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EXPLORING THE IMPACT OF CVIJIĆ'S GEOMORPHOLOGY RESEARCH: A LEGACY IN FRANCE AND THE BALKANS

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Abstract: Jovan Cvijić (1865–1927) played a major role in the development of geomorphology at national and international levels. His personal qualities were crucial to this recognition, but the intellectual background of the second half of the 19th century and the transnational context of the Austro-Hungarian Empire facilitated this threefold development. In Vienna, in contact with his professors, starting with Albrecht Penck, he fully embraced a modern geography based on field observations as opposed to a cabinet geography, a geography that needed to be illustrated by drawing or photography. His physical geography hypotheses needed to be supported by solid naturalist and physical knowledge. It was in this spirit that he carried out his successive responsibilities in Serbia, both at the University of Belgrade and at the Geographical Society, and that he subsequently extended his research to other areas of physical geography: climatology, hydrology, impact of last glaciation, fluvial erosion, limnology, etc. His knowledge of the French and German languages enabled him to exchange ideas with his peers throughout Europe. He also shared his work through courses abroad, most notably in Paris in 1917 and 1918, and through publications in international journals. Thus, he strengthened his academic authority at national and international levels. It is in the field of karstology that Cvijić's work remains most up-to-date, and his approach to field work, his constant exchanges with his peers, his concern for international issues and the practice of open geography are the foundations of modern physical geography.

Keywords: Jovan Cvijić; physical geography; karstology; geomorphology; epistemology

1. Introduction

The 5th Congress of Slavic Geographers and Ethnographers celebrates the 100 years since the First Congress of Slavic Geographers and Ethnographers in Prague in 1924 and the publication of the first volume of the monograph *Geomorphology* by the Serbian geographer Jovan Cvijić (1865–1927), one of the initiators of the Congress. When I was invited by the Organizing committee of the Congress to represent the Sorbonne University, so dear to Jovan Cvijić's heart, since he taught there at the invitation of both Louis Liard and Paul Vidal de La Blache in 1917 and 1918 and was awarded an honorary doctorate in 1924, I felt deeply honored and accepted the invitation for obvious institutional and memorial reasons, but also for more personal reasons. Being a Professor at Sorbonne University, a geographer, a

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geomorphologist specializing in geoarchaeology, having worked extensively in the Balkans (Albania, Greece, Bulgaria, Croatia, Northern Macedonia, and Romania) along with archaeological missions, in order to understand the different geomorphological contexts in which I was working, I often had to start by reading Jovan Cvijić's seminal articles which were always highly relevant as they described landscapes that had not yet been transformed by modernity. Finally, as a former President of the International Association of Geomorphologists from 2013 to 2016, I was able to appreciate the extent to which Jovan Cvijić had played a national, regional, and international role in the development of physical geography and his pioneering role in establishing field geography based on the observation and description of natural and physical phenomena. In this paper, I will illustrate how Jovan Cvijić developed this approach and show how it remains a founding principle that still influences research today.

2. The choice of field geography rather than cabinet geography in initial training

The first aspect of Jovan Cvijic's heritage is the practice of field geography as opposed to cabinet geography, which was still prevailing in the 19th century. This choice stemmed from the scientific training he received in Vienna.

2.1. The influence of the transnational context of the Austro-Hungarian Empire

Jovan Cvijić was born in Loznica in 1865 in the Principality of Serbia (1815–1882). He began his secondary and higher education in the Kingdom of Serbia (1882–1918), ending his career in the Kingdom of Yugoslavia (1918–1941), where he died in Belgrade in 1927 at the age of 62. Although Belgrade Higher School was founded in 1808, it did not become a university until 1905, and it only had a limited number of scientific departments in the 1880s. At that time in the Balkans, only the German language and the University of Vienna offered students the opportunity to open onto the Western world and its cultures (Feichtinger et al., 2003). Having learnt German at secondary school and graduated from the science and mathematics department of Belgrade Higher School, logically enough, young Jovan Cvijić, after having his degree translated into Latin and French, turned to the University of Vienna, as most Balkan intellectuals of his time did when it came to writing a thesis, and he chose to study physical geography and geology from 1889 to 1893. Such an itinerary was not so common as only 30% of the 7,000 students enrolled at the University of Vienna at that time did not originate from the Austro-Hungarian Empire.

