Mirko Danijel Bogdanić (1760-1802) Astronomer, Mathematician, Surveyor and Croatian Educator

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Abstract: *This article provides valuable information about the life and work of Mirko Danijel Bogdanić (Bogdanić Imre Dániel) (Virovitica, 1762 – Buda, 1802) who was an astronomer, mathematician, surveyor and the author of a book on world history in Croatian. This article observes his life and work from the historical perspective of the time of Emperor Joseph II in Austria. From 1782 to 1785, Bogdanić studied mathematics, physics and astronomy in Buda and Pešt. He often worked with famous Croatian scientists such as Ivan Paskvić (János Pasquich), Franjo Bruna (Ferenc Bruna), Josip Mitterpacher (József Mitterpacher) and others. Particular attention is paid to the period between approximately 1791 and 1796, which he spent in Vienna. At first, he focused on publishing the first volume of his history of the world in Croatian (Dogodjaji svieta (World events), 1792) in which he paid particular attention to astronomy and Croatian astronomical terminology. From 1793 to 1795, he studied astronomy at the University of Vienna. The following period was the most important in his life. He was second, then first assistant at the Buda Observatory (1796–1802) and also (1798–1802) appointed Imperial Assistant Astronomer to the cartographer János Lipszky, charged with conducting precise astronomical observations to determine the geographical coordinates for the geographical map of Hungary (Mappa Generalis Regni Hungariae). His observations, especially of latitudes, were considered excellent. He spent many long, hard hours working in the field under adverse weather conditions, leading to extreme exhaustion, which resulted in serious illness and his premature death.*

Key words: *astronomy, mathematics, geodesy, the Buda Observatory, geographical map of Hungary, patriotism, enlightenment (Age of Enlightenment), world history*

1. Introduction

The Croatian astronomer, mathematician, surveyor and educator Mirko Danijel Bogdanić (1760–1802), known in Hungary as Bogdanić Imre Dániel, and in Austria as Emrich[1] Daniel Bogdanić, was born on 5 November 1760, in Virovitica. He was one of the most important Hungarian astronomers and mathematicians of the 18th century, and was well known throughout Europe. On his tombstone, it says that the Seine and Thames knew him (Kren 2007). The first ten years of his childhood were spent in Virovitica, as can be inferred from the preface to *Dogodjaji svieta* (Bogdanić 1792). In it, he stated that he had spent more than twenty years away from his native land. A memorial pillar in Budapest, made by Janos Elter in 1972, bears the inscription *In memoriam Emeric Danielis Bogdanić inclytae Croatiae nati eruditissimque Mathematica et astronomerus Hungariae facti 1762[2] –1802* (Dadić 1986). In Croatia, too little is known about Bogdanić, the 18th century world famous astronomer, mathematician and surveyor. The 250th anniversary of his birth and the 200th anniversary of the printing of the map of Hungary by Lypszky[3], to which Bogdanić made an important astronomical, mathematical and geodetic contribution, mark an opportunity to extend this knowledge, and also evaluate objectively his role in education and his commitment to the Croatian people and his Croatian homeland. His contribution to the literary language is of special importance to all Croats, as is his contribution to the enlightenment of the Croatian nation in the troubled times of the reforms of Joseph II and the Jacobin revolution in France. In 1792, he published in Vienna the first volume of his world history in Croatian, entitled *Dogođaji svieta (World events)*. In his native town of Virovitica, a street is named after him. From 1975 to 1990, the Amateur Astronomical and Astronautical Society ''Mirko Danijel Bogdanić' operated in Virovitica. The Astronomical Association ''Mirko Danijel Bogdanić'' resumed its work in 2007 (Kren 2002, 2007).

