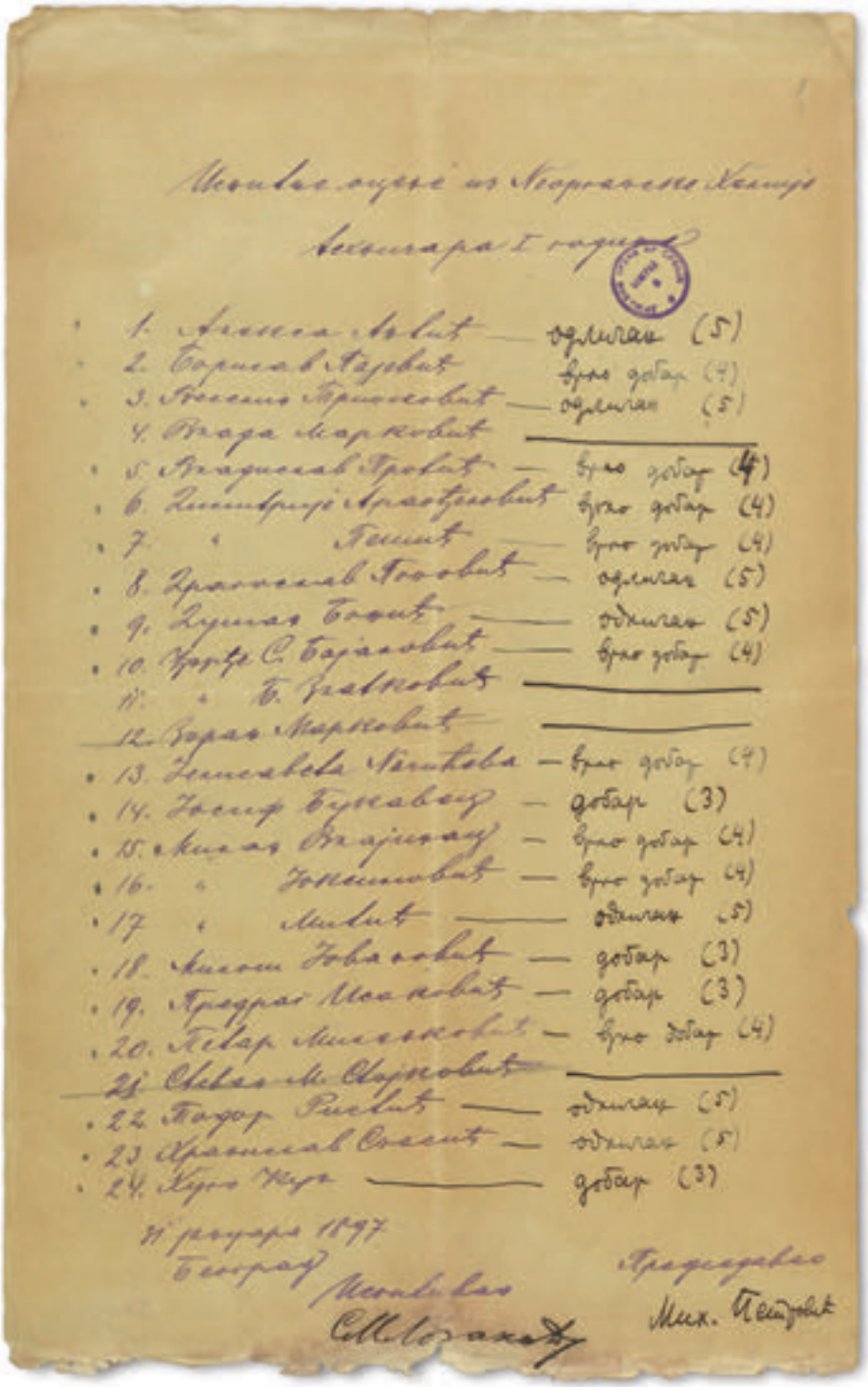
Не само наши државници, већ и сви мислећи родољуби, ужасавају се тог страшног факта, да нам је извоз поља већи од увоза. То је дефицит, не наших државних финансија, већ нашег народног газдинства, и такав дефицит за дуго не може благостању народном. Дефицит државних финансија безопасан је све довде, док не обухвата и народно газдинство, а над наступи тај случај, економска опасност обвала је. Рачун је прост, који може сваки да одреди рок, када би Србија, под теретом тог дефицита, подлећи морала, ако би се исти и даље из године у годину продужио. Крајње је дакле време, када још мере предузете можемо, те да ово неприродно стање нашег данашњег народног газдинства поправимо.

Нема сумње, да би повећана производња биља једини део тој преимућној народној привреди нашој; али као и на ком пољу треба развијати производњу нашу, о том питању постоје различити мишљења у нас. Једни обраћају главну пажњу на земљорадњу, и држе, да би савршенија и интензивнија рад на том пољу био довољан, да одржи равнотежу у нашој народној привреди. Други опет полажу много на занате и на домаћу индустрију, на надежи, како нам стране фабрикати тачне занате све јаче и јаче, траже с једне стране заштиту од те стране навале, а с друге стране злеђују на народ, да и он одбија ту туђинштину, подмирујући своје потребе отачаственим производима. Трећи виде опет у рударству наш економски спас и позивају државу, или приватне, да отворе та скривена рудна блага наша. Четврти опет полажу свој глас за велику индустрију, јер увиђају, да је наша занатска индустрија слаба и да не може издржати борбу са фабричком индустријом страном. Све су ове жеље оправдане, само их треба довести у неку хармоничну целину; јер привредна напредак на једном пољу, условљен је напретком на другом неком пољу. Прилагодити све те жеље нашим приликама, то значи решити економско питање наше. Моја намера није да се упуштам у претрес свију тих питања, већ ћу само нагласити важније изворе наших сировина, а затим ћу бацити поглед на садању занатску и на будућу велику индустрију нашу. У томе ћу изнети и моје мишљење о питању: који је најбржи и најсигурнији пут, да се повећа наша производња.

Земљорадња нам је сада готово једини извор сировина, и ја држим, да ће нам земљорадња остати увек као најјачи извор привреде наше. Земља у којој богато роди жито и кукуруз, у којој изврсно успева дуван и шљива, у којој сваког чак памук и пиринач, то је земља природом богато обдарена, и таква земља треба увек на тај тако важни извор велику пажњу да обрати. Кад је Француској, поред све њене индустрије, земљорадња главни извор привреде њене, то ће и нама наша плодна земља бити увек најјача снага привреде наше. Стручним осталим да изнесу свој суд о савршенству и интензивности наше данашње земљорадње и да предложе мере, у циљу појачања исте. Али и ми нестручни смемо тврдити: да нам је земљорадња на нижем ступњу, да велики део површине наше мале земље стоји необрађен и да се према томе још много што шта може градити на појачању производње наше земље. Између свега осталога, ми треба земљорадњу најприкладније да гајимо.

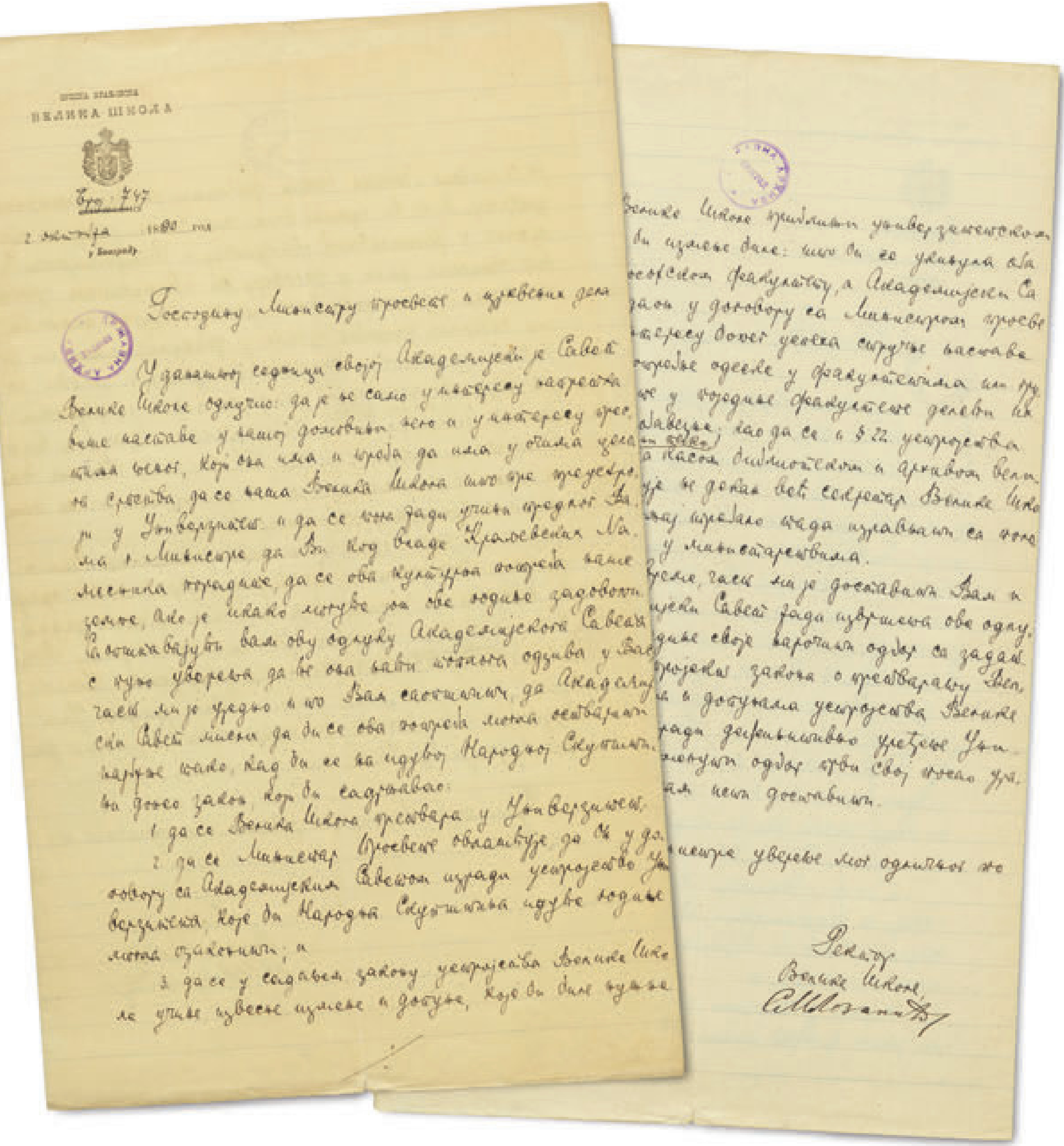
Други извор наших сировина јесу наша рудишта. Ретка је земља, која у себи скрива толико много и тако разноврсног рудног блага, колико га има у нашој милој отаџбини. Многа брда наша разривена су окнима и потконицама старих рудара, а по целој Србији налазе се велике гомиле шљака некадашњих топионичара. Те остаци казују, да је рударска и топионичка производња у нас, некада, врло напредна била, и у исто време наговештавају велико богатство наших рудишта.

Између свог рудног блага нашег, фосилни угаљ стоји на првом месту, јер је гориво прави фактор модерног привредног напретка. Напредак свог људства се служи у домаћинству; помоћу угља производи она разноликна загревања, којима долази у индустрији до оних многобројних продуката; помоћу угља креће парне машине, које му оне разноврсне радове врше, и то почиња од простог механичког рада, до стварања струје електричне и до производње леда. Изгледа чудновато, да се



Professors of the Great School, from left to right:
L. Dokić, J. M. Žujović, and J. Pančić (SASA Library)

Exam grades in inorganic chemistry of first-year technician students,
31st January 1897. Examined by Sima Lozanić,
presided over by Mihailo Petrović Alas
(State Archives of Serbia)


Српска Краљевска
Велика Школа
Бр. 747
2 октобра 1880 год.
у Београду

Господину Министру просвете и црквених дела

У данашњој седници својој Академијски је Савет Велике Школе одлучио: да је не само у интересу напретка више наставе у нашој домовини, него и у интересу просвете земље, коју она има и треба да има у очима целог света, не средства да се наша Велика Школа што пре претвори у Универзитет и да се тога ради учини предлог Вама г. Министре да Ви код владе Краљевске Намесника израдите, да се ова културна потреба наше земље, ако је икако могуће још ове године задовољи.

Достављајући Вам ову одлуку Академијскога Савета с пуно уверења да ће она наћи потпуна одзива у Вас част ми је уједно и то Вам саопштити да Академијски Савет мисли да би се ова потреба могла остварити најпре тако, кад би се на идућој Народној Скупштини донео закон, који би садржавао:

1 да се Велика Школа претвара у Универзитет.

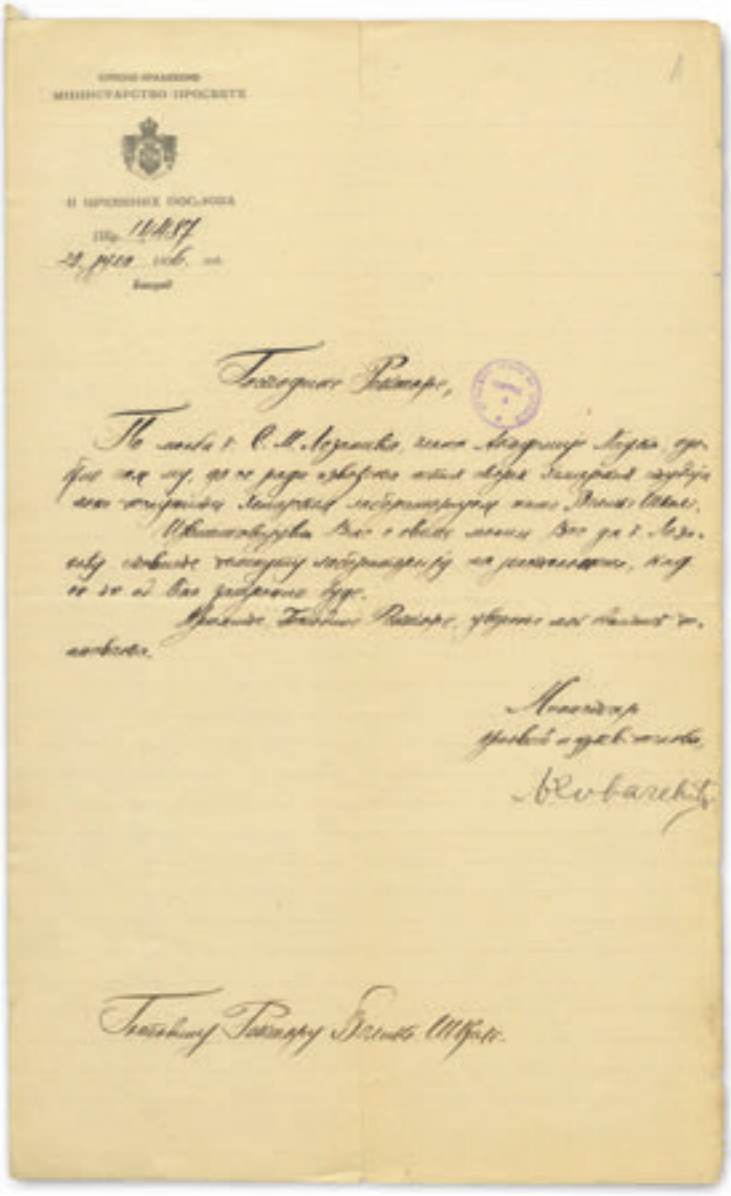
2 да се Министар просвете овлашћује да он у договору са Академијским Саветом изради устројство Универзитета, које би Народна Скупштина идуће године могла озаконити; а

3 да се у садашњем закону устројства Велике Школе учине извесне измене и допуне, које би биле нужне

...Велике Школе пребацити универзитетском
...би измене биле: што би се укинула ова
...софском факултету, а Академијски Са
...радом у договору са Министром просве
...интересу бољег успеха стручне наставе
...стручне одсеке у факултетима или гру
...не у поједине факултетске делови на
...Савеза; као да се и § 22 устројства
...а каса библиотеком и архивом Вели
...које не докле већ секретар Велике Шко
...ли треба сада изравнати са пово
...у министарствима.
...успех, част ми је достављам Вам и
...ијски Савет јако изврши ове одлу
...године своје нарочити одбор са задат
...пројекта закона о претварању Вел
...и допунама устројства Велике
...ради дефинитивно уређење Уни
...ом одбор први свој посао у
...ам исти доставити.

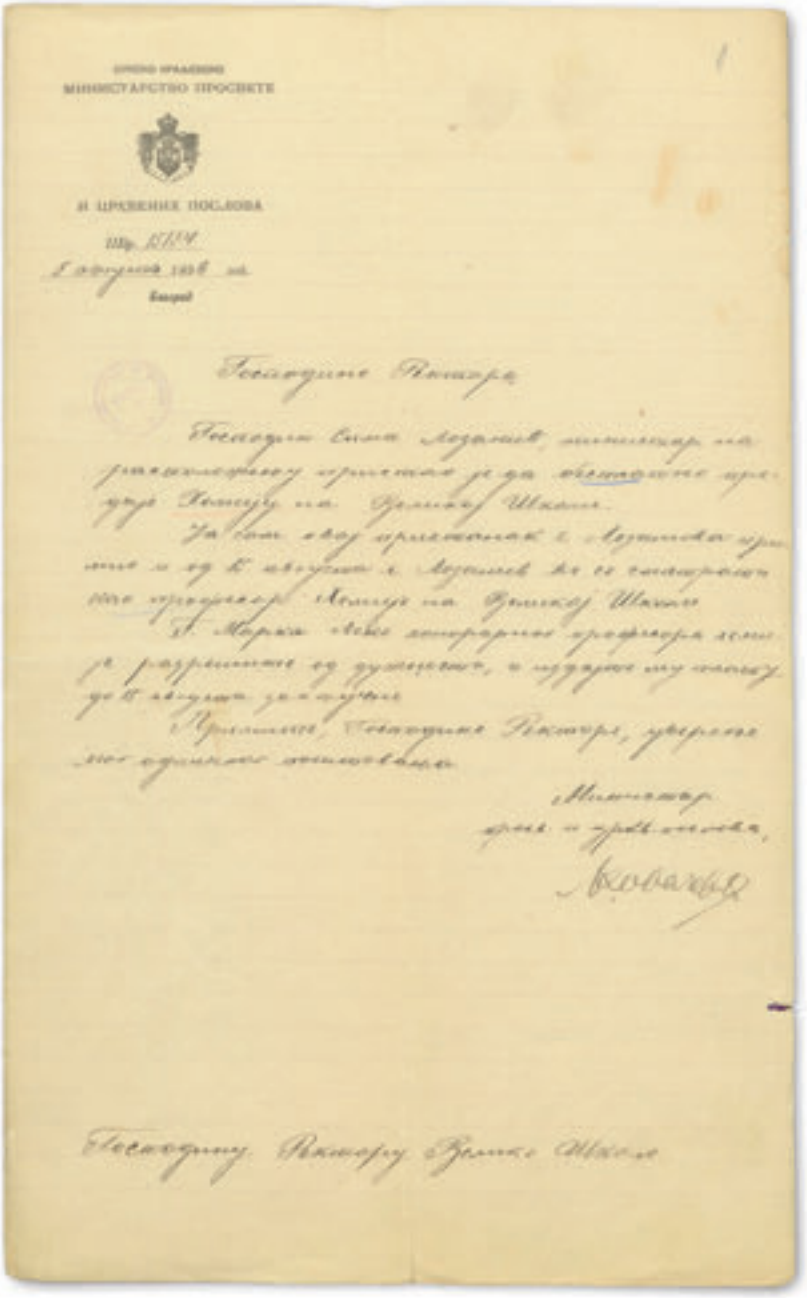
...Министре уверење мог одличног по...

Ректор
Велике Школе
С. М. Лозанић

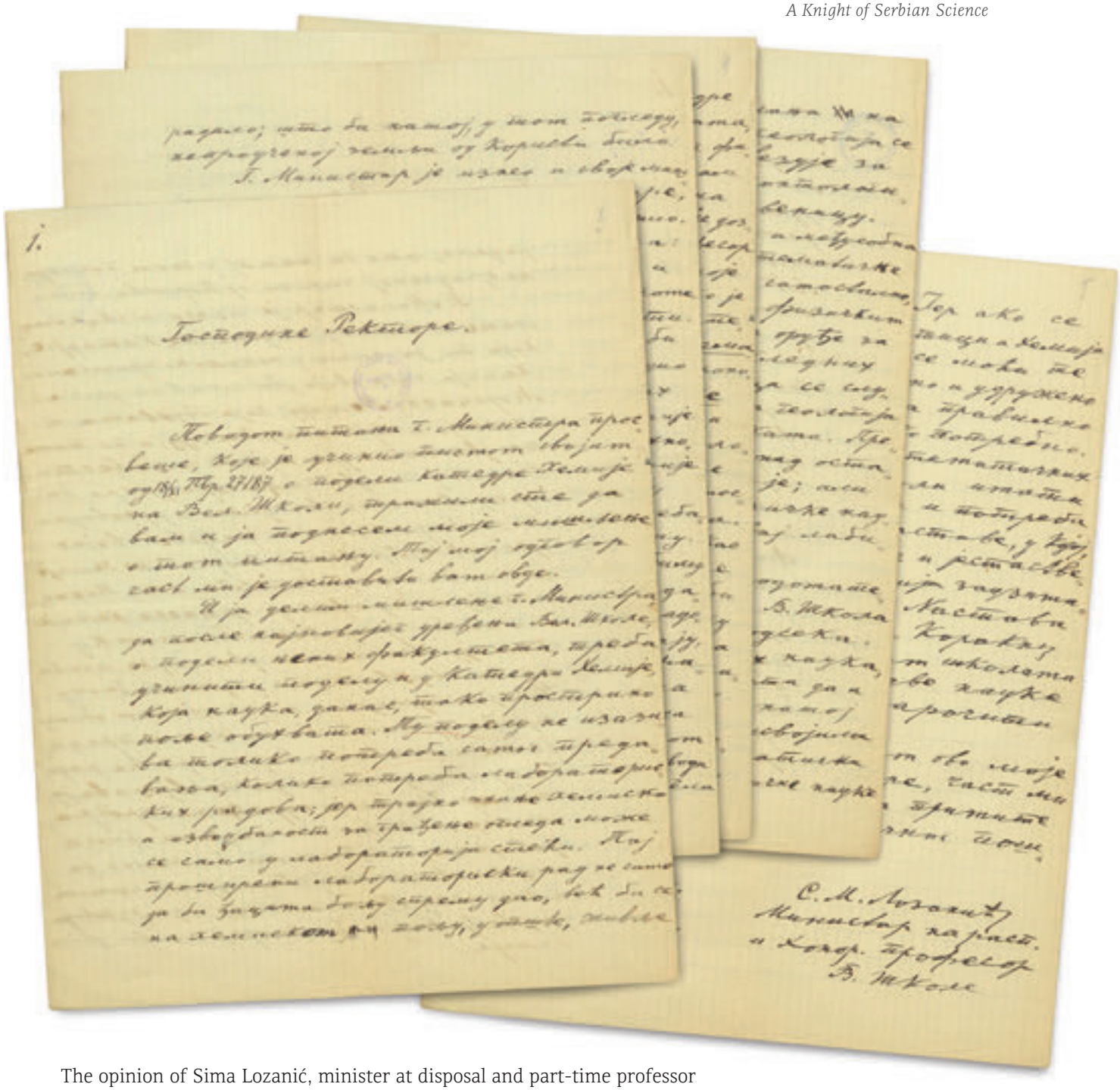


The Minister of Education informs the rector that, upon Sima Lozanić's request, he has approved the availability of the chemical laboratory of the Great School, 26th July 1896 (State Archives of Serbia)

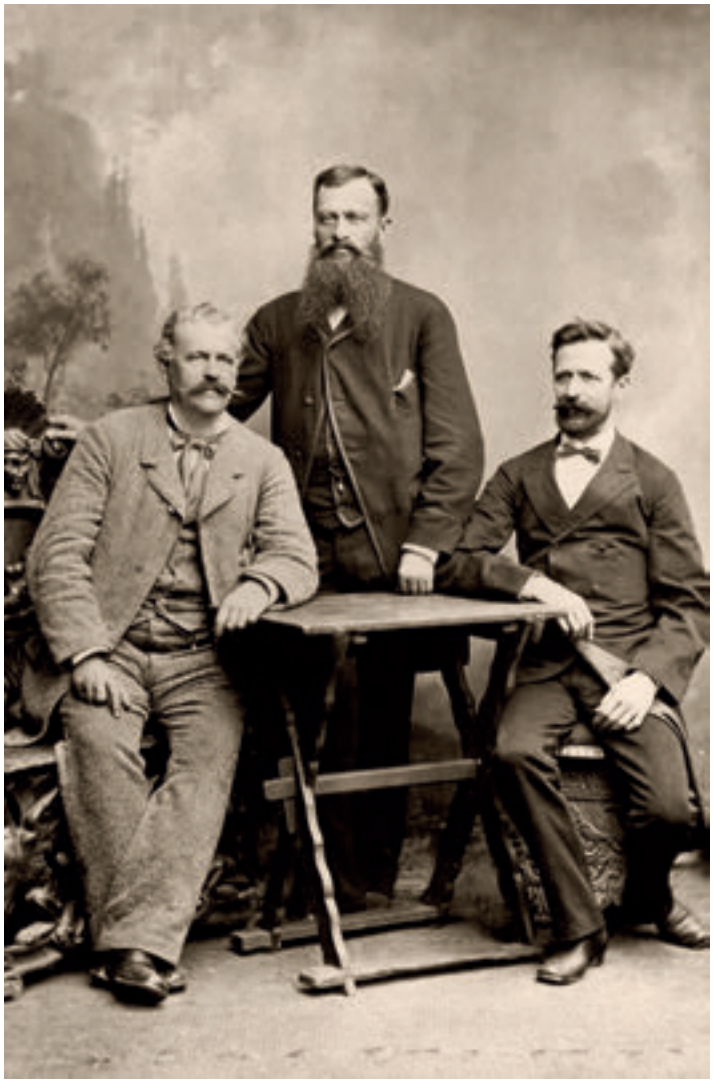
Letter of Sima Lozanić, rector of the Great School, to the Minister of Education requesting that the Great School be transformed into a university (State Archives of Serbia)



The Minister of Education informs the rector that Sima Lozanić has agreed to teach chemistry at the Great School for free, and that M. Leko be relieved of duty, 5th August 1896 (State Archives of Serbia)

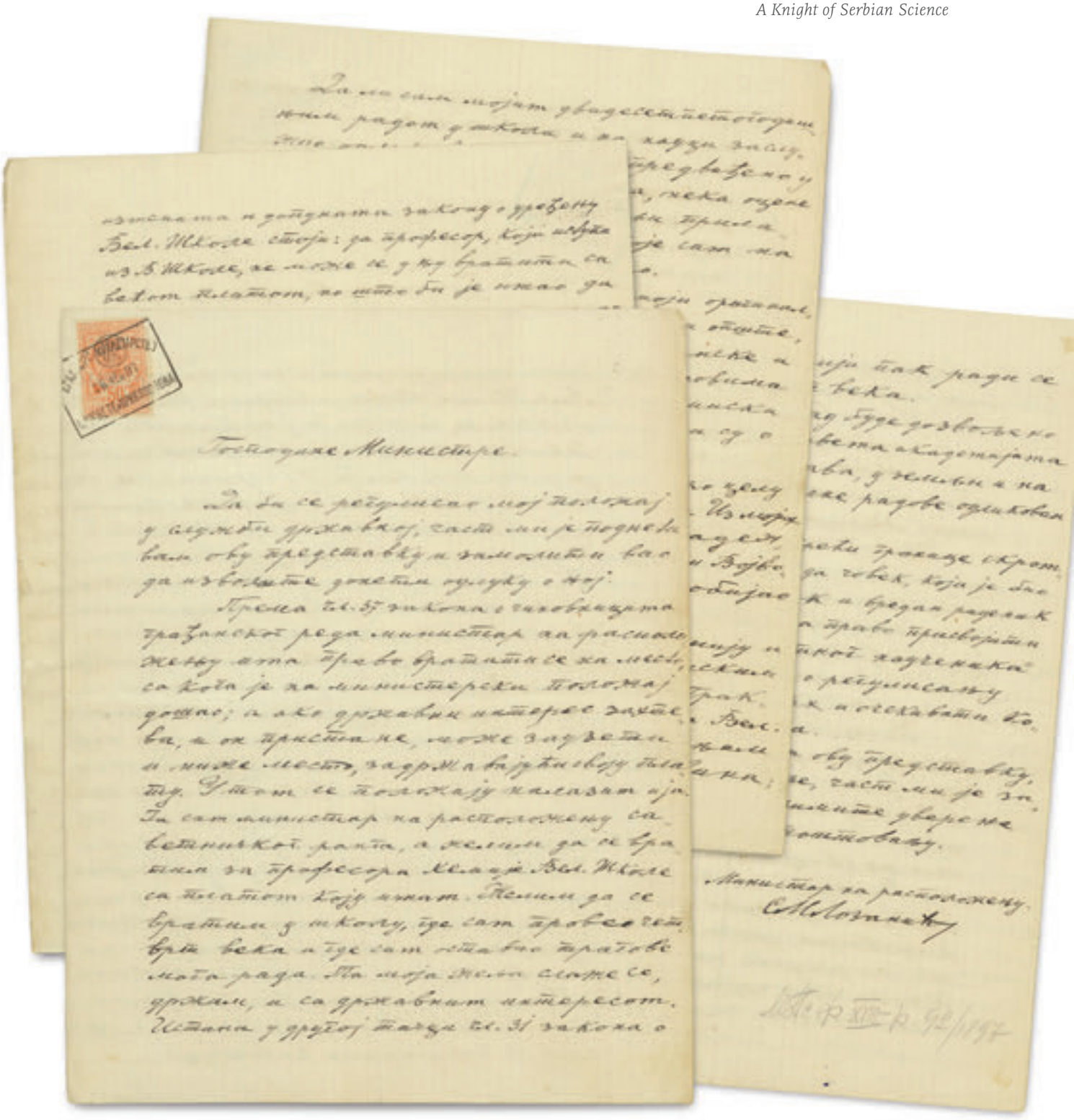


The opinion of Sima Lozanić, minister at disposal and part-time professor of the Great School, on the division of the Department of Chemistry and the division of sciences at the Faculty of Philosophy, 25th November 1896 (State Archives of Serbia)



Professors of the Great School, from left to right: K. Alković, Lj. Klerić, and D. Nešić (SASA Library)

Sima Lozanić, the minister at disposal, writes to the minister expressing his desire to have his position in the service regulated so that he can return to the Great School with the salary corresponding to the rank of an adviser, 20th February 1897
(State Archives of Serbia)



"Just as the sun, with its luminous, warm and chemical rays, provides life to inanimate nature, mediating so that from the earth, water and air emerge living creatures, so does the school, with its scientific rays, bestows life upon the human spirit, mediating the development of intellect in the unrefined son of cold nature and transforming that simple living being into a cultured person (...)
May God grant that our young University live, grow and flourish, and bear fruit."

From Sima Lozanić's rector speech at the solemn opening of the University in 1905

University

THE GREAT SCHOOL, FOUNDED IN 1863, UNDERWENT NUMEROUS reforms over several decades aimed at expanding and improving teaching in order to create conditions for its transformation into a university. The objective conditions for the establishment of the university were achieved in the last decade of the 19th century: an intellectual climate suitable for scientific work and serious university teaching was created, a number of teachers published papers in European scientific journals and gained recognition abroad, professional societies were established, as well as professional and scientific journals, and young scientists were educated. Aa a result, from 1890 onwards, the question of the university, initially raised by Lozanić in October 1890 as the rector of the Great School, became a constant topic in the Serbian public and over the following 15 years, various projects were drafted, and discussions were held regarding the establishment of the university. However, turbulent political events and frequent changes of governments hindered the transition of the Great School into a university. The coup d'état of 1903, the change of dynasty on the Serbian throne, and the introduction of civil parliamentarism and democracy ultimately facilitated the passing of the University Law.

The Law on University was proclaimed on 27th February / 12th March 1905. On that day, all professors of the Great School were placed "at disposal". That very day, by a special decree, the first eight full professors of the University were appointed, who simultaneously constituted the temporary University Board: Sima Lozanić, retired minister, Jovan Žujović, state counselor, Dr Dragoljub Pavlović, Ljubomir Jovanović, Dr Jovan Cvijić, Dr Mihailo Petrović (Faculty of Philosophy), Milić Radovanović (Faculty of Law), and Andra Stevanović (Technical Faculty). Sima Lozanić was appointed as the president of the Board. The task of the Board, as the parent committee, was to select the teaching staff of the University and organise classes. The entire process regarding the organisation of the University continued through the Board under the leadership of Sima Lozanić. The following day, 28th February, the Board made decisions regarding the selection of teaching staff.

In early March, full professors of the University were elected, followed by associate professors a few days later. Subsequently, the faculty councils assigned departments to eight regular professors: Sima Lozanić – chemistry, Jovan Žujović – geology, Jovan Cvijić – geography, Ljubomir Jovanović – history of the Serbian people, Mihailo Petrović – mathematics, Dragoljub Pavlović – general history (at the Faculty of Philosophy), Andra Stefanović – civil engineering (at the Techical Faculty), and Milić Radovanović – economics and economic policy (at the Faculty of Law). Thus, the organisation of the University was completed. Teaching at the University began in March when Sima Lozanić was elected as the rector.

The University was officially opened on the 2nd of October 1905. The opening of the University was attended by the king, the crown prince, members of the diplomatic corps, members of Parliament, members of the State Council, members of the Ministerial Council, the metropolitan, bishops, academics, the rector and professors of the University, representatives of educational and cultural societies, teachers of secondary and vocational schools, representatives of merchants and the press. In addition to local officials, representatives of foreign universities and educational and scientific institutions also attended the opening of the University.

Rector Sima Lozanić delivered a welcoming speech in which he presented the history of the young Serbian state, as well as the development of the Lyceum and the Great School, and emphasised the importance of the University for our nation: "Our former conviction that Serbia will be united not with a spelling book, but through the use of weapons, was fatal for our national thought. I believe, on the contrary, that education will be the main factor in resolving this important issue of ours. It would have been solved already if we had nurtured education with greater zeal. My belief rests on the assurance that education is a force that can guide a nation in all directions."

After the solemn opening of the University, classes were expected to commence in early October 1905. However, a student strike delayed the start of activities for more than twenty days. The students were not satisfied with certain articles of the General Regulation, particularly those concerning compulsory lecture attendance and ban on political associations. Student associations could only deal with scientific, artistic or humanitarian topics, excluding political issues.

Already on the 5th of October, the students sent a Memorandum to the University Council, as a proclamation of the University Youth against the new University Regulation. They proposed changes and amendments to the articles related to mandatory regular attendance of lectures, as well as

provisions on freedom of political beliefs and freedom of movement. The public supported the students, considering their dissatisfaction to be justified, and demanded that the Regulation be changed. All newspapers covered the student strike daily.

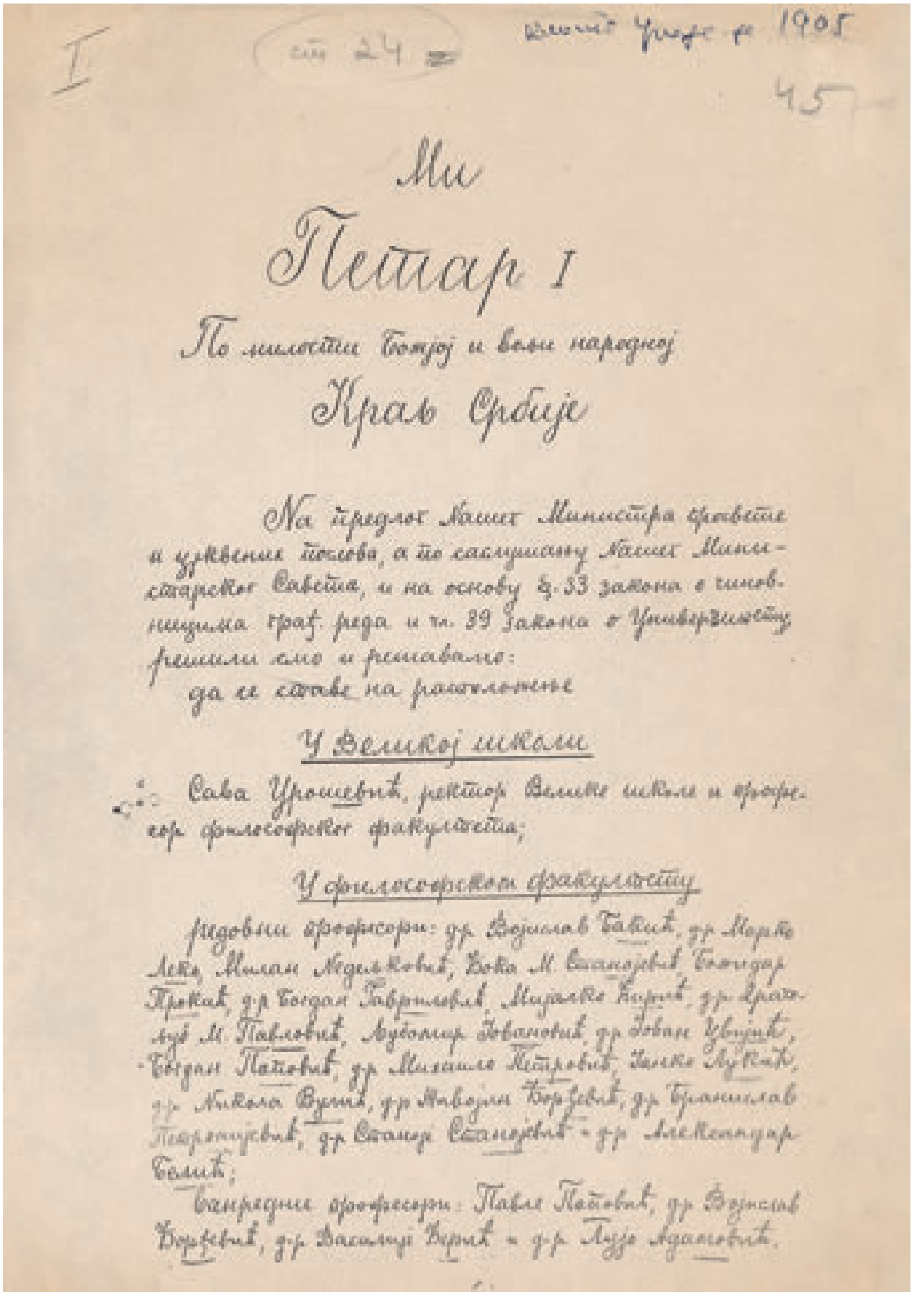
Lozanić led negotiations with the students on several occasions, but ultimately the strike was resolved in favour of the students. The University Council agreed to the students' demands, deciding to change the Regulation the following academic year, and until then, its "problematic" provisions would not be applied. The perseverance of the students and their unity in the struggle for their rights managed to change the inadequate provisions of the law and the first Serbian University was turned into a libertarian school where students participate in the decision-making and adoption of laws that concern them.

At the University, chemistry belonged to the II group of sciences, along with physics and physical chemistry. Sima Lozanić taught inorganic and organic chemistry in the first year of studies. In 1908, the first assistant professor at the Department of Chemistry, Lozanić's son Milivoje Lozanić, was elected. Milivoje Lozanić held special lectures in analytical chemistry, stereochemistry, chemistry of carbohydrates, and chemistry of dyes. In 1909, Milivoje and his father Sima Lozanić compiled a new curriculum and a programme of practical student work over a four-year period of study. The plan was extensive and ambitious, encompassing all exercises in the field of chemistry and aimed at forming a good practicing chemist.

The Chemical Institute was still housed in a small building constructed for the needs of Mihailo Rašković, with twelve student workstations in the laboratory. Under such conditions, implementing a new curriculum of practical works was not possible. Sima Lozanić had begun searching for a new building for the Chemical Institute as early as 1907, and in 1910, together with his son Milivoje, he submitted to the educational authorities a detailed plan for a new two-storey building for the Chemical Institute, with the ground and first floors for chemistry. At that time, plans were also underway to establish the Agricultural Department within the Faculty of Philosophy, for which Sima Lozanić drafted a plan and programme, with the second floor of the planned Chemical Institute earmarked for its use. The students' complaints about the poor working conditions in the laboratory prompted rector Jovan Cvijić to support the construction of a new building.

The new Chemical Institute was built after The First World War.

The first professors of the University of Belgrade, 1905;
seated, left to right: Jovan Žujović, Sima Lozanić, Jovan Cvijić, Mihailo Petrović Alas;
standing, from left to right: Andra Stevanović, Dragoljub Pavlović, Milić Radovanović,
and Ljubomir Jovanović, 1905 (SASA Library)



I (ст. 24) [illegible] фебруара 1905
45

Ми
Петар I
По милости Божјој и вољи народној
Краљ Србије

На предлог Нашег Министра просвете и црквених послова, а по саслушању Нашег Министарског Савета, и на основу §. 33 закона о чиновницима грађ. реда и чл. 39 Закона о Универзитету решили смо и решавамо:
да се ставе на расположење

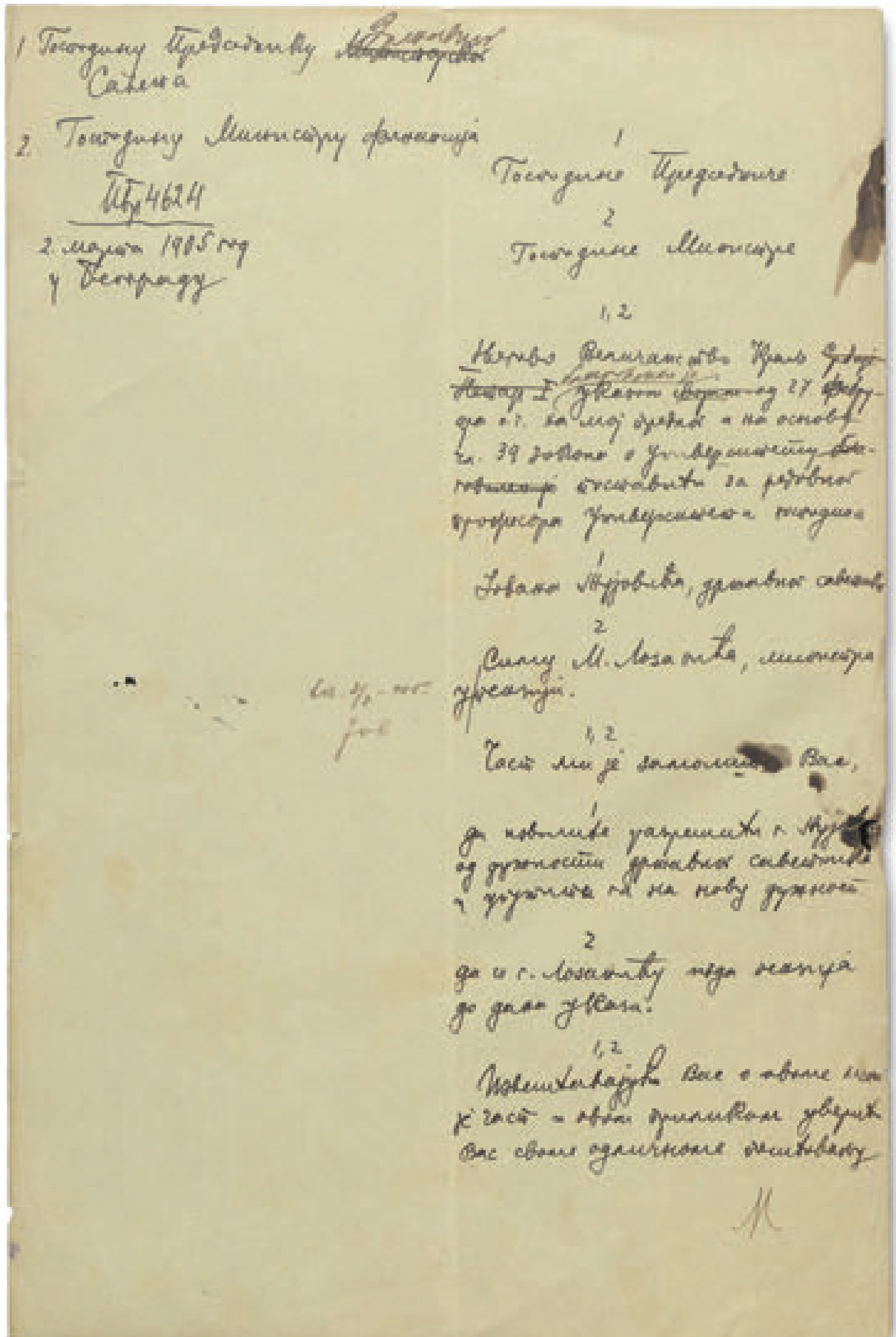
У Великој школи
Сава Урошевић, ректор Велике школе и професор философског факултета;

У философском факултету
редовни професори: др. Војислав Бакић, др. Марко Леко, Милан Недељковић, Ђока М. Станојевић, Божидар Прокић, др. Богдан Гавриловић, Мијалко Ћирић, др. Драгољуб М. Павловић, Љубомир Јовановић, др. Јован Цвијић, Богдан Поповић, др. Михаило Петровић, Јанко Лукић, др. Никола Вулић, др. Живојин Ђорђевић, др. Бранислав Петронијевић, др. Станоје Станојевић и др. Александар Белић;
ванредни професори: Павле Поповић, др. Војислав Ђорђевић, др. Василије Ђерић и др. Лујо Адамовић.