What is interesting about Jovan Cvijić is that he actually created a Serbian national school of geography that was closely linked to European universities. The Serbian secondary school system had prepared him for this by combining the teaching of German with that of the Serbian language. The teaching methods and the multicultural and transnational environment of the University of Vienna he benefited from, in the context of the Austro-Hungarian Empire, reinforced this intellectual awareness. There had been a chair of geography at the University of Vienna since 1851 and a department of geography had just been created in 1884. At the time, there were only two other departments of geography in Europe, both in Germany, one in Tübingen, the other in Berlin. The chair of physical geography was held by Albrecht Penck, while Eduard Suess, author of the monograph *Das Antlitz der Erde* (*eng.* The Face of the Earth, 1883), had held the chair of geology since 1862.

In Vienna, Cvijić was trained by renowned teachers in innovative teaching methods based on observation and field study (Mattes, 2016). Cvijić made numerous study trips to the Balkans, including to his home country during this period (Milanović Pešić et al., 2019). All the teaching was in German and the remarkable marks obtained by the student Cvijić are evidence of his perfect mastery of this language. In addition to his command of German, Cvijić also mastered French, acquired at university, as his later correspondence and travel diaries attest, and then English. The study of karst was an obvious choice in this pedagogical context of field geography and transnational opening.

2.2. The opportunity of karst studies

The interest of the Austrian geographical scientific world in the study of the Balkans was not without geopolitical and economic motives (Clewing & Pezo, 2005), particularly with regard to Bosnia and Herzegovina, which had been annexed by Austria-Hungary in 1878. Interest in geomorphological issues emerged mainly in Vienna during the 1880s. This context was particularly favorable for study and cartographic programs and provided a remarkable opportunity for Cvijić to complete his thesis and then circulate his results. Austria-Hungary, which was involved in the administrative management of areas where karst formations prevailed, was faced with the need to develop the *poljes*, particularly for agricultural purposes. In the 1880s, Carniola was faced with recurrent flooding (Lukić, 2018). According to Mattes (2016), it seems that it was during the Easter holidays of 1891 that the idea of studying karstic phenomena for his thesis finally took shape in Cvijić's mind. During that holiday, he discovered the region of Trieste, the Slovenian karst, then the Dinaric Alps down to Bosnia. This trip was followed by two long field missions in the Dinaric Alps in 1890 and 1892. He defended his thesis in 1893.

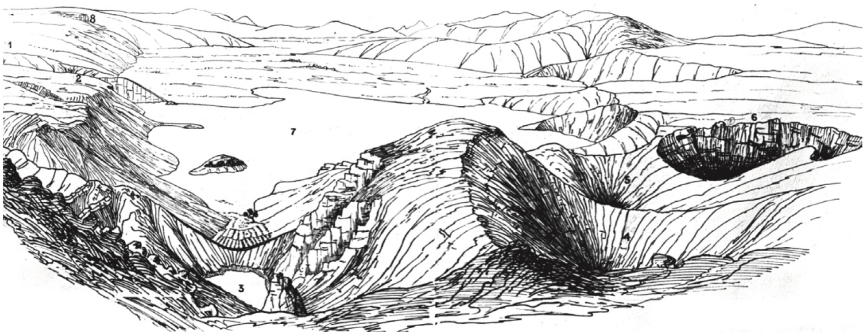

Figure 1. Dalmatia, drawing of deep dolines, Cvijić Eu440 (010).
Note. From "Circulation of Photographic Plates Between Jovan Cvijić and Emmanuel de Martonne", by G. Hallair, in V. Jović and A. M. Petrović (Eds.), *150th Anniversary of Jovan Cvijic's Birth* (p. 88), 2016, Serbian Academy of Sciences and Arts. Copyright 2016 by Serbian Academy of Sciences and Arts.