2. Bogdanić's childhood and education

Virovitica is located near the Hungarian border, along the southern branch of the Plain of Pannonia plain by the River Drava, almost in the centre of the Croatian Podravina region. It is one of the oldest settlements in the northern part of Croatia and was a well ordered medieval town until the Turks captured it.[4] After liberation from Turks, during the first half of the 18th century agricultural

1 Imre or Emrich is the equivalent of Mirko in Croatian. In Croatian articles he is called Mirko Danijel Bogdanić, Danijel (Daniel) Mirko Bogdanić or Dane Mirko Bogdanić. In his book Dogodjaji svieta he signed himself Dan Emir BogdanićBogdanić. Emir is probably a contraction of Emrich, Emericus in Latin.

2 For a long time, it was thought that Bogdanić was born in 1762. The latest research into his birth certificate shows that he was born on 5 November 1760 (Reisz, Lemić 2010).

3 On Thursday 4 November 2010, in the hall of the National University Library, an exhibition about Bogdanić, entitled *Seeker of the Stars* was officially opened. The exhibition was mounted to mark the 250th anniversary of Mirko Daniel Bogdanić's birth and the 200th anniversary of the completion of the Map of Hungary by Lipszky. The Croatian and Hungarian State. Archives prepared the exhibition jointly with the National and University Library in Zagreb. The authors of the exhibition were the Director of the Hungarian National Archive, Csaba T. Reisz, and Vlatka Lemić, of the Croatian State Archives,

4 The name Virovitica was first recorded in Koloman's Charter of 1234, in which the town was given preferential trading status. By the end of the 13th century in Virovitica, the Franciscans and Dominicans had sees in Virovitica. The further development of the city was halted by the Turkish invasion and the conquest of Virovitica in 1552, which caused destruction of such intensity that Virovitica was rebuilt as a town with oriental characteristics. Virovitica was liberated from Turkish rule more than a hundred years later, in 1684. The whole of western Slavonia was liberated in 1687 by the Military Border Army (Mohorovičić 1986).

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Sažetak: *Istraženi su život i djelo Mirka Danijela Bogdanića (Virovitica, 1760 – Budim, 1802), značajnoga hrvatskog, ugarskog i austrijskog astronoma i matematičara te autora svjetske povijesti na hrvatskom jeziku. U oblikovanju životopisa i objašnjenju njegova djelovanja slijedi se povijesni okvir burnih previranja u doba jozefinizma, u kojem je odrastao i djelovao, te njegov odnos prema hrvatskom jeziku i domovini. Studirao je matematiku, fiziku i astronomiju u Budimu i Pešti (1782–1785). Stručno je surađivao s poznatim hrvatskim znanstvenicima koji su ondje djelovali (Ivan Paskvić, Franjo Bruna, Josip Mitterpacher i drugi). Posebna je pozornost posvećena bečkom razdoblju njegova djelovanja (oko 1791. do 1796.). U prvom dijelu razdoblja Bogdanićeva su nastojanja usmjerena na objavljivanje prvog sveska svjetske povijesti na hrvatskom jeziku Dogodjaji svieta (1792), u kojem je pozornost obratio na astronomiju te na hrvatsko astronomsko nazivlje. U drugom dijelu bečkog razdoblja bio je student astronomije na bečkom sveučilištu (1793–1795). Slijedi najvažnije razdoblje njegova života kao drugog i prvog pristava na budimskoj zvjezdarnici (1796–1802), te carskoga imenovanog astronoma pomoćnika mađarskoga husarskog natporučnika i kartografa Jánosa Lipszkoga (1798–1802) u obavljanju preciznih astronomskih motrenja za određivanje geografskih koordinata za kartu Mađarske (Mappa Generalis Regni Hungariae…). Njegova motrenja ocijenjena su izvrsnima, posebice određivanje geografskih širina. Tijekom dugotrajnoga napornog terenskog rada pod nepovoljnim vremenskim okolnostima maksimalno se iscrpljivao, što je rezultiralo bolešću i preranom smrću.*

Ključne riječi: *Bogdanić, astronomija, matematika, geodezija, budimska zvjezdarnica, zemljovid Mađarske, domoljublje, prosvjetiteljstvo, svjetska povijest*