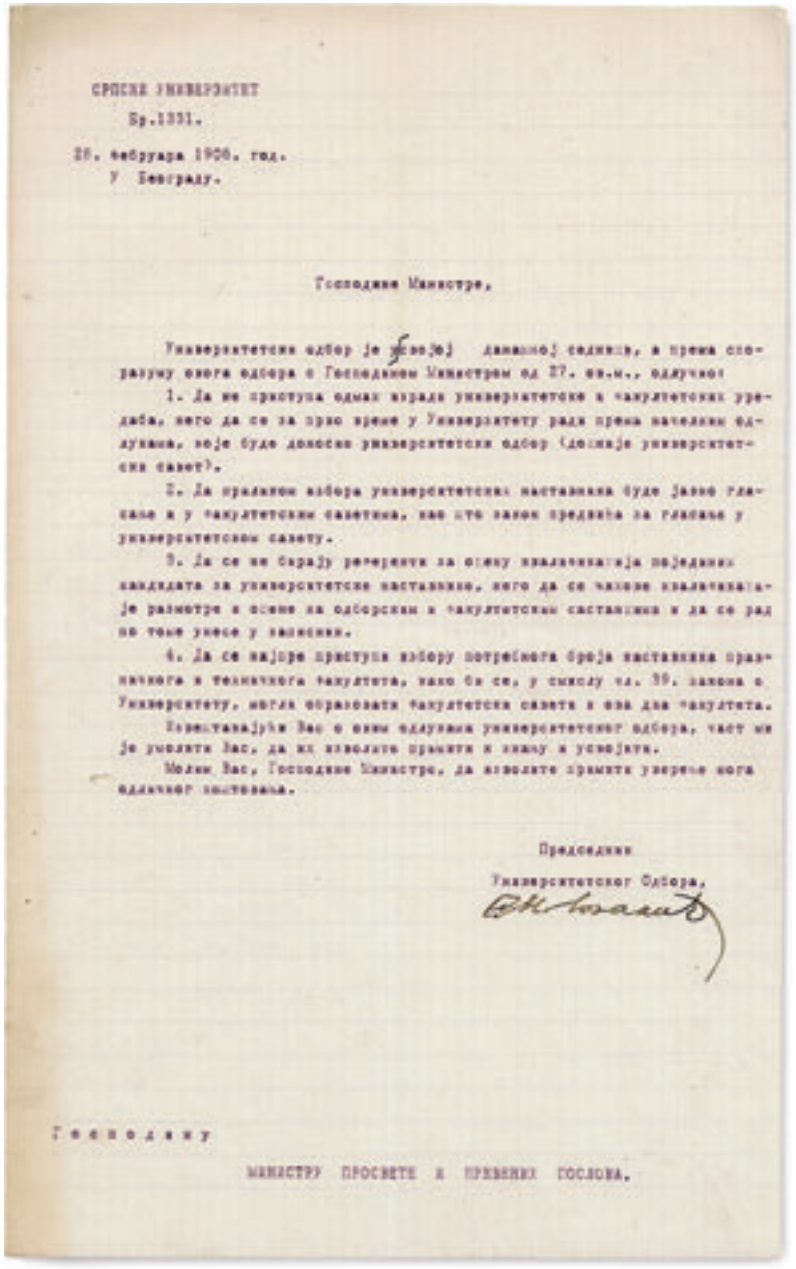
King Petar’s decree by which the rector and all professors of the Great School were put “at disposal”, 27th February 1905
(State Archives of Serbia)

The draft of the letter by which the Minister of Education informs that, by the King's decree, dated 27th February, Jovan Žujović, a state advisor, and Sima Lozanić, a retired minister, have been appointed full professors of the University and requests that Žujović be relieved of his duties as a state advisor and that Lozanić be granted a pension from the date of the decree, 2nd March 1905
(State Archives of Serbia)

The building of the University of Belgrade, 1906–1910
(Courtesy of Miloš Jurišić)


1 Господину Председнику ~~Министарског~~ Државног Савета
2. Господину Министру финансија
Пр 4624
2. марта 1905 год.
у Београду

1
Господине Председниче
2
Господине Министре
1, 2
Његово Величанство Краљ ~~Петар I~~ указом ~~[illegible]~~ од 27 фебруара о.г. на мој предлог а на основу чл. 39 закона о универзитету благоволео је поставити за редовног професора Универзитета господина
1
Јована Жујовића, државног саветника
2
Симу М. Лозанића, министра финансија.
1, 2
Част ми је замолити Вас,
1
да изволите разрешити г. Жујовића од дужности државног саветника и упутити га на нову дужност
2
да и г. Лозанићу [illegible] до дана указа.
1, 2
Известивајући Вас о овоме имам је част и овом приликом уверити Вас о своме одличноме поштовању
М



СРПСКИ УНИВЕРЗИТЕТ
Бр.1331.
28. фебруара 1906. год.
У Београду.

Господине Министре,

Универзитетски одбор је на својој данашњој седници, а према споразуму овога одбора с Господином Министром од 27. ов.м., одлучио:

1. Да не приступа одмах изради универзитетске и факултетских уредаба, него да се за прво време у Универзитету ради према начелним одлукама, које буде донесао универзитетски одбор (доцније универзитетски савет).

2. Да приликом избора универзитетских наставника буде јавно гласање и у факултетским саветима, као што закон предвиђа за гласање у универзитетском савету.

3. Да се не траже реферати за оцену квалификација појединих кандидата за универзитетске наставнике, него да се такове квалификације разматрају и оцене на одборским и факултетским састанцима и да се рад по томе унесе у записнике.

4. Да се најпре приступи избору потребнога броја наставника правничкога и техничкога факултета, пошто би се, у смислу чл. 39. закона о Универзитету, могли образовати факултетски савети и ова два факултета.

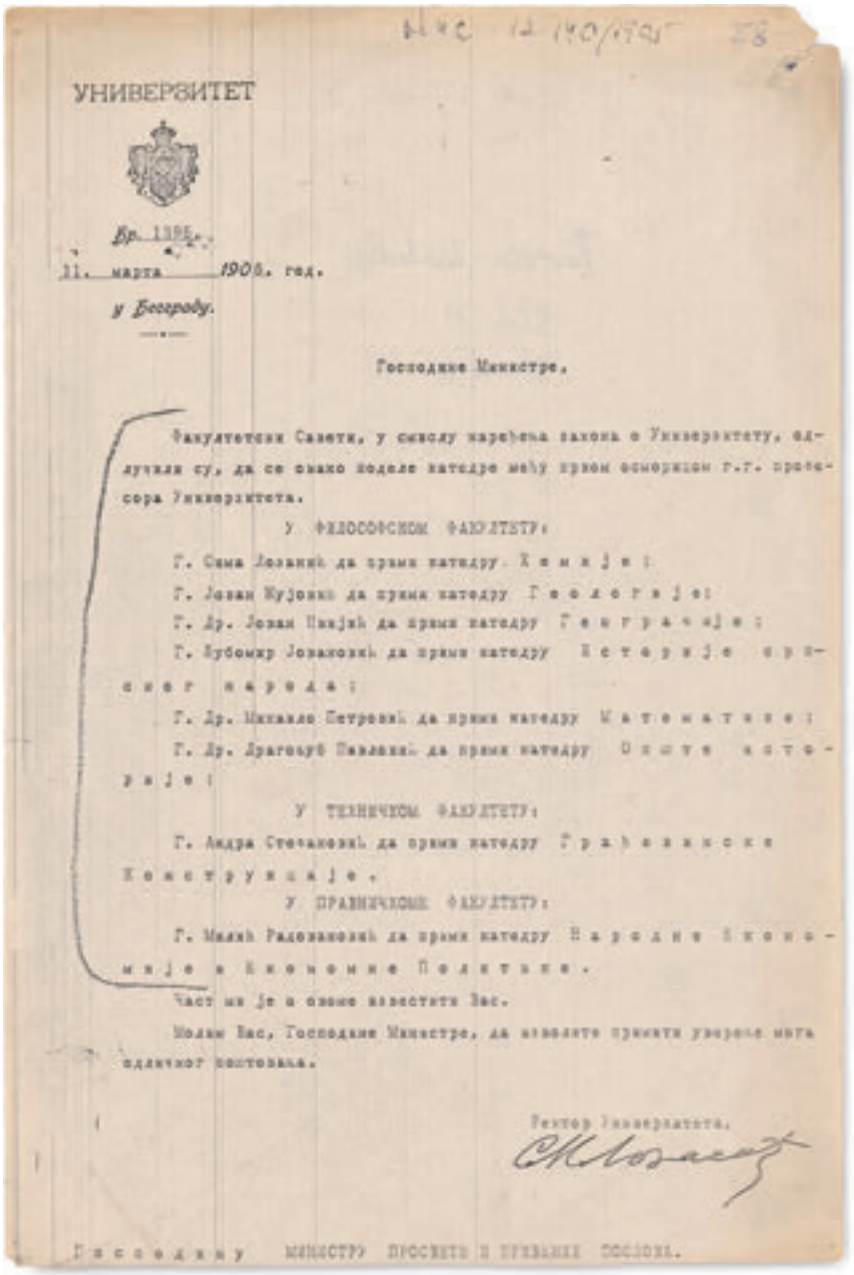
Представљајући Вас о овим одлукама универзитетског одбора, част ми је умолити Вас, да их изволите примити к знању и усвојити.

Молим Вас, Господине Министре, да изволите примити уверење мога одличног поштовања.

Председник
Универзитетског Одбора,
Ск. Лозанић

Господину
МИНИСТРУ ПРОСВЕТЕ И ЦРКВЕНИХ ПОСЛОВА.

The President of the University Board, Sima Lozanić, sends decisions of the University Board to the Minister of Education and Ecclesiastical Affairs, 28th February 1905
(State Archives of Serbia)



УНИВЕРЗИТЕТ

Бр. 1395.

11. марта 1905. год.

у Београду.

Господине Министре,

Факултетски Савети, у смислу чланова закона о Универзитету, одлучили су, да се онако поделе катедре међу првом осморицом г.г. професора Универзитета.

У ФИЛОСОФСКОМ ФАКУЛТЕТУ:

Г. Сима Лозанић да прими катедру Хемије;

Г. Јован Жујовић да прими катедру Геологије;

Г. Др. Јован Цвијић да прими катедру Географије;

Г. Љубомир Јовановић да прими катедру Историје српског народа;

Г. Др. Михаило Петровић да прими катедру Математике;

Г. Др. Драгољуб Павловић да прими катедру Опште историје;

У ТЕХНИЧКОМ ФАКУЛТЕТУ:

Г. Андра Стевановић да прими катедру Грађевинске Конструкције.

У ПРАВНИЧКОМ ФАКУЛТЕТУ:

Г. Милић Радовановић да прими катедру Народне Економије и Економске Политике.

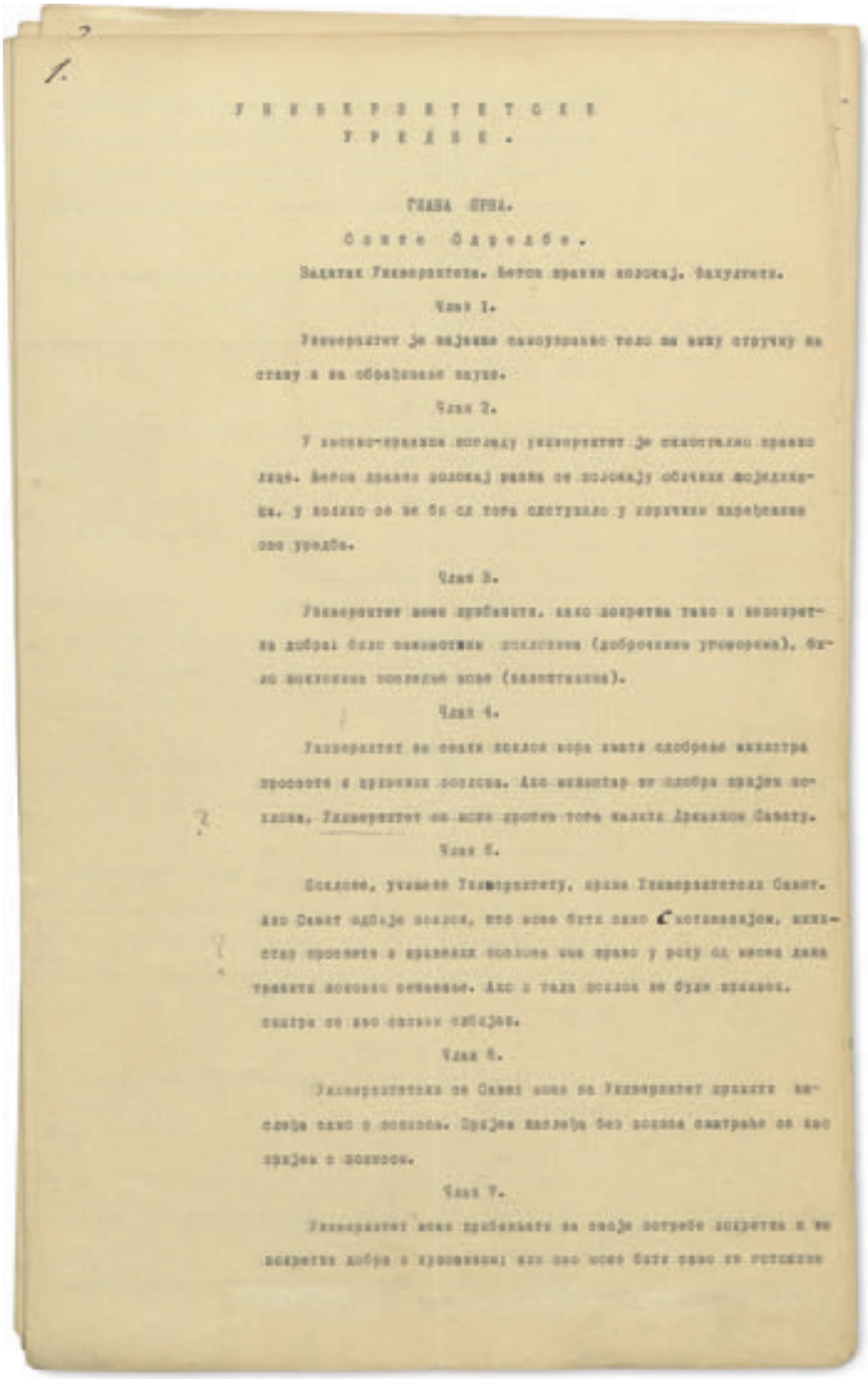
Част ми је о овоме известити Вас.

Молим Вас, Господине Министре, да изволите примити уверење моје одличног поштовања.

Ректор Универзитета.

Господину МИНИСТРУ ПРОСВЕТЕ И ЦРКВЕНИХ ПОСЛОВА.

Letter of rector Sima Lozanić by which he informs the Minister of Education and Ecclesiastical Affairs that the faculty councils have made a decision on the division of chairs among the first eight professors of the University, 11th March 1905 (State Archives of Serbia)



У Н И В Е Р З И Т Е Т С К И
У Р Е Д Б Е .

ГЛАВА ПРВА.

О с н о в н е О д р е д б е .

Задатак Универзитета. Његов правни положај. Факултети.

Члан 1.

Универзитет је највише самоуправно тело за сву стручну на-
стану и за обављање науке.

Члан 2.

У имовно-правним односима универзитет је самосталан правно
лице. Његов правни положај равна се положају обћинских општи-
на, у колико се не би од тога одступило у појединим наређења-
ма ове уредбе.

Члан 3.

Универзитет може прибављати, како покретна тако и непокрет-
на добра; може закључивати уговоре (облигације), би-
ло облигације послове врсте (залоготворне).

Члан 4.

Универзитет за сваки посао кога има сходно министра
просвете и црквених послова. Ако министар не одобри предлог по-
слова, Универзитет се може жалити Државном Савету.

Члан 5.

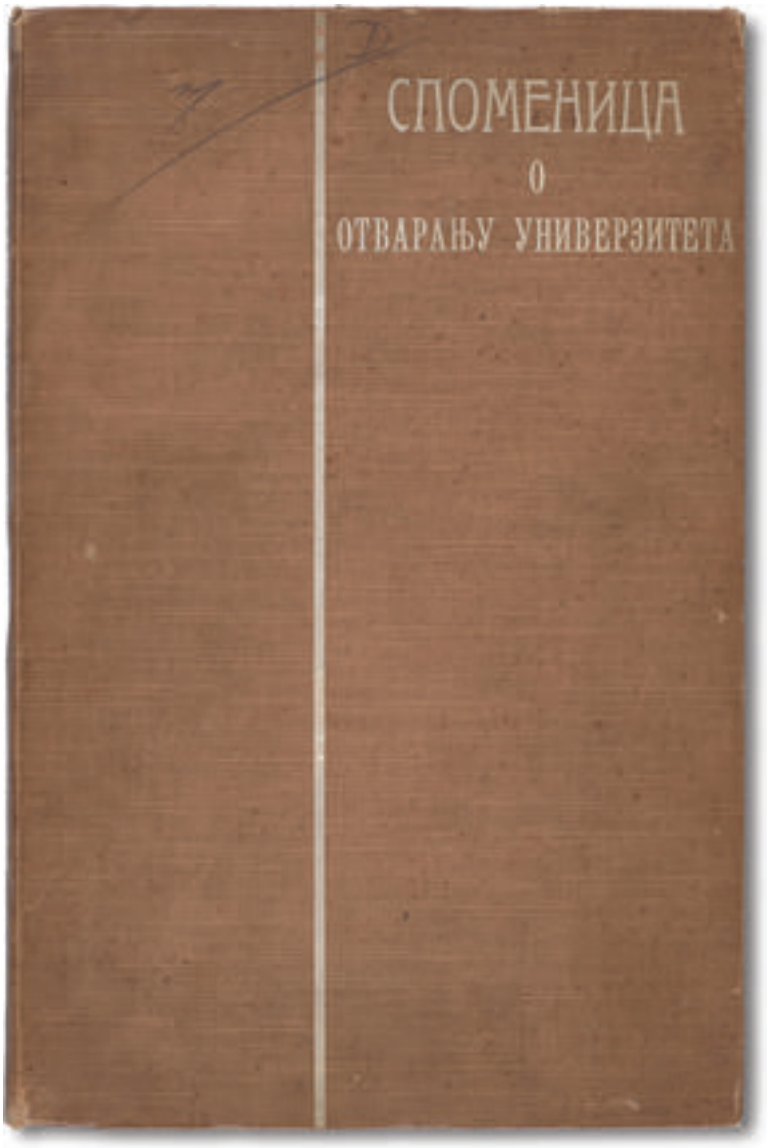
Послове, управне Универзитету, врши Универзитетски Савет.
Ако Савет одбије посао, што може бити само с потврђењем, мини-
стар просвете и црквених послова има право у року од месец дана
тражити поновно одлучење. Ако и тада посао не буде прихваћен,
сматра се као сасвим одбијен.

Члан 6.

Универзитетски Савет чине ће Универзитет сваким ма-
ње једна само о послови. Предмет мањи од горње сматраће се као
предмет о послови.

Члан 7.

Универзитет може прибављати за своје потребе покретна и не-
покретна добра и користити их, али они неће бити само за потребе



Memorial Book of the opening
of the University in 1905
(Faculty of Chemistry, Belgrade)

Letter of rector Sima Lozanić to the Minister of Education and Ecclesiastical Affairs containing the text of the General University Regulation, drafted by the University Council, for adoption, with separate opinions of five professors, 14th September 1905
(State Archives of Serbia)

Господину

Љуб. Стојановићу

нар. посланику

Београд.

МЕМОРАНДУМ

Универзитетске Омладине.

I.

Општа Уредба Универзитета, која је имала да буде живот свечано проглашеном и отворена прва српском Универзитету, изазвала је постанак овога меморандума.

Универзитетска Омладина, на којој лежавшу нема већа дужност да пред истеражем оправда очекивања од Универзитета, подиже свој глас против ове Уредбе и објављује овим путем своје мишљење о њој изнесу.

Она сматра да Универзитет, који не подстиче развијање својих ученика за научни рад и не кружа народу поврсну интелигенцију, нема промашити свој циљ. Две главне категорије одредаба ове Уредбе одузимају нашем Универзитету одмах у почетку битне услове за остварење тога циља, а нас — универзитетске ученике — доводе у сукоб са дужностима нашим. Ми ћемо се постарати да ово строго нагласимо наше и образложимо.

Прва категорија одредаба, којима се сваког уредног посећивања часова, *за навек се забрањују врата Универзитета сиромашним студентима.* По другој категорији тих одредаба *одузимају се ученицима Универзитета слобода научног и политичког уверења и слобода удружења.*

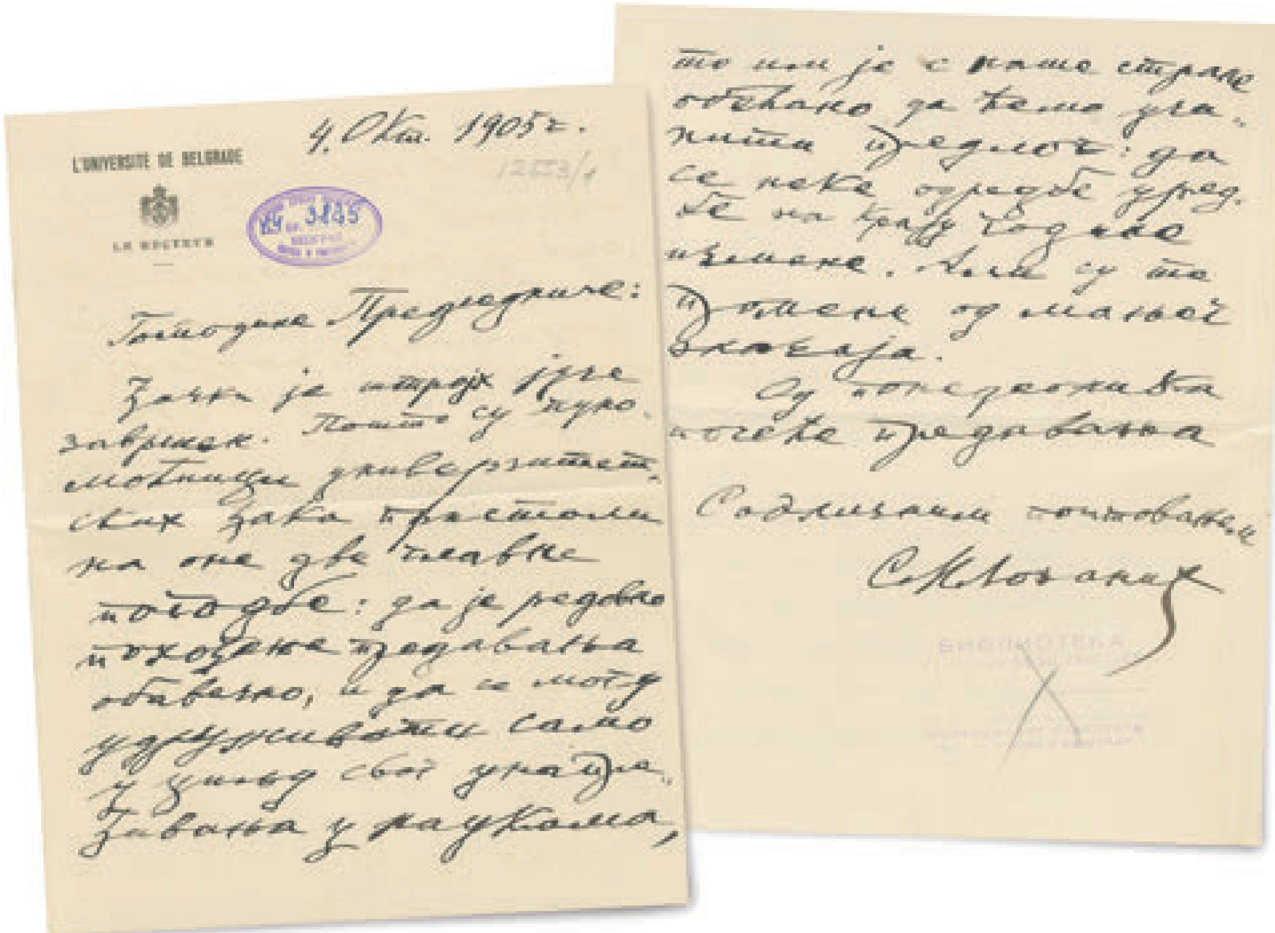
Разлози, из којих устајемо против ова два сасвим погрешна у темељу нашег Универзитета, нису само лична незадовољства и тешке симпатије према сиромашним друговима, већ које долазе $^{3}/_{4}$ студената, већ принципијелно наше начелно гледиште на уређење и значај Универзитета. Није довољно само у питању хоће ли се примењивати ова Уредба пакао сваку $^{1}/_{4}$ наших студената, већ погледајмо хоће ли се одвојити у нас систем монополизовања наше наставе за деца тих и наших породица само за средње родену децу мало богатих породица.

Ми и унапред и особито сваким даном све интензивније сведочимо да су материјална средства прва услов за сваки озбиљан рад на Универзитету и да је прека тога дужност државе да сваки здравствени владајући елементи развијање у науци и знатно. Али, иако је сувише још дуго чекати то време, не мора се, иако друге богатије народе, непрекидно строгим универзитетским уредбама потенцати крајеве Универзитету и нарочито спречавати сиромашним студентима да уђу учешће у научној установи. Дрета је што је [illegible] положај у тој установи стекли сами тек што су сиромашни, и треба много више поћи ове жртве и напоре, с којима је научно садашње и раније школовање скопчано.

То сво у толико пре у праву тражити што тренутно или потпуно пекаћење школе не користи да буде мерилом за оцену спреме и способности ученикове и што данашње наставно стање Универзитета мора у најповољнијем случају подлети са ученикове одговорност за неспособљавања предавања.

На овом се ми изразу Опште Уредбе које о свом водећи рачуна. У Уредби су пашле неке карактеристичне дефиниције обавезног похађања предавања, које ће се оперисати неке гимназијске установе за пробијену интелигенцију за универзитет. На тај начин спровођење система на Универзитету спречавају Ученицима изведено је у један *систем*, којим се још више иде на руку да се одабрани ученици за Универзитет а врло мала и за најелементарнија знања и најважније положаје који не почивају а на духовним способностима.

У свом се управо и неправда сва штетност и неправичност ових ограничења, која спомињу на Средњи Век, у коме је разних регулама и привилегијама у корист строго ванредно мали број људи који материјални и духовни живот и који стоје у најоштрији супротности *са свеукупним*


L'UNIVERSITE DE BELGRADE

LE RECTEUR

4. Окт. 1905 г.

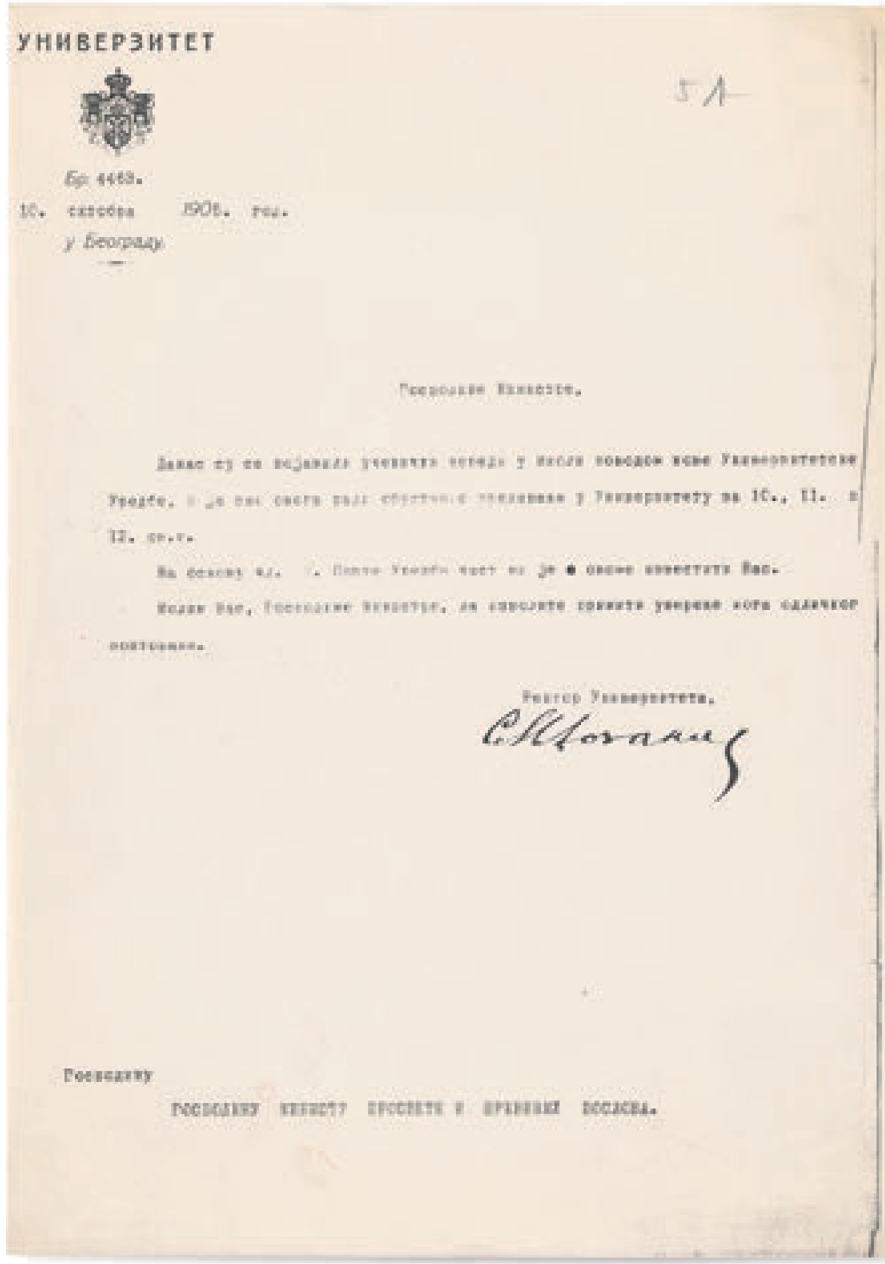
Господине Председниче:

[illegible]

С.М. Лозанић

Rector Lozanić informs that the student strike ended yesterday, that student representatives have agreed to mandatory attendance of classes and cooperation for the development of science, that they have been promised that amendments to certain articles of the regulation, that are of minor importance, will be put forward and that lectures will commence starting from Monday, 4th October 1905
(State Archives of Serbia)

Student Youth Memorandum, 1905
(State Archives of Serbia)



УНИВЕРЗИТЕТ

Бр. 4463.
10. октобра 1905. год.
у Београду

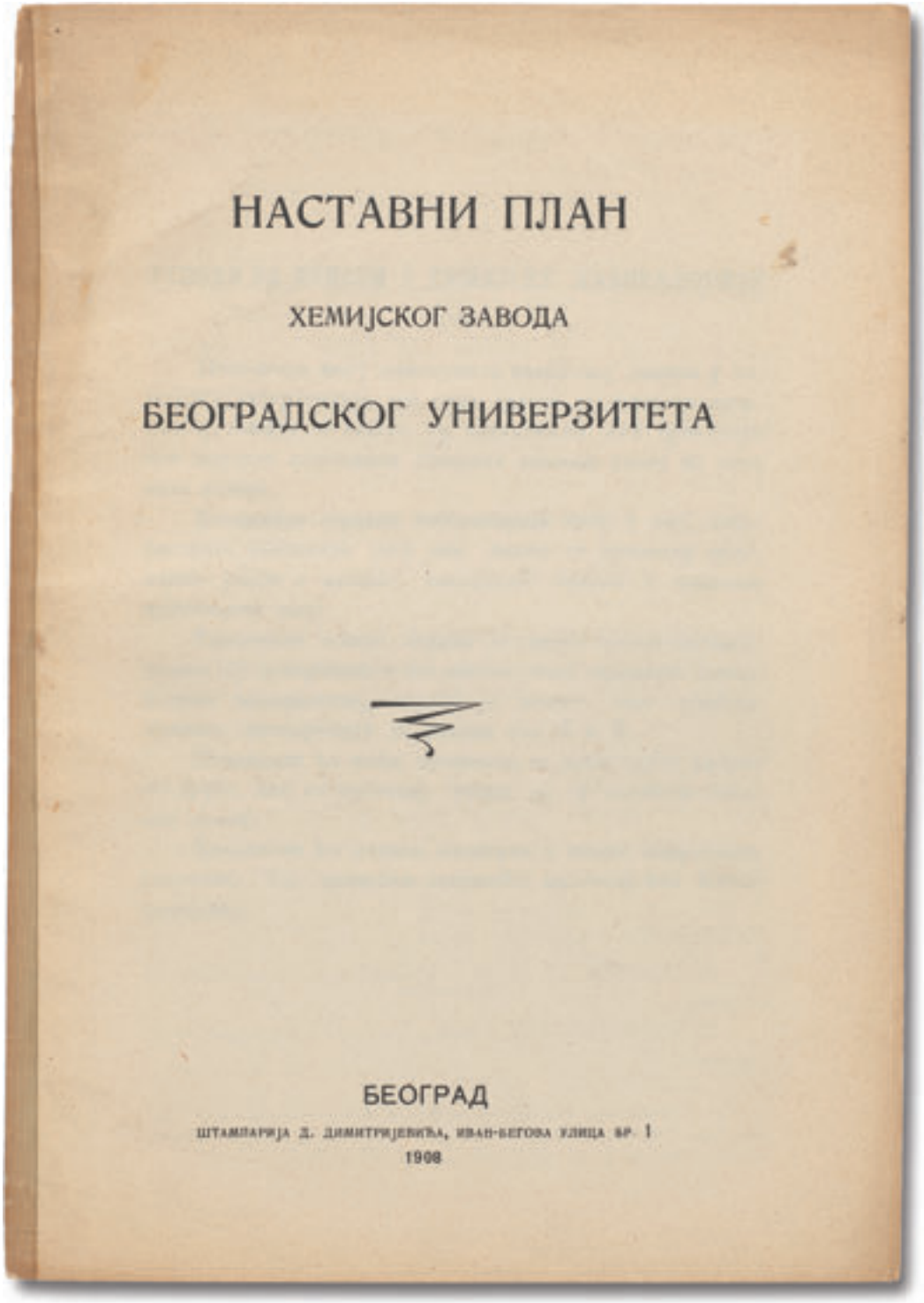
Ректор Универзитета,

Rector Lozanić informs the Minister of Education and Ecclesiastical Affairs that the new university regulation has triggered student protests and that he suspended lectures on 10th, 11th, and 12th October, letter dated 10th October 1905 (State Archives of Serbia)

Rector Lozanić informs the Minister that the University Council has decided to resume the lectures and calls on students to verify their student ID cards. Whoever fails do so will have their enrollement cancelled and will lose the semester, 11th October 1905
(State Archives of Serbia)

Milivoje Lozanić, Sima Lozanić's son
(Faculty of Chemistry, Belgrade)

Curriculum of the Institute of Chemistry of the University of Belgrade, 1908
(Faculty of Chemistry, Belgrade)



НАСТАВНИ ПЛАН

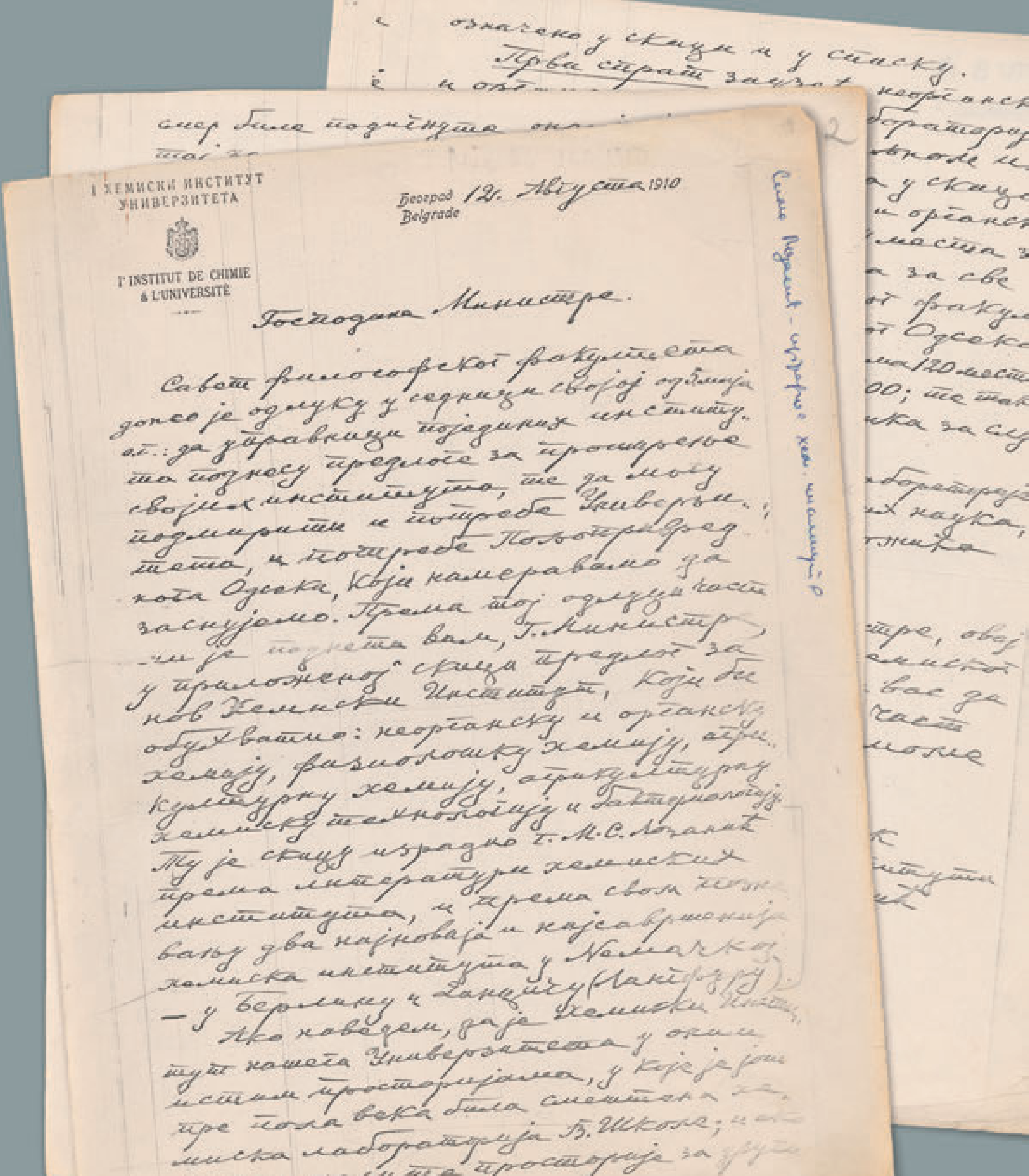
ХЕМИЈСКОГ ЗАВОДА

БЕОГРАДСКОГ УНИВЕРЗИТЕТА

БЕОГРАД

ШТАМПАРИЈА Д. ДИМИТРИЈЕВИЋА, ИВАН-БЕГОВА УЛИЦА БР. 1

1908



ХЕМИСКИ ИНСТИТУТ УНИВЕРЗИТЕТА

l'INSTITUT DE CHIMIE & L'UNIVERSITÉ

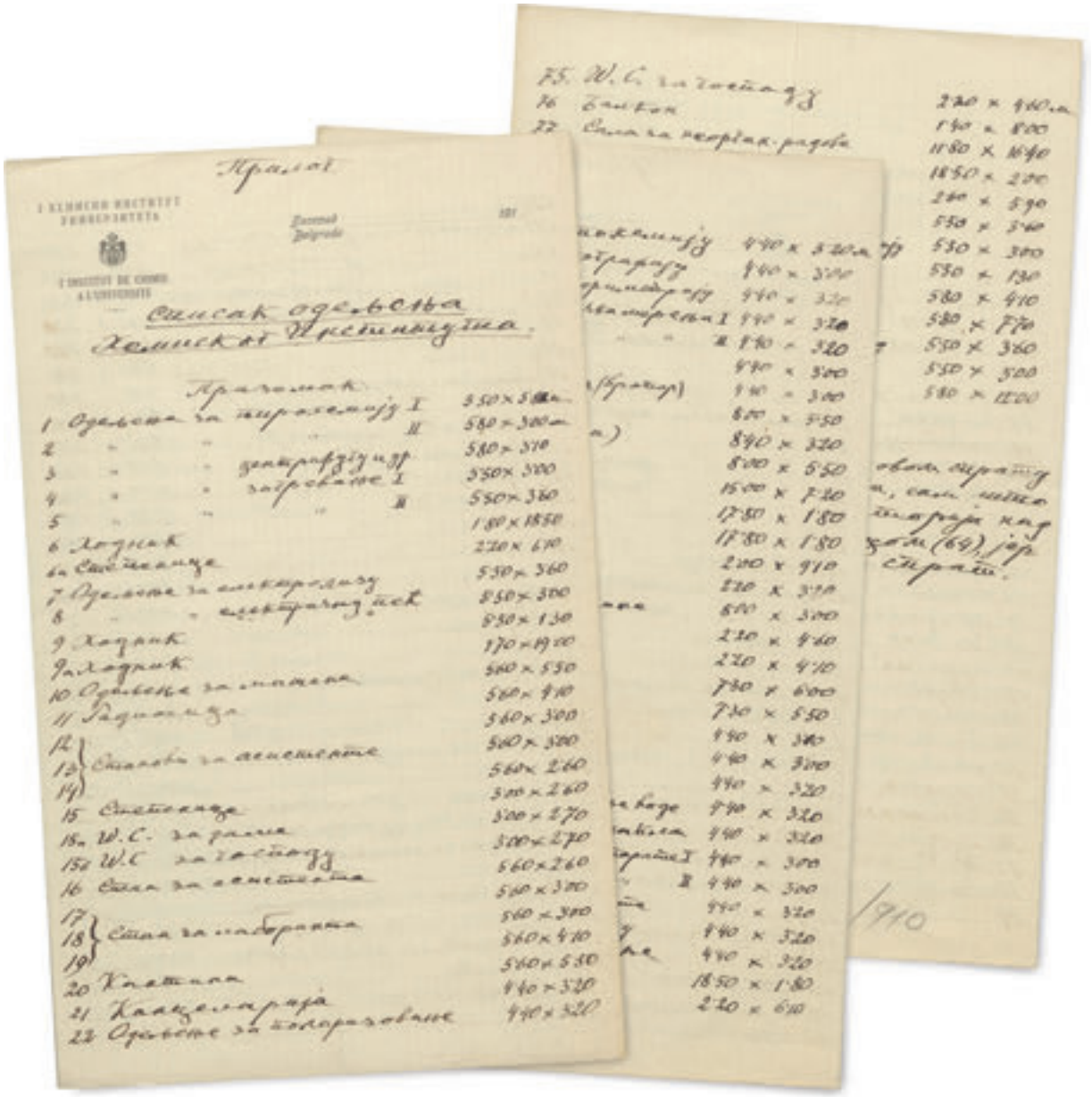
Београд Belgrade 12. Августа 1910

Господине Министре.

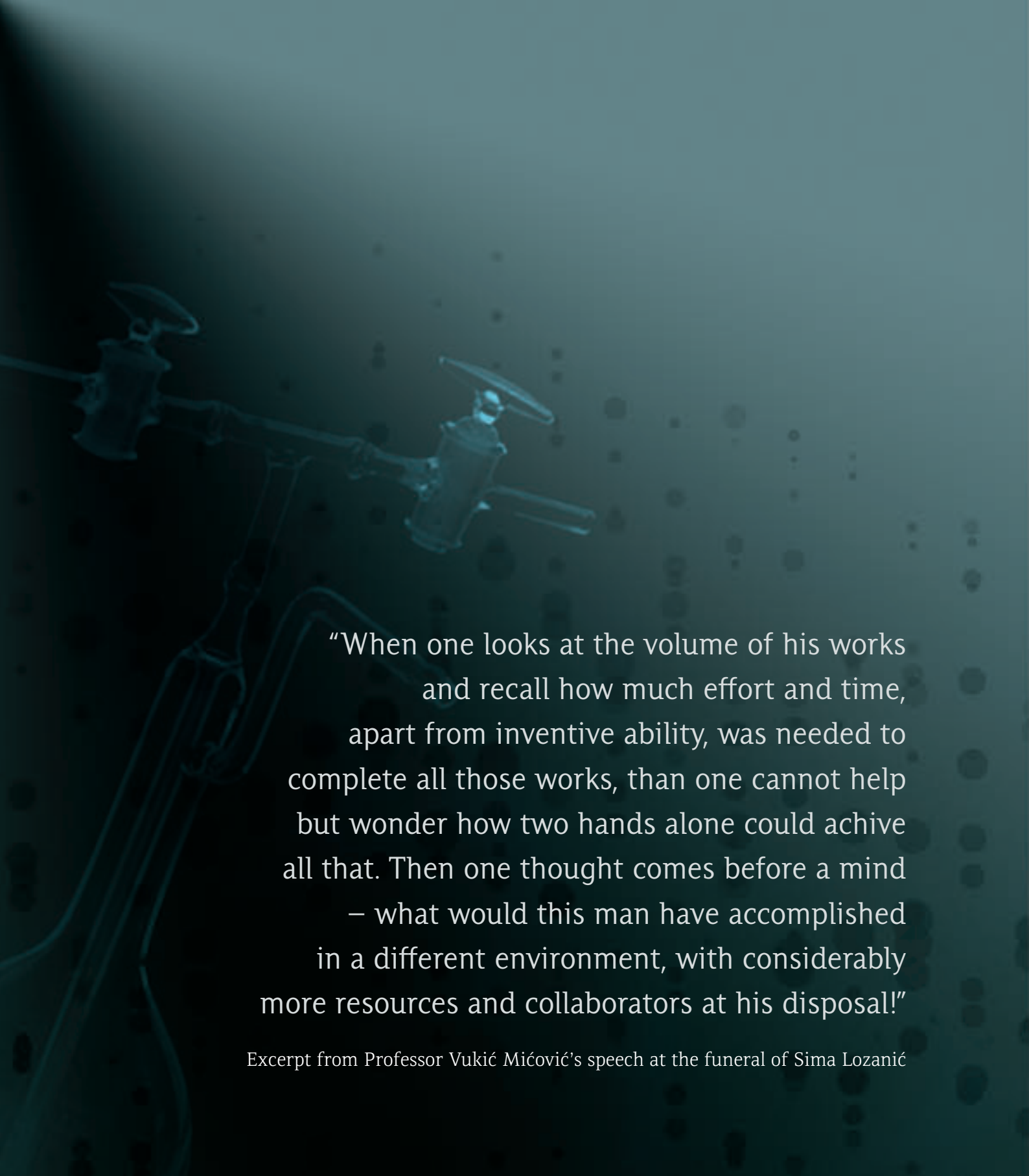
Савет философског факултета донео је одлуку у седници својој одржаној ... да управници појединих института поднесу предлоге за проширење својих института, те да могу подмирити и потребе Универзитета, и потребе Пољопривредног Одсека, који намеравамо да заснујемо. Према тој одлуци част ми је поднети вам, Г. Министре, у приложеној скици предлог за нов Хемиски Институт, који би обухватао: неорганску и органску хемију, физиолошку хемију, агрикултурну хемију, агрикултурну хемиску технологију и бактериологију. Ту је скицу израдио Г. М. С. Лозанић према литератури хемиских института, и према свом познавању два најновија и најсавршенија хемиска института у Немачкој — у Берлину и Лајпцигу.