2.3. Research and teaching based on observation and description

Cvijić's thesis focused on the description of the karst formations of the Dinaric Alps (Ford, 2007), mainly in the Austrian-Hungarian border region. Before him, a few precursors had

carried out some research on Dinaric karst such as Herder, Boue, and Visquenel (Ćalić, 2007), but Cvijić stands out for his profoundly modern work methodology that was well ahead of his time (Prnjat, 2016). First of all, he spent a lot of time observing shapes and describing them, using drawings, topographical and geological sections (Figures 1 and 2), as well as block diagrams and photography (Figures 3 and 4) (Hallair, 2016). This method can be found in all of his 42 field notebooks written in Serbian, German, and French (Milanović Pešić et al., 2019).

Figure 2. Topographical sections across Durmitor Mountain (Montenegro).
Note. From "Morphologische und glaziale Studien aus der Bosnien, Herzegovina und Montenegro, I Theil, Das Hochgebirge und die Canonthäler" [Morphological and glacial studies from Bosnia, Herzegovina and Montenegro – Part I: The high mountains and the canyon valleys], by J. Cvijić, 1900, *Abhandlungen der k.k. Geographischen gesellschaft in Wien*, 2(6). CC BY-NC-ND.

In his thesis, Cvijić synthesized all the knowledge of his time on karst phenomena and, based on his descriptions, gave a precise classification of the forms and terminology used to describe them. He stabilized the choice and use of terms such as *ponor*, *uvala*, and *polje*. He also dug deeper into the subject and constructed hypotheses on the evolution of the relief and the sequence of processes, which he sought to demonstrate. To that purpose, he compared his hypotheses with those of his peers, as illustrated by his extensive correspondence with

Alfred Martel, the founder of French speleology (Mulaomerović, 2016). He shared his data and was not reluctant to evolve in his point of view. Following on from Cvijić's publications, Martel visited the Dinaric Alps in 1893, then Penck accompanied by the American William Morris Davis undertook a long trip to study the karst formations in 1898. Cvijić's intellectual humility on this occasion ought to be noted, for although he was not involved in this field trip, he incorporated Penck and Davis's thoughts at least partly into his research (Lukić, 2018). Cvijić had focused mainly on describing and inventorying the karst forms, while Penck and Davis were seeking to understand the long-term evolution of those forms and emphasized the role of fluvial erosion and tectonics. Those reflections led Alfred Grund, one of Penck's students, to develop the concepts of karst ground water (*ger.* Grund Wasser des Kartes) and karst water (*ger.* Karstwasser), which were later revisited by Friedrich Katzer (1909) through the notion of karst hydrography. Those concepts later prevailed in the research into karst forms. Cvijić succeeded in integrating them and pursuing his inventory beyond the area covered by his thesis, extending his research on karst to regions other than Bosnia and Herzegovina, in Dalmatia, Montenegro, Macedonia, Albania, and of course Serbia. Starting with karst-related issues, he then turned his research towards hydrology and limnology.

3. A forerunner in terms of international collaboration and the circulation of his research, as well as in the training of university lecturers and researchers

The modernity of Cvijić's work methodology and the high quality of his descriptions and definitions meant that his thesis immediately won him recognition from his peers. Sir Archibald Geikie and Ferdinand von Richthofen, two major earth scientists of his time, complimented him on his work (Lukić, 2018). Also, the way in which he handled his publications and the network of his contacts was remarkably effective.