1. Uvod

Hrvatski astronom, matematičar, geodet i prosvjetitelj Mirko Danijel Bogdanić, u Mađarskoj poznat kao Imre Daniel Bogdanich, a u Austriji Emrich[1] Daniel Bogdanisc, rođen je 5. studenoga 1760. godine u Virovitici. Bio je jedan od najznačajnijih mađarskih astronoma i matematičara 18. st., što za ono vrijeme znači da je bio poznat i u cijeloj Europi. Kako piše u nadgrobnom epitafu, poznavala ga je i Seina i Themsa (Kren 2007). U Virovitici je proveo djetinjstvo, točnije prvih desetak godina života, kako se može zaključiti iz njegova predgovora knjizi *Dogodjaji svieta* (Bogdanich 1792), u kojem je naveo da je više od dvadeset godina izvan svoje domovine.

Dadić navodi da je 1972. u Budimpešti podignut spomen-stup Bogdaniću na kojem stoji natpis: ''*In memoriam Emerici Danielis Bogdanich inclytae Croatiae nati eruditissimque mathematici et astronomi Hungariae facti 1762*[2]*–1802".* Izradio ga je Janos Elter (Dadić 1986). U Hrvatskoj se premalo zna o tom hrvatskom velikanu, svjetski poznatom astronomu, matematičaru i geodetu iz 18. stoljeća, te je 250. obljetnica njegova rođenja i 200. obljetnica tiskanja Lipszkyjeva zemljovida Ugarske[3], za koji je dao svoj astronomsko-matematičko-geodetski doprinos, prigoda da se to znanje proširi, a također objektivno vrednuje i njegova angažiranost i prosvjetiteljska uloga za hrvatski narod i hrvatsku domovinu. Za Hrvatsku je posebno važnan njegov doprinos stvaranju književnog jezika za sve Hrvate i u prosvjećivanju hrvatskog naroda u burnim vremenima jozefinizma te jakobinske revolucije u Francuskoj. U Beču je na hrvatskom jeziku 1792. godine tiskao prvi svezak svjetske povijesti pod naslovom *Dogodjaji svieta.*

U rodnom gradu Virovitici jedna je ulica dobila njegovo ime. Od 1975. do 1990. u Virovitici je djelovalo amatersko Astronomsko astronautičko društvo ''Mirko Danijel Bogdanić''. Godine 2007. obnovljen je rad Astronomske udruge Mirka Danijela Bogdanića (Kren 2002, 2007).

2. Bogdanićevo djetinjstvo, odgoj i obrazovanje

Grad Virovitica smješten je blizu mađarske granice, uz južne odvojke Panonske nizine, pokraj rijeke Drave, gotovo u središtu hrvatskog dijela podravskoga međašnog područja. Jedno je od najstarijih naselja u sjevernom dijelu Hrvatske i bio je uređeni srednjovjekovni grad dok ga nisu osvojili Turci[4]. Nakon oslobođenja od Turaka, tijekom prve polovine 18. stoljeća u gradu se razvijala poljoprivredna, a potom šumarska proizvodnja te obrt i lokalna trgovina (Mohorovičić 1986), a

1 Imre i Emrich u hrvatskom prijevodu su Mirko ili Emerik te je u hrvatskim člancima navođen kao Mirko Danijel Bogdanić, Danijel Mirko Bogdanić ili Dane Mirko Bogdanić. U svojoj knjizi *Dogodjaji svieta* potpisao se kao Dan Emir Bogdanich. Radi se vjerojatno o imenu od milja Emir prema Emrich, Emerik, latinski Emerici.