Ако наведем, да је хемиски институт нашега Универзитета у оним истим просторијама, у којима је још пре пола века била смештена хемиска лабораторија В. Школе; и ... просторије за ...

Sima Lozanić submits to the Minister of Education a plan for a new two-storey chemical institute in which the ground floor and the first floor would be dedicated to chemistry, and the second floor to agricultural sciences (State Archives of Serbia)



Attached to the letter is a plan of all premises on the ground floor and first floor, 12th August 1910 (State Archives of Serbia)



"When one looks at the volume of his works and recall how much effort and time, apart from inventive ability, was needed to complete all those works, than one cannot help but wonder how two hands alone could achive all that. Then one thought comes before a mind – what would this man have accomplished in a different environment, with considerably more resources and collaborators at his disposal!"

Excerpt from Professor Vukić Mićović's speech at the funeral of Sima Lozanić

Scientific Work

SIMA LOZANIĆ, ALTHOUGH IN DIFFERENT POSITIONS AND WITH different titles and roles, was first and foremost a scientist. He was engaged in scientific research all his life, and scientific work is what deeply and best characterised him. Throughout his long life, he explored various fields of chemistry, focusing on those that attracted him the most as a scientist, as well as those works that were expected of him as the sole chemist in the country.

The primary focus of his work was organic chemistry, which he started to explore as a student in Berlin and continued to delve into throughout his life. Towards the end of the 19th century, within the framework of organic chemistry, he began to investigate electrochemical syntheses, which brought him the highest recognition and citations. During the final years of the 19th century and the early years of the 20th century, despite lacking access to a chemical laboratory, he published theoretical works, authored high school textbooks, and engaged in agricultural chemistry.

Sima Lozanić was a great patriot and throughout his life he tried to help his country progress faster and develop various areas in alignment with European standards. In his youth, he was mostly engaged in examining the natural resources of the country, previously unexplored, such as mineral waters, ores, coal, drinking water, industrial products, etc. As the only chemist in Serbia, he was obliged to conduct analyses for state institutions, primarily related to currency and ores.

For more than half a century Lozanić was actively engaged in the pursuit of science. His bibliography includes over 200 items, of which approximately 60 are scientific works from all fields of chemistry: organic, inorganic, analytical, electrochemistry, agricultural chemistry, and theoretical chemistry. He simultaneously published most of his works in both Serbian and foreign journals. The majority of papers he published appeared in *Glasnik Srpskog učenog društva* (*Gazette of the Serbian Learned Society*) (27), *Glas Srpske kraljevske akademije* (*Voice of the Serbian Royal Academy*) (18) and in the German magazine *Berichte der deutschen chemischen Geselschaft* (33),

one of the world's most prestigious scientific magazines of the period. The works in organic chemistry and electrosynthesis have left the greatest and deepest traces in the European scientific community. Apart from works in the aforementioned areas, Lozanić published a significant number of papers in analytical chemistry, as well as several papers in inorganic chemistry, theoretical chemistry, and the history of chemistry. His theoretical works were the first, and for a long time, the only theoretical works in our country. He published professional and popular articles since his youth. Most of these articles refer to economic issues, but also to everyday current problems and new findings in science and industry.

Organic Chemistry

Organic chemistry developed in the second half of the 19th century. The first organic compounds were synthesised in large laboratories, and the structures of many previously unknown compounds were elucidated.

Lozanić was educated in Hoffmann's laboratory in Berlin, where modern organic chemistry was pioneered during those years. It served as a meeting point for chemists from around the world, where they gathered to exchange experiences and delve into this emerging field of chemistry. Lozanić promptly immersed himself in the latest research, previously unknown in Serbia. He authored his initial papers in organic chemistry as a student in Berlin and continued his work in the same domain upon returning to Belgrade. Despite the absence of fellow scholars in his scientific field in Serbia, he consistently published papers in organic chemistry throughout his life, thereby demonstrating that Serbia was not lagging behind Europe in sophisticated scientific research.

He published a total of 23 papers from 1871 to 1890 at the Great School, and subsequently authored several more papers at the University. The main reason for the significant pause in his work was his involvement in political activities, leading to his absence from the Great School and his inability to work in the chemical laboratory during the period 1894–1905. Had he lived in different conditions, with better-equipped laboratories and surrounded by young collaborators, in countries where there was no war, the number of papers would probably have been much higher. Most of the works refer to the reactions involving aliphatic and aromatic amines, as well as related compounds. In the early works, he examined the behaviour of little-known organic compounds, whereas the later works are more complex and significant. In the last few works, he introduced new methods for synthesising entire classes of compounds. Some of these works are still cited

today. The most cited work is *Aromatic Dithiocarbamates*, published in 1890, in which he provided a new method for synthesising these compounds. He personally synthesised 20 compounds. The authors who cited him used his method to obtain the corresponding compounds.

Electrosyntheses

Electrosynthetic reactions are the most significant area of Lozanić's fundamental research. These works are among the pioneering research in this field and remain the most cited in foreign literature, persisting for more than half a century since their publication. Electrosyntheses are reactions that are carried out with gaseous or volatile substances when an electric current is passed through them. In this way, in the ozoniser, the apparatus where reactions take place, polymerisations and condensations occur, leading to the formation of complex compounds.

Lozanić started working with electrosyntheses in late 19th century at the Great School, and continued at the University after 1905. During that time, he published nine papers simultaneously in *Glas Srpske kraljevske akademije* (*Voice of the Serbian Royal Academy*) and in journals abroad. Following the ninth work, published in 1913, he presented the most important results of his previous works in two additional papers, published in 1914 and 1915.

In his early works, Lozanić subjected small molecules and their mixtures (carbon dioxide, carbon monoxide, hydrogen sulfide, nitrogen, water vapor, methane, ethylene, sulfur dioxide, and ammonia) to the effect of silent electric discharge. Later, he conducted experiments with various hydrocarbons of all classes. In his last works, he again returned to simple gaseous compounds, particularly to a mixture of carbon monoxide with hydrogen and methane, whereby he obtained an aldehyde as an intermediate, which was further polymerised and condensed into complex compounds.

Lozanić's electrosyntheses gained the most significant recognition in the theory of the origin of life of the Russian theoretician Alexander Oparin (1894–1980). In his book *The Origin of Life on the Earth* (1938, 1957), Oparin cited Lozanić's works seven times, referencing them five times as the pioneering experiments in that field. The aldehydes (formaldehyde, acetaldehyde) obtained by Lozanić in these reactions are, according to Oparin's hypothesis, considered the initial phase of the prebiotic synthesis of amino acids and sugars.

In 1953, Stanley Miller conducted a crucial experiment that confirmed Oparin's hypothesis about the origin of life on Earth, that is, he proved the

possibility of creating organic molecules from the gases present in the Earth's original atmosphere (primordial soup).[1] This experiment is now regarded as a classic and stands as one of the most famous scientific experiments in chemistry.

In the experiment, Miller used water, methane, ammonia, and hydrogen, which, under the action of an electric spark, produced a mixture of products from which Miller isolated amino acids. It is assumed that the mechanism of amino acid synthesis (via formaldehyde, acetylene, hydrogen cyanide, and other intermediate products) was as follows:

$CO_2 \rightarrow CO + [O]$
$CH_4 + 2[O] \rightarrow CH_2O + H_2O$
$CO + NH_3 \rightarrow HCN + H_2O$
$CH_4 + NH_3 \rightarrow HCN + 3H_2$

Formaldehyde, ammonia, and hydrogen cyanide continue to react with each other, forming amino acids:

$CH_2O + HCN + NH_3 \rightarrow NH_2\text{-}CH_2\text{-}CN + H_2O$
$NH_2\text{-}CH_2\text{-}CN + 2H_2O \rightarrow NH_3 + NH_2\text{-}CH_2\text{-}COOH$
(amino acid glycine)

The experiment through which Miller obtained organic compounds from a mixture of gases is analogous to Lozanić's experiment from 1897. Half a century before Miller, Lozanić obtained formaldehyde from a mixture of water vapour and carbon monoxide, which further polymerised and condensed into carbohydrates. With the methods he used at the time (basic chemical analyses and qualitative organic reactions), Lozanić could not identify the amino acids that most likely existed in his experiment. Miller only cites Lozanić's electro-synthesis from 1911 in his work from 1955, where Lozanić obtained acetaldehyde. In other works, he mostly cites Oparin and his contemporaries.

[1] Oparin's theory assumes the origin of life as a series of complex reactions: from inorganic molecules, the formation of small organic molecules (amino acids and sugars), the formation of aggregates or coacervates, organic molecules and then the formation of organisms. The period from the time of the formation of the planet to the origin of life on it is the period of abiogenesis, that is, the organo-chemical evolution of carbon compounds. The classic Miller's experiment, demonstrating the formation of amino acids (the basic elements of proteins) from simple, gaseous molecules, under the influence of an electric discharge, can be considered as a validation of Oparin's theory, at least its initial phase, which implies the formation of small organic molecules, primarily amino acids.

Lozanić's pioneering work in this field has not received the recognition it deserves, even though he conducted similar experiments several decades before Miller, but under conditions in which he could not achieve similar results. Nevertheless, we can say that Miller, in his famous work on obtaining amino acids, cited Oparin, and Oparin found experimental support for his hypothesis in the works of Sima Lozanić, so in this way, at least indirectly, we can link the name of Sima Lozanić with the most famous chemical experiment.

Through his research on electrosyntheses, Lozanić established, long before Oparin and other researchers, that complex organic substances can be obtained through the action of silent electrical discharges on simple substances, such as carbon monoxide, carbon dioxide, methane, water, and nitrogen. In this way, Lozanić was far ahead of his time in recognising the significance of these syntheses, and already in his first paper, he wrote: "The easy formation of aldehydes and their further condensation and polymerisation, as well as the polymerisation of unsaturated hydrocarbons induced by electric current, may be a ray that will shed light on the mystery of those complicated syntheses of organised bodies."

О АРОМАТИЧНИМ ДИТИЈОКАРБАМ

од

С. М. Лозанића.

Поштовани господо Академ

Нека ми буде допуштено, да на
скупу, а у овом мом првом говору у
несем резултате мог испитивања на
них дитијокарбамата. Но пре изла
проналазака, навешћу радове оних
ваше ту групу једињења.

Први је Цијзе показао, да се
пор-угљеник, у алкохолном раствор
нијум-дитијокарбамат:[1])

$$CS_2 + 2\,NH_3 = CS{<}^{\ }_{S}$$

и тако је засновао деривате дити
селине. Но сама дитијокарбаминс
постојано тело; она се распада
ператури, и то од чести у амонијак

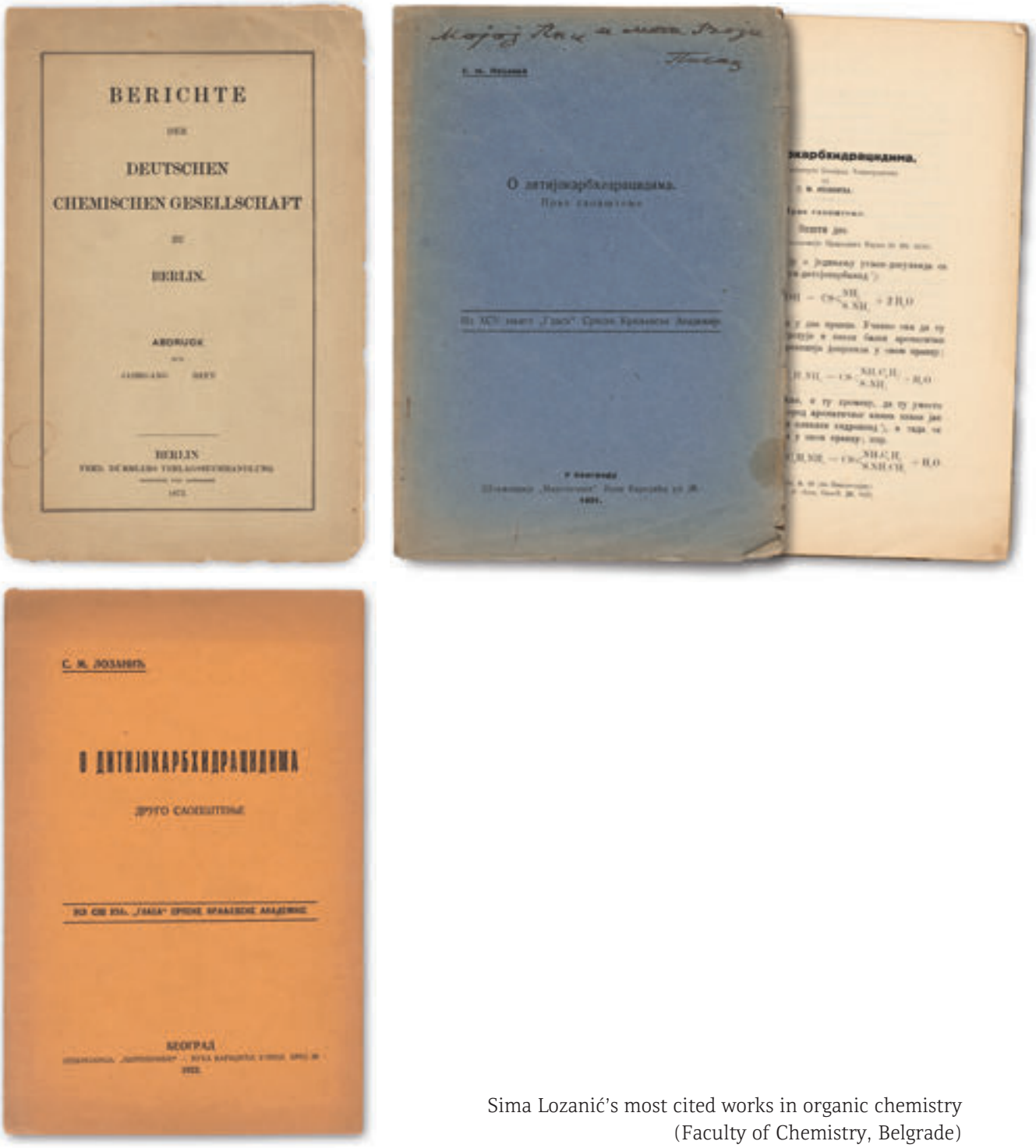
$$CS{<}^{NH_2}_{SH} = CS_2 +$$

1) Berzelius-Jahresbericht 4.86 (по Бе

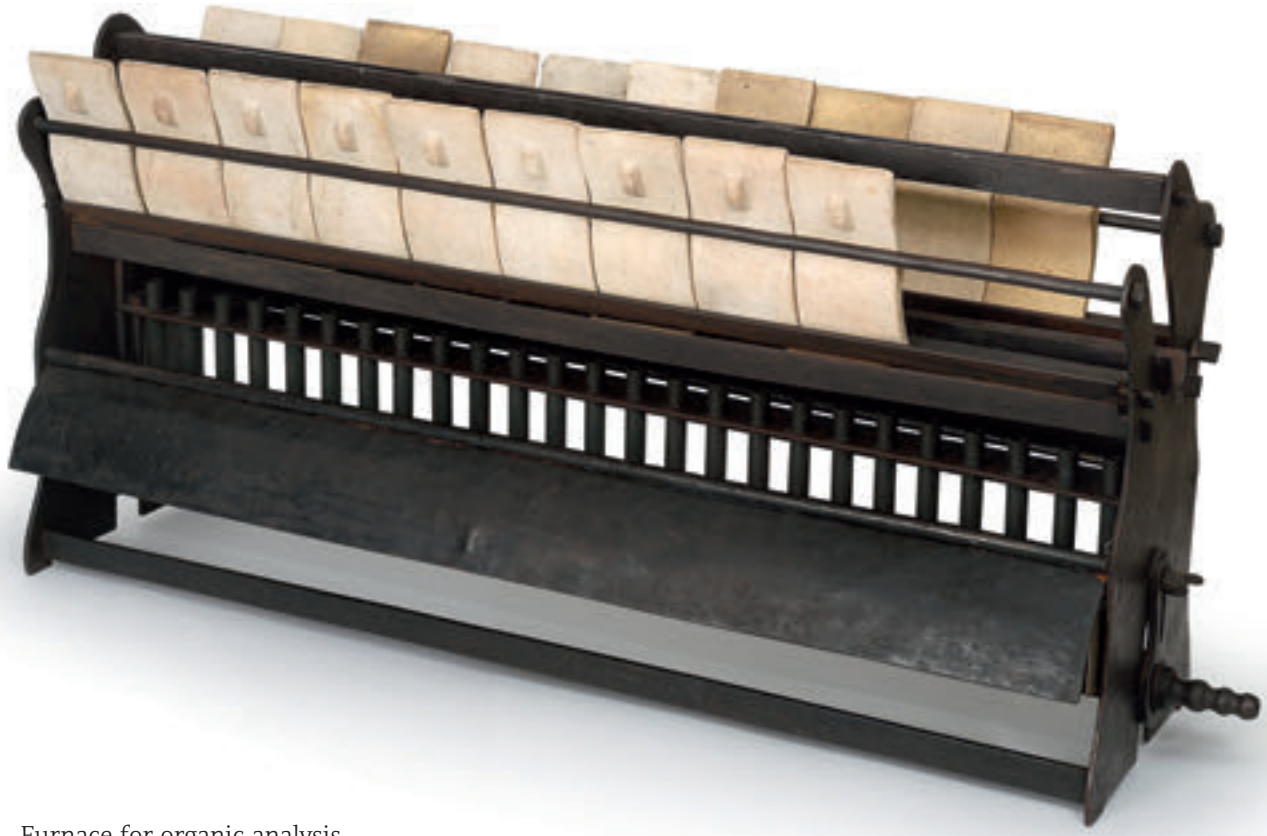
О АРОМАТИЧНИМ
ДИТИЈОКАРБАМАТИМА
I
ОД
С. М. ЛОЗАНИЋА

On Aromatic Dithiocarbamates (1890),
the most cited Sima Lozanić's work in organic chemistry
(Faculty of Chemistry, Belgrade)

Reagent bottles from Sima Lozanić's laboratory,
with labels handwritten by him
(Faculty of Chemistry, Belgrade)

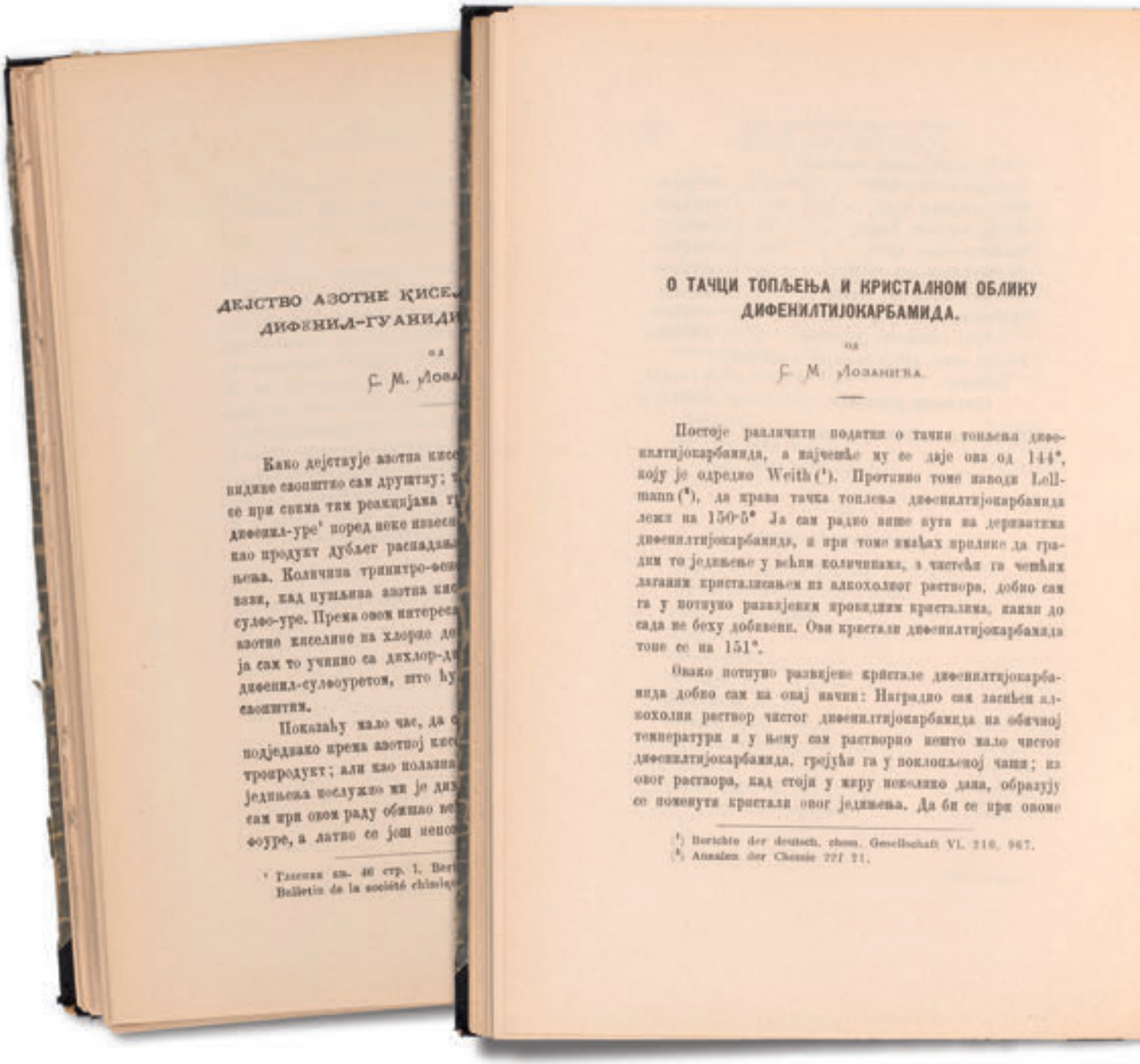


Sima Lozanić's most cited works in organic chemistry
(Faculty of Chemistry, Belgrade)



Furnace for organic analysis
(Faculty of Chemistry, Belgrade)

Chemical laboratory from the late 19th century
(Faculty of Chemistry, Belgrade)



ДЕЈСТВО АЗОТНЕ КИСЕ
ДИФЕНИЛ-ГУАНИДИ

од

Ђ. М. Лоза

Како дејствује азотна кис
видније саопштио сам друштву;
се при свима тим реакцијама г
дифенил-уре[1] поред неке изве
као продукт дубљег распадања
њена. Количина тринитро-фен
вази, кад пушљива азотна кис
сулфо-уре. Према овом интере
азотне киселине на хлорид ди
ја сам то учинио са дихлор-ди
дифенил-сулфоуретом, што ћу
саопштити.

Показаће мало час, да
подједнако према азотној кис
трпродукт; али као полазна
једињења послужило ми је ди
сам при овом раду обично
фоуре, а затим се још неп

[1] Гласник књ. 46 стр. 1. Ber
Bulletin de la société chimiq

О ТАЧЦИ ТОПЉЕЊА И КРИСТАЛНОМ ОБЛИКУ ДИФЕНИЛТИЈОКАРБАМИДА.

од

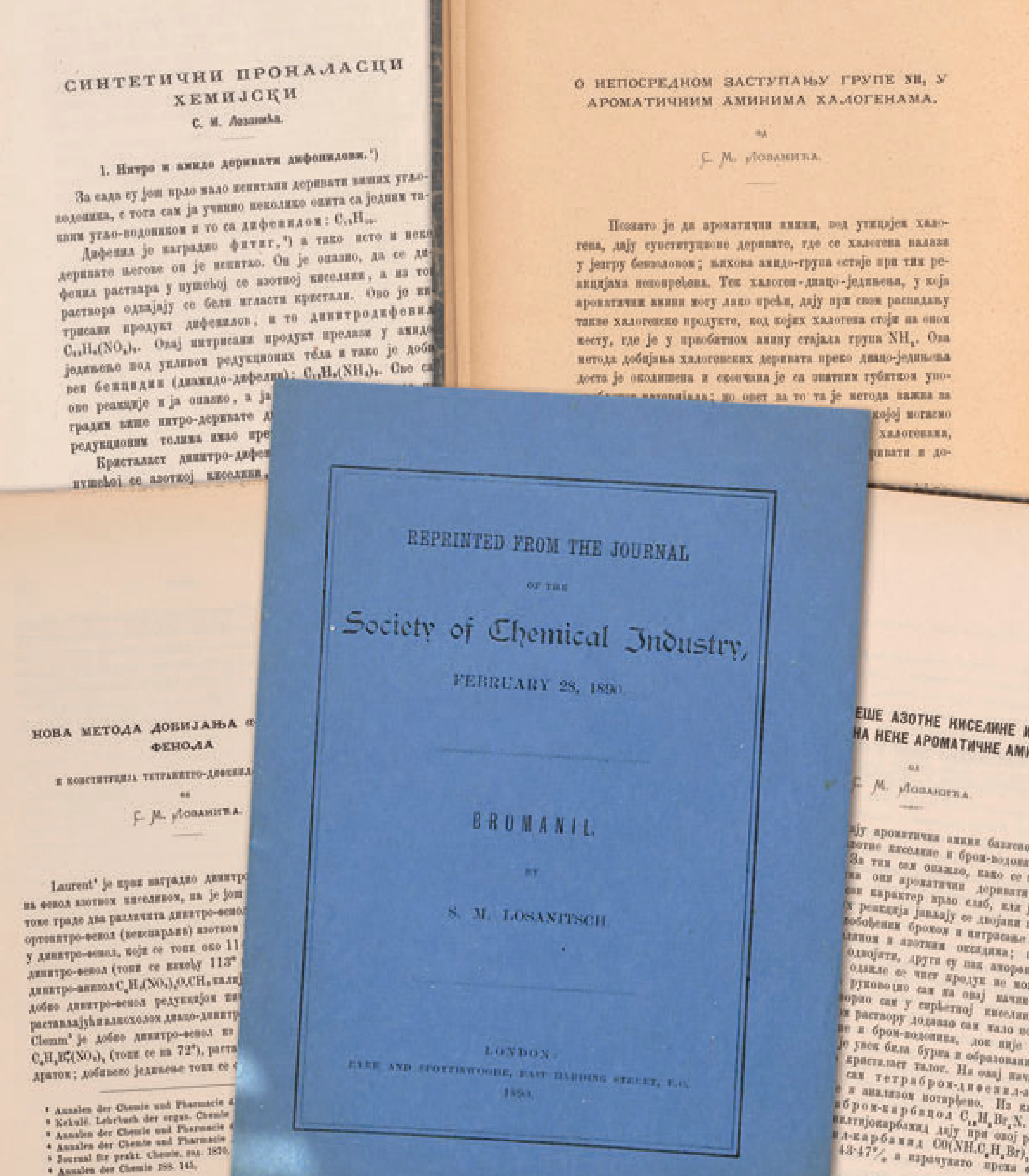
Ђ. М. Лозанића.

Постоје различити подаци о тачки топљења дифенилтиокарбамида, а највише му се даје она од 144°, коју је одредио Weith (1). Противно томе наводи Lellmann (2), да права тачка топљења дифенилтиокарбамида лежи на 150-5° Ја сам радио више пута на дериватима дифенилтиокарбамида, и при томе имађах прилике да градим то једињење у већим количинама, а чистећи га честим дотаним кристалисањем из алкохолног раствора, добио сам га у потпуно развијеним провидним кристалима, какви до сада не беху добивени. Ови кристали дифенилтиокарбамида тоне се на 151°.

Овако потпуно развијене кристале дифенилтиокарбамида добио сам на овај начин: Нагрејао сам засићен алкохолни раствор чистог дифенилтиокарбамида на обичној температури и у њему сам растворио нешто мало чистог дифенилтиокарбамида, грејући га у поклопљеној чаши; из овог раствора, кад стоји у жиру неколико дана, образују се поменути кристали овог једињења. Да би се при овоме

(1) Berichte der deutsch. chem. Gesellschaft VI. 210. 967.
(2) Annalen der Chemie 221 21.

Sima Lozanić's works in organic chemistry
(SASA Library, Biblioteka Hemijskog fakulteta u Beogradu)


СИНТЕТИЧНИ ПРОНАЛАСЦИ ХЕМИЈСКИ
С. М. Лозанића.
1. Нитро и амидо деривати дифенилови.
О НЕПОСРЕДНОМ ЗАСТУПАЊУ ГРУПЕ NH_2 У АРОМАТИЧНИМ АМИНИМА ХАЛОГЕНАМА.
од
С. М. Лозанића.
REPRINTED FROM THE JOURNAL
OF THE
Society of Chemical Industry,
FEBRUARY 28, 1890.
BROMANIL.
BY
S. M. LOSANITSCH.
LONDON:
EYRE AND SPOTTISWOODE, EAST HARDING STREET, E.C.
1890.
НОВА МЕТОДА ДОБИЈАЊА
ФЕНОЛА
С. М. Лозанића.
ЕШЕ АЗОТНЕ КИСЕЛИНЕ
НА НЕКЕ АРОМАТИЧНЕ АМ
С. М. Лозанића.

ХЕМИСКЕ СИНТЕЗЕ ПОМОЋУ ТАМНОГ (ТИХОГ) ЕЛЕКТРИЧ ИСПРАЖЊИВАЊА

од

Ђ. М. Лозанића и М. З. Јовичића

Континуална (једносмислена) струја елект
електролише, као што је познато, растворен
стопљена једињења, а индукована (наизменична
и анализе и синтезе на гасовитим телима. П
чин електричног дејства примењен
лабораторијама за вршење разноврсн
већ се и индустрија служи тим м
ђење многих производа својих. Др
тричног дејства примењен је по ла
које врло често, и многе су ан
помоћу варница индуковане струј
тамно (тихо) испражњивање индук
примењено за синтезе хемиске, и ак
електричног дејства довео до оз
сумпоровог и других неких важн
дећемо да тај начин електричног
врло многе синтезе хемиске. Там
пражњивање повољно је за хемис
што бива по целој гасној маси и
загревање, које би могло поста
њена смести. У томе и лежи узр

једине. Дали и при Бродијевом огледу нису ови хемизми у извесној мери наступили, о томе би се требало уверити.

4. **Угљен-диоксид и водоник.** Смеша ова два гаса претвара се у електризатору у мрављу киселину:

$$CO_2 + H_2 = CH_2O_2$$

5. **Угљен-моноксид и метан.** Смеша равних запремина сувог угљен-моноксида и метана смањује запремину у електризатору доста брзо, ишчезавајући за пет сати потпуно и претварајући се у неку густу зејтињаву течност, пријатна мириса. И овде пролази хемизам кроз две фазе. Ту се прво угљен-моноксид и метан једине у ацеталдехид:

продуката, вероватно је да ту постају неке сложеније полимерије. Студију тих полимерија незасићених угљоводоника предузећемо доцније.

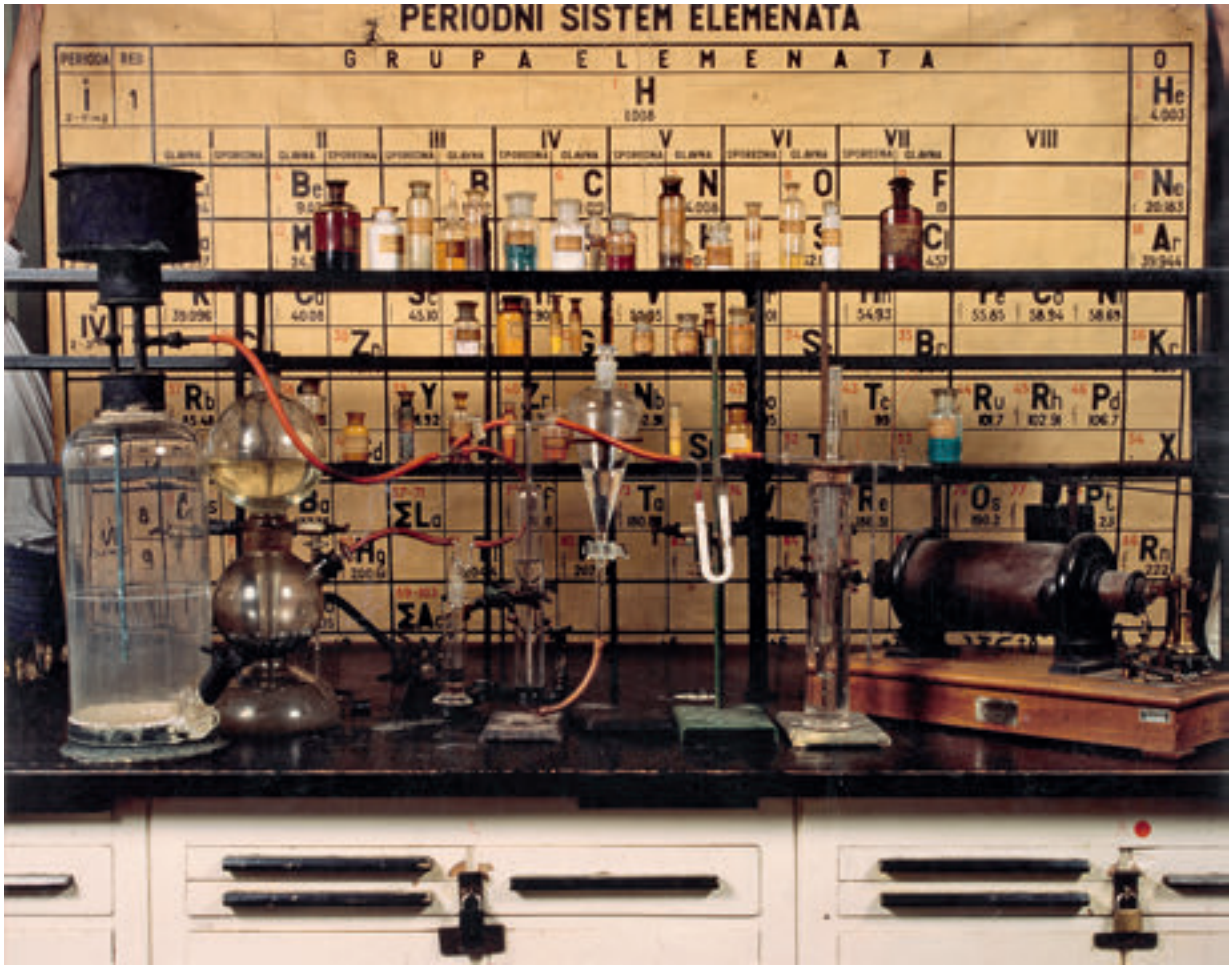
Са овим првим низом огледа завршићемо ово широко поље рада. Тим огледима прикупљени податци тврде: да тамно електрично испражњивање посредује многе синтезе хемиске, и то органске и неорганске, просте и сложене. Онај лаки постанак алдехида и њихово даље кондензовање и полимерисање, као и оно полимерисање незасићених угљоводоника под утицајем струје електричне, јесу може бити неки зрачак, који ће осветлити тајну оних компликованих синтеза организованих тела. О тим синтезама може се за сада само толико рећи да је вероватно: да и оне постају на подобан начин под утицајем топлотне, електричне или светлосне енергије.

Из хем. лабораторије В. Школе.

Децембра 1896 год.

Sima Lozanić's works on electrosyntheses
(Faculty of Chemistry, Belgrade)

Model of apparatus for electrosyntheses
(Faculty of Chemistry, Belgrade)



О ЕЛЕКТРОСИНТЕЗАМА

од

С. М. ЛОЗАНИЋА

ЧЕТВРТО САОПШТЕЊЕ

Из I Хемиског Института на Универзитету

(Приказано на скупу Академије Природних Наука

Утврђено је код електросинтеза
вита и пара органска тела отпуш
изложе дејству тихог електричног ис
неки део свога водоника, кондензују
сложене молекулске комплексе. Под
струје отпуштају водоник не само
њења, као што је нпр. метан, већ г
незасићена. Тако и сам ацетилен, ко
великом степену незасићен, отпушта
водоника под утицајем тихог електр
њивања, кондензујући се у нераствор
неспарљиво, експлозивно, чврсто
томе, мора имати врло велике моле
сићеност електрокондензованих пр
је, као што сам показао раније, што
кисеоник из ваздуха.

[1] Гласе I раздео: **54.** 219 (1897); **73.** 253 (190
d. d. chem. Gesell. **31.** 135 (1898); **40.** 4657 (1
Sitzungsber. Akad. d. Wissen. Wien. **117.** Abt. II

О ЕЛЕКТРОСИНТЕЗАМА

од

С. М. ЛОЗАНИЋА

ЧЕТВРТО САОПШТЕЊЕ

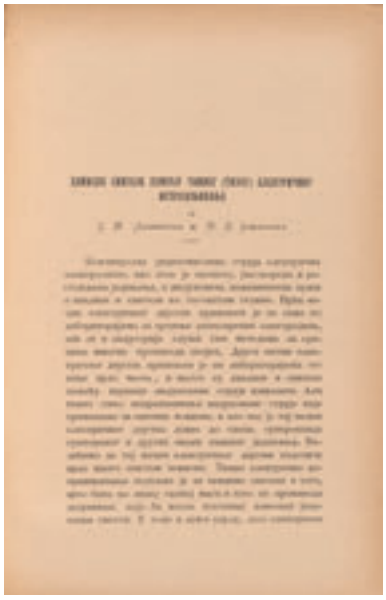
(Приказано на скупу Академије природних наука 17. априла 1909.)

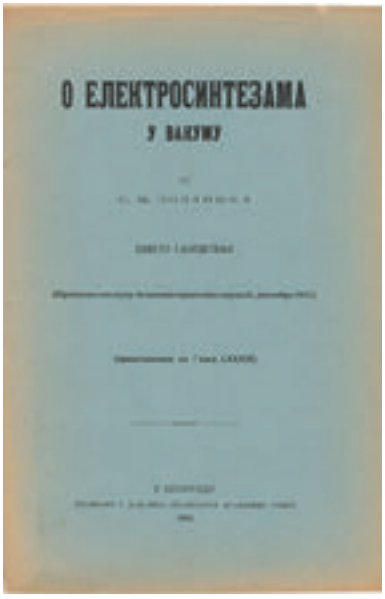
(прештампано из Гласа LXXVII)

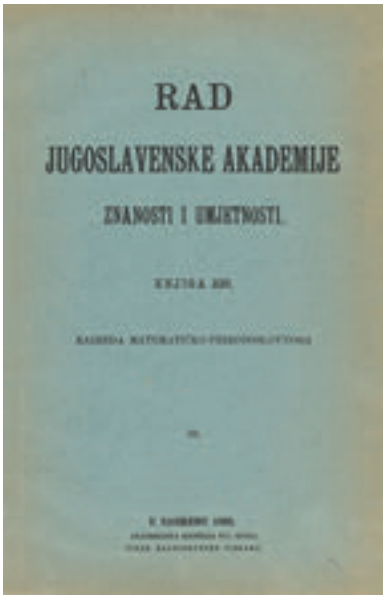
У БЕОГРАДУ

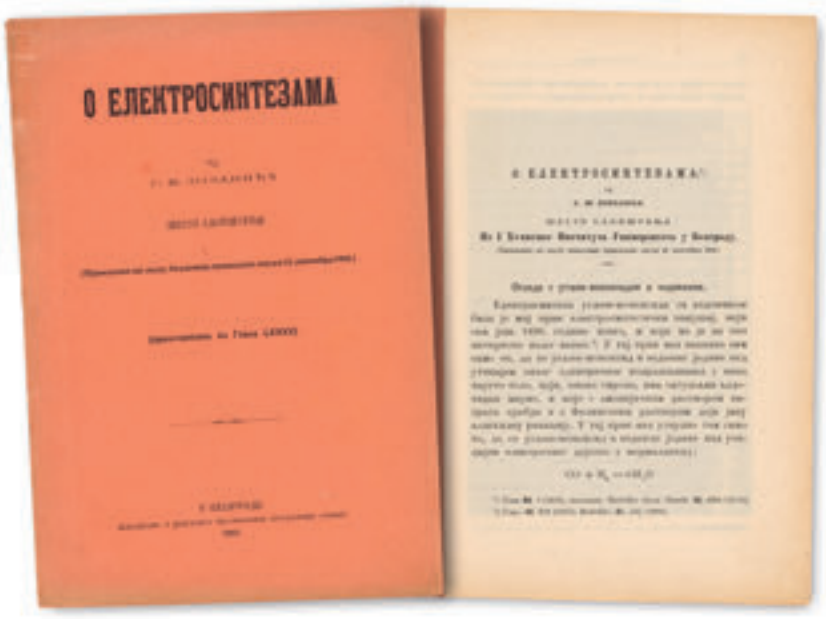
ШТАМПАНО У ДРЖАВНОЈ ШТАМПАРИЈИ КРАЉЕВИНЕ СРБИЈЕ

1909.









Sima Lozanić's works on electrosyntheses
(Faculty of Chemistry, Belgrade)

О ЕЛЕКТРОСИНТЕЗАМА

ОД

С. М. ЛОЗАНИЋА

ШЕСТО САОПШТЕЊЕ

(Приказано на скупу Академије природних наука 13. децембра 1910.)

(прештампано из Гласа LXXXV)

У БЕОГРАДУ

ШТАМПАНО У ДРЖАВНОЈ ШТАМПАРИЈИ КРАЉЕВИНЕ СРБИЈЕ

1911.

О ЕЛЕКТРОСИНТЕЗАМА.[1]

ОД

С. М. ЛОЗАНИЋА

ШЕСТО САОПШТЕЊЕ

Хемиског Института Универзитета у Београду.

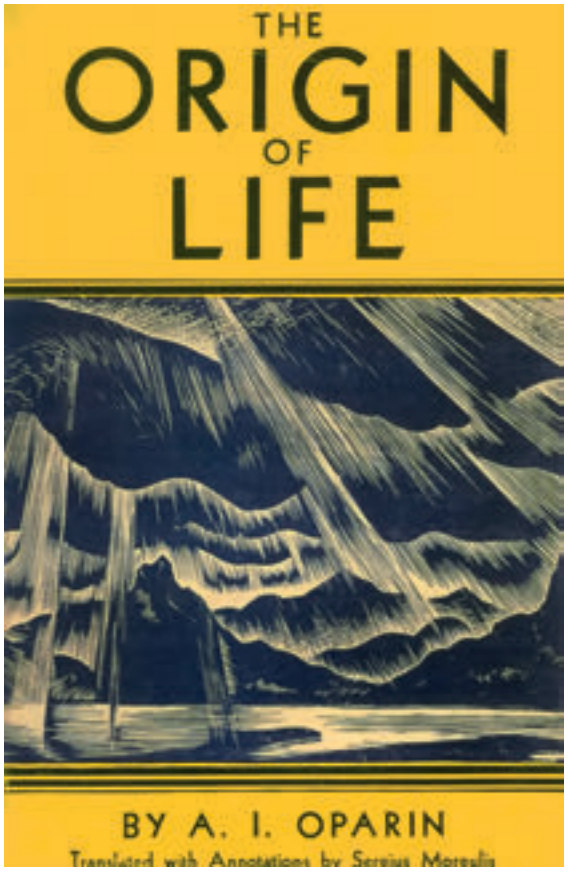
Приказано на скупу Академије природних наука 13. децембра 1910.)

Огледи с угљен-моноксидом и водоником.