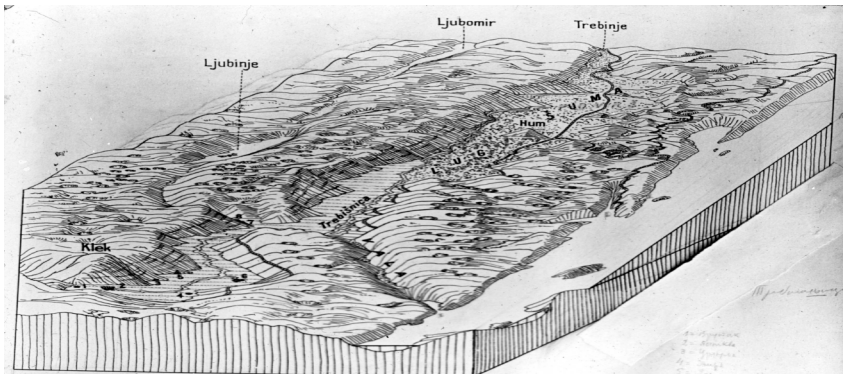

Figure 3. Block diagram of the Popovo polje (Bosnia-Herzegovina), Cvijić Eu440 (021).
Note. From "Circulation of Photographic Plates Between Jovan Cvijić and Emmanuel de Martonne", by G. Hallair, in V. Jović and A. M. Petrović (Eds.), *150th Anniversary of Jovan Cvijic's Birth* (p. 87), 2016, Serbian Academy of Sciences and Arts. Copyright 2016 by Serbian Academy of Sciences and Arts.

3.1. An international network of exchange and reflection

Thanks to the very positive reception of his thesis, Cvijić started an extensive correspondence with earth scientists interested in karst. He collaborated with Penck, as well as Davis, but he

also exchanged with Emmanuel de Martonne to whom he sent photographic plates for his collections (Hallair, 2016) and above all with Martel (Mulaomerović, 2016). The contact was established through the French Speleological Society, of which Cvijić had been a correspondent since 1895. The links with France were to become increasingly significant from the First World War onwards. Cvijić was a particularly efficient networker, as demonstrated by his founding of the Serbian Geographical Society in 1910. During the Balkan wars of 1912 and 1913, he found refuge in Switzerland and then in Paris, where he built close links with Vidal de la Blache and de Martonne. In the academic year 1917–1918, Vidal de la Blache invited him to give a lecture at the Sorbonne on the geography of the Balkan Peninsula, a lecture which attracted considerable attention. He returned to Paris as scientific head of the Serbian delegation to the international peace conference in 1919.

His scientific aura, his excellent knowledge of the terrain and the people, and his linguistic skills were all extremely effective. From the time of his thesis until his death, Cvijić never ceased to develop a national and international research network and to lead it, which legitimately earned him scientific recognition both in Serbia, where he was the rector of the University of Belgrade in 1905 and the president of the Serbian Royal Academy, and abroad notably as an honorary doctor of Charles University in Prague and of the Sorbonne in particular.