2 Donedavno se smatralo da je rođen 1762. te su tek najnovija istraživanja i uvid u maticu rođenih pokazali da je rođen 5. studenoga 1760. (Reisz, Lemić 2010)

3 Dana 4. studenoga 2010. svečano je otvorena u auli Nacionalne i sveučilišne knjižnice u Zagrebu izložba o Bogdaniću, pod naslovom *Tragač za zvijezdama*. Izložba je postavljena u povodu 250. obljetnice rođenja Mirka Danijela Bogdanića i 200. obljetnice dovršetka Lipszkyjeva zemljovida Ugarske. Zajedno su je priredili Hrvatski i Mađarski državni arhiv te Nacionalna i sveučilišna knjižnica u Zagrebu. Autori izložbe su: iz Mađarskoga državnog arhiva upravitelj Csaba T. Reisz, a iz Hrvatskoga državnog arhiva Vlatka Lemić.

4 U povelji hercega Kolomana iz 1234. godine, kojim je dobila status povlaštenog trgovišta, prvi puta je zapisano ime Virovitice, a potkraj 13. st. svoja sjedišta u Virovitici imali su franjevci i dominikanci. Daljnji razvoj grada prekinula je najezda Turaka, osvajanje Virovitice 1552. godine i razaranje grada takvog stupnja da se grad uskoro pretvorio u varoš s orijentalnim karakteristikama. Oslobodila se turske vladavine više od stotinu godina poslije, 1684. godine, a do 1687. godine krajiška vojska oslobodila je čitavu zapadnu Slavoniju (Mohorovičić 1986).

and forestry production, local production and trade were developed (Mohorovičić 1986). Virovitica became the centre of education and schooling in the region[5]. A source of constant turmoil in the region of Slavonia was widespread abuse by the commercial and court officials and badly regulated relations between the nobility and the subjected population. So in 1736, Emperor Charles VI sent to a Royal Commission to Virovitica (Marjoram 1986). They carried out a census of estates in Virovitica, from which it is known that, in 1736, there were 327 households and houses and about 2,000 inhabitants. Later reports in 1757 indicated that there were 400 houses, and 470 in the year 1766. In the year 1783, there were 3029 residents. At that time, the population of Zagreb was smaller. In Croatia and Slavonia, only Varaždin and Koprivnica had more inhabitants. Virovitica was among the largest cities of continental Croatia (Adamček 1986). Along with the residents from the census in Virovitica there were a number of unregistered inhabitants, such as members of the nobility, priests, soldiers, military officials, and others. The barracks, restored in 1750, were located in the city. The Franciscan monastery dominated Varaždin, with the baroque Church of St. Rocco. Bogdanić was baptized in this church, which boasted a beautiful pulpit built between 1755 and 1759, just before Bogdanić's birth (Horvat 1986). His parents were among the population which was not included in the census, and probably were native inhabitants of Virovitica. In the 1736 census for Virovitica, the surname Bogdanić does not appear, nor his mother's surname, Damjanić. Vargha (URL 1) states that Bogdanić's father was an officer and a nobleman. Bartha says that Bogdanić's parents were respectable citizens and that he was raised in a good family (URL 2). In the dedication to *Dogodjaji svieta*, Bogdanić did not attribute nobility to his father's name. In the text, he called him a 'citizen'. If Varga's sources are reliable, the term citizen indicates that Bogdanić and his father fostered a commitment to the new order. In the utopia of Joseph II, that meant greater equality, the right to education, the reduction of aristocratic privileges, and more. According to Kučera (Kučera 1900), Bogdanić's parents were Nikola Bogdanić and Ana Damjanić. He was the eldest son and second child in a family of ten children.[6] Kučera said that he grew up in poverty. He also said that it seemed that his father's desire was for Mirko to become a priest[7], but the boy devoted himself to mathematics.