ектросинтеза угљен-моноксида са водоником
мој први електросинтетички покушај, који
ш 1896. године извео, и који ме је на ово
сно поље навео.[2] У тај први мах запазио сам
, да се угљен-моноксид и водоник једине под
м тихог електричног испражњивања у неко
тело, које, онако сирово, има загушљив алде-
мирис, и које с амонијачним раствором ни-
ребра и с Фелинговим раствором даје јаку
ну реакцију. У тај први мах утврдио сам само
е угљен-моноксид и водоник једине под ути-
ектричног дејства у формалдехид:

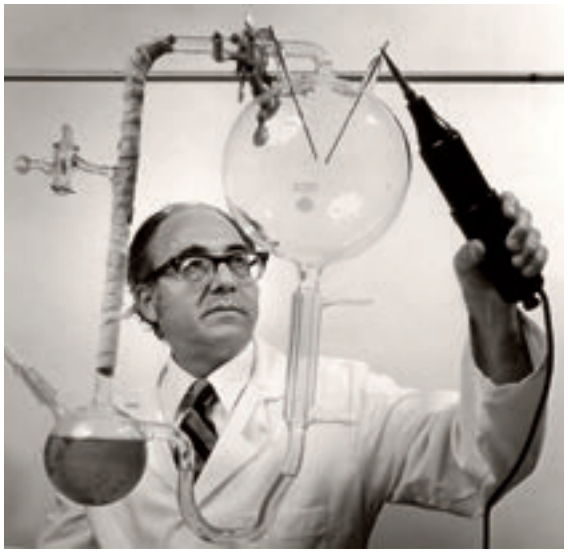
$$CO + H_2 = CH_2O$$

83. 1 (1910), наставак; Berichte chem. Gesell. **42**. 4394 (1910)
, **54**. 219 (1897); Berichte, **31**. 135 (1898).

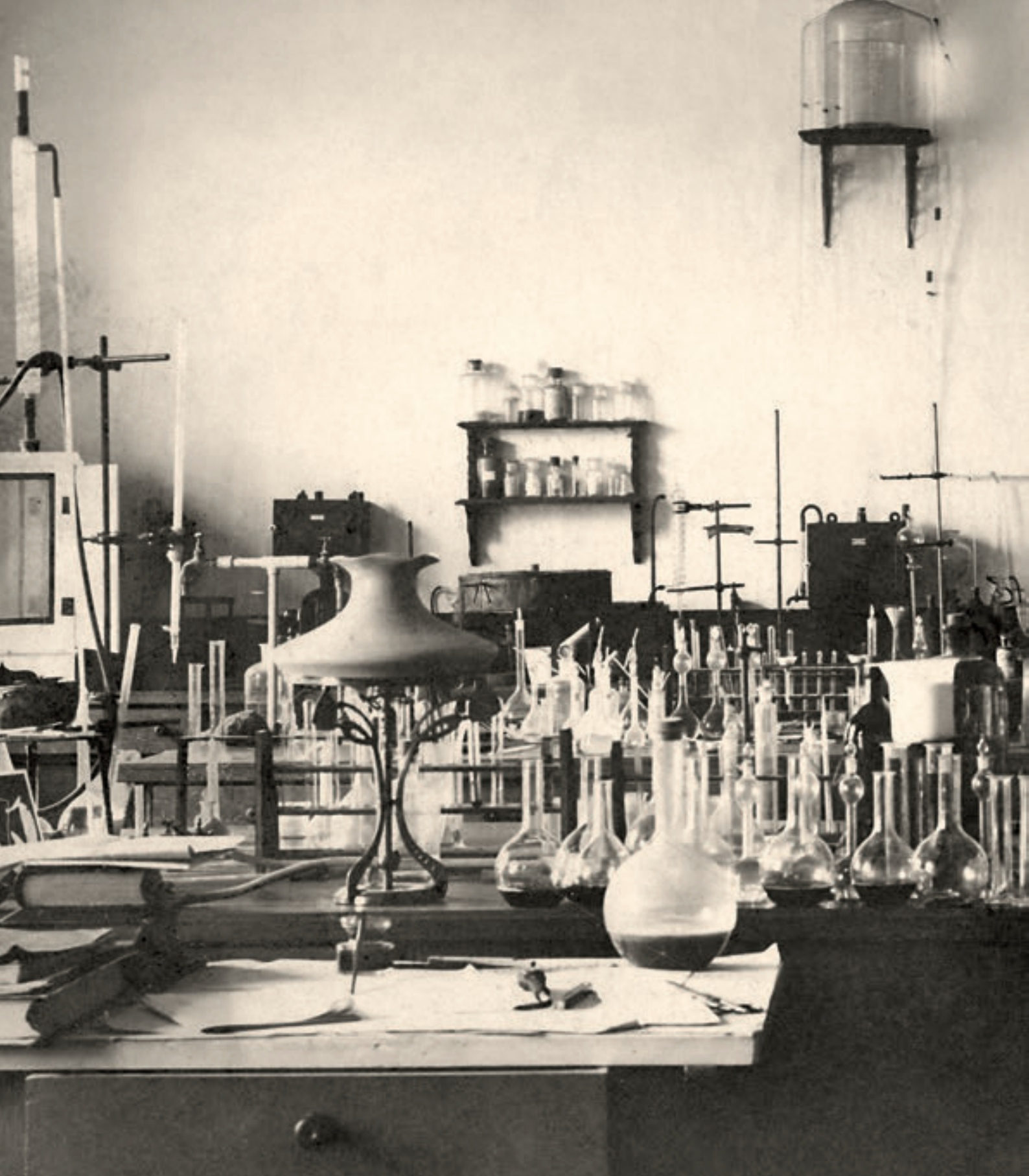


Alexander Oparin, 1894–1980
(Public domain)

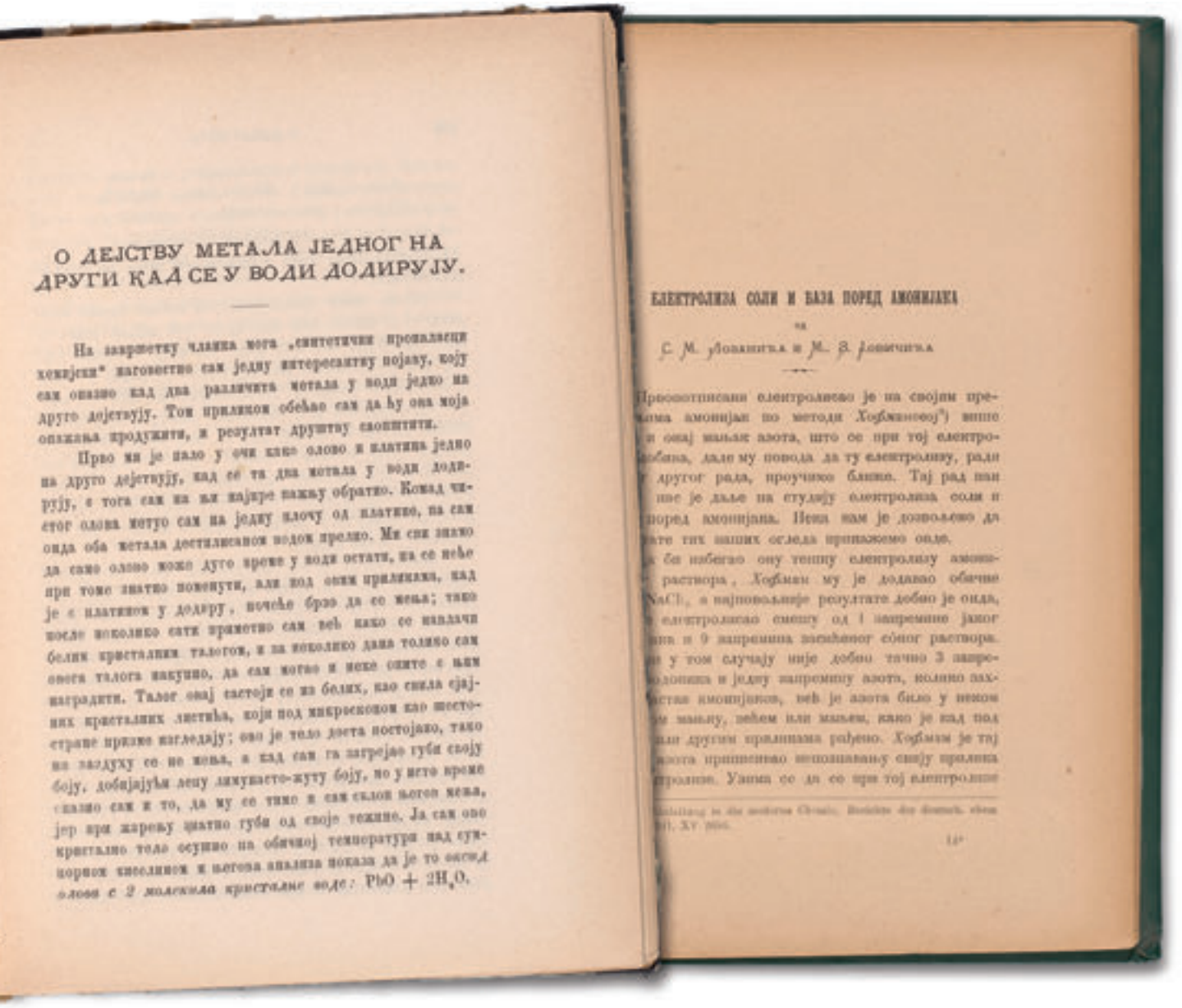
The most significant book by A. Oparin
in which he repeatedly cites Lozanić's works
(Public domain)



Stanley Miller, 1930–2007
(Public domain)



Chemical Laboratory
(Faculty of Chemistry, Belgrade)



О ДЕЈСТВУ МЕТАЛА ЈЕДНОГ НА ДРУГИ КАД СЕ У ВОДИ ДОДИРУЈУ.

На завршетку чланка мога „синтетични проналасци хемијски" наговестио сам једну интересантну појаву, коју сам онажио кад два различита метала у води једно на друго дејствују. Том приликом обећао сам да ћу ова моја опажања продужити, и резултат друштву саопштити.

Прво ми је пало у очи како олово и платина једно на друго дејствују, кад се та два метала у води додирују, с тога сам на њи најпре пажњу обратио. Комад чистог олова метнуо сам на једну плочу од платине, па сам онда оба метала дестилисаном водом прелио. Ми смо знали да само олово може дуго време у води остати, да се неће при томе знатно повећати, али под овим приликама, кад је с платином у додиру, почеће брзо да се мења; тако после неколико сати приметио сам већ како се навлачи бели кристалини талогом, и за неколико дана толико сам овога талога накупио, да сам могао и неке своје с њим наградити. Талог овај састоји се из белих, као снега сјајних кристалних листића, који под микроскопом као шестостране плоче изгледају; ово је тело доста постојано, тако на ваздуху се не мења, а кад сам га загрејао губи своју боју, добијајући лепу limunasto-жуту боју, но у исто време сазнао сам и то, да му се тиме и сам састав исто мења, јер при жарењу знатно губи од своје тежине. Ја сам ово кристално тело осушио на обичној температури над сумпорном киселином и његова анализа показа да је то *оксид олова с 2 молекула кристалне воде:* PbO + $2H_2O$.

ЕЛЕКТРОЛИЗА СОЛИ И БАЗА ПОРЕД АМОНИЈАКА

од

С. М. Лозанића и М. Ђ. Јовичића

Предпостављени електролизно је на својим пре-ма амонијак по методи *Хофмановој*[3]) више и овај мањак азота, што се при тој електро-бана, дало му повода да ту електролизу, ради другог рада, проучимо ближе. Тај рад ми ше је даље на студију електролиза соли и поред амонијана. Неке нам је дозволено да ате тих наших огледа приложемо овде.

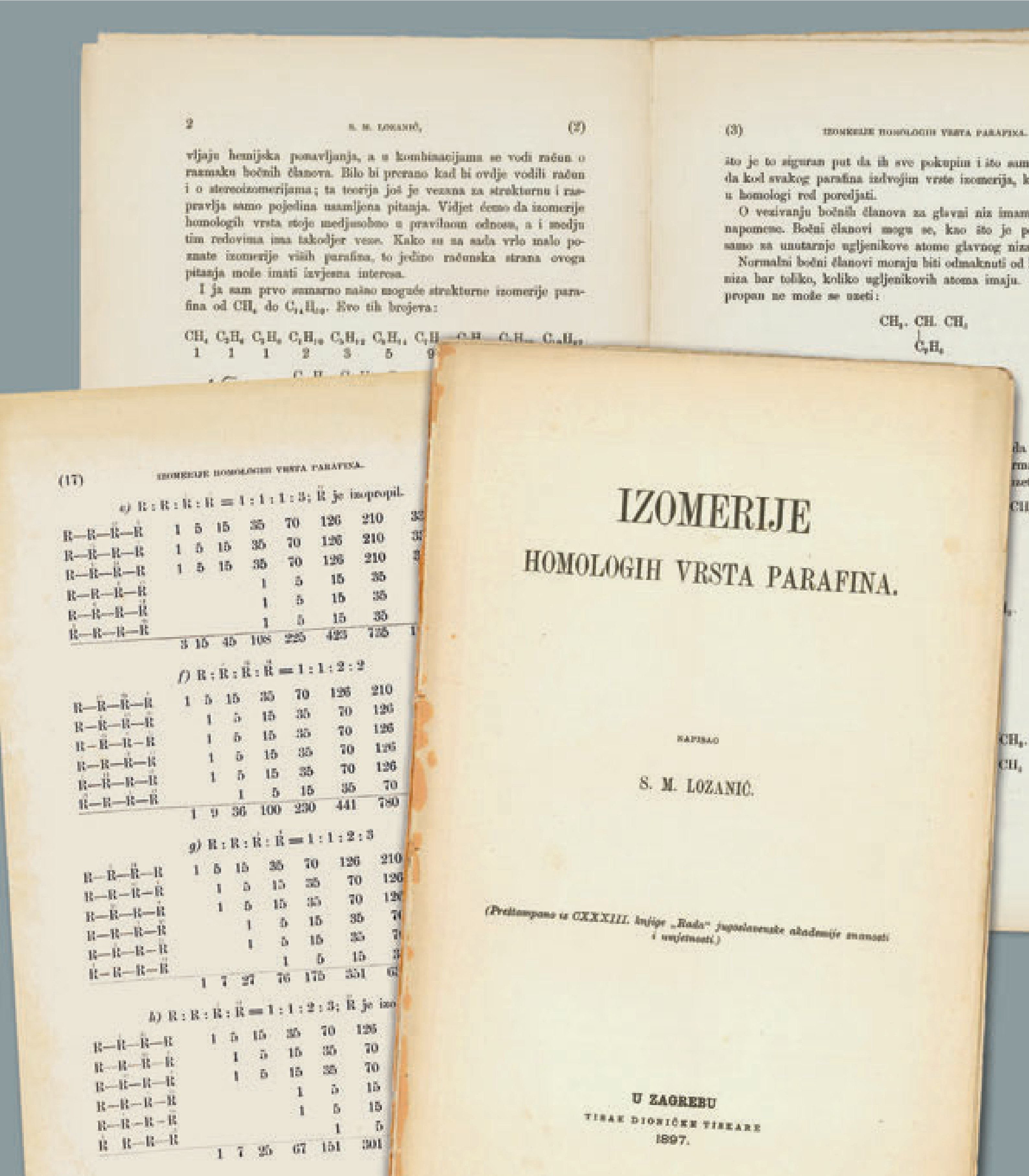
За избегао ону тешку електролизу амони-растворa, *Хофман* му је додавао обичне NaCl, а најповољније резултате добио је онда, електролисао смешу од 1 запремине јаког ина и 9 запремина засићеног сланог раствора. у том случају није добио тачно 3 запре-лонића и једну запремину азота, колико зах-стах амонијака, већ је азота било у нешто ом мањем, већем или мањем, како је кад под или другим приликама рађено. *Хофман* је тај азота приписивао неједнакавању сиђу приликa тролизе. Узима се да се при тој електролизе

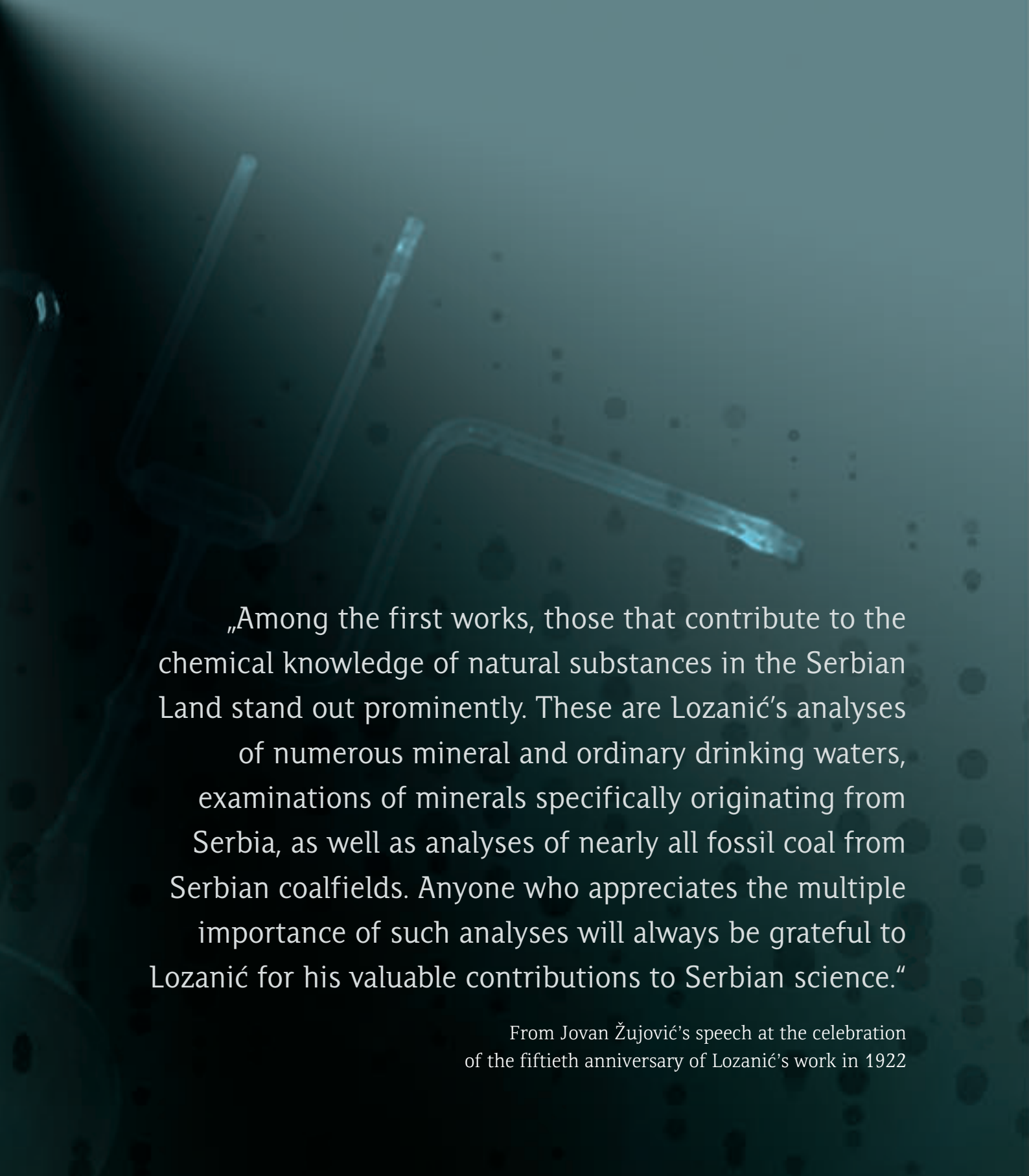
[3]) Ann. d. Chem. u. Pharm. Suppl. Bd. I. 1861.

14*

Sima Lozanić's works in inorganic chemistry
(SASA Library)

Sima Lozanić's works in theoretical chemistry
(Faculty of Chemistry, Belgrade)


IZOMERIJE
HOMOLOGIH VRSTA PARAFINA.
NAPISAO
S. M. LOZANIĆ.
(Preštampano iz CXXXIII. knjige „Rada" jugoslavenske akademije znanosti i umjetnosti.)
U ZAGREBU
TISAK DIONIČKE TISKARE
1897.



„Among the first works, those that contribute to the chemical knowledge of natural substances in the Serbian Land stand out prominently. These are Lozanić's analyses of numerous mineral and ordinary drinking waters, examinations of minerals specifically originating from Serbia, as well as analyses of nearly all fossil coal from Serbian coalfields. Anyone who appreciates the multiple importance of such analyses will always be grateful to Lozanić for his valuable contributions to Serbian science."

From Jovan Žujović's speech at the celebration
of the fiftieth anniversary of Lozanić's work in 1922

Analytical Chemistry

THE FIRST PROFESSOR OF CHEMISTRY AT THE LYCEUM AND THE Great School, Mihailo Rašković, specialised in analytical chemistry. Foreigners who came to Serbia to examine ores and mineral waters also applied analytical methods. Members of the Society of Serbian Letters and the Serbian Learned Society considered the most important task of "naturalists" was to examine the country's natural resources. Sima Lozanić was also expected to engage in analytical chemistry and investigate the unexplored and unknown to both our and European public.

Upon arriving in Serbia after completing his studies, Sima Lozanić, despite having already published scientific papers in organic chemistry and considering this field to be his scientific focus, felt obliged to analyse ores, minerals, mineral waters, soils, and everything else considered beneficial for the people and the state.

In the first decade following his arrival at the Great School, Lozanić extensively explored the field of analytical chemistry, publishing 19 papers. The most significant contributions were dedicated to the analysis of three new minerals and the examination of meteorites. However, his work on the analysis of drinking and mineral waters, as well as ores, soil, and other natural resources of Serbia, received the highest appreciation from the entire Serbian public, including the professors at the Great School.

New Minerals

The most important analytical works of Sima Lozanić include the discovery and analysis of three new minerals, milošin, alexandrolite, and avalite.

Milošin was discovered by Baron Herder on Mount Rudnik in 1835, when he came to Serbia to examine the mineral wealth of Serbia at the invitation of Prince Miloš, in whose honour he named the mineral. The mineral was later analysed by several chemists, but all the analyses were incorrect due to impurities present in the mineral. In 1884, Lozanić conducted an analysis revealing that the mineral discovered by Herder, initailly named milošin, was, in fact, a composite of two different minerals: a blue mineral,

for which Lozanić retained the name milošin, and the green one, which he named 'alexandrolite' in honour of King Aleksandar Obrenović.

Avalite is a mineral discovered by Lozanić on Mount Avala and named after the place of discovery. He analysed it for the first time in 1884, but the sample contained impurities, so he repeated the analysis in 1893, when he obtained a pure mineral in the form of a fine green powder. Lozanić also determined that milošin and alexandrolite are formed by the decomposition of avalite, during which alkali and a portion of silicon dioxide are separated.

Meteorites

In the 19th century, knowledge about meteorites was pretty limited, so their origin and composition were of interest to both experts and the general public. The Sokobanja meteorite is the first officially recorded meteorite fall in Serbia. According to Josif Pančić's record, it descended on the 13th of October 1877 between the villages of Šarbanovac, Sokobanja and Mount Devica. Scattered stones fell on an area 16 km long and approximately 4 km wide. The largest specimen, weighing around 38 kg, was found north of Sokobanja and subsequently named after this location.

This rare natural phenomenon stirred considerable interest among the public and professors of the Great School. Several fragments of the meteorite were sent to the Great School for analysis, and professors Josif Pančić, Sima Lozanić, and Ljubomir Klerić were tasked with travelling to Banja to collect data on this "celestial stone" and uncover all the details surrounding its descent. Lozanić conducted a chemical analysis of the meteorite, but published the results in a German journal. Two years later, in 1880, Pančić released a study on the meteorite in the *Gazette of the Serbian Learned Society* in which he presented everything known about meteorites up to that moment and disclosed the chemical composition of the Sokobanja meteorite. This analysis was performed by Sima Lozanić, "who had announced the results to the learned world at the beginning of the previous year".

The Jelica meteorite, which descended in October 1889, is the second recorded meteorite fall in Serbia. It fell on the Jelica Mountain near Čačak and was named after that location. Lozanić received samples of this meteorite from Jovan Žujović, who also examined it. The results of the Jelica meteorite were published by Lozanić published in both Serbian and German. Examining this meteorite, Lozanić found the similarities to the Sokobanja meteorite. Pieces of both meteorites were later exchanged by Lozanić with other European laboratories.

Radioactivity

After the discovery of radioactivity (1896), physicists and chemists tried to explain this unusual phenomenon, primarily aiming to discover the nature of this radiation and the substances emitting it. Sima Lozanić was also engaged in this research. At that time, Lozanić did not possess a chemical laboratory, nor did he require one for his research. Instead, he investigated radioactivity or "radioactive reaction" using a sensitive photographic plate. In a darkened room, he placed the photographic plate inside a box, covered it with a black sheet of paper, and placed the substance under examination on the paper. After leaving the box undisturbed in darkness for several days, he developed the photographic plate. Lozanić utilised the mineral uraninite as a reference for comparison of the reaction.

In a paper published in 1905, he presented the results obtained by examining the "radioactive reaction" of twenty ores from various locations in Serbia, including ten minerals, mineral waters from five spas, and four types of mineral fertilisers. He also tested some elements (sulfur, selenium, and tellurium) and mercury ore for radioactivity. Of all the samples mentioned, only cinnabarite, a mercury ore from the Avala Mountain and Bare (Kragujevac district) was found to be radioactive.

In 1904, in the capacity of the president of the Serbian Royal Academy, Lozanić delivered a speech titled *Hemija na uranku veka, obasjana zrâkom radioaktivnog zračenja* (*Chemistry at the Dawn of the Century, Illuminated by the Rays of Radioactive Radiation*) during a formal gathering at the Academy. In this speech, he presented the research results on the newly discovered phenomena and his views regarding the matter. After the First World War, he published an article on radioactivity, indicating that this area still held his interest. However, advancements in this area had progressed so much that he, already at the age of 75, found it challenging to keep up with the rapid developments.

Mineral Waters

Lozanić was the first to professionally and systematically analyse the mineral waters of Serbian spas. Over a period of ten years, Lozanić examined nearly all the then known spa waters in Serbia. The waters from our spas sparked keen interest among both domestic and foreign public. Lozanić published the results of the analysis in Serbian, German, and Romanian. In 1876, samples of several waters with qualitative and quantitative analyses were exhibited at the World Exhibition in Anvers (Antwerp). In the rector's speech from 1891, where he presented the possibilities of the country's

faster development, Lozanić expressed concern about the frequent departure of our people to foreign spas, emphasising the substantial material resources left abroad, and proposed a more effective organisation of domestic spas to encourage both our citizens and foreigners to visit them.

Drinking Water

The analysis of Belgrade's drinking water was initiated by Lozanić upon his arrival at the Great School because there were no available data on the quality of water consumed by the citizens of Belgrade. At that time, water was consumed from city fountains, supplied with water from Mokri Lug and Bulbulder, as well as from wells, Topčider fountains, the Sava, and the Danube. Based on the accepted standards for the chemical composition of water, Lozanić demonstrated that only the water from Topčider fountains met the criteria for safe drinking. It was a spring water and contained an acceptable level of organic impurities.

Mineral Wealth

In the 1891 rector's speech, in which he highlighted the most important ores in the country, Lozanić put coal in the first place, but he also emphasised the significant presence of high-quality iron ore, followed by lead, copper, zinc, and antimony, including mercury ores found on Mount Avala. During the 1880s and 1890s, Lozanić analysed ores from around fifty mines in Serbia.

Analyses Conducted for State Institutions

Mihailo Rašković, Lozanić's predecessor at the Department of Chemistry, as the only chemist in Serbia, worked for years for the Ministry of Finance in the capacity of "state examiner of ores and flawed money". After his death and the arrival of Sima Lozanić as professor of chemistry, the Ministry of Finance continued to send defective coins and ores to the Chemical Laboratory for analysis. Upon assuming his position, samples of ore and coined money were already waiting examination, so he had to commence analytical work from his very first day.

Over the course of ten years, Lozanić conducted a vast number of analyses that consumed much of his time and effort. Most of these analyses were related to flawed money. Serbia did not have its own currency until 1868, that is 1870. Before Serbian coins began to be minted, 43 types of foreign currency were in circulation in the country, including Turkish, Austrian, French, Dubrovnik, Dutch, Spanish, Portuguese, etc. Because of

this, counterfeit money frequently circulated and Lozanić, like Rašković before him, had the constant obligation to determine whether the money was genuine or counterfeit. From the 1870s, when Serbia began minting its own currency, counterfeiting of our money began: all our coins were counterfeited, especially the two dinar coin. These replicas were typically made of tin with a dash of copper (occasionally even lead). Apart from the two dinar, counterfeit versions of one dinar coins, half dinar, five dinars and 20 nickel paras likewise circulated. Among foreign currencies, the ruble and ducat were most often counterfeited. From time to time, Lozanić also examined devices for counterfeiting money. He carried out this meticulous routine work for over ten years, until experts arrived to replace him.

Ore Analyses

Analysing ores was much more complex than analysing counterfeit money and took much of Lozanić's time. For this reason, he did not willingly accept this job, despite having been responsible for analysing both ores and flawed money for the Ministry of Finance since 1873. The head of the Mining Department often sent a larger number of ores for analysis and demanded immediate results. In such cases, Lozanić would refuse to finish the work, and in 1875 he managed to free himself from the obligation of routine ore analysis for the Podrinje Mines, but occasionally conducted ore analyses for the state until the late 1880s. The majority of analyses refers to iron ores, followed by copper, lead, and zinc ores.

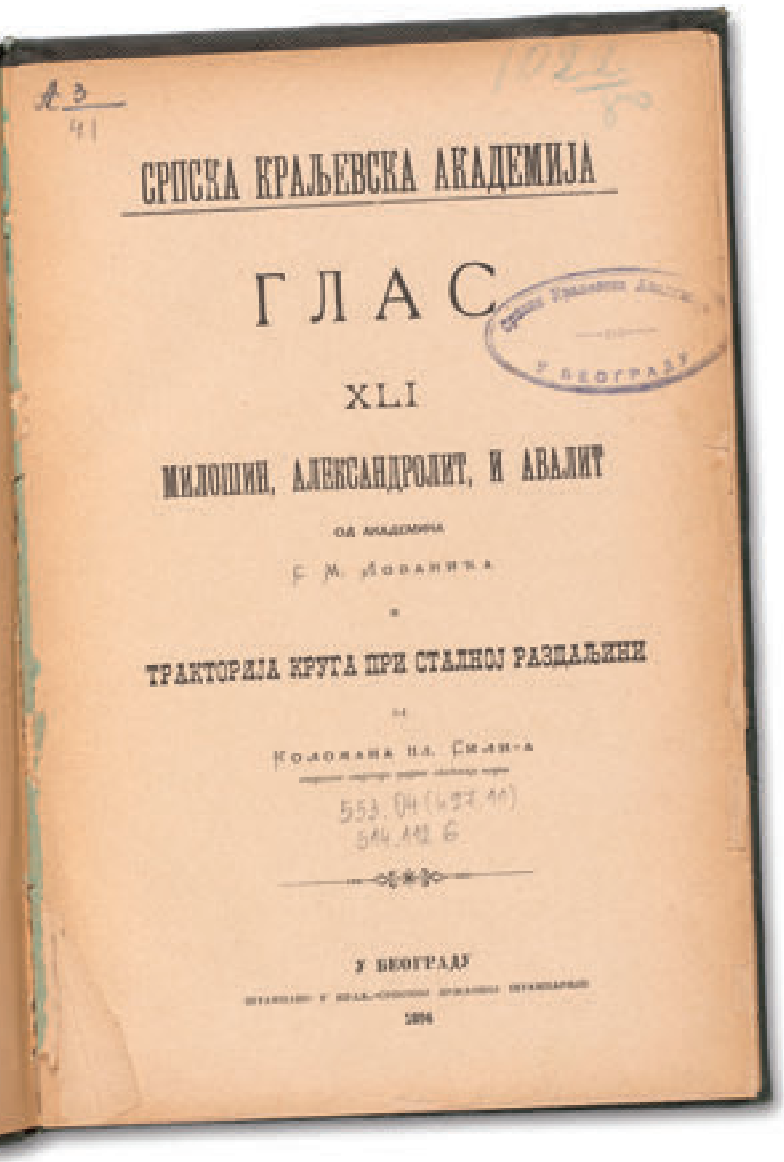
Other analyses

Apart from analyses of ores and flawed money, approximately twenty analyses of various products made for the Ministry of Finance or other institutions are preserved in Sima Lozanić's legacy. Several analyses relate to military needs during wars. Thus, in April and May 1876, prior to the Serbian-Turkish war, he analysed materials for military uniforms to determine colour fastness, examined raw materials for gunpowder, and conducted analyses of bread and flour for the army, as well as city water and water from Delijska česma fountain. He performed analyses for other institutions, too.

It was only in the mid-1880s that he finally managed to alleviate himself of a portion of his numerous obligations, primarily the daily analyses for the Ministry of Finance, as well as other tasks that often had little to do with his profession. Until the early 20th century, Lozanić undertook analyses that did not necessarily contribute to his published works, considering such obligations as his duty to the country and the people.

Avalite sample, label on the bottle handwritten by Sima Lozanić (Faculty of Chemistry, Belgrade)

Milošin and avalite
(Faculty of Chemistry, Belgrade,
Faculty of Mining and Geology, Belgrade)



СРПСКА КРАЉЕВСКА АКАДЕМИЈА

ГЛАС

XLI

МИЛОШИН, АЛЕКСАНДРОЛИТ, И АВАЛИТ

ОД АКАДЕМИКА

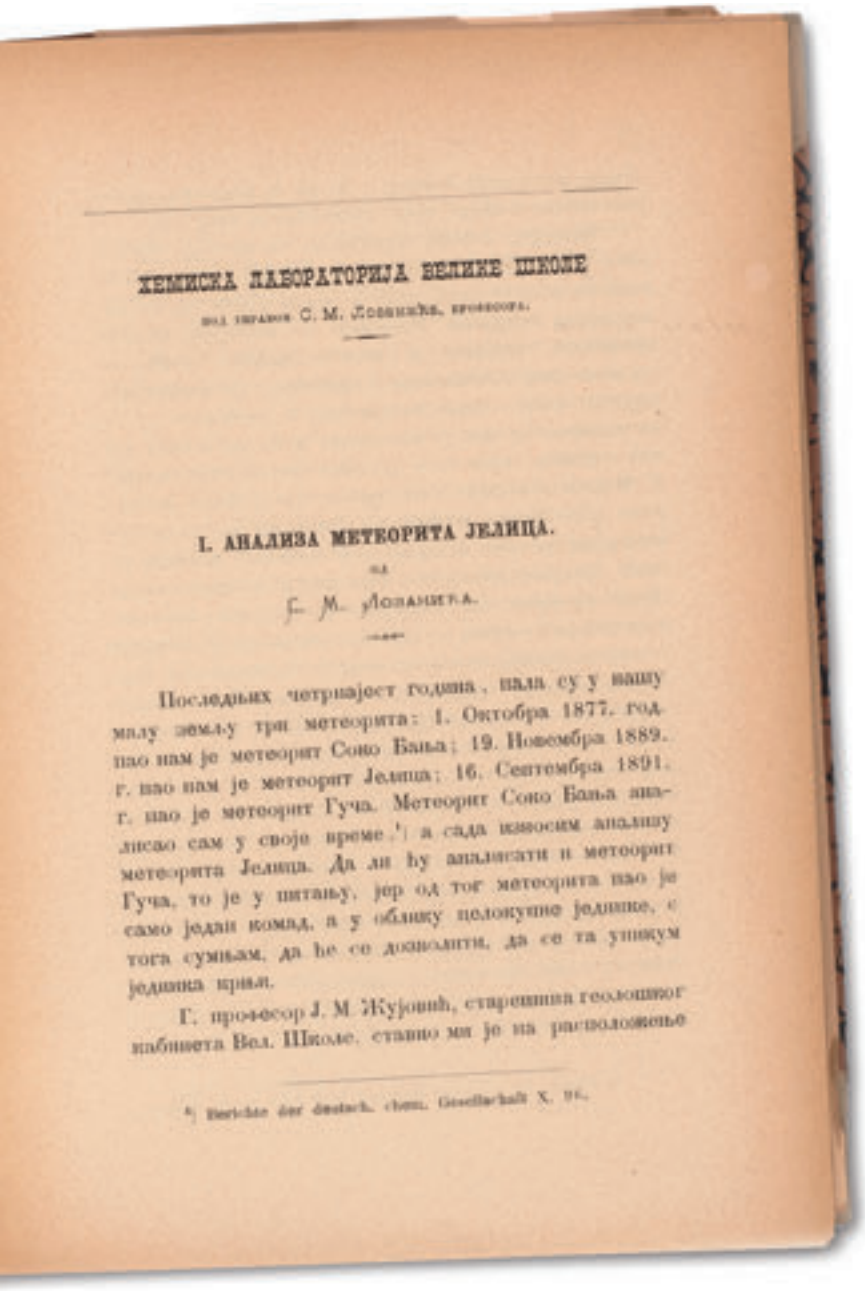
С. М. ЛОЗАНИЋА

И

ТРАКТОРИЈА КРУГА ПРИ СТАЛНОЈ РАЗДАЉИНИ

У БЕОГРАДУ

Sima Lozanić's work on Milošin, alexandrolite, and avalite
(SASA Library)



ХЕМИСКА ЛАБОРАТОРИЈА ВЕЛИКЕ ШКОЛЕ

под управом С. М. Лозанића, професора.

I. АНАЛИЗА МЕТЕОРИТА ЈЕЛИЦА.

од

С. М. Лозанића.

Последњих четрнајест година, пала су у нашу малу земљу три метеорита: 1. Октобра 1877. год. пао нам је метеорит Соко Бања; 19. Новембра 1889. г. пао нам је метеорит Јелица; 16. Септембра 1891. г. пао је метеорит Гуча. Метеорит Соко Бања анализао сам у своје време,[1] а сада износим анализу метеорита Јелица. Да ли ћу анализати и метеорит Гуча, то је у питању, јер од тог метеорита пао је само један комад, а у облику целокупне јединке, с тога сумњам, да ће се дозволити, да се та јединка цепа.

Г. професор Ј. М. Жујовић, старешина геолошког кабинета Вел. Школе, ставио ми је на расположење

[1] Berichte der deutsch. chem. Gesellschaft X. 91.

Sima Lozanić's paper on the analyses of the Jelica meteorite
(SASA Library)

Jelica meteorite
(Faculty of Chemistry, Belgrade)

Radioactive minerals in Serbia, 1905
(Faculty of Chemistry, Belgrade)

истек, управник Борског бакарног рудника, и
земљорадничке задруге: Соко-Бањска и Ри-
ска. Нека је хвала свима овима, који су ми
могли у добављању материјала за ове огледе.
Шта сам обухватно овим огледима и какве
м резултате добио, види се из овог списка.

Испитани минерали на радиоактивност.

		Реакција:	
	Живине руде.		
	Авала	»	»
Цинабарит	»	»	»
Каломел	»		
Метална жива (природна)		»	нема
Цинабарит	Баре	»	»
»	Рина	»	»
»	Ставица	»	»
»	Копрившица, Кортар	»	»
»	Завлака	»	има
Zn-Hg руда	Ћирија	»	нема
Цинабарит (Ziegelerz)		»	»
(Stahlerz)	Залакиња	»	»
»	Никитовка	»	»
»	Алмаден	»	»
»	Мексика	»	»
»	Калифорнија	»	»
»			

		Реакција:	нема
	Друге руде.		
	Рупље	»	»
Галенит	Копаоник	»	»
»	Рудник	»	»
»	Пересница	»	»
Галенит-пирит	Завлака	»	»
Галенит-галма)	Рудник	»	»
Пирхотин	Полрије	»	»
Цинкбленда	Горачић	»	»
»	Постење	»	»
Церусит	Зајача	»	»
Антимонит	Метовница	»	»
Борнит	Бор	»	»
Пирит-халкосин	Ребељ	»	»
Бакарна руда	Градиште (Тимок)	»	»
Халкопирит-висмутин			

РАДИОАКТИВНИ МИНЕРАЛИ У СРВИЈИ

од
С. М. ЛОЗАНИЋА.

ДАНО НА СКУПУ АКАДЕМИЈЕ ПРИРОД. НАУКА 7. ЈУНА 19

ћ би и ја учинио један мали прилог по
наших радиоактивних минерала, и ради
минерала у опште, бавио сам се тим н
м у последње доба, па нека ми буде
о, да тај мој рад изнесем овде. Али ћу
казати пут, којим сам изводио те огл
тоје, као што је познато, две главне ме
кивање радиоактивних тела, од којих је
рафска, а друга *електрична*. Фотографск
новања на тој особини радиоактивних т
во зрачење може да редукује фотограф
плочу; а електрична је метода основ
угој особини радиоактивних тела, д
нују ваздух, претварајући га у елект
графска је метода толико проста, да
адити сваки, који је поле познат с
радом, и толико је лака, да се мо
у обичној соби. И електрична је
и лака, кад је све удешено, али јо
сложена и доста скупа. Обадве мето

Analyses of Belgrade drinking water
(Faculty of Chemistry, Belgrade)

АНАЛИЗЕ БЕОГРАДСКИХ
ПИЈАЋИХ ВОДА.

Све јавне пијаће воде београдске могу се у главноме на четворо поделити; тако Београд има чесама, којима долази воде из околине Авале, даље има турских чесама, које добијају воду од Булбулдера и најзад има Саву и Дунаво. Осим водама вала додати још и бунарске воде, као пету групу пијаћих вода београдских. Ја сам се ограничио у свом моме прегледу испитивању само на прво поменуте четири воде, испитао сам их квантитативно на њихове главније саставне делове, који у неравној количини имају.

1. Анализа воде с „Делинске чесме."

3. децембра 1872 год.

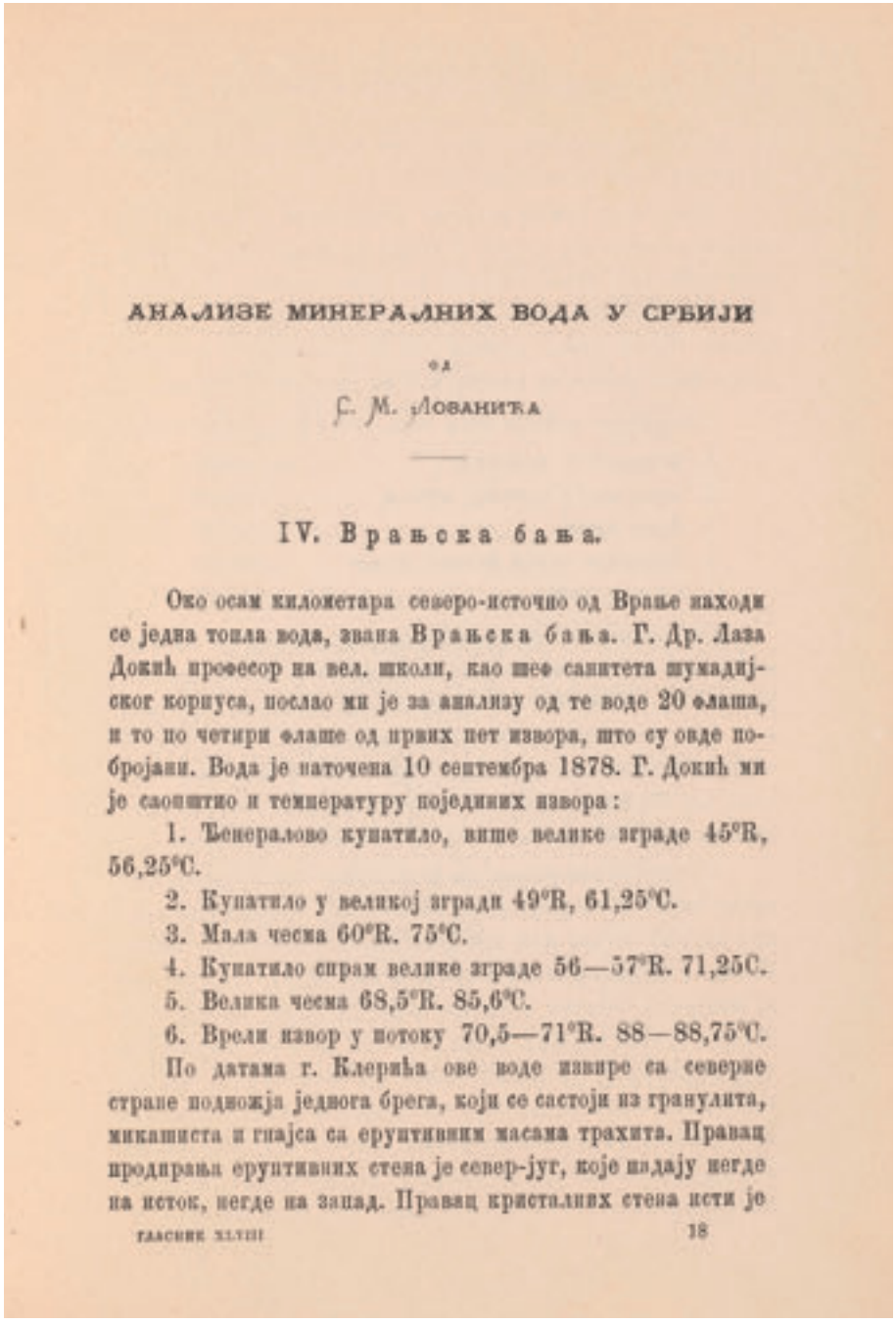
Температура ваздуха	2°C.	+ 29°C
Температура воде	+ 10°C.	+ 16°C
Специфична тежина воде		1,000248

Сви бројеви, који су овде изложени означују граммове, а односе се на један литар (1000 кубичних сантиметара) воде; т. ј. они нам кажу, колико грама означеног тела има у једном литру испитане воде. Ја ћу изложити овде у кратко ток саме анализе, одакле ће се видети методе, којима сам поједине саставне делове одређивао; да би опет резултати анализа што ближе истини били, све изложено бројеве узимао сам као средњи број из два или више огледа, а контролне анализе тврде тачност њихову.