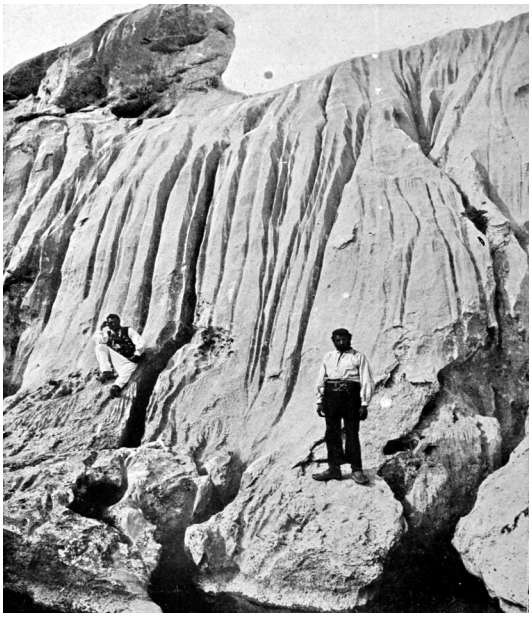

Figure 4. Photograph of vertical lapiez (Dalmatia), Cvijić Eu440 (022).
Note. From "Circulation of Photographic Plates Between Jovan Cvijić and Emmanuel de Martonne", by G. Hallair, in V. Jović and A. M. Petrović (Eds.), *150th Anniversary of Jovan Cvijic's Birth* (p. 88), 2016, Serbian Academy of Sciences and Arts. Copyright 2016 by Serbian Academy of Sciences and Arts.

3.2. A strategy of national and international publications

Cvijić voluntarily built up this international status by paying extreme attention to circulating the results of his research both in Serbia and abroad. His thesis *Das Karstphänomen* (*eng.* The Karst

Phenomenon, 1893), written in German, was published in Serbian only two years after its German publication. The links established with Martel were also very meaningful. Martel collaborated with Cvijić for almost thirty years and very quickly made him known in the French-speaking and international world by publishing a presentation of his thesis in the journal *Spelunca*. He also published Cvijić's articles entitled *La grande grotte de Douboca, dans la Serbie Orientale* (1895), *Les glacières naturelles de Serbie* (1896), and *Brusque formation d'une doline en Serbie* (1897). However, it was de Martonne (Renault, 1990) who most effectively circulated Cvijić's ideas from 1909 onwards, when he began publishing his *Traité de Géographie physique* (*eng.* Treaty of Physical Geography), with several successive updates. He devoted a crucial chapter to karstic phenomena, inspired by the works of Cvijić and Martel. At the end of his life, he revised the manuscript of Cvijić's *La géographie des terrains calcaires* (*eng.* Geography of Limestone Terrains), published in French in Belgrade in 1960, which gave the definitive version of the ideas of the father of karstology.

3.3. Cvijić's concepts at the origin of French karstology

This circulation of Cvijić's concepts in France, together with his talents as a speaker and teacher who never refused to speak at a conference, explains why French karstology developed largely from his work. At the end of the 19th century and the beginning of the 20th, theoretical knowledge was based on the speleological ideas of Martel while the ecological conception of the underground world originated from the Romanian Emil G. Racovitza—a lecturer at the Sorbonne and then at the Paris Natural History Museum (Racovitza, 1927). Therefore, the notions of chemical erosion and then of the karstic erosion cycle came from the work of Cvijić (Blanc, 1959). The cyclical evolution model coined by Cvijić on the basis of the Slovenian karst region and the Dinaric Alps was to be the conceptual framework within which French research later developed (Renault, 1992). The first French thesis in karstology was that of Georges Chabot (1927), who studied the plateaus of central Jura. Cvijić is therefore legitimately and unanimously considered to be the father of karst geomorphology (Blanc, 1959; Bleahu, 1974; Sweeting, 1972). Even though karstology has evolved considerably since then, giving rise to numerous specializations, Cvijić's work was seminal.

4. Conclusion

Jovan Cvijić was a pioneer, choosing from the outset to pursue a field geography rather than a cabinet geography. He laid the foundations of modern geography, particularly in the field of earth sciences and karstology, where his legacy is most significant.

The tools have evolved, but his scientific approach to observation remains relevant today. Through his training and research, Jovan Cvijić demonstrated that active participation in the construction of a national culture and a nation state is not incompatible with a universal spirit that is open to the international community and promotes experimental science that is open to criticism from its peers.

He was keen to pass on this way of working and communicating the results of his research, firstly by helping to build a high-performance higher education system and then by training young Serbian researchers. In this he was a major, dedicated agent. This is an optimistic message at a time when many Balkan states are still waiting to join the European Union. More than ever, Cvijić remains a perfect model for further generations.