Kučera's reference to poverty probably referred to caring for a large family. However, his father assisted Bogdanić financially in the 1730s and supported him in all his choices in life, as is evident from the dedication to *Dogodjaji svieta*,. The book was printed in Croatian, in Roman script, before the reforms of the 19th century. Bogdanić was grateful to his father for everything he did teaching him to serve all Croatian patriots. He apologised for not doing enough for him and their homeland. He said he did not aspire to material goods and through all his activities he wished to thank his father for everything he had done for him. It is quite clear that he carried with him a sense of patriotism from his home life. It was further developed and built up by association with his compatriots from different parts of Croatia in Buda, Pešt, Veliki Varadin (Hung. Nagyvárad, Ger. Großwardein, Lat. Magnovaradinum in Transylvania, today Oradea in Romania), Vienna, and probably in Zagreb. It can be assumed that, as a boy in his parents' house, Bogdanić gained insights into various complex military, political and economic situations after the liberation of Slavonia from the Turks and the fragmentation of Croatia. His later work showed that he read books by foreign and Croatian authors, either during his schooldays or later by his own choice. It seems that Bogdanić's father was well acquainted with the situation in Croatia. In the dedication, Bogdanić emphasises his father's patriotism and desire to raise a son who would serve his fellow-countrymen (Bogdanić 1792). The most reliable historical source so far, his own book, claims that he left Virovitica when he was 11 at the most. Perhaps his father was transferred and the whole family left Slavonia or perhaps he was sent away to school, as was common in those days. Until 1781, there were no sources about this period of his life to confirm whether he went to a Jesuit school in Zagreb or was educated in Hungary. As early as the 17th century, the historian Vitezović[8], with his calendars, and public school teachers working in Zagreb, laid the foundations of the future cultural focus of the Croats (Kombol and Novak 1992). The Jesuit school in Zagreb instilled in its students an awareness of the value of knowledge and ethnicity. In the 18th century, the Croatian nation was fragmented into several countries: Croatia itself (Croatia and part of Slavonia with Virovitica), the Military Border under the direct administration of Austria, Istria and Dalmatia under Venetian rule, the Hungarian Coast, the Dubrovnik Republic and Bosnia and Herzegovina under the Turks (Horvat 1980, Map: Croatian lands in the late 18th century). In Slavonia, liberated from the Turks in the late 17th century, the Empress Maria Theresa ordered the establishment of three new Slavonian counties in 1745: Virovitica, Požega and Srijem. The county of Virovitica was divided into three smaller districts: Virovitica, Osijek and Djakovo. Virovitica became the county seat. Fearing Germanisation, in 1751 the Slavonian overlords in Požun decided to incorporate Slavonia into Hungary. Slavonia became a dependence of Hungary, with official Hungarian policies. Such was the Virovitica into which Bogdanić was born in 1760 and spent his childhood. His parents probably remained in Virovitica or returned after his father's retirement. It is well known that, after surveying in Dubica, while performing measurements of latitude and longitude in Croatia in 1799, Bogdanić went to visit his native town, although it had not been selected for surveying. In the 1804 population census, a Miko[9] Bogdanić, probably his father is recorded. As previously stated,

5 At the time of Empress Maria Theresa, schools for boys and girls were established. In Croatia in 1774, there were 17 schools for boys, one of which was in Virovitica, where pupils were taught the catechism, biblical history, reading, German, accountancy, ethics and business (Pavlica 1986). In Virovitica, philosophy was the predominant branch of learning in the Franciscan monastery from 1771 to the 1782, which means that the Franciscans made a significant contribution to academic education. Their students also learned Croatian, Hungarian and Latin (Cvekan 1986). However, in 1771 Bogdanić was only 11 years old, and his education took place outside Virovitica (Bogdanić 1792, foreword).

6 According to the register of births in Virovitica Nikola Bogdanić had ten children: Eva, Mirko, Ana, Marija, Julijana, Julijana, Katarina, Magdalena, Franciska and Magdalena. The fact that the names of Julijana and Magdalena are repeated may indicate that the first children to be given those names had died (Reisz, Lemić 2010)

7 Since he was the only son, it was not logical for his father to direct him to the priestly vocation, yet he was probably not suitable for the military. He was attracted to science.