Одредба сталних тела. — Прво сам одредио укупно количину сталних тела, што се у овој води налазе (не-

Delijska česma fountain
(Courtesy of Snežana and Dragan Vicić)

A young man in a spa with a glass of water (Courtesy of Miloš Jurišić)



АНАЛИЗЕ МИНЕРАЛНИХ ВОДА У СРБИЈИ

од

Ђ. М. Лозанића

IV. Врањска бања.

Око осам километара северо-источно од Врање находи се једна топла вода, звана Врањска бања. Г. Др. Лаза Докић професор на вел. школи, као шеф санитета шумадијског корпуса, послао ми је за анализу од те воде 20 флаша, и то по четири флаше од пяих пет извора, што су овде побројани. Вода је наточена 10 септембра 1878. Г. Докић ми је саопштио и температуру појединих извора:

1. Ђенералово купатило, више велике зграде 45°R, 56,25°C.
2. Купатило у великој згради 49°R, 61,25°C.
3. Мала чесма 60°R. 75°C.
4. Купатило спрам велике зграде 56—57°R. 71,25C.
5. Велика чесма 68,5°R. 85,6°C.
6. Врели извор у потоку 70,5—71°R. 88—88,75°C.

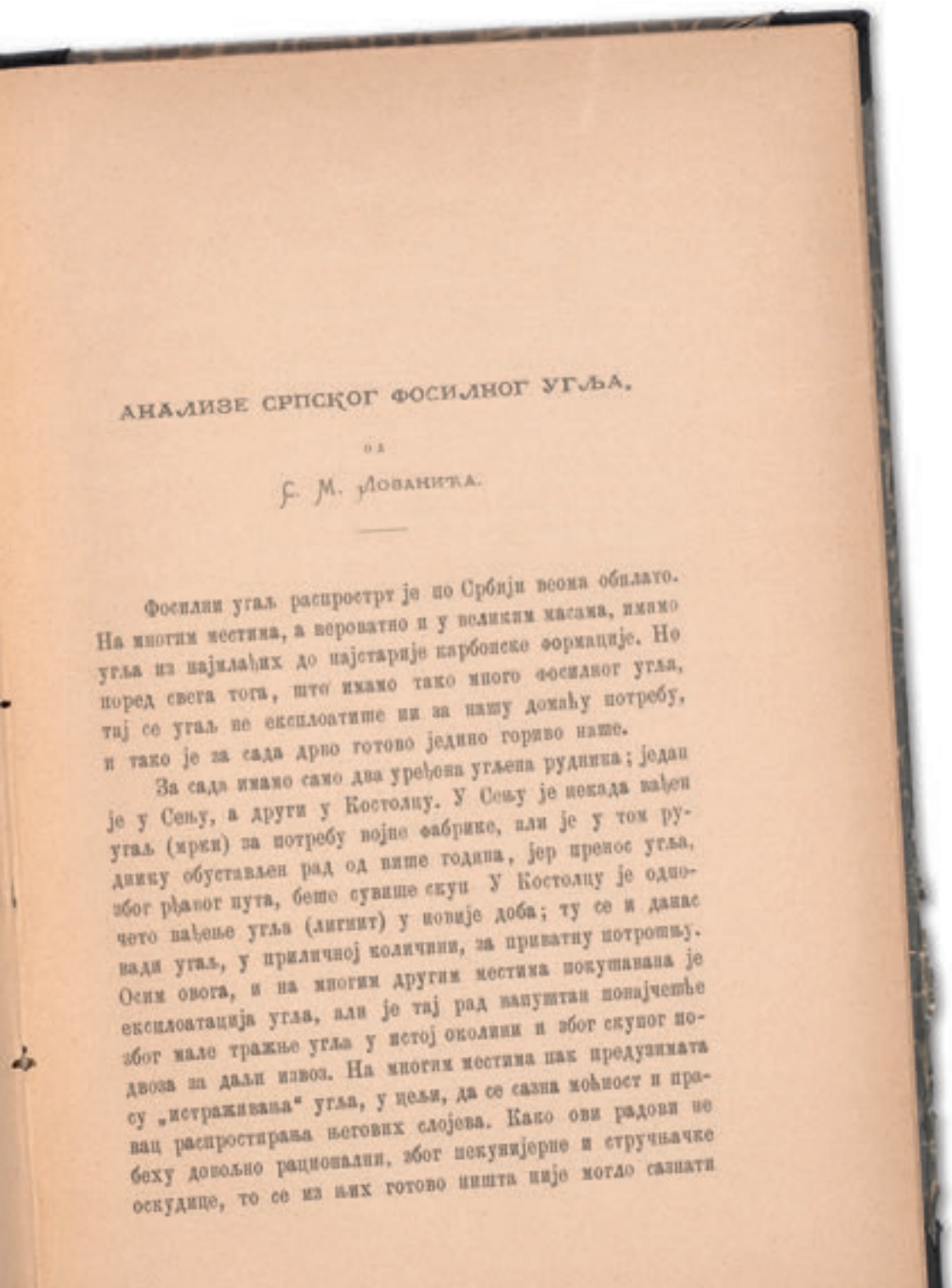
По датама г. Клерића ове воде извире са северне стране подножја једнога брега, који се састоји из гранулита, микашиста и гнајса са еруптивним масама трахита. Правац продирања еруптивних стена је север-југ, које падају негде на исток, негде на запад. Правац кристалних стена исти је

The Analyses of Mineral Waters in Serbia by Sima Lozanić
(Faculty of Chemistry, Belgrade)

Vranjska Banja spa (Courtesy of Miloš Jurišić)

Vrnjačka Banja spa (Courtesy of Miloš Jurišić)

The Analyses of Serbian Fossil Coal by Sima Lozanić
(Chemistry Museum, SASA Library)



АНАЛИЗЕ СРПСКОГ ФОСИЛНОГ УГЉА.

од

Ѕ. М. Лозанића.

Фосилни угаљ распростр је по Србији веома обилато. На многим местима, а вероватно и у великим масама, имамо угља из најмлађих до најстарије карбонске формације. Но поред свега тога, што имамо тако много фосилног угља, тај се угаљ не експлоатише ни за нашу домаћу потребу, и тако је за сада дрво готово једино гориво наше.

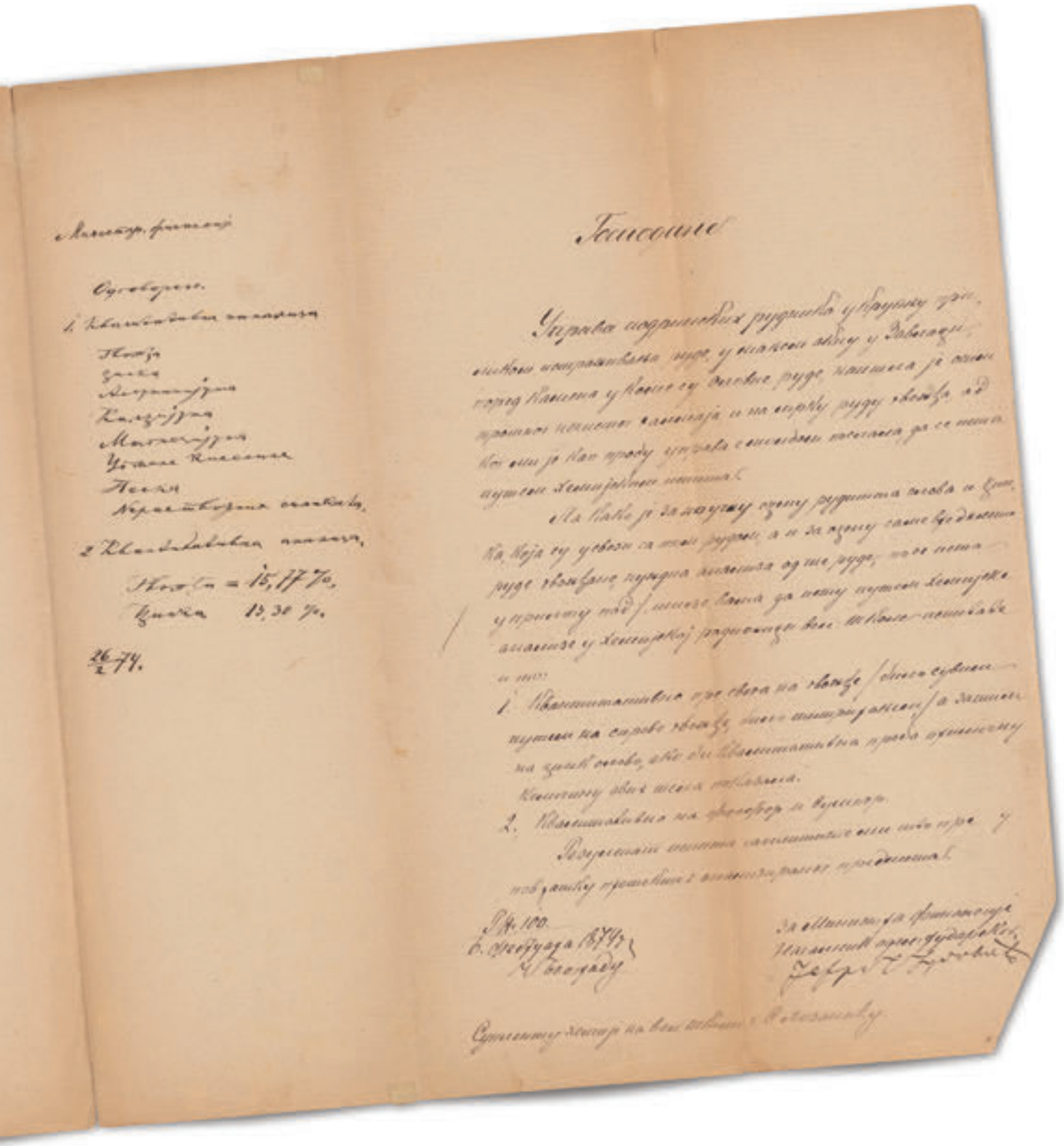
За сада имамо само два уређена угљена рудника; један је у Сењу, а други у Костолцу. У Сењу је некада вађен угаљ (мрки) за потребу војне фабрике, али је у том руднику обустављен рад од пяте године, јер пренос угља, због рђавог пута, беше сувише скуп. У Костолцу је одпочето вађење угља (лигнит) у новије доба; ту се и данас вади угаљ, у приличној количини, за приватну потрошњу. Осим овога, и на многим другим местима покушавана је експлоатација угља, али је тај рад напуштан понајчешће због мале тражње угља у истој околини и због скупог повоза за даљи извоз. На многим местима пак предузимата су „истраживања“ угља, у циљу, да се сазна моћност и пространство распростирања истових слојева. Како ови радови не беху довољно рационални, због некомпетентне и стручначке оскудице, то се из њих готово ништа није могло сазнати

I.

Анализе српског фосилног угља.

БРОЈ	МЕСТО ГДЕ СЕ НАЛАЗИ	У СТО ДЕЛОВА УГЉА НИМА: УГЉЕНИК	ВОДОНИК	КИСЕОНИК И АЗОТ	ВОДА	ПЕПЕО	ИСПАРИ %	КОКС %	КАЛОРИЈЕ
	I. ГРАФИТ.								
1	Стол.	88·66	—	—	0·74	10·60			
	»	92·59	—	—	0·46	6.95			
	II. КАМЕНИ УГАЉ								
2	Мустапић Миљковица	82·61	3·99	6·48	0·95	5·96	17·17	75·92	7725
	» »	72·16	3·31	3·41	0·95	20·17	—	—	6726
	» »	70·19	3·84	4·54	0·78	20·65	—	—	6695
	» »	50·85	2·78	4·11	0·40	41.86	—	—	5012
3	Каздурово	74·34	3·69	4·80	1·12	16·77	—	—	7097
4	Осипаоница	76·40	3·73	4·80	1·34	13·73	18·39	66·54	7215
5	Бољетин	61·93	4·04	7·89	2·49	23.65	15·22	58·64	5995
6	Пролата	86·42	3·81	4·06	1·18	4·53	10·94	83·35	8669
	»	85·94	4·05	5·10	0·85	4·05	10·71	84·39	7087
	»	64·81	2·85	10·41	11·03	10.90	23·56	54·51	5648
	III. УГАЉ ИЗ ФОРМАЦИЈЕ ЛЕЈАСА								
7	Добра	77,58	4·41	12·28	3·05	2·68	30·90	63·37	7168
	»	75·55	4·17	13·58	5·60	1.10	32·08	61·22	6843
	»	74·96	4·74	14·98	1·48	3·84	—	—	6947
	»	74·54	4·63	11·98	1·65	7·20	—	—	7020
	» окно Басман	74·94	4·46	11·46	1·58	7·56	—	—	6954
8	Милановац доњи	64·54	3·40	11·04	1·80	19·20	17·23	61·77	5845
9	Брзи вир	77·35	4·53	12·83	1·47	3·82	—	—	7098
	» »	69·91	3·67	8·38	1·32	16·72	23.93	58·03	6493
10	Брзи Вир (троман)	80·60	3·71	8.94	2·24	4·51	12·89	80·36	7342
11	Брза-Паланка	80·14	4·50	9·88	2·84	2·64	27·61	66.91	7524
	» »	78·88	4·30	11·18	3·14	2·50	27·14	67·22	7319
	IV. УГАЉ ИЗ ФОРМАЦИЈЕ КРЕДЕ								
12	Сење	58·12	3·78	20·73	13·32	4·05	35·75	46·88	4910
	»	59·01	3·54	21·17	13·63	2.65	36.72	47.00	4876
	»	50·85	4·44	19·41	12·63	3·67	—	—	5285
13	Сење, смоласт угаљ	60·85	4·02	21·47	12·43	1·23	34·64	51·70	5081
14	Сење, бели угаљ	27·25	3·55	8·40	5·01	55·83	29·52	9.64	—

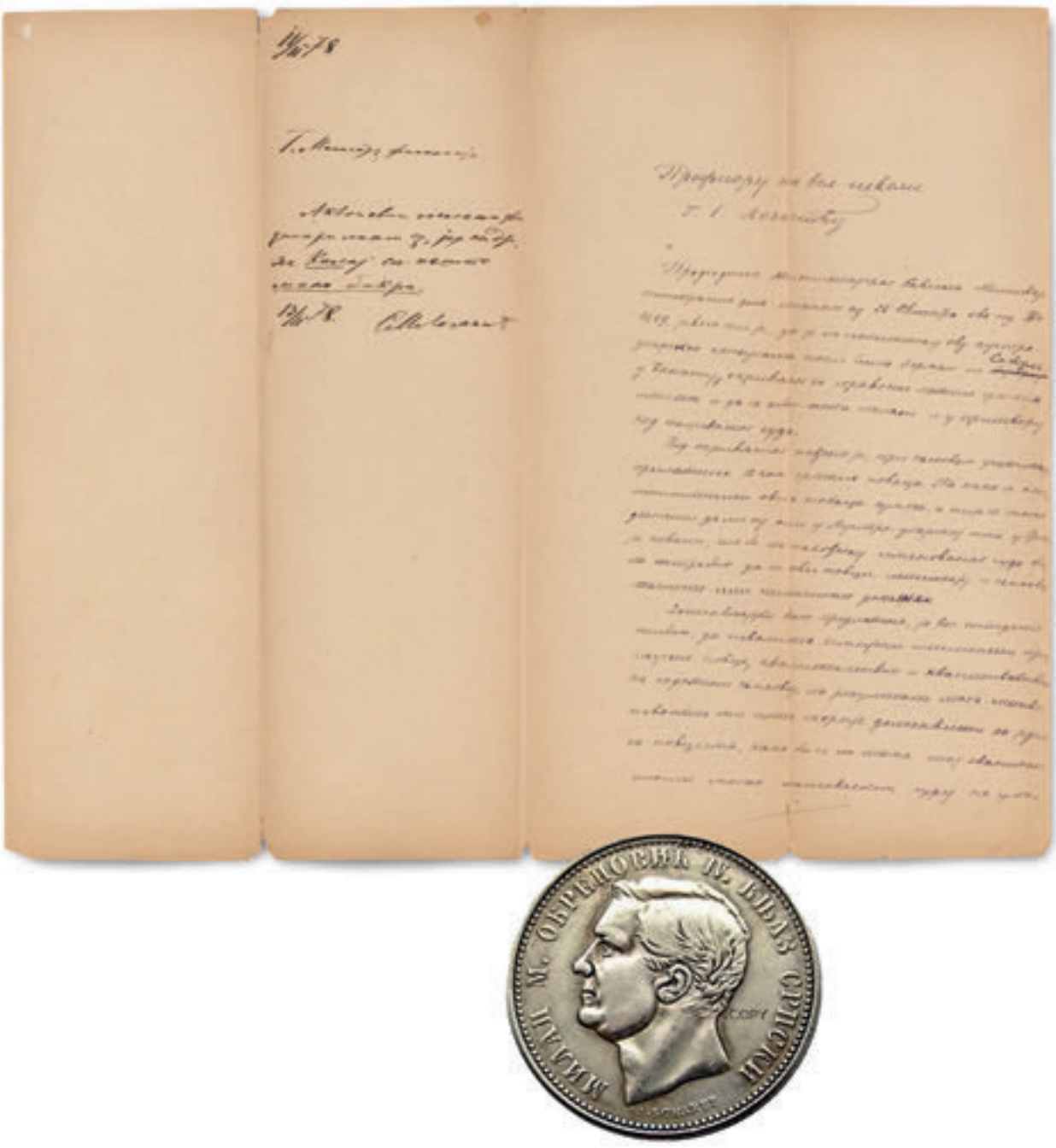
ЕСТО ГДЕ СЕ НАЛАЗИ	У СТО ДЕЛОВА УГЉА НИМА: УГЉЕНИК	ВОДОНИК	КИСЕОНИК И АЗОТ	ВОДА	ПЕПЕО	% ИСПАРИ	
ерац	59·48	3·90	21·30	12·30	3·02	—	
ље	47·75	3·49	18·86	10·65	19·25	34·46	33
ље	58·85	3·62	21·57	14·16	1·80	35·73	48
	59·52	3·98	19·97	11·98	4·55	—	
	55·53	3·59	22·19	14·40	4·29	39·18	42
	58·02	4·22	15·14	16.64	5·98	37·39	40
	57·01	4·07	16,74	16·10	6·08	37·95	39
	47·78	3·32	18·15	10·77	19·98	34·72	34
а рашка река	55·82	4·01	19·91	14·74	5·49	—	
а	58·78	4·37	19·85	11·80	5·20	—	
	51.75	3·47	21·39	13·08	10·31	37·02	39
	62.49	4.75	16·18	12·22	4·36	—	
ица	51,61	4·24	20·27	12·21	11·67	—	
	63.42	4·60	18·35	6·10	7·33	37·12	49
АЉ ИЗ ТЕРЦИ-ФОРМАЦИЈЕ							
ица	49.91	3·27	23·11	16·01	7·70	40·23	36·05
ица	54·32	3·60	21·93	12·74	8·01	37·84	41·41
	45.20	3·51	20·18	21·00	10·11	35·50	33·39
	53·59	3·37	20·11	17·08	5·85	34.98	42·76
	43·45	3·10	19·19	24·93	8·71	39·61	27·65
	46·46	3·44	23·12	12·13	14·85	40·90	32·12
	57·06	3·63	21·76	14·22	3·33	37·78	36·67
	50.73	3.64	19·16	14·81	11·66	—	
	59·44	4·14	24·73	10·33	1·36	40·70	47·61
	61·25	3·93	20·85	9·77	3·50	—	
ица	52·51	3·35	20.82	14·16	9·16	33·97	42·68
Паланица	51·14	4·21	23·62	15·29	5·74	54·91	41·96
	50·22	3·72	19·37	17·40	9.29	39·90	33·41
	55·69	3·50	21·58	14·38	4·85	35·37	45·20
	57·86	4·14	21·36	13,07	3·57	—	
	47·50	3·54	28·21	15·07	5·68	41·12	38.08
	58·38	4·33	19.84	13·46	3·99	—	
	45·33	3·42	23·83	18·30	9·12	40·30	32·23
	40·13	3·31	14·37	30·79	11·40	33·62	24·19
ИНСКИ ЛАЦ							
	47·23	6·80	12·13	3·90	29·94	49·36	16·80
	47·40	6·81	12·70	3·84	29·25	49.63	17·28
	17·09	2·32	12·60	1·70	66·23	29·61	2·48
	15·17	2·16	11·19	1·83	—	—	—



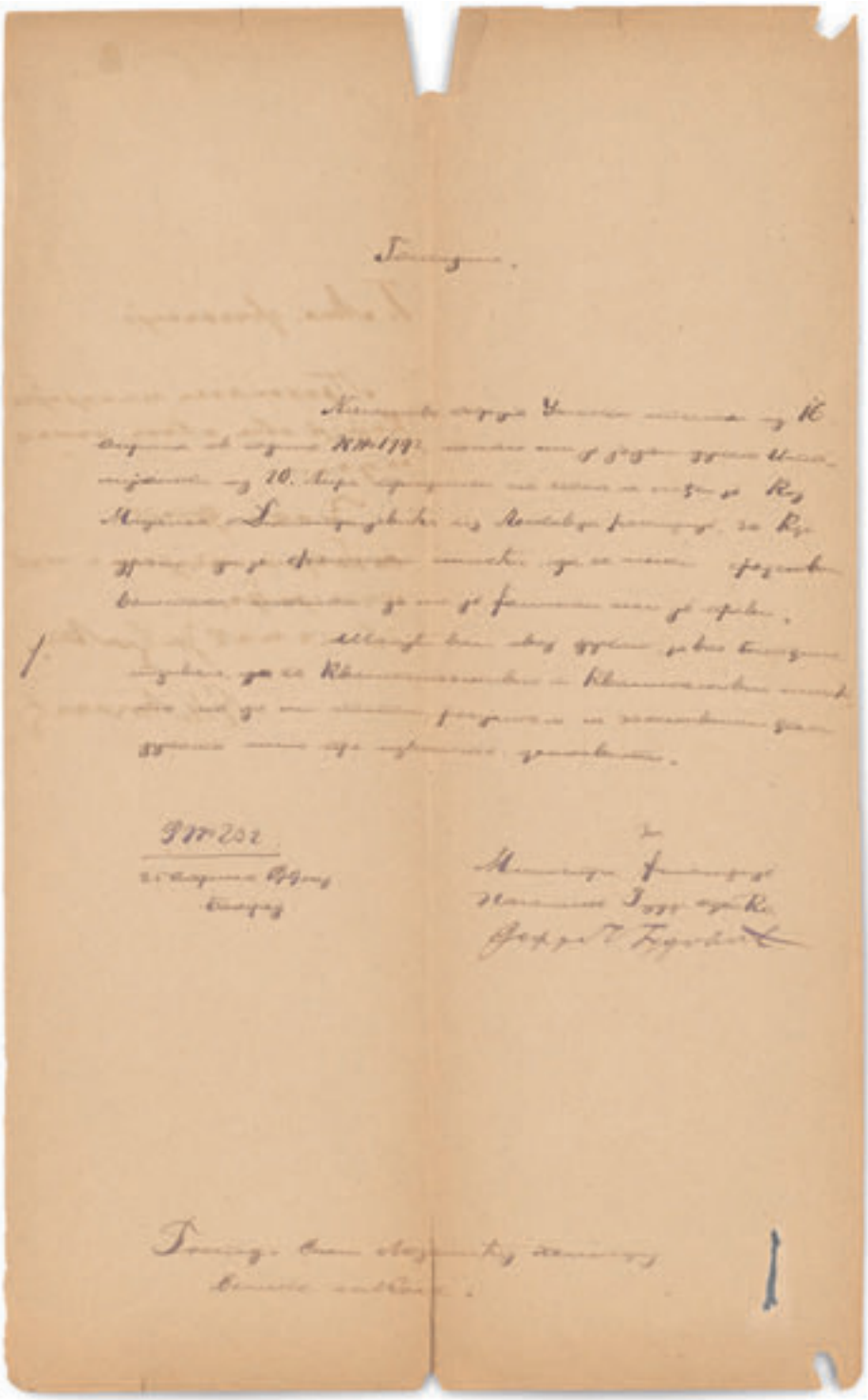
Sima Lozanić's analysis as a state examiner of ores and flawed money
(Faculty of Chemistry, Belgrade)

Weighing scale
(Faculty of Chemistry, Belgrade)

Analysis of counterfeit ruble
(Faculty of Chemistry, Belgrade)

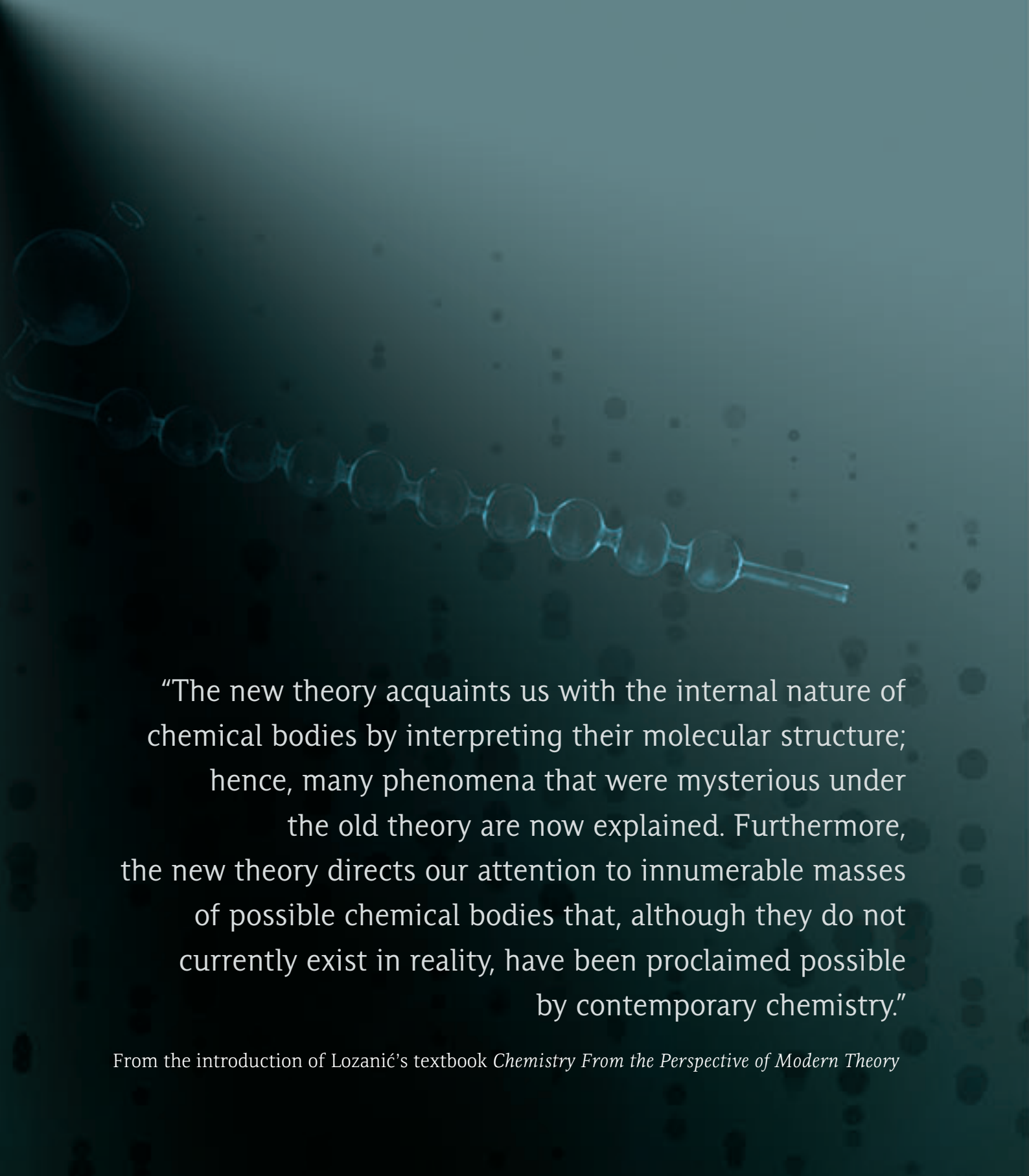


Analysis of counterfeit dinar
(Faculty of Chemistry, Belgrade)



Obverse and reverse of the Italian ducat (Faculty of Chemistry, Belgrade)

Request concerning the analysis of the Italian ducat and Sima Lozanić's reply (Faculty of Chemistry, Belgrade)



"The new theory acquaints us with the internal nature of chemical bodies by interpreting their molecular structure; hence, many phenomena that were mysterious under the old theory are now explained. Furthermore, the new theory directs our attention to innumerable masses of possible chemical bodies that, although they do not currently exist in reality, have been proclaimed possible by contemporary chemistry."

From the introduction of Lozanić's textbook *Chemistry From the Perspective of Modern Theory*

Textbooks

THE GREATEST CONTRIBUTION TO SERBIAN CHEMISTRY WAS MADE by Lozanić's textbooks. Textbooks on inorganic and organic chemistry, along with his scientific work, had the most influence on the rapid development of chemistry and the introduction of modern education at the Great School. Lozanić wrote textbooks on inorganic and organic chemistry already in the mid-19th century (inorganic chemistry in 1874, 1880 and 1890; organic chemistry in 1875 and 1883). Through these textbooks, Serbia received new chemistry almost simultaneously with the most developed countries in Europe, and modern education preceded many European universities.

With each new edition, Lozanić supplemented, expanded, and changed the systematisation of the material, perfected the terminology, and introduced not only new knowledge but also entire new areas, following the development of science worldwide. Textbooks on inorganic chemistry are among the first university textbooks in Europe to contain new formulas, Mendeleev's periodic table of elements, and a chapter on thermochemistry. In the textbooks of organic chemistry, for the first time in our country, organic compounds were presented as carbon compounds and represented with structural formulas.

The role of Lozanić's textbooks, for a long time the only university textbooks of chemistry in Serbia, was not limited solely to teaching; they were also used by all those involved in chemistry. That is why all the textbooks, especially the later editions, are very extensive, containing many facts and details that were not always necessary for his students, but had great practical value for the profession. In addition to textbooks on inorganic and organic chemistry, he also authored textbooks on chemical technology and prepared manuals for experimental exercises.

Through his textbooks, Lozanić formed a chemical language we still use today. At that time, every translation or writing meant creating new scientific terms, and instead of translation, the term "Serbianisation" was used. Most of our scientists and experts believed that professional and scientific terms should be Serbianised. Lozanić did not agree with that and kept the

Latin and Greek terms where necessary, and only translated "what other nations express in their own language". The basic principles of chemical nomenclature and terminology introduced by Lozanić have been retained to this day.

The inorganic chemistry textbook

In his final year of study in Berlin, Lozanić wrote a textbook of inorganic chemistry, which was published in 1874 under the title *Chemistry from the Standpoint of Modern Theory* (411 pages with 44 figures). The term "Modern theory" referred to the atomic-molecular theory which replaced the theory of equivalents and organised a large part of chemistry in a new way. The general part of the textbook introduces fundamental theories and laws, nomenclature, acids, bases, and salts. These laws are derived from detailed descriptions of experiments conducted during lectures. The special part is dedicated to metals and non-metals. The second edition of the textbook was published in 1890, comprising 695 pages. It was the first university textbook outside Russia at the time to mention Mendeleev and the Periodic Table of Elements. The third edition was published in 1893, totaling 787 pages.

The organic chemistry textbook

The organic chemistry textbook, published in 1875 (580 pages), saw its second edition in 1883 (1008 pages). Before the release of these textbooks, organic chemistry was taught on a modest scale, focusing on describing known organic compounds without classification and structure. Lozanić was the first to present organic compounds as carbon compounds, emphasising this by classifying them according to the number of carbon atoms in the molecule: monocarbonides, bicarbonides, etc. These textbooks cover a large number of compounds, serving as the only chemical literature in our language for decades. They have been used by all those engaged in chemistry and related sciences.

Lozanic's textbooks on Chemical technology

In the late 1870s and early 1880s, Lozanić wrote four textbooks on chemical technology:

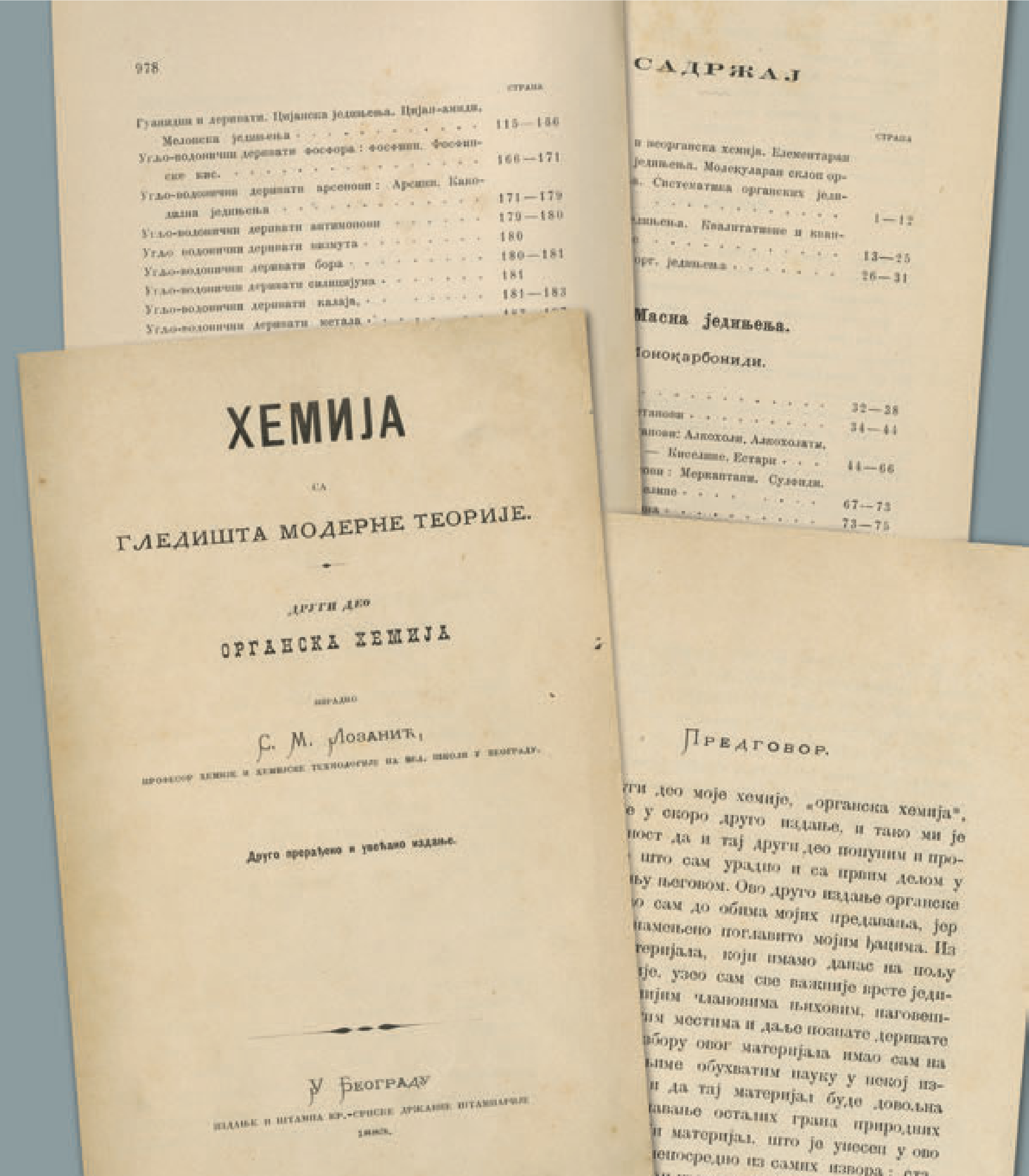
1. *On Water and Fuel* (1887)
2. *Fundamentals of Metallurgy* (1887)
3. *Glass, Ceramics, Lime, Cement, and Plaster* (1892)
4. *Inorganic Chemical Products* (1894)

His model for writing textbooks was the textbook of Rudolf Wagner, a professor of chemical technology at the University of Würzburg. In these textbooks, he presented most of the known products and processes of chemical technology in a modern way. He devoted the greatest attention to topics he considered important for improving the economy and industry, as well as the quality of life in Serbia, such as obtaining drinking water, fuel, building materials, and artificial fertilisers.

Laboratory manuals

Lozanić prepared two manuals for the practical work of his students. As a chemistry student in Zurich, in 1870 he translated his teacher Wislicenus's manual and sent it to Belgrade for evaluation. However, the Serbian Learned Society and the Ministry of Education refused to publish it, and the manual only became available when Lozanić became a professor at the Great School in 1873, under the title *Instructions for Qualitative Chemical Analysis of Inorganic Substances*. The second edition of the manual was published in 1879. A quarter of a century later, in 1924, his son Milivoje Lozanić published the third edition of the manual, slightly expanded, as the third part of the manual on qualitative analysis, entitled *Qualitative Chemical Analysis. Instructions for Qualitative Chemical Analysis by Prof. S. M. Lozanić. 3rd edition by Prof. M. S. Lozanić.*

In 1875, Lozanić also translated and published his teacher Hofmann's manual in analytical chemistry, under the title *Analytical Classification of Metals and Their Important Reactions*, and 73 years later, in 1948, Milivoje Lozanić prepared the second edition of the manual under the title *A. V. Hoffmann, Analytical Reactions and Instructions for Qualitative Analysis, by S. M. Lozanić, Professor at the Great School, second edition by M. S. Lozanić, University Professor*.



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ХЕМИЈА

СА

ГЛЕДИШТА МОДЕРНЕ ТЕОРИЈЕ.

ДРУГИ ДЕО

ОРГАНСКА ХЕМИЈА

ИЗРАДИО

С. М. ЛОЗАНИЋ,

ПРОФЕСОР ХЕМИЈЕ И ХЕМИЈСКЕ ТЕХНОЛОГИЈЕ НА ВЕЛ. ШКОЛИ У БЕОГРАДУ.

Друго прерађено и увећано издање.

У БЕОГРАДУ

ИЗДАЊЕ И ШТАМПА КР.-СРПСКЕ ДРЖАВНЕ ШТАМПАРИЈЕ

ПРЕДГОВОР.

Sima Lozanić's textbooks in organic chemistry – second edition from 1883
(Faculty of Chemistry, Belgrade)


№247
ХЕМИСКА ТЕХНОЛОГИЈА
ТРЕЋИ ДЕО:
У БЕОГРАДУ


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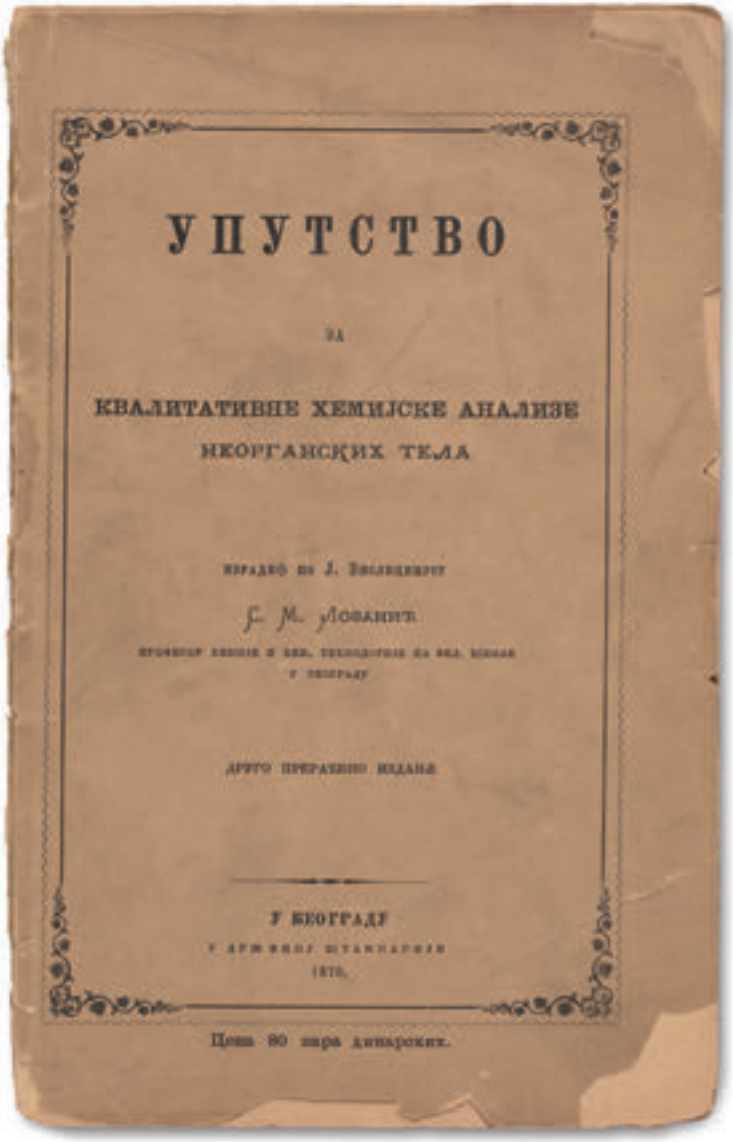

УПУТСТВО

ЗА

КВАЛИТАТИВНЕ ХЕМИЈСКЕ АНАЛИЗЕ

НЕОРГАНСКИХ ТЕЛА

Ст. М. Лозанић

ДРУГО ПРЕРАЂЕНО ИЗДАЊЕ

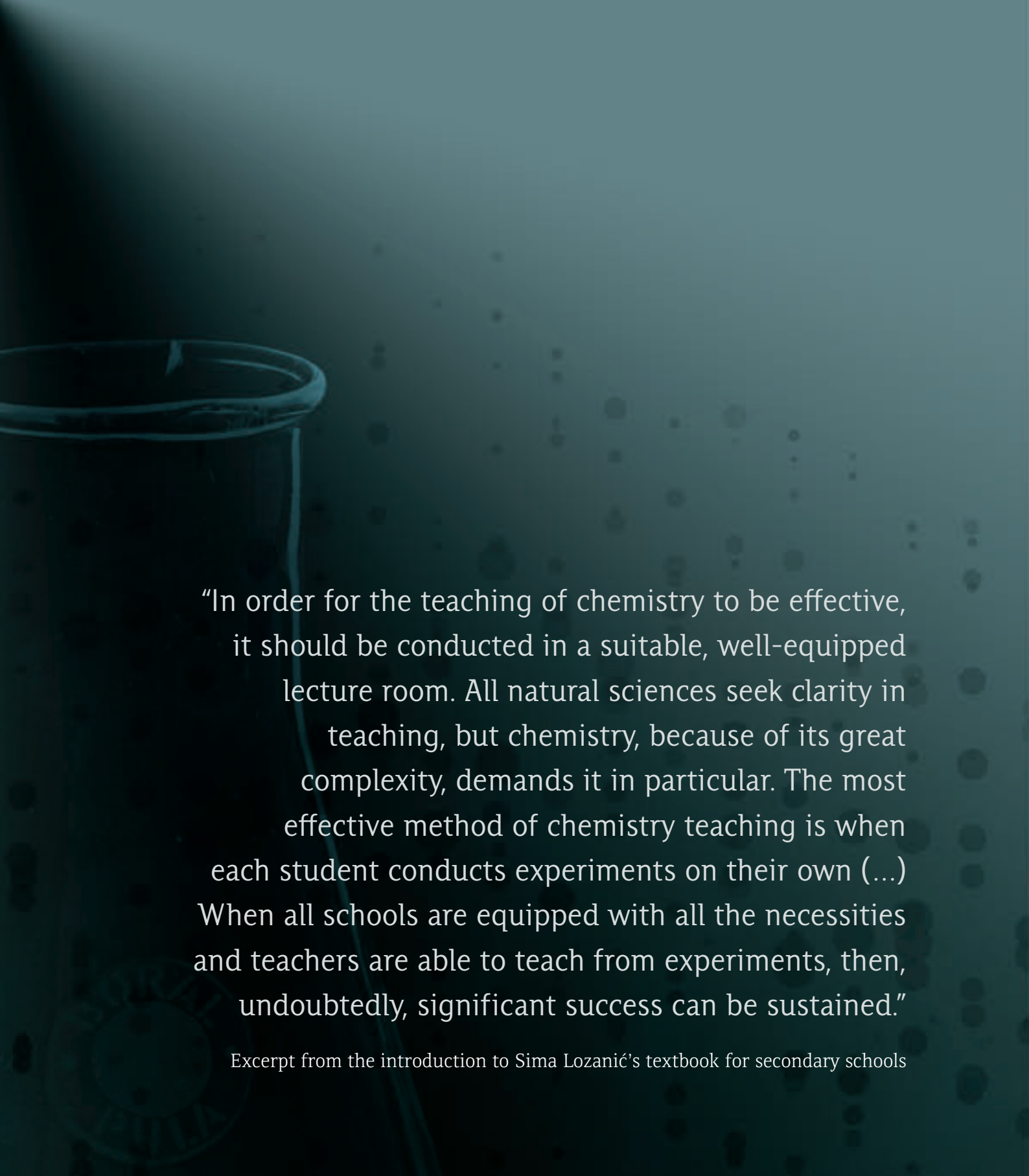
У БЕОГРАДУ

1878.

Цена 80 пара динарских.