References

Blanc, A. (1959). *Répertoire bibliographique des études du relief karstique en Yougoslavie depuis J. Cvijic: mémoires et documents* [Bibliographical directory of studies of karst relief in Yugoslavia since J. Cvijic: memoirs and documents] (Vol. 6, pp. 137–227). CNRS.

Bleahu, M. (1974). Bref historique de la karstologie [Brief history of karstology]. *Morfologia carstica*, 14–22.

Clewing, K., & Pezo, E. (2005). Jovan Cvijić als Historiker und Nationsbildner. Zu Ertrag und Grenzen seines anthropogeographischen Ansatzes zur Migrationsgeschichte [Jovan Cvijić as historian and nation-builder: On the yield and limits of his anthropogeographic approach to migration history]. In M. Krzoska & H.-C. Maner (Eds.), *Beruf und Berufung. Geschichtswissenschaft und Nationsbildung in Ostmittel- und Südosteuropa im 19. und 20. Jahrhundert* [Profession and vocation: History and nation building in East Central and Southeastern Europe in the 19th and 20th centuries] (pp. 165–297). LIT Verlag.

Chabot, G. (1927). *Les plateaux du Jura central. Etude morphogénique* (Publications des la faculté des lettres de l'université de Strasbourg, Fascicule 41) [The plateaus of the central Jura: Morphogenic study (Publications of the Faculty of Letters of the University of Strasbourg, Fascicle 41)]. Les belles lettres.

Cvijić, J. (1893). *Das Karstphänomen. Versuch einer morphologischen Monographie* [The karst phenomenon. Attempt at a morphological monograph]. Hölzel.

Cvijić, J. (1895). La grande grotte de Douboca dans la Serbie orientale [The Great Douboca Cave in Eastern Serbia]. *Spelunca: bulletin de la Societé de Spéléologie*, *3*, 81–87.

Cvijić, J. (1896). Les glacières naturelles de Serbie [Natural glaciers of Serbia]. *Spelunca: bulletin de la Societé de Spéléologie*, *6–7*, 64–77.

Cvijić, J. (1897). Brusque formation d'une doline en Serbie [Sudden formation of a sinkhole in Serbia]. *Spelunca: bulletin de la Société de Spéléologie*, *11*, 89–93.

Cvijić, J. (1990). Morphologische und glaziale Studien aus der Bosnien, Herzegovina und Montenegro, I Theil, Das Hochgebirge und die Canonthäler [Morphological and glacial studies from Bosnia, Herzegovina and Montenegro – Part I: The high mountains and the canyon valleys]. *Abhandlungen der k.k. Geographischen gesellschaft in Wien*, *2*(6), 1–94.

Cvijić, J. (1918). Hydrographie souterraine et evolution morphologique du karst [Underground hydrography and morphological evolution of karst]. *Receuil des Travaux de l'Institute de Géographie Alpine*, *6*(4), 376–420.

Cvijić, J. (1960). *La géographie des terrains calcaires* (Académie serbe des sciences et des arts, 341, Classe des sciences mathématiques et naturelles, 26) [The geography of limestone terrains (Serbian Academy of Sciences and Arts, Book 341, Class of Mathematical and Natural Sciences, No. 26)]. Académie serbe des sciences et des arts.

Ćalić, J. (2007). Karst Research in Serbia before the Time of Jovan Cvijić. *Acta Carsologica*, *36*(2), 315–319. https://doi.org/10.3986/ac.v36i2.200

Davis, W. M. (1930). Origin of Limestone Caverns. *Bulletin of the Geological Society of America, 41*(3), 475–628. https://doi.org/10.1130/GSAB-41-475

Feichtinger, J., Prutsch, U., & Csáky, M. (Eds.). (2003). *Habsburg postcolonial. Machtstrukturen und kollektives Gedächtnis* [Habsburg postcolonial: Power structures and collective memory]. Studienverlag.

Ford, D. (2007). Jovan Cvijić and the founding of karst geomorphology. *Environmental Geology, 51*(5), 675–684. https://doi.org/10.1007/s00254-006-0379-x

Hallair, G. (2016). Circulation of Photographic Plates Between Jovan Cvijić and Emmanuel de Martonne. In V. Jović & A. M. Petrović (Eds), *150th Anniversary of Jovan Cvijic's Birth* (Scientific Meetings, Book 162, Presidency, Book 10, Vol. 2, pp. 69–90). Serbian Academy of Sciences and Arts. http://www.gi.sanu.ac.rs/media/com_form2content/documents/c26/a414/f478/2016Zbornik_JCvijic.pdf

Katzer, F. (1909). *Karst und karsthydrographie* [Karst and karst-hydrography]. D. A. Kajon.

Lukić, D. (2018). *A Strong Class of Serious Scholars: The Power Dynamics of Knowledge Production in the Earth Sciences in Serbia, 1880–1914* [Doctoral dissertation, Central European University]. CEU Library. https://www.etd.ceu.edu/2020/lukic_dejan.pdf

Mattes, J. (2016). Coming From Abroad: The Discourse on Scientific Centralism and Cvijic's Studies in Vienna. In V. Jović & A. M. Petrović (Eds), *150th Anniversary of Jovan Cvijic's Birth* (Scientific Meetings,

Book 162, Presidency, Book 10, Vol. 2, pp. 12–28). Serbian Academy of Sciences and Arts. http://www.gi.sanu.ac.rs/media/com_form2content/documents/c26/a414/f478/2016Zbornik_JCvijic.pdf

Milanović Pešić, A., Ćalić, J., Petrović, M. D., & Terzić, A. (Eds.). (2019). *From the Notebooks of Jovan Cvijić: Selected Pages and Interpretations* (Special Issue, No. 94). Serbian Academy of Sciences and Arts & Geographical Institute "Jovan Cvijić" SASA. https://dais.sanu.ac.rs/123456789/13664

Mulaomerović, J. (2016). Edouard Alfred Martel and Jovan Cvijić: Excerpts From the Correspondence. In V. Jović & A. M. Petrović (Eds), *150th Anniversary of Jovan Cvijic's Birth* (Scientific Meetings, Book 162, Presidency, Book 10, Vol. 2, pp. 29–36). Serbian Academy of Sciences and Arts. http://www.gi.sanu.ac.rs/media/com_form2content/documents/c26/a414/f478/2016Zbornik_JCvijic.pdf

Prnjat, A. (2016). Jovan Cvijić on Scientific Work. In V. Jović & A. M. Petrović (Eds), *150th Anniversary of Jovan Cvijic's Birth* (Scientific Meetings, Book 162, Presidency, Book 10, Vol. 2, pp. 37–44). Serbian Academy of Sciences and Arts. http://www.gi.sanu.ac.rs/media/com_form2content/documents/c26/a414/f478/2016Zbornik_JCvijic.pdf

Racovitza, E. (1927). *Speologia. O ştiinţa nouă a străvechilor taine subpământeşti* [Speleology: a new science of ancient underground mysteries]. Astra.

Renault, P. (1990). Les grandes étapes de la karstologie française [The major stages of French karstology]. *Travaux du Comité français d'Histoire de la Géologie*, *4*(1), 1–21. https://annales.org/archives/cofrhigeo/karstologie.html

Renault, P. (1992). La karstologie française de 1900 à 1992 [The French karstology between 1900 to 1992]. In J. N. Salomon & R. Maire (Eds.), *Karst et évolutions climatiques: hommage à Jean Nicod* [Karst and climate change: tribute to Jean Nicod] (pp. 17–30). Presses Universitaires de Bordeaux.

Suess, E. (1883). *Das Antlitz der Erde* [The Face of the Earth]. Tempsky G. Freytag.

Sweeting, M. M. (1972). *Karst Landforms*. Macmillan.