Instructions for Qualitative Chemical Analyses by Sima Lozanić
(Faculty of Chemistry, Belgrade)

Sima Lozanić's textbook in chemical technology
(Faculty of Chemistry, Belgrade)



"In order for the teaching of chemistry to be effective, it should be conducted in a suitable, well-equipped lecture room. All natural sciences seek clarity in teaching, but chemistry, because of its great complexity, demands it in particular. The most effective method of chemistry teaching is when each student conducts experiments on their own (...) When all schools are equipped with all the necessities and teachers are able to teach from experiments, then, undoubtedly, significant success can be sustained."

Excerpt from the introduction to Sima Lozanić's textbook for secondary schools

Secondary Schools

SIMULTANEOUSLY WITH HIS WORK AT THE GREAT SCHOOL, SIMA Lozanić dedicated himself to the development and modernisation of chemistry education in high school. As a ministerial representative at secondary school exams, a member of the Education Council, a member of the Commission for professional exams, a reviewer and author of chemistry textbooks for secondary schools, he exerted a substantial impact on the development of secondary school chemistry teaching.

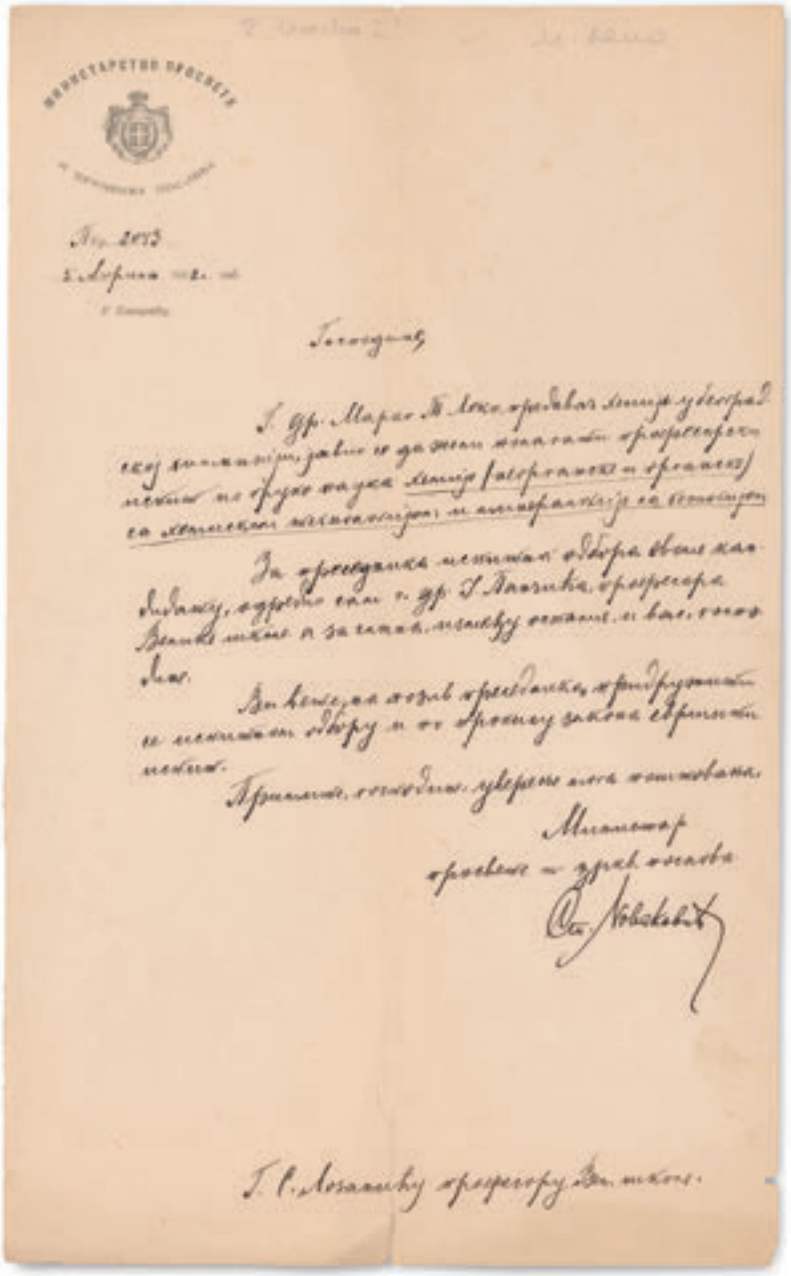
Chemistry was taught as a separate subject in secondary schools since 1874. In the following year, 1875, after visiting various secondary schools, Lozanić noted in his June 1875 Report to the Minister of Education that "the benefits of the introduced chemistry lectures are evident" but emphasised the necessity of establishing chemistry laboratories in every school "where chemical phenomena could be clearly presented to the students". Due to the lack of collections and experimental teaching, students were often "introduced to the properties and reactions of some chemical bodies, which they did not actually see". Later, in his reports to the Minister of Education, he advocated for the establishment of chemistry laboratories, experimental teaching methods, improved education for secondary school teachers, and the development of modern textbooks.

Prior to the beginning of the 1890s, chemistry was taught in Serbian high schools based on outdated theories with incomplete nomenclature, many incorrect formulas and terms. Sima Lozanić participated in formulating the modern chemistry programme adopted in 1882, which covered the crucial aspects of general, inorganic, and organic chemistry and was based on modern, newly adopted theories. Just as the year 1872 marked a turning point in higher education with the arrival of Sima Lozanić, the year 1882 marked the beginning of modern chemistry teaching in high school.

In 1895, Lozanić authored the first modern chemistry textbook for secondary schools. Already in 1897 the textbook saw its second edition, with several additional editions following in 1903, 1910, 1921, and 1925. In the introduction to the first edition of the textbook, he wrote: "Striving to

present this complex science to young students in a sufficiently clear form, I tried to derive all chemical concepts from experiments." In addition to modern content that followed the development of science worldwide, Lozanić also included material specific to our country into the textbooks. For instance, in the edition published after the First World War in Vienna, in 1921, he devoted 38 out of 120 pages to agricultural chemistry, considering that it was necessary to first develop agriculture in a war-devastated country. The last chapter in this textbook is entitled "How Can We Improve Our Agriculture?"

Lozanić advocated for modern and professional nomenclature and terminology in secondary schools, opposing the prevailing trend among most high school teachers to Serbianise professional terms, such as writing elements with the suffixes *ij*, *ija* or *ije* (for instance, "natrij", "natrija" or "natrije", instead of "natrijum") and using adjective form for compounds ("kalcijski hlorid" instead of "kalcijum-hlorid", "gvožđani sulfat" instead of "fero-sulfat"). When naming compounds, Lozanić adhered to international nomenclature, often appending the suffixes "-um" or "-jum" to element names ("natrijum", "kalijum"). He particularly opposed the Serbianisation of scientific terms. Through his textbooks, numerous professional articles and reviews of papers and textbooks, he succeeded in establishing a scientifically-based terminology and nomenclature that is now considered the basis of our chemical language.



Notification by which the Minister of Education, St. Novaković, appoints Sima Lozanić as a member of the examination board for Professor Marko Leko's academic examination in the field of chemistry (inorganic and organic) with chemical technology and mineralogy with geology, 1882
(Faculty of Chemistry, Belgrade)

A glass retort
(Faculty of Chemistry, Belgrade)

Sima Lozanić's textbook for secondary schools, sixth edition, 1925
(Faculty of Chemistry, Belgrade)

Смеша хлората и пиролузита греје се у реторти *a* (сл. 27), а ослобођени кисеоник води се под цилиндар *C*, или у гасометар. Фабрички се произ-
води кисеоник дести-
ловањем згушнутог
ваздуха, при чему пре-
лази прво азот, затим
кисеоник. Електроли-
зом воде поред содс
добива се водоник и
кисеоник. У гвоздене
бомбе сабијени ки-
сеоник (до 250 атмо-
сфера) долази у трговину. Водонично-кисеонични пламен упо-
требљен је за јача загревања (сл. 24).

Сл. 27.

Обични кисеоник. Овако се добива обични кисеоник, који је гас без боје, без укуса и без мириса; згушнути кључа на — 180°, а смрзнути топи се на — 218°. Сви се елементи, сем флуора, једине с кисеоником, грејући овамо. Једни се елементи једине с кисеоником и на обичној температури, као натријум, фосфор и други; а неки тек при грејању, као гвожђе, угљеник и други. Једна се тела оксидују лагано, а друга се запале и лоју. Тако фосфор се на ваздуху дими, јер се оксидује лагано; кад се, пак, смлаченим стакленим прутићем дирне, запали се. Живље горе тела у кисеонику, но у ваздуху, где је кисеоника са пет запремина азота помешан. Зато жишка на ваздуху тиња, а у кисеонику плане; усијано гвожђе не може у ваздуху горети, а у кисеонику гори, бацајући варнице.

У ваздуху, који има кисеоника, водоник може горети, а кисеоник не може. У водонику, пак, кисеоник може горети, а водоник не може. То ће показати овај оглед. У изврнути балон пролази јача струја водоника, и запаљен је на грлићу. Кроз тај пламен увучена је у балон цев, на коју истиче слабија струја кисеоника, и он гори у водонику с пламеном.

Узимање кисеоника оксидима назива се редукцијом; то врше она тела, која имају јак афинитет према кисеонику, као: водоник, угљеник, натријум, алуминијум, магнезијум, итд. То ће показати овај оглед. У стакленој кугластој цеви загрејан је цинк оксид бакра (CuO) у струји водоника (сл. 28), и он ће од редуковање бакра почрвенити, а цев ће се од нагрејане воде овлажити. Ту је био овај хемизам:

$$CuO + H_2 = H_2O + Cu$$

Према интензивности спектара елемената васионских тела, ... се да количине њихових елемената стоје према земаљским ... овој сразмери:

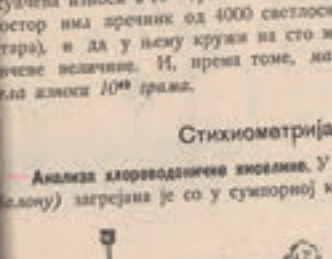
	Si	Na	Mg	Al	C	Ca	Fe	K
Сунчева маса	6	6	4	4	3·6	3	2·5	0·1
Земља има	16	2	0·4	5	0·2	1·5	1·5	1

На Земљу падне годишње на 20.000 тона метеорита, ... Сунце падне их преко 300 милијарди тона, а и на остала ... васионска тела падне их по толико. Али васионска тела у свом ... кретању губе од своје материје, вероватно толико, колико ... и метеорити добијају. *Материја кружи, дакле, међу васионским телима.*

Према рачуну астронома, земљина маса износи $6 \cdot 10^{27}$ грам ... сунчева износи $2 \cdot 10^{33}$ грама. Она цене, да васионски звездани ... простор има пречник од 4000 светлосних година ($4 \cdot 10^{16}$ кил... метара), и да у њему кружи на сто милиона звезда просечне ... сунчеве величине. И, према томе, *материја свију васионских тела износи 10^{55} грама.*

Стихиометрија.[1])

Анализа хлороводоничне киселине. У округлом стакленом с... балону) загрејана је со у сумпорној киселини, па на одво... цеи одлази безбој... пушљива, загушљива ... води раствори гас ... 4), зван *хлороводонична киселина*. Тај раст... киселог је укуса и ... ветни лакмус претв... у црвени. У двокр... стакленој цеви (сл. ... са електродама при... изложен је тај рас... хлороводоничне ... дине (помешан са 9 ... засићеног соног ра... ра) дејству електр...



Сл. 4.

...трује, па се на негативном полу (*катоди*) развија безбо... ...ишљав гас; а на позитивном полу (*аноди*) течност пожу... ...лос неког времена развија се зеленкаст загушљив гас.

[1]) Од грчких речи: στοιχεῖον, елемент; и μέτρον, мерити.

Hofmann's apparatus for electrolysis
(Faculty of Chemistry, Belgrade)

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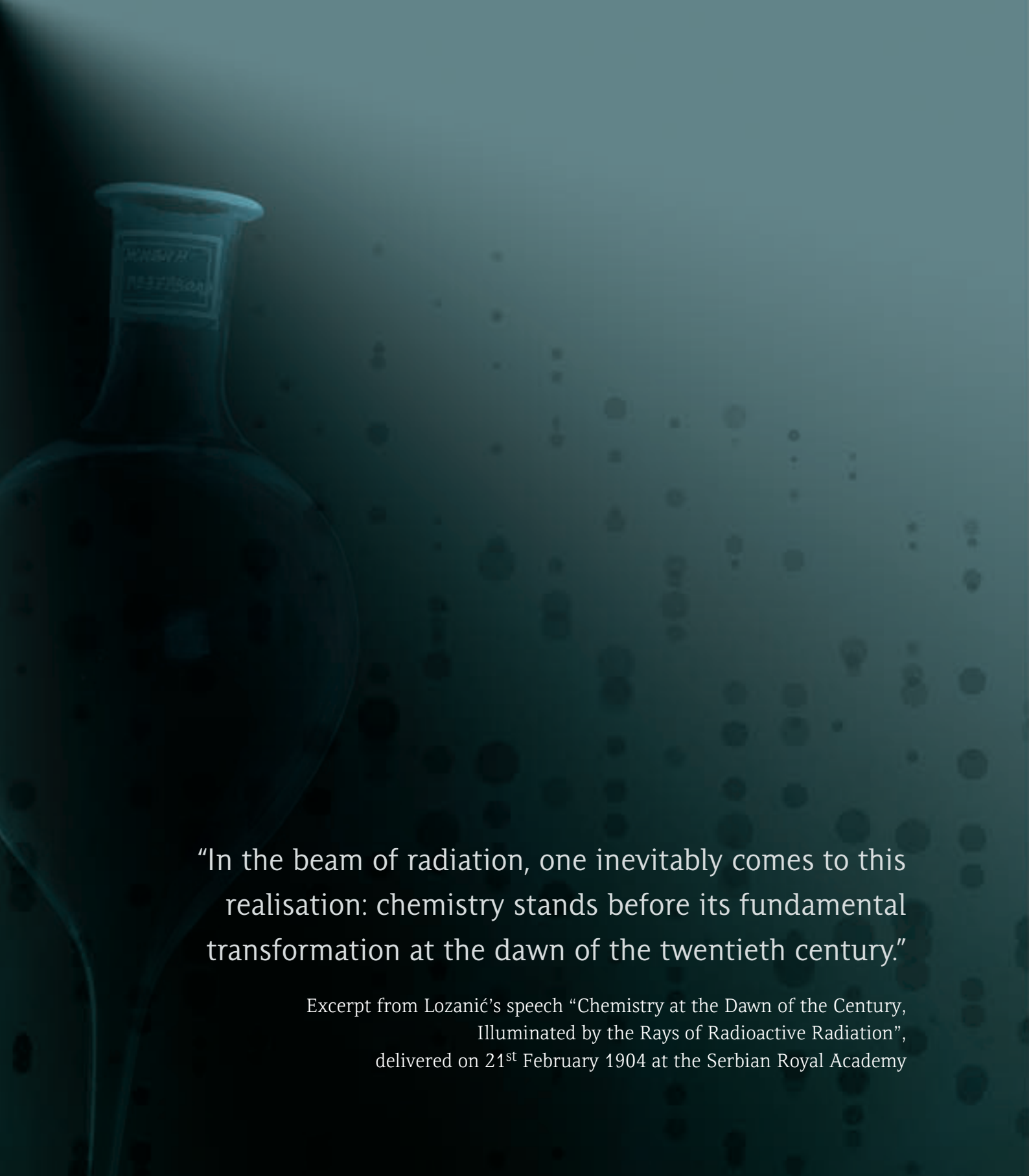
није запаљив. Тај се гас раствара у води нешто мало, бојени је жуто, зато се јавља тек онда, кад се течност њиме засити. Катодни гас назван је *водоник**) по томе, што га има у води; а анодни гас је назван *хлор***) по боји. Водоник и хлор елементи су. Ова помоћу електричне струје извршена анализа, звана *електролиза*, показала је: *да хлороводонична киселина има водоника и хлора*, па отуда јој име.

Сл. 5. Сл. 6. Сл. 7.

Кад се при овој електролизи хлор престане растварати, треба заврнути славине на оба крака, па ће се у обадва накупити једнаке запремине водоника и хлора. И, по томе, *хлороводонична киселина има једну запремину водоника и једну запремину хлора.*

Синтеза хлороводоничне киселине. Смеша водоника и хлора пуцне, кад се запали или се изнесе на сунце, градећи загушљив бео дим хлороводоничне киселине. *Из водоника и хлора постаје, дакле, хлороводонична киселина.* Огледом је утврђено: *да једна запремина водоника и једна запремина хлора дају, кад се сједине, две запремине хлороводоничне киселине.*

*) [illegible]



"In the beam of radiation, one inevitably comes to this realisation: chemistry stands before its fundamental transformation at the dawn of the twentieth century."

Excerpt from Lozanić's speech "Chemistry at the Dawn of the Century, Illuminated by the Rays of Radioactive Radiation", delivered on 21st February 1904 at the Serbian Royal Academy

Academy of Sciences

SIMA LOZANIĆ WAS ACTIVE IN THE SERBIAN LEARNED SOCIETY AND the Serbian Royal Academy for more than half a century. He became a member of the Serbian Learned Society in 1873, at the age of 26, and a member of the Serbian Royal Academy in 1890, at the age of 43. He was president of the Serbian Royal Academy twice (1899 and 1903). Through his scientific work, papers, and lectures, Lozanić belongs to those scholars who significantly contributed to the scientific progress of the Serbian Royal Academy during this period. He presented most of his papers at meetings of the Department of Natural and Mathematical Sciences (1874–1879), the Board for Natural and Mathematical Sciences (1877–1889) and meetings of the Academy of Natural Sciences (1894–1922). He published 27 papers in the *Gazette of the Serbian Learned Society* (SLS), and 18 papers in the *Voice of the Serbian Royal Academy* (SRA). Scientific papers, which he simultaneously published in both domestic and foreign journals, were first presented at the Academy. Often, it took a long time for a paper to be published, which is why papers sometimes appeared in a foreign journal after a year or more before being published first in a foreign journal and then in the *Gazette of the SLS* or *Voice of the SRA*, but they always carried a note indicating that they were presented at a session of the Serbian Learned Society or the Serbian Royal Academy.

Lozanić was elected a member of the Serbian Learned Society in 1873, having already published several papers in *Chemische Berichte*, one of the most renowned chemical journals of that time. Following his election, Lozanić regularly presented his papers at the SLS meetings. As the sole chemist in Serbia, but also one of the few "natural scientists", he was tasked with evaluating papers submitted to the SLS for publication in the field of chemistry, as well as other natural sciences. At the beginning of 1883, when the Fifth Committee of the Serbian Learned Society (Committee for the Spread of Science and Literature among the People) was established, Sima Lozanić was entrusted with overseeing "national science", i.e. examining mineral waters, coals, and minerals in Serbia. In January 1886, the Board for Natural

and Mathematical Sciences (First Board of the SLS) elected Lozanić as its president. He remained in that position until 1890. He was also a member of the Supervisory Board of the SLS, and participated in the submission of annual and periodic financial reports of the SLS.

After the founding of the Serbian Royal Academy in 1886, the first 16 academicians were appointed by the decree of King Milan Obrenović, and from the following year onward, the members of the Academy were elected by the academicians themselves. Sima Lozanić became the first member of the Academy to be elected in this manner on the 6th of January 1890, following the death of the previous president Jovan Ristić. Lozanić was president of the Serbian Royal Academy twice (1899 and 1903). The first presidency lasted briefly and there was no time for major activities. After a few months, in March 1900, he resigned in order to be elected as a deputy in Great Britain. His words were noted in the minutes of that meeting at the Academy: "Deeply regretting that my new duties in state service require me to leave Belgrade, I had to resign from my position in the Academy, a position most suitable for someone engaged in science. Rest assured that even during this short time of holding the presidential duties, I invested all my efforts for the progress of the Academy. I am grateful to my colleagues who wholeheartedly supported me in my endeavours. As I depart for some time from the Academy, I wish it continued even greater and bigger successes."

He was elected president of the Academy for the second time in 1903 and held that position until 1906. He delivered his academic lecture titled *On Aromatic Dithiocarbamates* on the 4th of November 1890. Similar to his duties in the Serbian Learned Society, Lozanić immediately engaged in the work of the Serbian Royal Academy. Now as a mature and recognised scientist, he assumed not only research responsibilities but also ceremonial tasks, such as recommending the selection and promotion of new academicians, delivering speeches at important events, and the like.

As the president of the Serbian Royal Academy, Lozanić deliverd a speech titled *Chemistry at the Dawn of the 20th Century, Illuminated by the Rays of Radioactive Radiation*, at a formal gathering on the 21st of February 1904, which was also attended by King Petar. In his lecture, he presented the latest works on the structure of atoms and newly discovered phenomena, outlined newly established hypotheses, along with his opinion on certain issues. At that time, he himself began to examine the phenomenon of radioactivity and incorporated his personal views, doubts, and hypotheses into the lecture. The formal gathering coincided with the celebration of the

centenary of the First Serbian Uprising, so Lozanić also referred to this important historical event at the beginning of his speech.

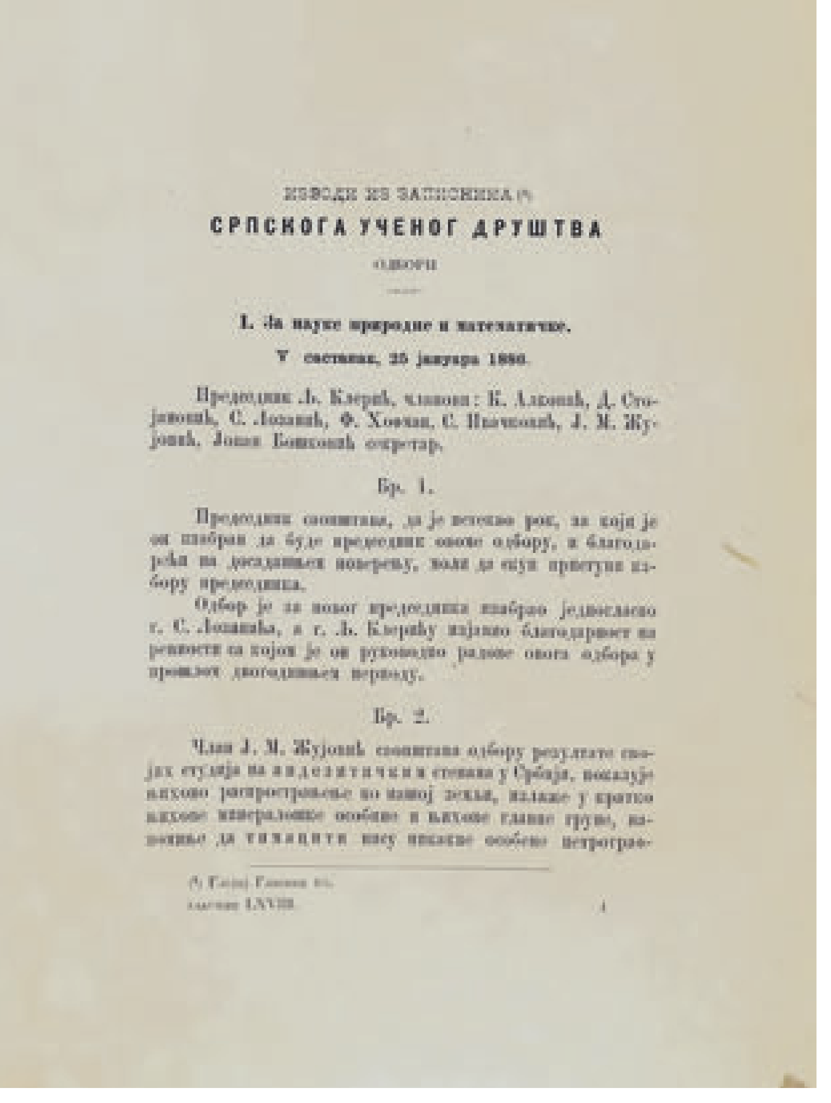
He was elected secretary of the Academy of Natural Sciences for the first time on the 10th of January 1896, and re-elected in 1897, 1914, 1915, 1920, and 1922. In that position, he assumed numerous duties. At almost every session, he presented his papers or the work of other members, evaluated papers submitted to the Academy for publication, proposed new members of the Academy, and so on. Even while serving as the minister plenipotentiary of the Serbian government in London (1900–1902), Lozanić reported on articles submitted to the Academy.

In January 1904, as president of the Academy, Lozanić proposed D. I Mendeleev for membership. In February 1934, due to his old age and illness, Lozanić could not attend the celebration dedicated to Mendeleev, but sent a letter to the president of the Academy in which he greeted the participants of the ceremony.

Through his professional and scientific work, papers, and lectures, Lozanić joined those who were most responsible for the Academy's very fruitful scientific results during that period.

After the First World War, upon the suggestion of the then-president of the Academy, Jovan Cvijić, and academician Mihailo Petrović-Alas, it was decided that the Academy would participate in the celebration of the fiftieth anniversary of Sima Lozanić's scientific work in November 1922. President Jovan Žujović was chosen to extend greetings on behalf of the Academy. At Žujović's suggestion, it was decided to commission a bas-relief with Lozanić's portrait for the occasion, and Uroš Predić was tasked with painting his portrait in oil. During the celebration, attended by the king, the patriarch, the prime minister, the minister of education, the president of the Academy of Sciences, and the rector of the University, Lozanić was bestowed with an honorary doctorate from the Faculty of Philosophy of the University of Belgrade. Additionally, a memorial book commemorating the fiftieth anniversary of Sima M. Lozanić's work, edited by his friends and admirers, was presented. Published in Belgrade in 1922 and totaling 367 pages, the book included contributions from over 50 scientists from Serbia, as well as several from Zagreb and Ljubljana.

At the funeral of Sima Lozanić, Bogdan Gavrilović, the president of the Academy, bid farewell to him on behalf of the Academy, and laid a wreath with the inscription "To the worker without equal and the first knight of our science." The eulogy was read at the Academy gathering on the 6th of March 1936.



ИЗВОДИ ИЗ ЗАПИСНИКА (*)

СРПСКОГА УЧЕНОГ ДРУШТВА

ОДБОРИ

I. За науке природне и математичке.

V састанак, 25 јануара 1888.

Председник Љ. Клерић, чланови: К. Алковић, Д. Стојановић, С. Лозанић, Ф. Хофман, С. [illegible], Ј. М. Жујовић, Јован Бошковић секретар.

Бр. 1.

Председник саопштава, да је истекао рок, за који је он изабран да буде председник овоме одбору, и благодарећи на досадашњем поверењу, моли да скуп приступи избору председника.

Одбор је за новог председника изабрао једногласно г. С. Лозанића, а г. Љ. Клерићу изјавио благодарност на ревности са којом је он руководио радове овога одбора у прошлом двогодишњем периоду.

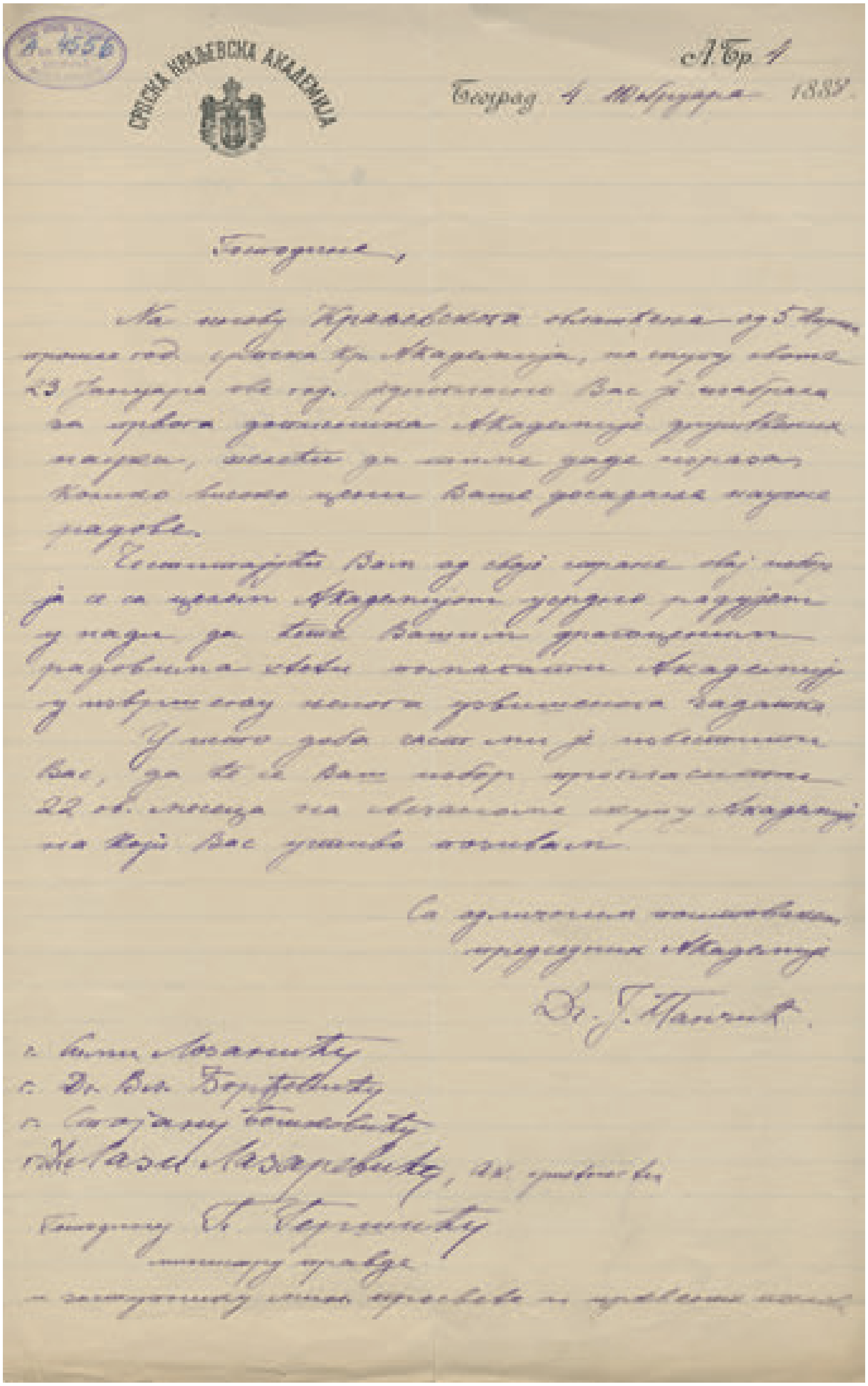
Бр. 2.

Члан Ј. М. Жујовић саопштава одбору резултате својих студија на андезитичким стенама у Србији, показује њихово распрострањење по нашој земљи, излаже у кратко њихове минералошке особине и њихове главне групе, напомиње да [illegible] нису показале особено петрогра-

(*) Гласник [illegible]
свеска LXVIII 1

Excerpt from the minutes regarding the election of Sima Lozanić as the President of the Board for Natural Sciences and Mathematics of the Serbian Learned Society, 25th January 1888
(SASA Archives)

Notification from Josif Pančić, President of the Serbian Royal Academy, informing Lozanić that he was elected a corresponding member of the Serbian Royal Academy at the Academy's session on 23rd January 1888
(SASA Archives)



СРПСКА КРАЉЕВСКА АКАДЕМИЈА

Л. Бр. 1

Београд 4 Фебруара 1888.

Господине,

Са одличним поштовањем
председник Академије
Др. Ј. Панчић

Sima Lozanić, 1918
(SASA Library)

Sima Lozanić's inaugural academic lecture delivered on the 4th of November 1890
(Faculty of Chemistry, Belgrade)

КРАЉЕВСКА СРПСКА АКАДЕМИЈА

ГЛАС

XXVII.

О АРОМАТИЧНИМ ДИТИОКАРБАМАТИМА.

од

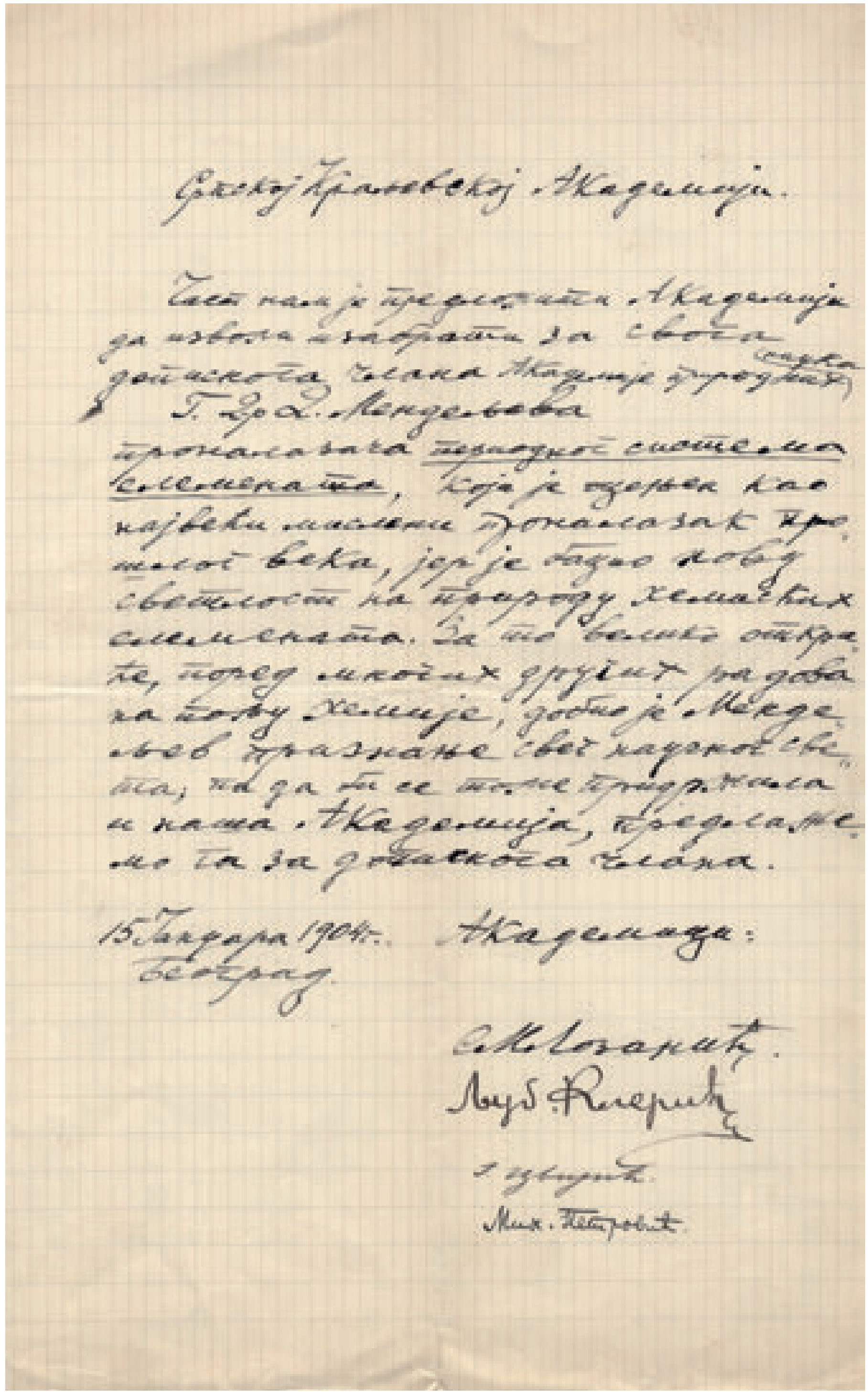
С. М. Лозанића

Саопштено у свечаној седници Академије 4. Новембра 1890.

У БЕОГРАДУ

У српској краљевској државној штампарији

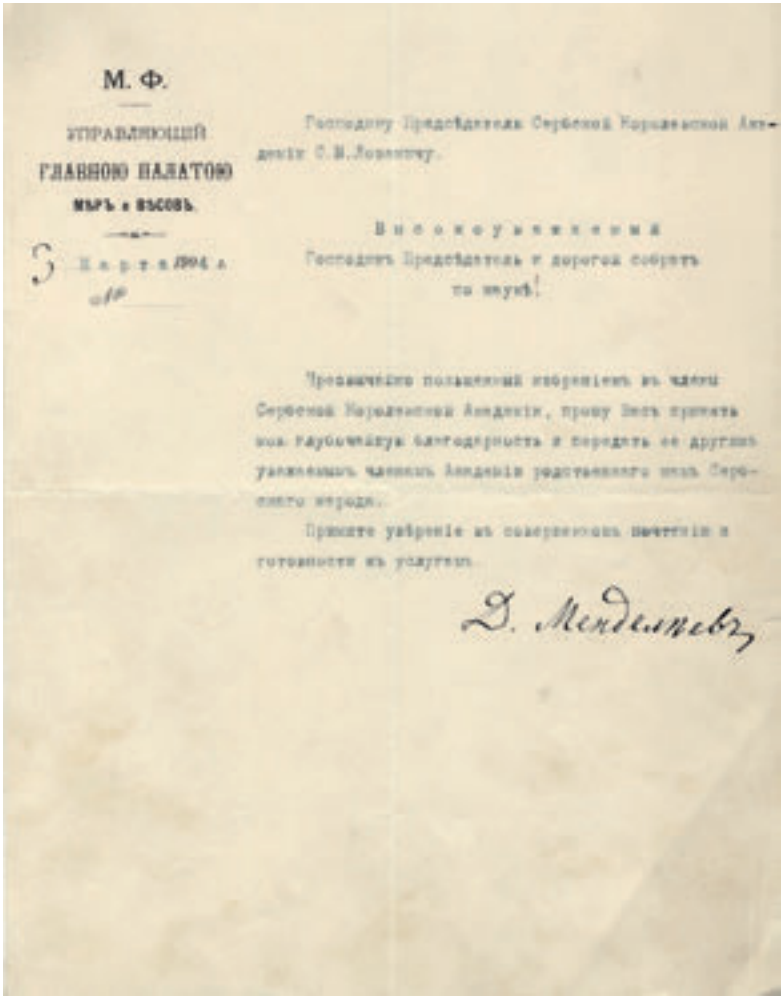
1890


Српској Краљевској Академији.

Част нам је предложити Академији да изволи изабрати за свога дописнога члана Академије природних наука
Г. Др. Д. Мендељејева
проналазача периодног система елемената, који је оцењен као највећи мисаони проналазак прошлог века, јер је бацио нову светлост на природу хемијских елемената. За то велико откриће, поред многих других радова на пољу хемије, добио је Мендељејев признање свег научног света, па да би се томе придружила и наша Академија, предлажемо га за дописнога члана.

15 Јануара 1904. Академици:
Београд.

С. М. Лозанић.
Љуб. Клерић
Ј. Цвијић.
Мих. Петровић.



М. Ф.

УПРАВЛЯЮЩІЙ
ГЛАВНОЮ ПАЛАТОЮ
МѢРЪ и ВѢСОВЪ.

Господину Председателю Сербской Королевской Академіи С.М.Лозаничу.

Высокоуважаемый
Господинъ Председатель и дорогой собратъ
по наукѣ!

Чрезвычайно польщенный избраніемъ меня членомъ Сербской Королевской Академіи, прошу Васъ принять мою глубочайшую благодарность и передать ее другимъ уважаемымъ членамъ Академіи представителямъ этого Сербскаго народа.

Примите увѣреніе въ совершенномъ почтеніи и готовности къ услугамъ.

Д. Менделѣевъ

Mendeleev expresses his gratitude to Lozanić for the report on his election as a member of the Serbian Royal Academy, 3rd March 1904 (SASA Archives)

Proposal by the academicians Sima M. Lozanić, Ljubomir Klerić, Jovan Cvijić, and Mihailo Petrović for the election of D. I. Mendeleev as a corresponding member of the Serbian Academy of Sciences, 15th January 1904 (SASA Archives)

СПОМЕНИЦА

ПЕДЕСЕТОГОДИШЊИЦЕ ПРОФЕСОРСКОГ РАДА

С. М. ЛОЗАНИЋА

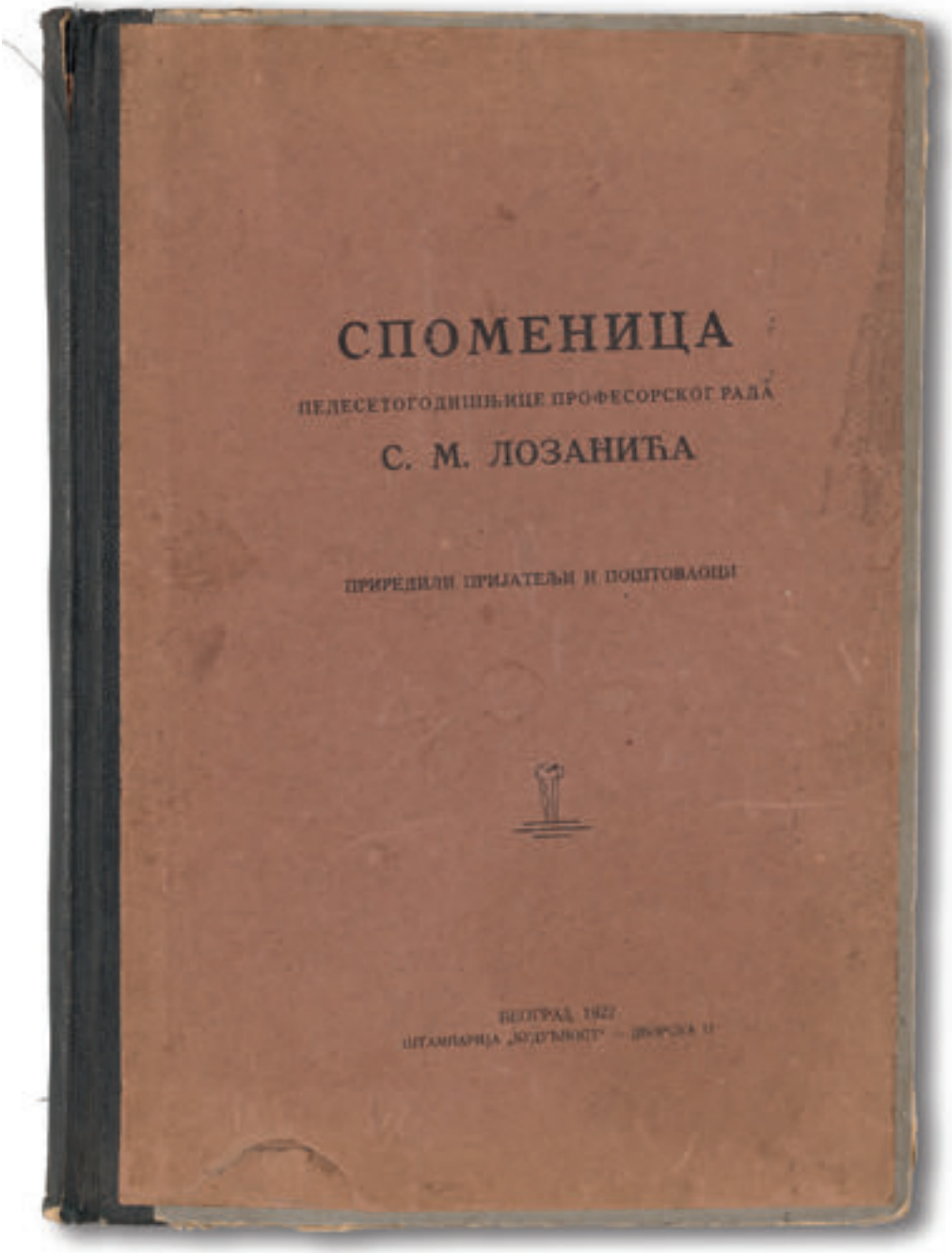
ПРИРЕДИЛИ ПРИЈАТЕЉИ И ПОШТОВАОЦИ

БЕОГРАД 1922
ШТАМПАРИЈА „БУДУЋНОСТ" — ДВОРСКА 17

СИМА М. ЛОЗАНИЋ

С. М. Лозанић рођен је у Београду 1847 год. Основне школе учио је у Кладову, Параћину и Београду, а гимназију у Неготину, Зајечару, Београду и Крагујевцу. У Великој Школи у Београду свршио је правнички факултет 1868 год., где је хемију учио код М. Рашковића, а јестаственицу код Ј. Панчића. Затим је продужио студије из хемије у Цириху код Ј. Висличенуса и у Берлину код В. А. Хофмана. Г. 1872 поверена му је на Великој Школи катедра хемије и хемијске технологије. На том месту остао је до 1894 год. Затим је био једно кратко време посланик у Лондону и министар спољних послова, а у неколико махова министар привреде. Као министар привреде израдио је двадесет основних привредних закона, од којих је неке саставио он лично. Овај законодавни рад био је од великог значаја за унапређење наше привреде. Г. 1905 С. Лозанић је постављен за редовног професора београдског универзитета и за председника привременог универзитетског савета који је имао да изабере прве универзитетске наставнике. Он је дао доказа правог родољубља у рату против Турака 1876 год. У том првом рату потпао је торпеде на доњем Дунаву и намештао мине у тимочко-моравској војсци. У другом рату вршио је дужност управника тополивнице у војној фабрици у Крагујевцу. У истраживању и отварању живиног рудишта на Авали имао је удела својим хемијским радом, којом је приликом открио све минерале тог рудишта и пронашао је нови минерал „авалит", тог верног пратиоца наших живиних руда. Тополивницу тог рудника засновао је пећњака своје конструкције и управљао је њоме.

С. Лозанић је био: председник Српске Краљевске Академије, ректор Велике Школе и Универзитета, председник



A Memorial Book on the Occasion of Sima Lozanić's Fiftieth Work Anniversary, Edited by His Friends and Admirers, Belgrade 1922
(Faculty of Chemistry, Belgrade)

Jovan Žujović's address of welcome on behalf of the Serbian Royal Academy,
on the occasion of Sima Lozanić's fiftieth work anniversary, 1922
(Faculty of Chemistry, Belgrade)

Sima Lozanić with colleagues and students in the laboratory, to the right of Lozanić is Persida Ilić,
his first assistant in Chemistry, standing behind Lozanić is his son Milivoje Lozanić,
in the third row from the right is the assistant Vukić Mićović, 1922
(Faculty of Chemistry, Belgrade)

И најкраћи преглед свију њег
било би тешко учинити свако
међу нама, да их није он сам бри
купио и пописао. Издања наши
Српске и Југословенске и претход
ског Ученога Друштва, украше
стручних хемијских радова Г. С.
ван тога он је публиковао још
расправа, чланака, уџбеника итд.
бројеви казују, да педесет годи
вања нашега свечара предста
година живота испуњенога велик
радом, који је стекао — како с
и види — свеопште велепштова

Оригинални хемијски радов
јесу поглавито из области Ана
и Електро-Хемије.

Међу првима се највише и
доприносе хемијскоме познава
у Српској Земљи. То су њего
многих минералних и обичн
анализе оних специфично с
и анализе скоро свега фосил
ских угљишта. Сви који знај
струку важност оваквих ана
нићу навек захвални за ове
прилоге Српској Науци.

Међ многобројним други
вима, истиче се велики бро
којима се, како стручњаци кажу,
рова и оригиналност и велика умешност.

Ј. М. ЖУЈОВИЋА

Поздравна реч на прослави педесетогодишњице научнога рада

СИМЕ ЛОЗАНИЋА

28. Новембра 1922 год.

И Српска Краљевска Академија дугује своме бившем председнику Г. Сими Лозанићу повелики данак признања; па је на предлог свога садашњега председника Г. Цвијића мене одредила, да му бар један део тога дуга поднесем овде пред скупом који прославља пола столећа његова истрајнога рада на науци и на универзитетској настави. Рад је његов толико разноврстан и опсежан да је оправдано што га овде сада поздрављају и приказују неколики говорници. Ови које чусте и које ћете чути смањују и олакшавају мој задатак; те ја треба само по неколико речи да изговорим о појединим сферама рада нашега друга, који тако дуго, високо и поносно носи заставу Српске Науке.

решења извесних
хипотезама које могу помоћи
нових истина.

"A nation with no industries lacks the most important condition for its material and moral progress, as well as its political independence."

Excerpt from the printed text *Call to the Serbian People* from 1874

Economy

LOZANIĆ WAS NOT ONLY A UNIVERSITY PROFESSOR, ACADEMIC AND scientist; as usually stated in his biographies; he was also an economic expert without formal qualifications, who successfully solved many agrarian and economic problems.

At the dawn of the 20th century, when he fervently advocated for the establishment of an agricultural faculty, many farmers reproached him for dealing with a field for which he was not competent. Lozanić himself explained this domain of his work: "First and foremost, I want to declare that I have been paying attention to agricultural chemistry throughout my entire life. Upon graduating from the Great School in 1868, I not only requested from the Minister of Education to send me abroad to study agricultural chemistry, but I have continuously engaged with that discipline ever since, contributing through research work and publications. A man, whose profession is chemistry, and who has invested forty years to following advancements in agricultural chemistry, can rightfully claim to possess substantial knowledge in that science." Citing the significant achievements of chemists in agriculture, he concluded that it was precisely chemists who had "transformed the country's economy and that they are the greatest workers in agricultural sciences".

Since his youth, Sima Lozanić had been engaged in economic issues with the goal of enhancing the economy and fostering industrial development in order to bring Serbia into the ranks of developed European countries. Immediately upon returning to Belgrade from his studies in Switzerland and Germany in the 1870s, he took the first steps with great enthusiasm in the fight for the industrialisation of the country. He organised a committee, which he chaired, with the task of establishing the first sugar factory in Serbia. However, this initial attempt failed due to inadequate laws and the public's unpreparedness for large investments in untested institutions.

After the failed campaign to establish the sugar industry, Lozanić had been preparing for years to solve the country's economic issues. In professional and popular articles, he informed both experts and the general public

about the importance of utilising domestic raw materials and reducing the import of foreign products. He emphasised the need to modernise agriculture and the economy and the importance of establishing necessary institutions, as well as preparing experts for the country's future industry. In the rector's speech of 1891, under the title "Does Our Industry Respond to its Own Call?", Lozanić presented a comprehensive programme for the future economic development of the country, highlighting its basic resources and the directions of the future industrial development, laws that should protect the beginning of industrialisation, training of personnel for the industry, and so on.

A few years later, outside the Great School and without a chemical laboratory, engaged in political tasks or serving as a minister at disposal, Lozanić advocated in various ways for the improvement of Serbian agriculture. At the beginning of the 20th century, he promoted, both theoretically and practically, the use of artificial fertilisers, that had been successfully utili-sed in developed European countries. Initially, he tried to educate the professional community through speeches and professional and popular articles. However, lacking like-minded individuals among farmers, in 1903 and 1904 he organised the execution of vegetation experiments in Serbia, conducting them in the vicinity of Belgrade, following instructions that he himself authored.

Lozanić's most significant success in solving economic challenges was the adoption of modern economic laws at the end of the 19th century. As Minister of Economy in 1897, he enacted a dozen laws that modernised and bolstered the Serbian economy, and the law on supporting domestic industry enabled the industrialisation and rapid development of Serbia from the late of the 19th century until the First World War.

Upon the establishment of the University of Belgrade in 1905, which was intended to house the Department of Agriculture within the Faculty of Philosophy, Lozanić advocated for its establishment for several years. Due to disagreements between the university authorities and the Ministry of Economy, and at times even the Ministry of Education, as well as resistance from agricultural experts, the issue of establishing the Agricultural Department remained unresolved until the First World War. Considering the Department of Agriculture necessary for addressing agricultural issues at a scientific level, and for training highly qualified experts, Lozanić wrote numerous articles, several reports, visited the most renowned agricultural schools, and drafted a plan and programme for the future Faculty of Agriculture.

We may wonder why Lozanić, a scientist and academician, delved into economic issues. The answer can be summarised in two words: patriotism and love. He aspired to see his country as one of the developed European countries where he had received his education. Through his articles and books, it becomes evident that he saw Serbia as a modern country achieving that status through advanced intensive agriculture, utilisation of domestic resources, development of different branches of the economy, and finally, through intensive industrialisation. Although some of his endeavours were not successful, primarily due to his economic laws, by the early 20th century, the country succeeded in emerging from backwardness and advancing at a fast pace, striving to reach the level of developed European countries, just as Lozanić had desired and said.

Efforts to industrialise Serbia – Sugar Factory

As a young professor in 1873–1874, Lozanić examined the conditions for growing sugar beet. Finding the country's conditions favourable, and considering that such an important branch of industry should not be in foreign hands, he founded the Committee for the Manufacture of Sugar with headquarters in the Chemical Laboratory of the Great School.

The tasks of the Sugar Manufacturing Company are listed in the Committee's Statute:

The intention of this company is to promote the growth of this branch of industry by manufacturing sugar, thereby enhancing the economic conditions of the country.

With this goal in mind, the Commettee is currently establishing one sugar factory, and later, if possible, it will establish more based to the needs of our people and surroundings areas.

This first factory is being established in Paraćin for the time being.

In the autumn of 1874, the Committee sent an invitation to all reputable householders and merchants in Serbia to register in a joint stock company for the construction of the first sugar factory in Serbia. Several letters have been preserved in which prospective shareholders applied to the Committee or reported the number of shareholders in their district. However, due to the insufficient response from the shareholders, unfavourable laws and immature conditions, i.e. an unprepared public for the industry's development, the Committee stopped working after less than a year. They decided to halt their activities "until the Serbian public is better convinced that it is a matter of life for them to take care of their own industry and not to leave that concern to foreigners".

Programme of Overall Development of the Country

After the failed attempt to launch the sugar industry, Lozanić spent years preparing to solve the country's economic issues. In his rector's speech from 1891, entitled "Does Our Industry Respond to Its Own Call?", he presented a comprehensive programme for the future economic development of the country, pointing out the basic resources and directions for future industry development, laws that should protect the beginnings of industrialisation, the training of personnel, and so on.

Claiming that in the developed world, handicraft production had given way to factory production, while in our country crafts still remianed the main pillar of the industry, he concluded that economic salvation "lies only in our future large-scale industry". He believed that large-scale industry "should be initiated by establishing factories for the production of candles, soap, leather, carpentry, paper, sugar, wine, cement, glass, stone and similar products". He also criticised some failures in earlier directions of economic development: "If, by some stroke of luck, the money collected in Majdanpek had been invested in enterprises like this, we would now have a series of factories, that would meet our most urgent needs, hence a lot of products would no longer be imported from abroad, and much of what pertains to the field of agriculture would be improved."

He recommended the opening of vocational schools so that the youth could be educated in the sciences needed by the economy and new technology: "There are thousands of students in our schools, and all that intelligent youth is directed exclusively towards clerical careers (...) While our bureaucracy is full of intelligent young people, our economic sector craves intellectual strength due to the lack of educational institutes for agriculture and industry."

The seriousness with which Lozanić prepared to help solve the country's basic economic problems is also evidenced by the mention of laws that would protect and help the development of domestic industry, which he enacted only a few years later as Minister of Economy: "The state should, above all, enact laws that will ensure real assistance and protection for our industry. This support will require certain sacrifices from both the state and the people, but they will be quickly compensated by the prosperity of our national economy."

This Lozanić's speech presents him not only as an expert in economic and business conditions in the country, but also as an expert ready to take part in creating the conditions for the progress of all branches of the economy, above all modern industry.

Artificial Fertilisers

At the beginning of the 20th century, outside the Great School, Lozanić spent most of his time working on the improvement of Serbian agriculture. Considering that agriculture in Serbia is irrational and extensive, he advocated the introduction of artificial fertilisers, which, in European countries, yielded several times more crops compared to Serbia: "According to the Statistical Yearbook, the average wheat harvest in the entire country is only 1,000 kilograms per hectare (…). There are Western countries that achieve an average of over 30 loads of wheat per hectare per year. The poverty of our harvest indicates that our lands are exhausted and that our country is underdeveloped."[2]

Lozanić wrote over 20 articles advocating for the introduction of artificial fertilisers. In 1903, due to the resistance of farmers to the new type of soil fertilisation, Lozanić established the Committee for Conducting Vegetation Experiments. On that occasion, he issued "Instructions" in which he provided accurate information on the timing of fertiliser application, crop sowing, crop growth monitoring methods, harvesting schedules, the maintenance of a meteorological conditions diary, the procedure for sending crop samples for analysis to determine increase in yield, and he personally prepared vegetation experiments in the vicinity of Belgrade.

In 1903, around 60 tests were conducted on 270 plots of grain, meadows, clover fields, plum orchards and vineyards. Nitrogen, phosphate and potassium fertilisers were utilised. Based on the data collected, Lozanić published Reports on Experiments with Artificial Fertilisers in Serbia in 1903 (71 pages). The following year, a large number of new experiments were conducted under his leadership, based on which he wrote a new "Report" on the experiments carried out in 1904. Based on the results of the vegetation tests, it is evident that the yield from fertilised soil is significantly higher than that from unfertilised soil, and the quality of the crop is superior. Lozanić believed that further exploration in this direction "would elevate the country to the pinnacle of modern science" and that the future Faculty of Agriculture, which, as he envisioned, would continue his work, "would transform our primitive agriculture".

Lozanić's visionary ideas were ahead of their time and were materialised much later. The Faculty of Agriculture was established after the First World War, and artificial fertilisers entered daily agricultural practices only in the middle of the 20th century.

Minister of Economy

Lozanić served as the Minister of Economy in three terms: from January to April 1894, from October 1894 to July 1895, and from October 1897 to July 1899. During the third mandate within the government led by Vladan Đorđević, he partially implemented the ambitiously designed economic programme that he outlined in his 1891 rector's speech. Through twelve laws, Lozanić laid the foundation for economic legislation, establishing the basis for the country's swift departure from economic stagnation.

The largest number of laws was related to the improvement of agriculture. The Law on Agricultural Stations mandated the establishment of an agricultural station in each district, with a district farm and a practical agricultural school whose role was to improve agriculture by its own example, advice and through educational courses. The Law on State Economists had the objective of training experts for implementing and enforcing the economic laws, providing guidance on land cultivation, meadow maintenance, fruit and vegetable cultivation, as well as the raising of livestock, poultry, bees, and silkworms. Laws addressing the improvement of fruit growing, animal husbandry, hunting, fishing, and forestry focused on enhancing these economic branches. The Law on Agricultural and Craft Cooperatives established the legal foundations for further development and progress of cooperatives. The Law on the Improvement of Fund Management granted autonomy to this institution, allowing it to address accumulated financial issues and operate as an independent financial institution. This resulted in a substantial increase in the volume of loans provided.

The most important economic law was the Law on Supporting Domestic Industry. The passing of this law enabled faster development of the industry and accelerated the application of the achievements of the industrial revolution. From the passing of the Law in 1898 until 1905, the industry almost quadrupled: from 38 companies with 1,702 workers and a total production worth 3,787,671 dinars in 1898, to 94 industrial companies with 4,730 workers and a total production value of 12,119,673 dinars in 1905. In the period leading up to the First World War, industrial production grew even faster, but the war halted any further progress.

Faculty of Agriculture

Dealing with agrarian problems throughout his life, Lozanić believed that by establishing the Faculty of Agriculture, most of these issues would be successfully resolved. Due to the efforts of Lozanić and a number of professors of the Faculty of Philosophy, the Agricultural Department of the

Faculty of Philosophy was incorporated into the Law on the University in 1905. However, the Faculty of Agriculture was founded only in 1920.

Considering the Agricultural Department necessary for the progress of the Serbian economy, Lozanić vigorously advocated for its establishment. He wrote two reviews concerning its establishment and functioning, including plans and work programmes for all four years of study and all the necessary institutions: the first review was published in 1905, immediately after the founding of the University, and the latter in 1909, after visiting the most significant European higher agricultural schools.

Propagating this idea for almost a decade, Lozanić, in addition to papers, reports and lectures, wrote about fifteen articles in which he explained the need to establish the department, asserting that "it is one of our most urgent issues (…) because the transformation of our stagnant agriculture, almost the sole source of our income, will create a material basis for the solution of all other state and national issues." In the speech delivered on the occasion of the celebration of Saint Sava's Day, titled "The Importance of Science for the Agricultural Economy", Lozanić emphasised the importance of the Agricultural Department for the development of the Serbian economy.

Lozanić faced considerable opposition, comprising fierce opponents of the agricultural faculty, primarily farmers, as well as trained experts, professional associations, and ministers of the economy. Therefore, the issue of establishing the agricultural faculty was not resolved until the First World War. After the First World War, in 1920, the Faculty of Agriculture was finally founded. Its first curriculum was formulated based on Lozanić's 1909 curriculum, but the author's name is not mentioned, nor is Lozanić's decade-long persistent struggle for the establishment of this faculty acknowledged in its memorial books.

ПОЗИВ

НАРОДУ СРПСКОМ.

Познато ће бити нашем свету из новина, да се још летос саставио један одбор од стручних људи, који ће научно испитати какви су код нас сви они услови од којих зависи успех једног врло важног индустријалног предузећа фабрикације шећера.

Тај стручни одбор као што се види из његовог штампаног извештаја, нашао је да су ти природни услови не само повољни, него још много бољи од оних где се гоје трска индустрије у другим земљама са успехом развија.

Даље тај је одбор начинио тачан прорачун шта ће коштати та фабрика, док се доведе у стање да потребну количину шећера фабрицира, па се увидело, да би наш народ много јевтиније добијао шећер из те срп. фабрике, него што га сад добија, па да опет друштво, које ту радњу предузима има толике добити колико се код нас ни на једној радњи имати не може.

Кад је све то било обзнањено и кад су за то запали страни фабриканти шећера, они су са разних страна полетели и траже код наше владе концесију за предузеће и чине велике жртве да то постигну.

Кад се узме на ум то што је науком постављено и искуством потврђено, да народ који нема никакве индустрије нема најважнијег услова за свој материјални и морални напредак и своју политичну независност, и да онај народ који није умео одржати у својим рукама бар оне гране индустрије за које има најбољих услова у својој земљи, није ничим могао осигурати своју будућност, онда ће сваки увидети штету и управо опасност за народну будућност, кад би та важна грана индустрије прешла у стране руке. Тим би начином странци скорим постали господари на нашој земљи а ми Срби њихови мењачи.

Узимајући даље на ум како те материјалне користи не само за друштво, него и цео народ тако и те опасности за будућност српску, ако те индустријалне послове прегребе странци у своје руке, сваки патриот српски пажеће ће да се ово опште корисно предузеће покрене и оствари само српском снагом и то како материјално тако и морално.

У тој цели стручни одбор овим позива све патриоте српске да приме учешће у том индустријалном предузећу од кога зависе толике благодетне последице за цео народ и његову будућност; нека сваки по могућству припомогне да се оствари народна индустрија. А да би у томе могао скоро сваки Србин учествовати, одбор мисли да акција тога предузећа не кошта више од 20 дуката, па да се и та сума уплаће постепено у 4 рате.

Истина до сад су код нас готово сва друштвена предузећа лоше среће била, што је потресло у народу поверење према тим друштвеним предузећима; али ово није каквно шпекулативно предузеће, као што су до сада била, него ово је предузеће народно индустријално кога се последица сваког корака прорачунити може.

Ако у нашем народу има довољан број људи, и још о тој ствари деле мишљење онога одбора, онда нека похитају да се што пре овом позиву одазову. Упис траје најдаље до нове године.

Ако се довољан број акционера упише, онда ће припремена стручни одбор одма по новој години позвати те акционаре на скупштину која ће прегледати све услове и предрачун, као и друштвена правила, јер је све то спремљено, па кад уради све како треба, онда ће се обратити влади да концесију на то предузеће и потврду друштвених правила. Та ће скупштина изабрати један одбор који ће управљати том радњом; он ће одредити време кад ће се прва рата положити, а остало ће се полагати према потреби.

Poziv narodu srpskom (*Call to the Serbian People*) – an invitation to shareholders to apply to the Committee for the Construction of a Sugar Factory headquatered in the Chemistry Laboratory of the Great School
(Faculty of Chemistry, Belgrade)

First sugar factory in Belgrade, 1901
(Institute for the Protection of Cultural Monuments of the City of Belgrade)

Ст. Градишка 24 Децем 1874

Почитаемы Брате и пријатељи

ваше Пријатељско дјело Са Позивом
од 12 Декем о. Г. Исам уредно Примио и из вашег
Писма Свесам точно разумио. Милопатие А и-
Свјетла нам дај вам Почетак Развитка На-
рода Србскога задосе Радујемо и Свиби Ради били
што и писмо Могућни за Народну Срећу и Будућ-
ност чинити и чинити тако
Задо Ево овде придворам Едну Позивницу и у и Свој
имате .11. уписника из Ваше вароши Мало
којеј до Едну Акцију Драговољно Примили
А даље Нисмо изостало времена као у Бања-
луки и Приједор опште узрок што у писи
драк Само до Нове Године Ако би пак остало
времена и даље у пис ваше опадби Могли и
више уписника добити Зато бидемо обзнани-
ти Сваки уписник Својим Собственим По-
дписом Подписујесе и Новци Како буде уро-
ћено поплатасе задоле
Не сумњамо вам срећ. Адако и Нову
1875 Годину желећи вам до Здравље и Срећно мир.
Раду Будете за Многогодина живили

Примите Братске поздраве

Letters from shareholders to the Sugar Manufacturing Board, 1874–1875
(Faculty of Chemistry, Belgrade)

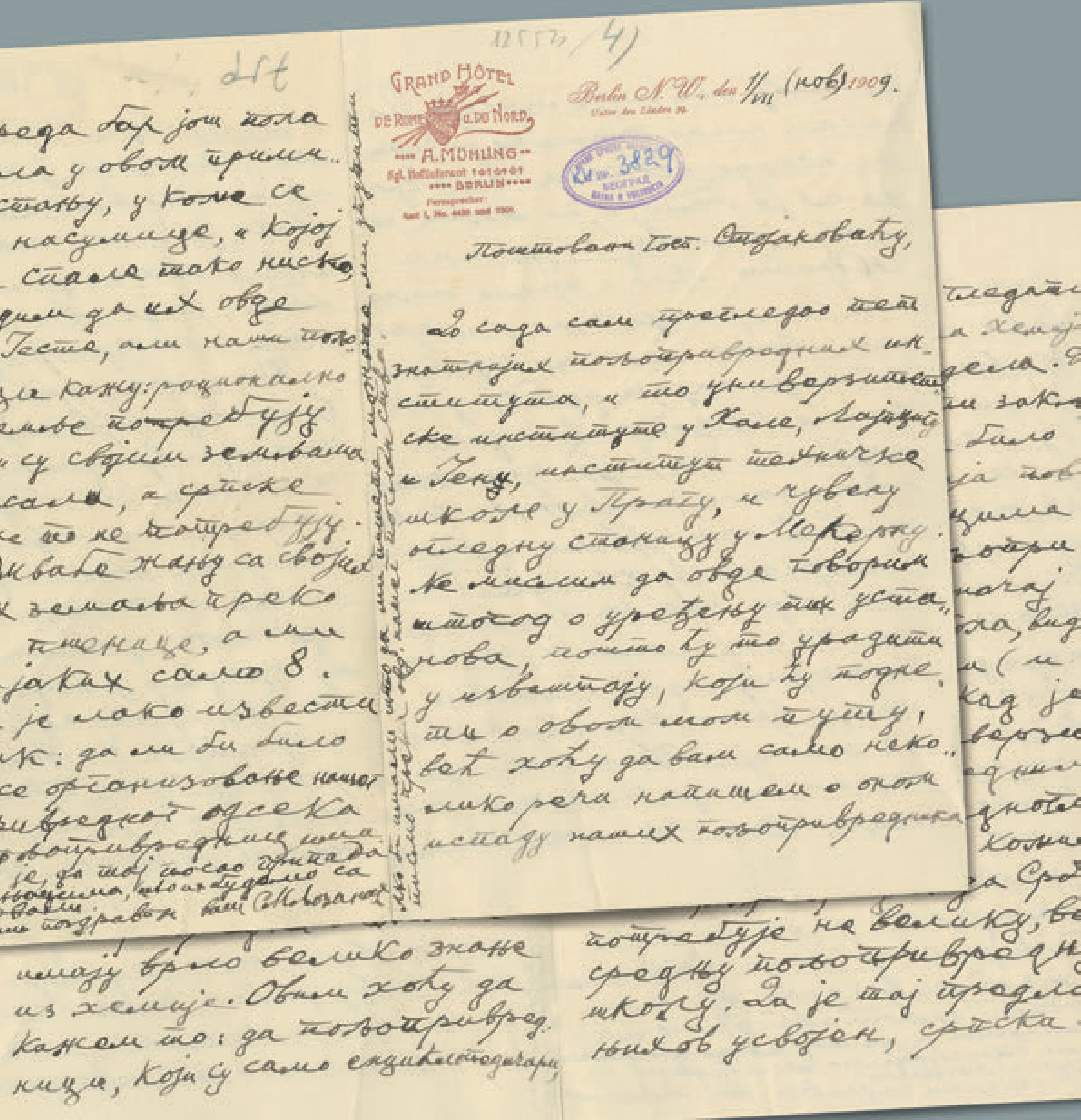
Sima Lozanić, Minister of Economy in the government led by Vladan Đorđević, 1898 (SASA Library)

Law on the Improvement of Animal Husbandry formulated by Sima Lozanić in 1898 (Public domain)


ЗАКОН
О
УНАПРЕЂЕЊУ СТОЧАРСТВА
БЕОГРАД
ШТАМПАНО У ДРЖАВНОЈ ШТАМПАРИЈИ КРАЉЕВИНЕ СРБИЈЕ
1898.
МИ
АЛЕКСАНДАР I
по милости Божјој и вољи народној
Краљ Србије
ЗАКОН
О
УНАПРЕЂЕЊУ СТОЧАРСТВА
Чл. 1.
Свака општина мора имати толико добрих
мушких грла домаће стоке, колико је
за оплођивање женских грла дотичних
колико буде недостајало оваких мушких
према броју находећих се женских, дужне
набавити и издржавати општине о своме
и то:
потребан број бикова у року од 2 го-
потребан број овнова и нерастова, у року
1

S. M. Lozanić, *Report on Experiments with Artificial Fertilizers in 1903*
S. M. Lozanić, *Report on Experiments with Artificial Fertilizers in 1904*
(Faculty of Chemistry, Belgrade)

Faculty of Agriculture in Zemun
(Public domain)


GRAND HÔTEL DE ROME u. DU NORD
A. MÜHLING
Kgl. Hoflieferant
BERLIN
Fernsprecher: Amt I, No. 6436 und 1907.

Berlin N.W., den 1/VII (нов) 1909.
Unter den Linden 39.

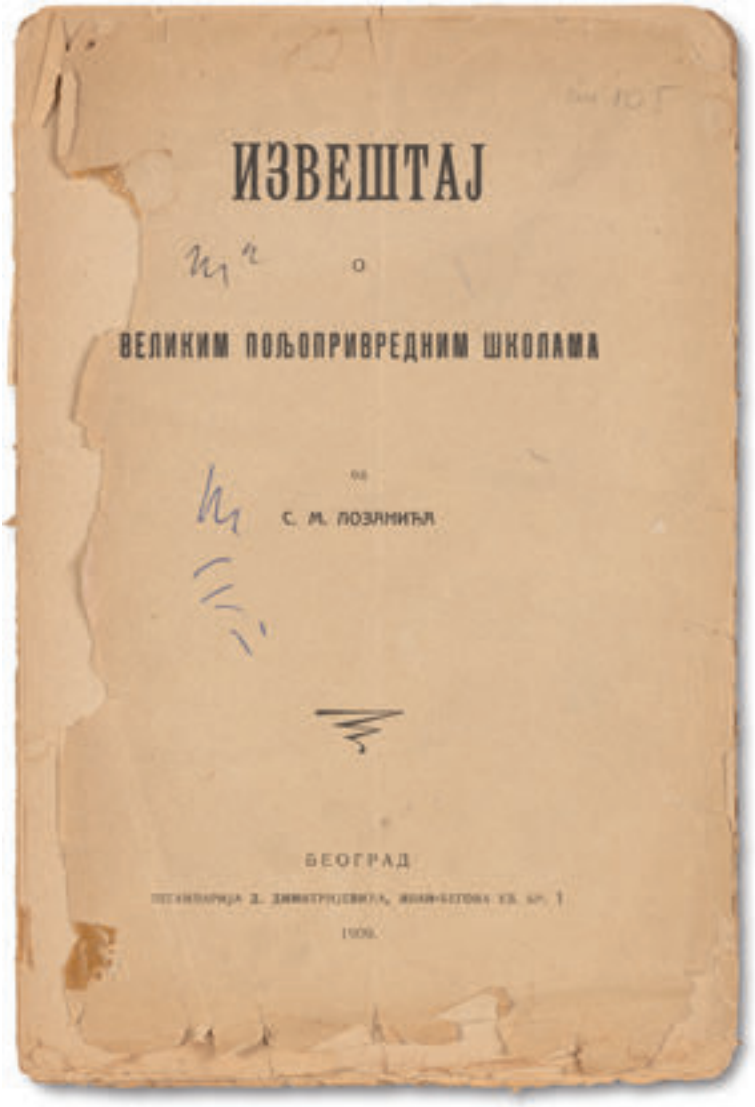
Бр. 3829 БЕОГРАД

Поштовани Гос. Стојановићу,

Ја сада сам прегледао пет пољопривредних института, и то универзитетске институте у Хале, Лајпцигу и Јену, институт техничке школе у Прагу, и чувену огледну станицу у Мекерну. Не мислим да овде говорим штогод о уређењу тих установа, пошто ћу то урадити у извештају, који ћу поднети о овом мом путу, већ хоћу да вам само неколико речи напишем о опом испаду наших пољопривредника

имају врло велико знање из хемије. Овим хоћу да кажем то: да пољопривредници, који су само енциклопедисти

потребује на велику, ве... средњу пољопривредн... школу. Да је тај предло... њихов усвојен, српска



Printed Report by Sima Lozanić to the Minister of Education and Ecclesiastical Affairs on the large agricultural schools he visited in Europe in 1909 (Faculty of Chemistry, Belgrade)

Sima Lozanić reports from Berlin on the agricultural schools he visited, 1909 (State Archives of Serbia)

Пољопривредни Гласник

Godina XV 15 avgust - 1 septembar 1935 Broj 16 i 17

Poqoprivredni glasnik (*The Agricultural Herald*),
magazine of the Serbian Agricultural Society with which Lozanić collaborated
(Faculty of Chemistry, Belgrade)

Sima Lozanić's article "How to Improve Our Agriculture",
published in *The Agricultural Herald*, 1921
(Faculty of Chemistry, Belgrade)

Прештампано из „Пољопривредног Гласника" Децембар, 1921.

С. М. Лозанић
Професор Универзитета у Београду.

Како можемо подићи нашу пољопривреду.

Кад је реч о унапређењу наше пољопривреде, која жање само осам товара пшенице од хектара, а од које сва средства за стварање наше нове државе очекујемо, онда је оправдано ставити истакнуто питање пре свију других привредних питања. Овај тешки данашњи наш економски положај може нам само наша унапређена пољопривреда уклонити. Узмимо да нам унапређена пољопривреда жетве само удвоји, да их од 8 товара повиси на 16 — што се може лако извести — тај би вишак био довољан да нам подмири и све државне и све народне потребе. А кад нам пољопривреда достигне врхунац, кад и ми почнемо жњети пшенице по 30 товара, колико је културне земље жању, онда ће наша земља кипити у богатству.

Што ми нисмо то досада урадили, то потиче отуда: што нисмо знали значај науке за пољску привреду. Не може се рећи да наши образовани пољопривредници нису били одушевљени нашом пољопривредом, нити им се може пребацити да се нису старали за њено унапређење. Било је код њих и једног и другога у великој мери; али им је одушевљење било појетичко, а старање несавремено. Јер у времену, када је пољопривреда постала наука и када је онако велики успех на свима пољима показала, ми заснивамо у Пожаревцу средњу пољопривредну школу, да је за тим у просту ратарницу претворимо. Ове две школе нису биле на висини науке, зато нису могле извести преуређење наше пољопривреде; јер исто захтева да се сва пољопривредна питања проуче на огледним пољима и у истражним институтима, па да се отуда изведе закључак о њиховом извођењу. Средње школе и ратарнице далеко су од таквих студија. Да је којом срећом пожаревачка пољопривредна школа претворена, не у ратарницу, већ у велику, снабдевену способним професорима, наша би пољопривреда била већ проучена и високо би стајала. Да је то учињено, наше би жетве биле три, па и четири пута веће од наших данашњих жетава. Ја ово тврдим, јер на нашим добрим земљама наука би велики успех постигла.

Што је изгубљено треба накнадити. Сада имамо Пољопривредни Факултет, и да би од њега имали стварну корист, треба му поред његовог школског рада ставити у дужност: да организује по земљи обласне пољопривредне огледне станице, и да проучава у њима пренашање културне пољопривреде у нашу земљу, па добивене резултате да уноси у народ. Тај посао треба поверити правим знаљцима, који су га и раније са успехом изводили. Професор агрикултурне хемије треба да утврди природу земаља појединих области, и да на основу тих података постави правила о њиховом снажењу. Професор науке о производњи биља треба на обласним огледним пољима да проучи храњење и гајење појединих варијетета усева, а у лабораторији да утврди састав добивених производа, па на основу тих података да истави правила о њиховој производњи. Професор науке о производњи животиња треба у обласним огледним стајама да проучи храњење и гајење наше стоке, и на основу те студије да покаже шта ми треба на том пољу да радимо. А да би наше газдовање на селу било поправљено, треба његову студију дотичном професору поверити, па да га на угледном имању изведе. Поред тог главног рада треба обухватити и оне пољопривредне огранке, који у појединим местима већи значај имају.

Сви и најбољи пољопривредни проналасци остали би мртво слово, ако не би били унесени у народ. Зато је поред поменутог научног пољопривредног рада важан и онај, који разноси корисне проналаске по народу. Томе служи пољопривредна пропаганда, коју треба поменути професори, сваки по својој струци, да организују, узимајући у помоћ ратарнице, путне учитеље, угледна имања, популарне списе, изложбе, утакмице, школске баште и тако даље.

Али примену корисних пољопривредних проналазака по народу условљује и то: да земљорадник има средства за тај бољи, али скуп рад. Зато је добар земљорадднички кредит основа унапређењу земљорадње. Наш сељак има обично зеленашки кредит, који је не само скуп, већ му плаћање пада обично онда, кад сељак није при новцу; и тада стару тешку обавезу замењује још тежом. Задругарство пружа земљораднику најевтинији и најповољнији кредит, чије плаћање пада о жетви или о берби; а у случају неродице одлаже се до бољих времена. Сем тога, задругарство искључује код својих чланова посреднике и у куповини и у продаји; и тако прве цене спушта до најмање мере, а друге подиже до највеће. Зато пољопривреда успева само у оним земљама, где је, поред оних првих погодаба, и задругарство развијено.

Само заједничка сарадња Пољопривредног Факултета, пољопривредне пропаганде и земљорадничког задругарства може пољопривреду једне земље на савремени ступањ подићи. Ето то је одговор на постављено питање: како можемо нашу пољопривреду подићи.

"Personally, I see little difference between these parties. The Progressives are enamoured with Western civilisation, the Radicals are infused with foreign ideas acquired abroad, with many of them educated in France and other foreign countries. Some of us, with more conservative aspirations, would like to preserve old Slavic ideas and institutions to the fullest extent. However, we are all united in our efforts to establish one national Serbian party."

From Lozanić's interview with the London magazine *The Humanitarian* in June 1901. Quoted in the paper by S. Marković, „Sima Lozanić kao diplomata i ministar u vladama Kraljevine Srbije" [Sima Lozanić as Diplomat and Minister in the Governments of the Kingdom of Serbia], Proceedings from the scientific conference *Sima Lozanić's Contributions to Science, Education, Economy, and Society*, held on 10th–11th May 2023 at the Serbian Academy of Sciences and Arts (in print)

Politics

IN THE 19TH CENTURY, THERE WERE ONLY A FEW EDUCATED individuals and they were appointed to high political positions when necessary. During the period 1894–1905, Sima Lozanić assumed the following political positions: Minister of Economy in three terms, Minister of Foreign Affairs in two terms (in the government led by Svetomir Nikolajević from April to October 1894, and in the government of Dimitrije Cincar-Marković from January to April 1903), and as a deputy in London from 1900 to 1901. He held these responsibilities during the reign of King Aleksandar Obrenović (1889–1903). This period of Serbian history was characterised by frequent changes in governments, with political appointments and dismissals being determined at the court.

Lozanić's interest in economic problems began at a young age, but it was his expertise in economic and business matters that came to the fore and recommended him for political duties after delivering a speech as the rector of the Great School in 1891, a speech in which he advocated for the country's economic progress through the development of agriculture, iron industry and mining. He likewise advised students to dedicate themselves to industrial sciences for both personal and national interests. That year, and several following years, Lozanić published works on the analyses of Serbian ores, fossil coal, and other natural resources of the country and published textbooks on chemical technology, which further solidified his reputation as an expert in economic issues. This was the reason why he entered the government of Đorđe Simić as Minister of Economy in early 1894.

Lozanić served as the Minister of Economy in Nikola Hristić's government (27th October 1894 – 7th July 1895). Hristić's government was brief, and Lozanić's role in the ministry was remembered for his protection of young officials, contrary to the practice of dismissing them at the will of the court.

Lozanić's fruitful work as Minister of Economy extended into the government of Vladan Đorđević (1897–1899). In this government, while Prime Politics Minister and Minister of Foreign Affairs Vladan Đorđević was in Vienna, Lozanić acted as his representative in the Ministry of Foreign Affairs.

During this period, two notable incidents occurred. In June, a conflict erupted on the Serbian-Turkish border, which almost grew from a local conflict into a major international incident. Then, on the 6th of July 1899, Midsummer's Day, an assassination attempt on King Milan took place. Already on the 10th of July, a state of emergency was declared in Belgrade and the Danube region, leading to the formation of a court-martial. Following these events, several ministers, including Sima Lozanić, resigned.

The Kingdom of Serbia, being a smaller European country, did not appoint ambassadors to foreign countries, but rather "envoys extraordinary". Between 1895 and 1900, the role of the Serbian royal representative at the British court was performed by Čedomilj Mijatović, succeeded by Lozanić.

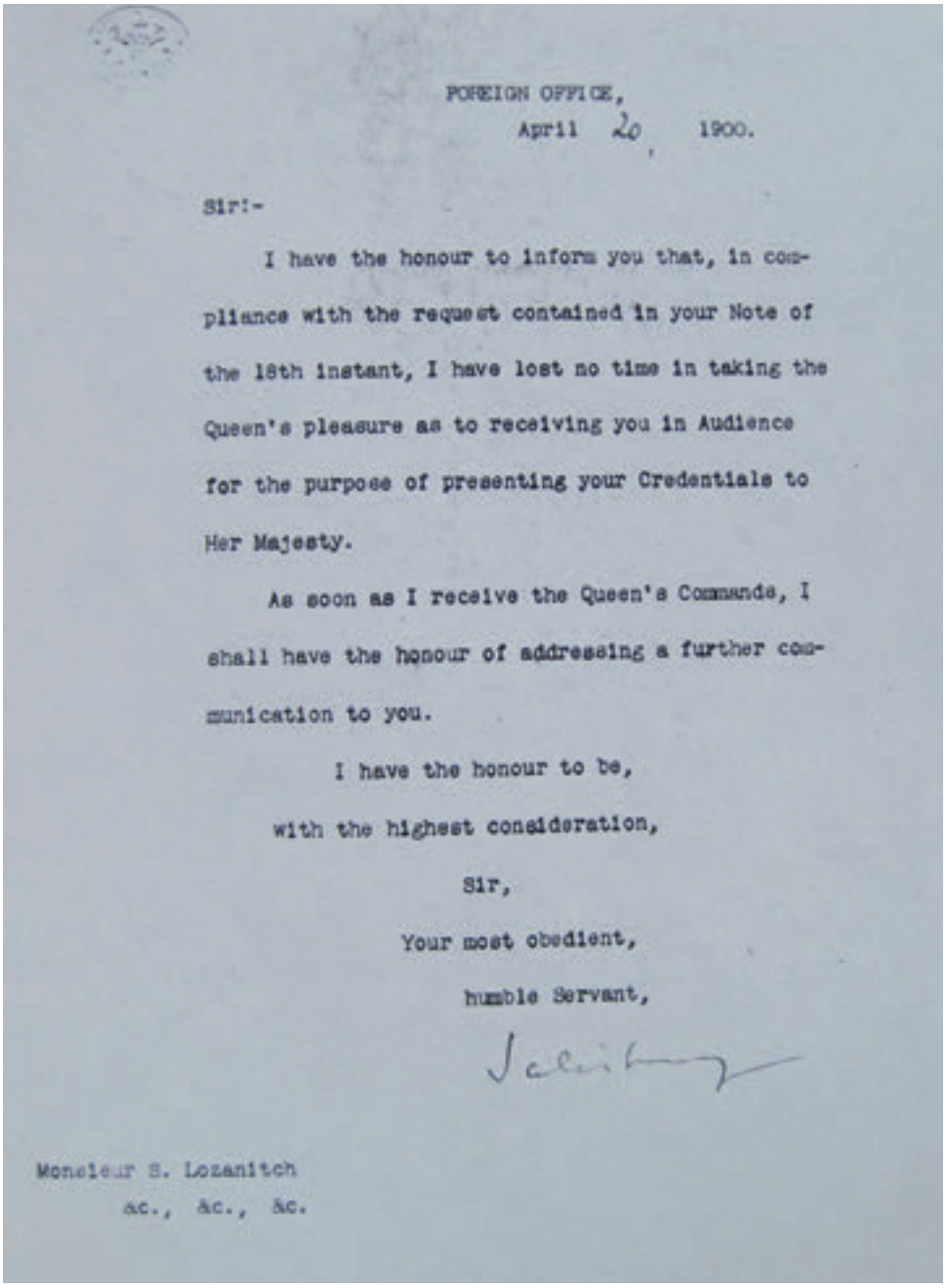
Lozanić arrived in London in April 1900, and on the 3rd of May, Queen Victoria received both the old and new representatives of the Kingdom of Serbia: Mijatović for a farewell visit, and Lozanić to present his letter of credence. A few days later, Lozanić was received by the Prince and Princess of Wales and on that occasion, he met the British heir to the throne. In the same month, during a lunch with the Lord Mayor of London, he was introduced to the King of Sweden and Norway. Simultaneously serving as an ambassador at the Dutch court, Lozanić travelled to the Netherlands to present a letter of credence to Queen Wilhelmina. In February 1901, as an envoy of the royal government, he attended her wedding.

During his mandate, Queen Victoria died at the end of January 1901. The following month, Lozanić was commissioned to organise a memorial service for King Milan in London, on the 16th of February 1901, in the chapel of the Russian Embassy. In March 1901, he presented his credentials once again, this time to the new monarch, King Edward VII.

In April 1901, Lozanić received notification of his recall as a deputy in London. Already at the beginning of May, he handed over his duties to the previous MP, Čedomilj Mijatović, and informed the Serbian authorities that he would return to Belgrade via Berlin, in order to visit the German Chemical Society, of which he had been a member for 30 years, as well as to see his son Milivoje, who was studying chemistry at the University of Berlin.

Upon completing his duties as an MP in London, Lozanić gave an interview to the London-based magazine *The Humanitarian*, in which he expressed some of his political views and social orientations. The magazine presented Lozanić as "the most outstanding representative of his country" and a renowned scientist whose work was recognised by foreign learned societies.

King Aleksandar and Queen Draga Obrenović
(Public domain)



FOREIGN OFFICE,
April 20 1900.

Sir:-

I have the honour to inform you that, in compliance with the request contained in your Note of the 18th instant, I have lost no time in taking the Queen's pleasure as to receiving you in Audience for the purpose of presenting your Credentials to Her Majesty.

As soon as I receive the Queen's Commands, I shall have the honour of addressing a further communication to you.

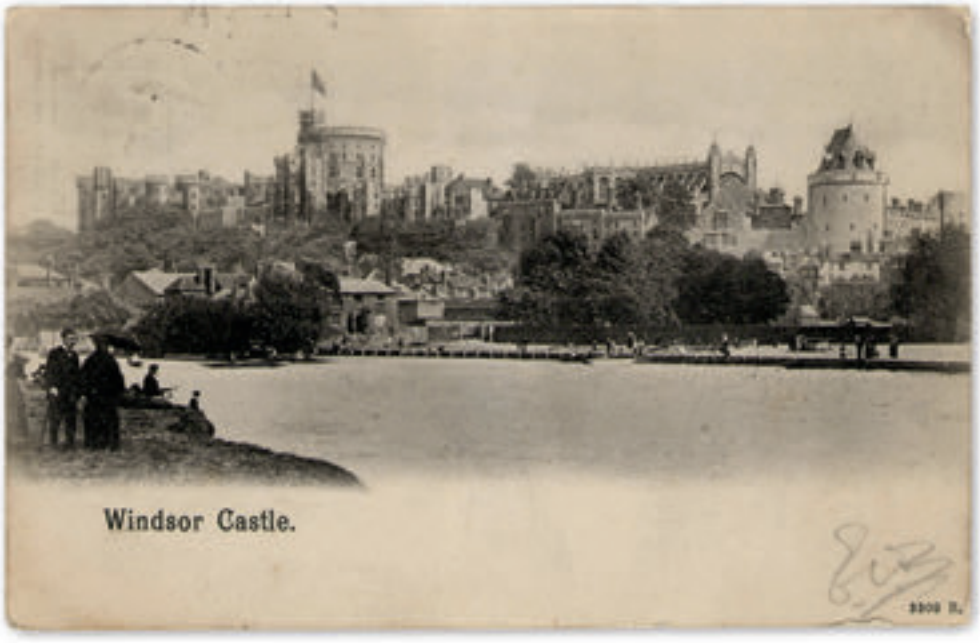
I have the honour to be,
with the highest consideration,
Sir,
Your most obedient,
humble Servant,

Salisbury

Monsieur S. Lozanitch
&c., &c., &c.

Lord Salisbury informs Sima Lozanić that he will invite him to present his credentials to the Queen as soon as he receives approval, 20th April 1900
(State Archives of Serbia)

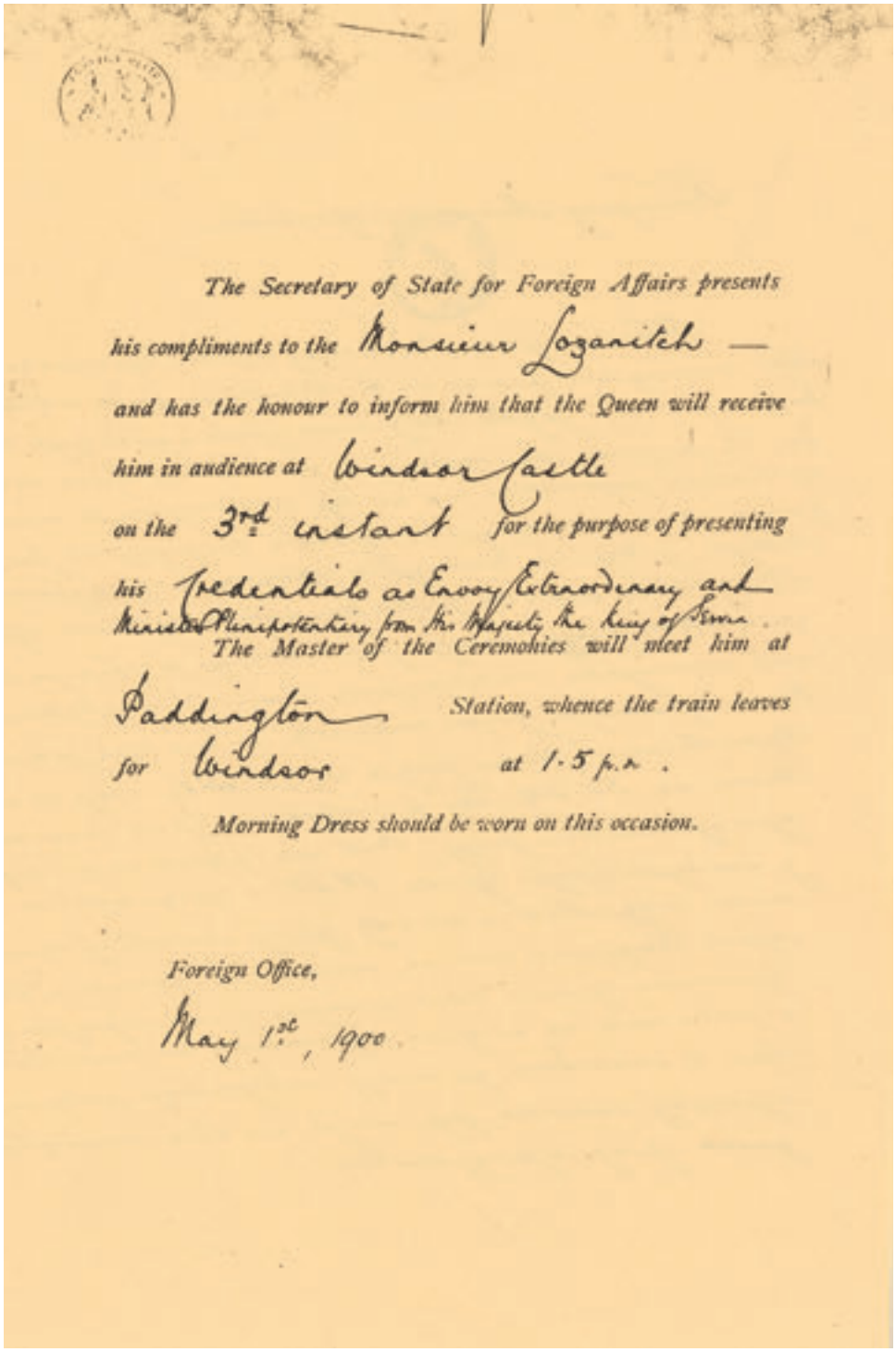
Lord Salisbury, 1903
(London Stereoscopic and Photographic Company / National Galleries of Scotland / public domain)



Windsor Castle, ca 1900
(Public domain)

Queen Victoria, ca 1890
(Getty Images)

The secretary of the Ministry of Foreign Affairs informs Sima Lozanić
that he is scheduled to have an audience with Queen Victoria, 1900
(State Archives of Serbia)



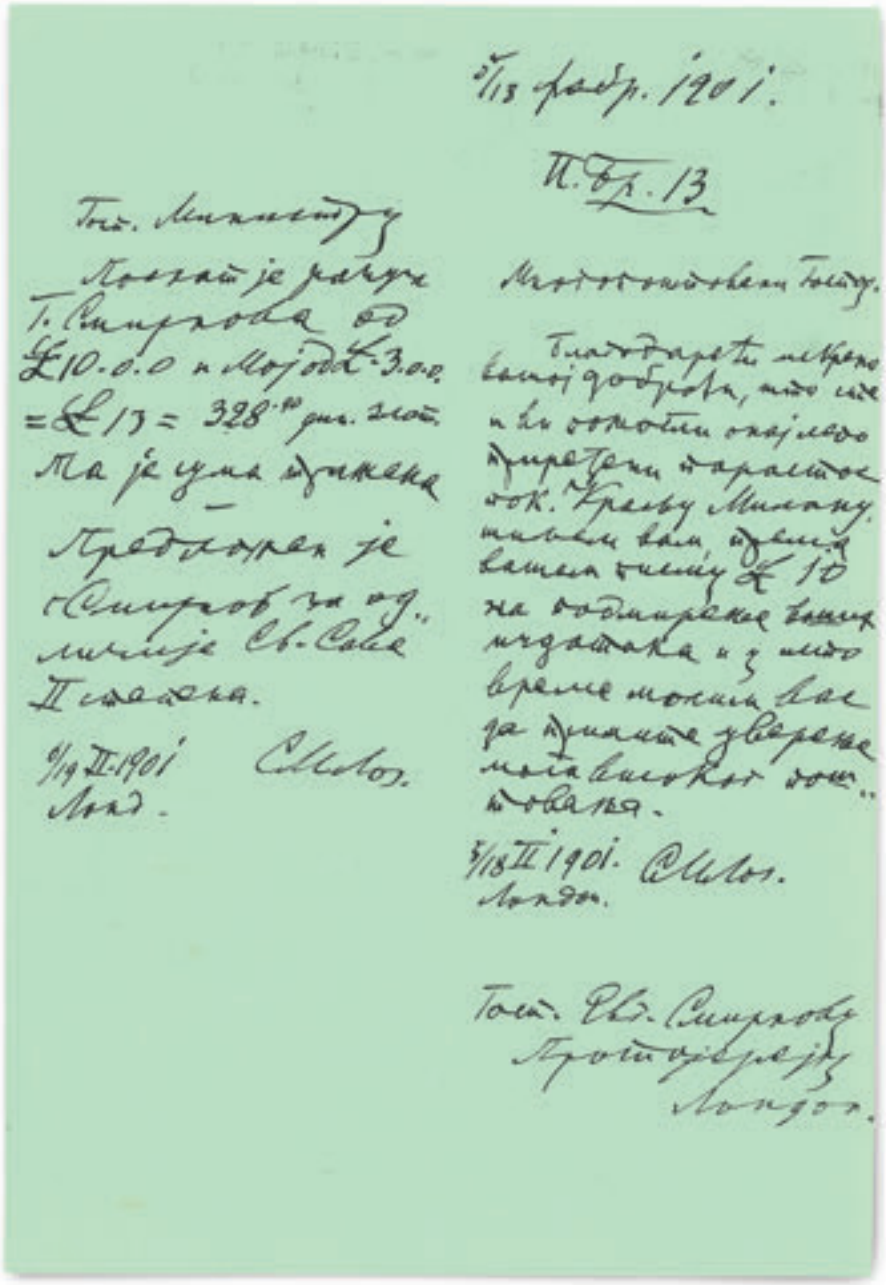
The Secretary of State for Foreign Affairs presents his compliments to the Monsieur Loganitch — *and has the honour to inform him that the Queen will receive him in audience at* Windsor Castle *on the* 3rd instant *for the purpose of presenting his* Credentials as Envoy Extraordinary and Minister Plenipotentiary from His Majesty the King of Serbia.

The Master of the Ceremonies will meet him at Paddington *Station, whence the train leaves for* Windsor *at* 1.5 p.m.

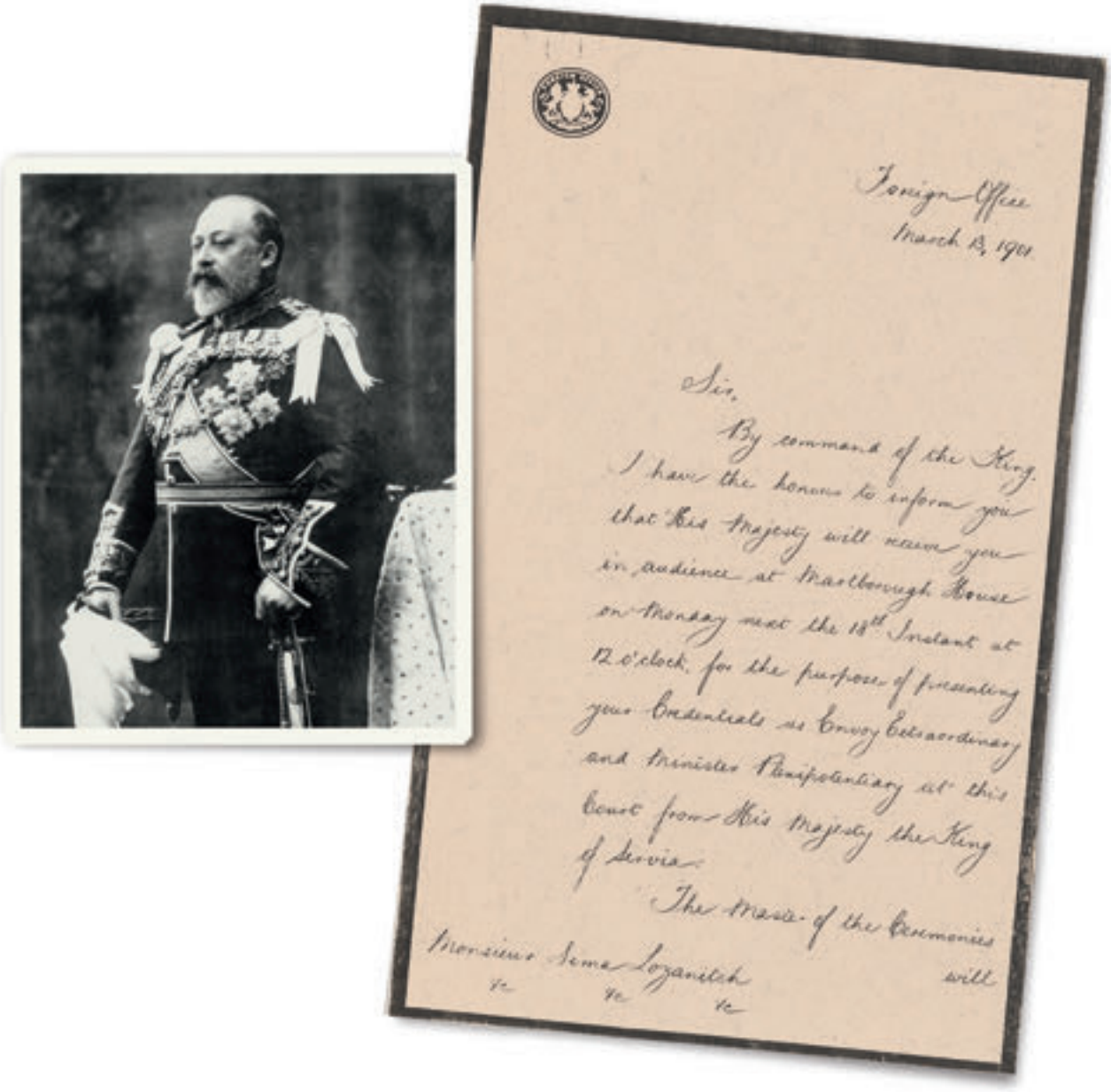
Morning Dress should be worn on this occasion.

Foreign Office,

May 1st, 1900.



Drafts of Sima Lozanić's letters from February 1901: He expresses his gratitude to Smirnov, archpriest of London, for his assistance in holding the memorial service for King Milan in London. Lozanić also informs the minister about the bill for Smirnov and proposes him for the Order of Saint Sava, 2nd class (State Archives of Serbia)



Foreign Office
March 13, 1901

Sir,

By command of the King
I have the honour to inform you
that His Majesty will receive you
in audience at Marlborough House
on Monday next the 18th Instant at
12 o'clock, for the purpose of presenting
your Credentials as Envoy Extraordinary
and Minister Plenipotentiary at this
Court from His Majesty the King
of Servia.

The Master of the Ceremonies

Monsieur Sima Lozanitch
&c &c &c

will

King Edvard VII, 1902
(Sir Samuel Luke Fildes / National Portrait Gallery, London / public domain)

Notification to Sima Lozanić that King Edward will receive him to present credentials on 18th March 1901
(State Archives of Serbia)

THE
HUMANITARIAN.

VOL. XVIII. [ENTERED AT STATIONERS' HALL.] JUNE, 1901. [NEW SERIES.] No. 6.

SERVIA—THE PEASANT KINGDOM.

AN INTERVIEW WITH THE SERVIAN MINISTER.

THE average Englishman, it is to be feared, knows very little of Servia beyond one or two stories of its late King's eccentricities, as unduly related by the dustrakers of the "Yellow Press." But although the "Grand Monarque" could say, with some show of reason, "L'état ç'est moi," the Bohemianism of Milan, who, by the way, was not half as black as he was painted, was not in any sense representative of the Servian race. Nor does the history of the Balkan States commence with the accession of the Obrenovitch dynasty, in 1815. There are three distinct periods in the national life. The era of romance, from the eleventh to the fourteenth century, culminates in Stephan Dushan, whose memorable conquests—he subjugated Epirus, Thessaly, Macedonia, and all but stood at the gates of Constantinople—were commemorated in his proud title of "Emperor of the Greeks, Serbians, and Bulgarians." Then a great tragedy overwhelms the Empire. At the battle of Kossovo, fought against Servia's life-long enemy, the Turk, Lasar and the flower of the Servian army, whose deeds the national bards grew never weary of reciting, perished bravely and gloriously. With them the country loses its freedom, and, for the next four centuries, Servia is nothing more than "a geographical expression." Slowly, but surely, the people rouses itself from its long lethargy, and the dawn of the nineteenth century witnesses the nation's awakening. From 1804 to 1876, the fickle goddess of war distributing her smiles with provoking impartiality, intermittent conflict rages between the Serb and the Turk, the former struggling to regain his independence and, indirectly, rendering the whole of Europe a service, but imperfectly recognised at the Berlin Congress, by acting as a bulwark against Ottoman aggression. The Treaty of San Stefano, however, guarantees the independence of Servia, which, from 1882 onwards, takes its place among civilised kingdoms, the greatest evidence of which is probably afforded by the fact that, whilst in its unregenerate days it had no national debt, it now owes a very considerable sum. As a political experiment, Servia may

Sima Lozanić, 1901 (SASA Library)

Sima Lozanić's interview in the London magazine *The Humanitarian*, June 1901
(*The Humanitarian*, vol. 18, No 6)

"During the deployment on the Đunis Heights, we were ordered to mine the road that leads from Kruševac to the Đunis Bridge. We laid three mines on that road (...) with the aim of blocking the enemy's passage to the bridge (...)
Two squadrons of enemy's cavalry headed towards the bridge along the Đunis road. They stopped in front of a mine at a distance of 200–250 meters; a horseman separated from them and approached the mine to make some observations; then he returned to his cavalry, accompanied by 5 senior officers and 3 horsemen, and they headed back to the location where the mines were planted (...) Chief Pečenović (...) detonated the mine beneath these observers, and they all flew into the air. As a result, the enemy's cavalry retreated."

In Ražanj, 21st October 1876
Professors of the Great School Ljub. Klerić, sgd. S. M. Lozanić, sgd.

Wars

SIX WARS WERE FOUGHT DURING SIMA LOZANIĆ'S LIFETIME: THE Serbian-Turkish wars of 1876–1878, the Serbian-Bulgarian war of 1885, the Balkan wars of 1912–1913 and the First World War. He actively participated in all of these wars.

Lozanić documented his activities in the Serbian-Turkish war of 1876 in the book *Minski radovi u srpsko-turskom ratu 1876. godine* [*Use of Mines in the Serbian-Turkish War of 1876*], published in 1905. Prior to the war, Sima Lozanić and Ljubomir Klerić were assigned a task by the Minister of Defense to deploy underwater mines in the Danube to prevent Turkish ships from Vidin from reaching our shore. Lozanić and Klerić personally made mines using wooden barrels, insulated and filled them with gunpowder, laid cables, submerged them and activated the mines themselves. Later, under the command of the Russian General Mikhail Chernyaev, they placed mines in the Đunis Gorge and the surrounding areas. The activation of these mines in the Gorge resulted in the death of a group of Turkish officers, which enabled the Serbian army's safe crossing to the other bank of the Morava River. For this achievement, Lozanić was awarded the Order of Takovo Cross, as well as the Silver Medal for Courage and the Veteran's Memorial, in recognition of his overall participation in this war.

When the First World War began in 1914, Sima Lozanić was almost seventy years old. The beginning of the war found him in Niš. In the summer of 1914, the difficult and arduous journey of exile began for Sima Lozanić and his wife Stanka. They withdrew from Serbia together with the Serbian government. After Niš, they traversed several places: Kraljevo, Raška, Novi Pazar, Mitrovica, Prizren, Peć, Andrijevica, Shkodër, crossing the Montenegrin and Albanian mountains, Medua (Shëngjin), Brindisi, Naples, Rome, Geneva and Paris. The progress along the way was slow, and the stops were long and difficult.

On that journey, Stanka and Sima Lozanić were accompanied by their daughter, Ana Marinković (1881–1973), whose husband, Vojislav Marinković, was a minister and prime minister. During those few months, Lozanić

lost ten kilograms, not due to hunger and fatigue, but because of psychological suffering caused by the hopelessness in which the people and the army found themselves.

In early 1916, after facing a series of difficulties on the route from Shkodër via Medova and Brindisi, the Lozanićs finally arrived in Rome. From there, Sima Lozanić headed to Switzerland (Bern, Lausanne, Geneva), where, upon his suggestion and that of M. Radovanović, the Relief Committee was founded with the purpose of collecting funds for the Serbian people. The Committee's Memorandum briefly presented the history of the Serbian people and the development of the country in the pre-war period before the war. In a dignified manner, the Allies were asked for help in rebuilding the country after the war. In Switzerland, the Committee for Aid to Prisoners was established, with Baron De Blonay presiding over its Serbian section. In addition to the Swiss members, the Committee included the Consul General of Serbia in Geneva and Sima Lozanić.

In early 1917, Sima Lozanić was appointed as the Serbian delegate in the Anglo-Franco-Russian Commission for the Nutrition of Prisoners. At that time, 62,000 prisoners were held in 49 camps across Germany and Austria-Hungary, necessitating the provision of food. Correspondence between S. Lozanić and Sava Grujić, a Member of Parliament in Switzerland, has been preserved from this period. The supply, unfortunately, was irregular and insufficient. To address this issue, Lozanić travelled to Paris with the goal of securing a reliable means of procuring flour and establishing permanent sources for other foodstuffs. In Paris, Lozanić addressed Princess Ksenija of Montenegro, who led the Association for Aid to Captured Montenegrins. He received information from her regarding the needs of Montenegrin captives. Procuring flour and other essential foodstuffs became increasingly challenging day by day, prompting Serbia to seek assistance from the United States of America.

By the end of 1917, Lozanić was appointed as a member of the Mission in America, tasked with providing material aid and political support to Serbia. Members of the Mission included Milenko Vesnić, the head of the Mission, along with Sima Lozanić, Mihailo Rašić, Mihailo Nenadović, Milan Jovičić, and Vojislav Martinac. In America, our consul in Washington, Ljuba Mihailović, the father of our chemist and academician Mihailo Mihailović, also joined the Mission. With the approval of the American government, Jelena Lozanić, Sima Lozanić's daughter, joined the Mission. From 1915, she actively participated in its activities in America and, in collaboration with Mihajlo Pupin, collected aid for Serbia.

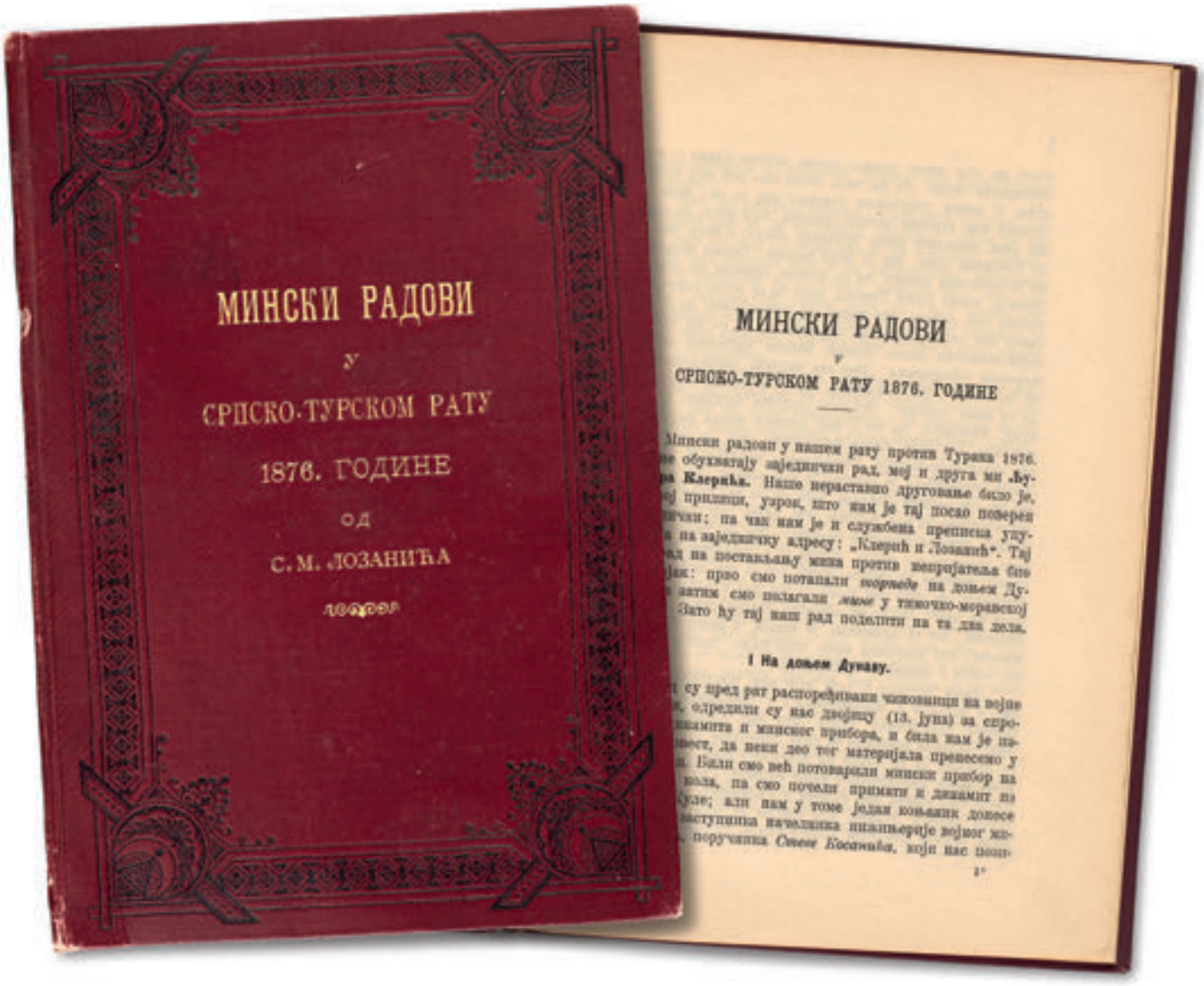
Lozanić visited Columbia University with his daughter, Jelena, where they were welcomed by Mihajlo Pupin. He guided them through various buildings, including his working cabinet, and showcased a newly developed apparatus for detecting sound in water. In the basement, there was a specially constructed water pool for experiments. Due to Jelena Lozanić's acquaintances with Pupin and other prominent individuals, Lozanić remarked to her in New York, "In Serbia, the world knows you as the daughter of Prof. Lozanić, and here in America, they know me as Miss Lozanić's father." While in New York, Lozanić and Rašić attempted, albeit unsuccessfully, to meet with Nikola Tesla. Unfortunately, Tesla "had already severed all ties with the world".

The Mission stayed in the USA from mid-December 1917 to mid-February 1918. Its members were warmly welcomed by American officials. They held talks with the most prominent representatives of the American administration, as reported by American newspapers. Lozanić had meetings with the Minister of Economy, D. Houston, to whom he submitted a memorandum on economic aid to Serbia. In addition to President Wilson (on 21st December and 24th January), the members of the Mission were received by Vice President Thomas Marshall, Secretary of State Robert Lansing, Ministers of Defense and Finance, Minister of the Interior, Secretary of Agriculture David Houston, Secretary of the Navy, and Chief of the US General Staff. Milenko Vesnić delivered speeches in the Senate (on 5th January) and the House of Representatives (on 8th January), as well as in the representative bodies of the states of Massachusetts and New York, and the city of New York.

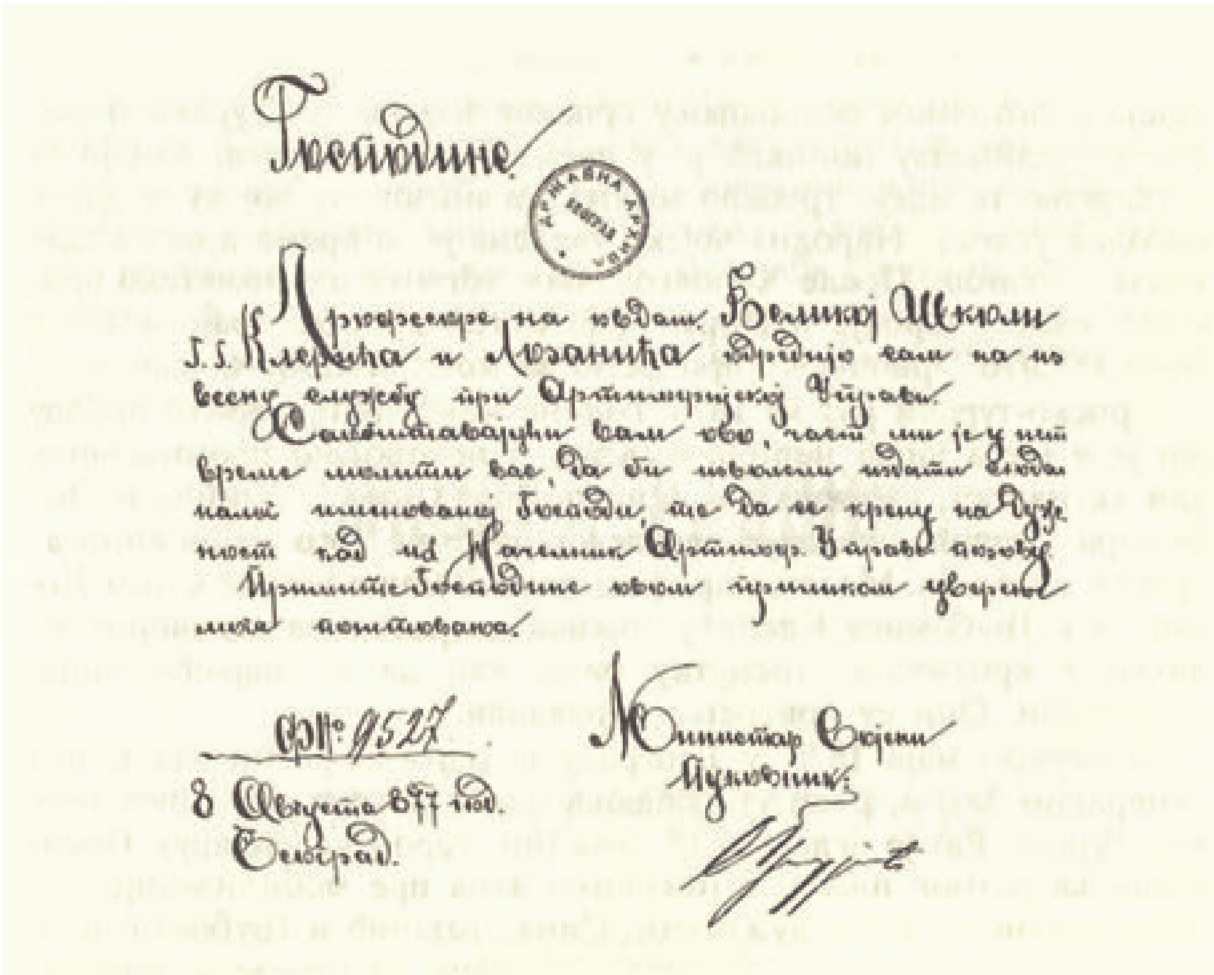
Upon his return to Serbia, Lozanić, along with other members of the Mission, submitted a special report to Pašić regarding the discussions held with experts and key members of the American administration. The Mission's sojourn in the USA was of great importance for further relations between Serbia and America. The importance is underscored by the meetings with the highest representatives of the American administration and the institutions visited by the Mission.

For his patriotism, love for his people and homeland, as well as his dedication to public and political service, Lozanić was awarded the following orders and decorations: Silver medal for bravery (1876), Veterans Memorial (1876), Order of Saint Sava, 3rd class (1889), Order of Saint Sava, 1st class (1922), Order of Takovo Cross, 5th class (1876), Order of Miloš the Great, 3rd class (1899), Order of Osmanieh, 1st class (Ottoman Empire), Order of the Redeemer, 1st class (Greece), Order of Orange-Nassau, 1st class (The Netherlands, 1901), and the Order of the Crown of Romania, 1st class (1907).

Battle of Đunis in the Serbian-Turkish War, 1876
(Public domain)



Minski radovi u srpsko-turskom ratu 1876. godine [*The Use of Mines in the Serbian-Turkish War of 1876*]
by Sima Lozanić, Belgrade 1905
(Faculty of Chemistry, Belgrade)



Господине,

Професоре на овдаш. Великој Школи
Г. Г. Клерића и Лозанића одредио сам на из-
весну службу при Артилериској Управи.
Саопштавајући вам ово, част ми је у ист
време молити вас, да би изволели издати одо-
пуст именованој господи, те да се крену на дуж-
ност код нас Начелник. Артилер. Управе ...
Примите Господине овом приликом уверење
мога поштовања.

ФН° 9527

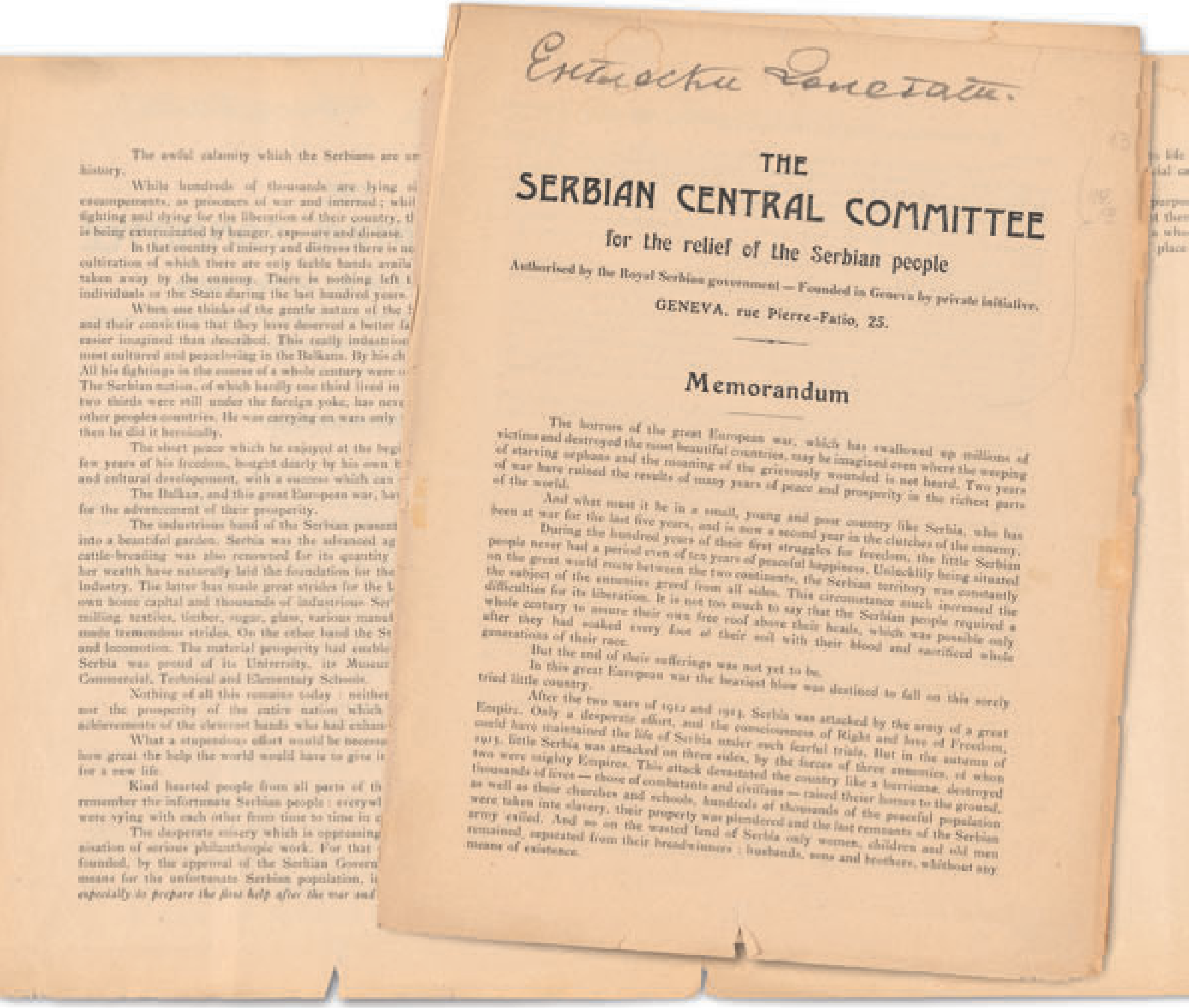
8 Августа 877 год.
Београд.

Министар Војни
Пуковник

The Minister of Defense assigned the professors of the Great School, Ljubomir Klerić and Sima Lozanić, to serve in the Artillery Administration, 1877
(State Archives of Serbia)

Photographs from the First World War
(SASA Archives)

Memorandum of the Serbian Committee for Assistance from Allies 1916
(Faculty of Chemistry, Belgrade)



THE
SERBIAN CENTRAL COMMITTEE
for the relief of the Serbian people

Authorised by the Royal Serbian government — Founded in Geneva by private initiative.

GENEVA, rue Pierre-Fatio, 25.

Memorandum

The horrors of the great European war, which has swallowed up millions of victims and destroyed the most beautiful countries, may be imagined even where the weeping of starving orphans and the moaning of the grievously wounded is not heard. Two years of war have ruined the results of many years of peace and prosperity in the richest parts of the world.

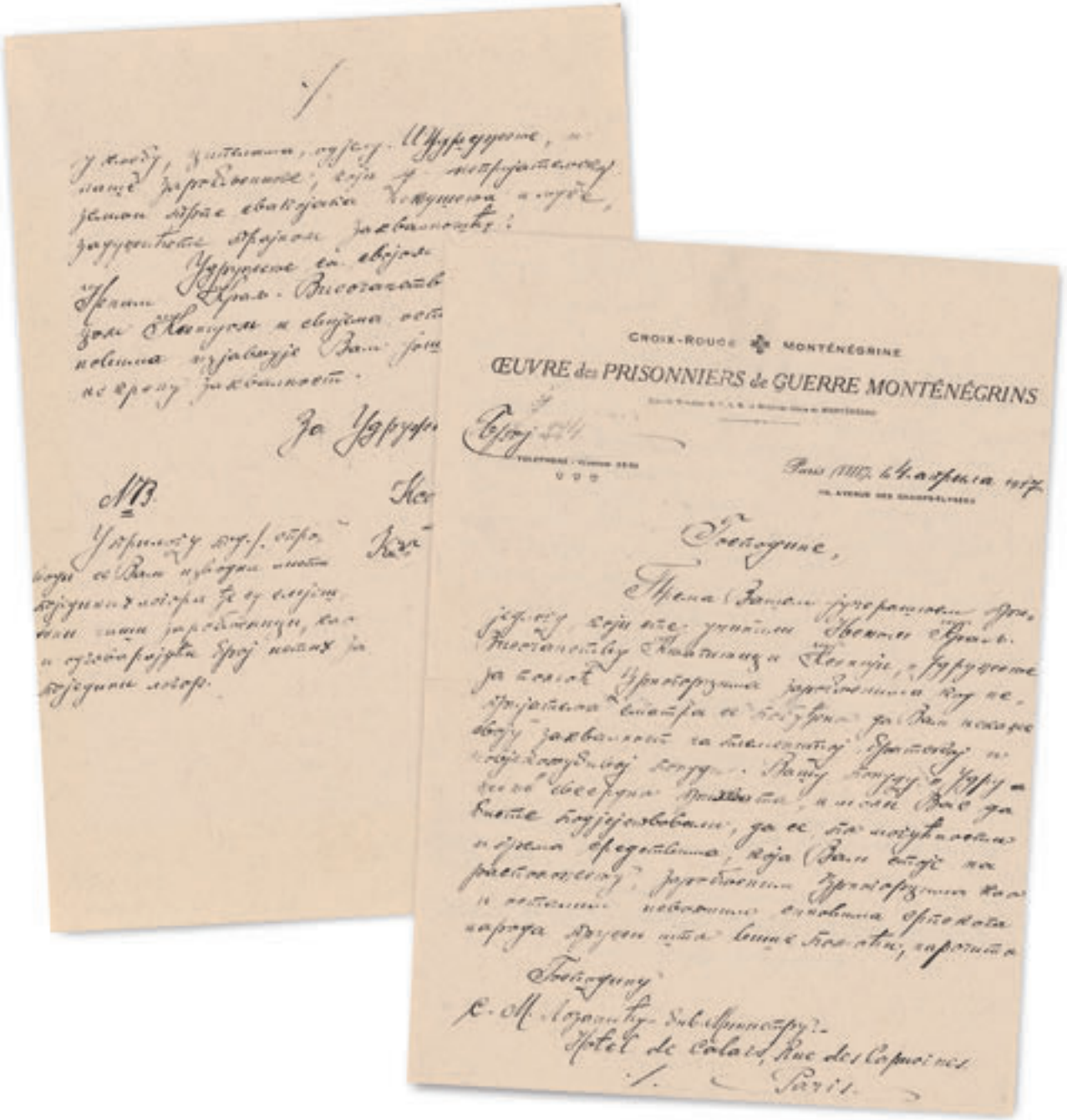
And what must it be in a small, young and poor country like Serbia, who has been at war for the last five years, and is now a second year in the clutches of the enemy.

During the hundred years of their first struggles for freedom, the little Serbian people never had a period even of ten years of peaceful happiness. Unluckily being situated on the great world route between the two continents, the Serbian territory was constantly the subject of the enemies greed from all sides. This circumstance much increased the difficulties for its liberation. It is not too much to say that the Serbian people required a whole century to assure their own free roof above their heads, which was possible only after they had soaked every foot of their soil with their blood and sacrificed whole generations of their race.

But the end of their sufferings was not yet to be.

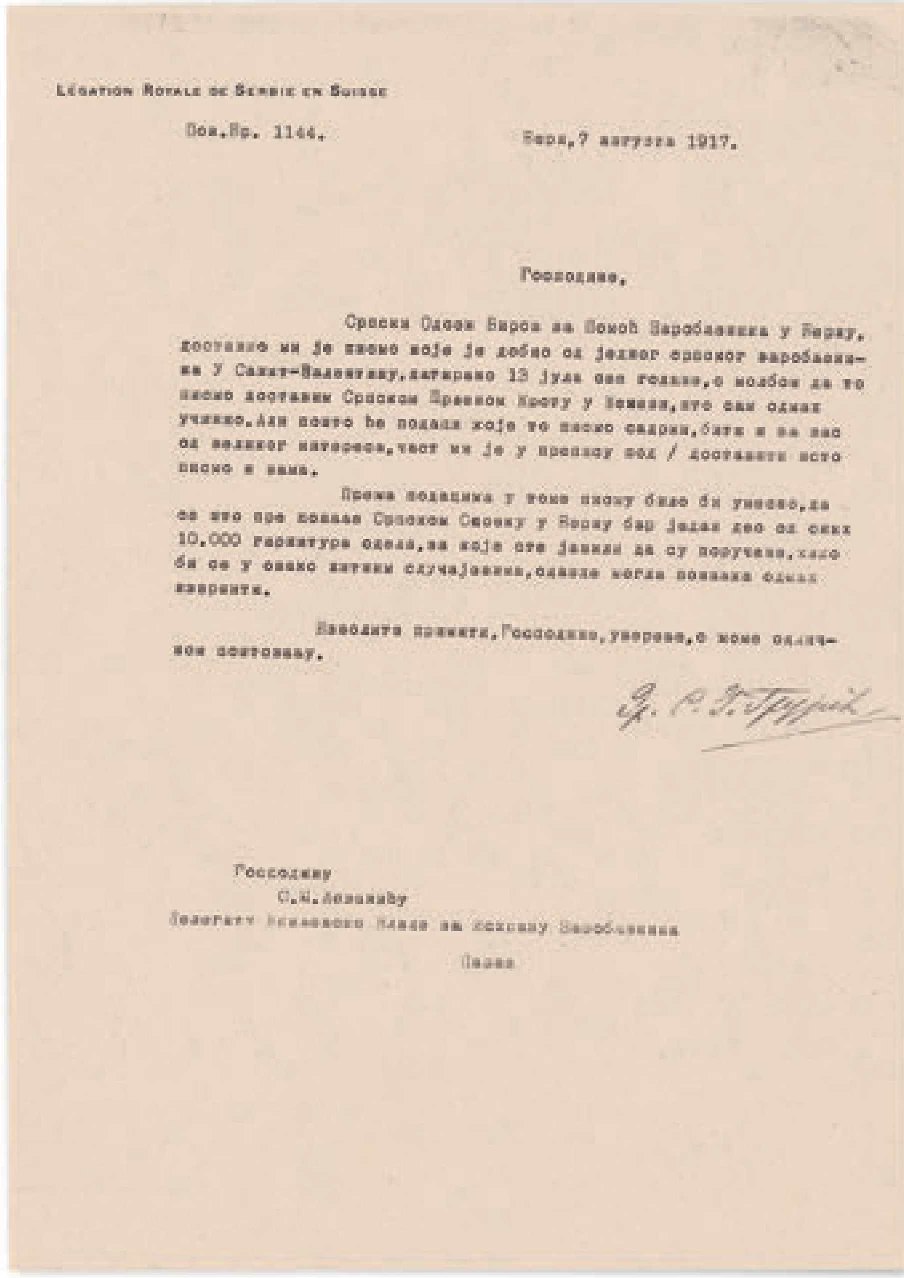
In this great European war the heaviest blow was destined to fall on this sorely tried little country.

After the two wars of 1912 and 1913, Serbia was attacked by the army of a great Empire. Only a desperate effort, and the consciousness of Right and love of Freedom, could have maintained the life of Serbia under such fearful trials. But in the autumn of 1915, little Serbia was attacked on three sides, by the forces of three enemies, of whom two were mighty Empires. This attack devastated the country like a hurricane, destroyed thousands of lives — those of combatants and civilians — razed their homes to the ground, as well as their churches and schools, hundreds of thousands of the peaceful population were taken into slavery, their property was plundered and the last remnants of the Serbian army exiled. And so on the wasted land of Serbia only women, children and old men remained, separated from their breadwinners: husbands, sons and brothers, without any means of existence.


CROIX-ROUGE ✠ MONTÉNÉGRINE

ŒUVRE des PRISONNIERS de GUERRE MONTÉNÉGRINS

Princess Ksenija of Montenegro, head of the Association for Aid to Montenegrins Captured by the Enemy, expresses gratitude to Sima Lozanić for the letter in which he offers assistance to Montenegrin captives and sends a list of the number of prisoners in certain camps, 1917
(State Archives of Serbia)



LÉGATION ROYALE DE SERBIE EN SUISSE

Пов.Бр. 1144. Берн, 7 августа 1917.

Господине,

Српски Одбор Берн за Помоћ Заробљеника у Берну, доставио ми је писмо које је добио од једног српског заробљеника у Сант-Валентину, датирано 13 јула ове године, с молбом да то писмо доставим Српском Црвеном Крсту у Женеви, што сам одмах учинио. Али пошто ће подаци које то писмо садржи, бити и за вас од великог интереса, част ми је у прилогу под / доставити исто писмо и вама.

Према подацима у томе писму било би умесно, да се што пре пошаље Српском Одбору у Берну бар један део од оних 10.000 гарнитура одела, за које сте јавили да су поручена, како би се у овако хитним случајевима, одавде могли помагати одмах [illegible].

Изволите примити, Господине, уверење о моме одличном поштовању.

Господину
С.М. Лозанићу
Делегату Краљевске Владе за исхрану Заробљеника
Париз

Sava Grujić, the Serbian ambassador in Bern, informs Sima Lozanić, delegate of the royal government's commission for the nutrition of prisoners in Paris, about the needs of the Serbian Committee for Assistance to Prisoners headquartered in Bern, 1917
(State Archives of Serbia)

War Mission in America, left to right: Sima Lozanić, Milenko Vesnić, General Rašić, Ljuba Mihailović, 1917–1918 (Courtesy of the Vesnić family)

War Mission in America, Milenko Vesnić and Ljuba Mihailović, behind Sima Lozanić, 1917–1918 (Courtesy of the Vesnić family)

THE ORGANIZERS OF THE EXHIBITION OWE THANKS TO ALL THE INSTITUTIONS AND INDIVIDUALS WHO HAVE CONTRIBUTED EXHIBITS, PHOTOGRAPHS, AND OTHER MATERIALS:
Faculty of Chemistry of the University of Belgrade, State Archives of Serbia, SASA Archives, SASA Library, Svetozar Marković University Library, Miloš Jurišić, Snežana and Dragan Vicić.

Special thanks to the SASA Audiovisual Archive and Centre for Digitization, which digitized the books, documents, correspondence, and photographs displayed at the exhibition and reproduced in this publication.

CIP – Каталогизација у публикацији
Народна библиотека Србије, Београд

Sima Lozanić
A Knight of Serbian Science