8 Pavao Ritter Vitezović (1652–1713) was among the first Croatian writers who spoke of the renewed Croatia *(Croatia redivi-va)*. His major poetic work was *Opsida sigetska (Siege of Siget)*. Vitezović's Illyrian crest in his book *Stematografija*, became the emblem of the Croatian Illyrians led by Gaj in the 19th century. He was director of printing in Zagreb in 1694, when the first calendars in Croatian were printed using Roman script.

9 In the 1804 census Miko Bogdanić was listed. Most likely it was Bogdanić's father Nikola, in local dialect Miko, who was living in Virovitica two years after the untimely death of his son.

postao je i središtem prosvjete i školstva[5] tog područja. Velike zloporabe komorskih i vlastelinskih službenika te nesređeni odnosi između vlastelina i podložnog stanovništva bili su izvor stalnih nemira u Slavoniji. Stoga je car Karlo VI. poslao 1736. dvorsku komisiju (Mažuran 1986) koja je provela zemaljski popis Virovitice i virovitičkog vlastelinstva, iz kojeg znamo da je 1736. Virovitica imala 327 domaćinstava i kuća i oko 2000 stanovnika. Iz kasnijih izvještaja poznato je da je godine 1757. imala 400, a 1766. godine 470 kuća. Godine 1783. bilo je 3029 stanovnika. Zagreb je u to vrijeme imao manje stanovnika, a u Hrvatskoj i Slavoniji više stanovnika imali su jedino Varaždin i Koprivnica te je Virovitica tada bila među najvećim gradovima kontinentalne Hrvatske (Adamček 1986). Uz stanovnike s popisa u Virovitici su živjele osobe koje se nisu popisivale, kao što su plemići, svećenici, vojnici, vojni službenici i drugi. U gradu se nalazila vojarna koja se 1750. obnavljala. Gradom je dominirao franjevački barokni samostan s crkvom sv. Roka, u kojoj je Bogdanić kršten, s prekrasnom propovjedaonicom izrađenom neposredno prije Bogdanićeva rođenja, od 1755. do 1759. godine (Horvat 1986). Bogdanićevi roditelji pripadali su populaciji koja nije obuhvaćena popisom, a vjerojatno nisu ni bili autohtoni stanovnici Virovitice. U spomenutom zemaljskom popisu Virovitice i virovitičkog vlastelinstva iz 1736. nema prezimena Bogdanić ni majčina prezimena Damjanić. Vargha (URL 1) navodi da je Bogdanićev otac bio časnik i pripadnik plemstva, a Bartha navodi da su Bogdanićevi roditelji bili poštovanja vrijedni i da je odrastao u dobrom obiteljskom ozračju (URL 2). U posveti u knjizi *Dogodjaji svieta* Bogdanić uz ime svog oca nije stavio nikakvu plemićku oznaku, a u tekstu ga naziva pučaninom. Ako su Varghini izvori pouzdani, onda riječ pučanin pokazuje opredjeljenje Bogdanića i njegova oca za nova strujanja, koja su u utopiji Josipa II. težila ravnopravnosti puka, pravu na obrazovanost, smanjenju plemićkih privilegija i drugo. Prema Kučeri (Kučera 1900) Bogdanićevi roditelji su

bili Nikola Bogdanić i Ana, rođena Damjanić, bio je drugo dijete po starosti u obitelji od desetero djece i najstariji sin.[6] Kaže da je odrastao u siromaštvu i da se čini da je očeva želja bila da postane svećenikom[7], ali se on odlučio posvetiti matematici. Govoreći o siromaštvu Kučera vjerojatno misli na mnogobrojnu obitelj koju je trebalo izdržavati. No otac je materijalno pomagao Bogdanića i u tridesetim godinama života i podupirao ga u svim njegovim životnim odlukama, što je vidljivo iz posvete knjizi *Dogodjaji svieta*, u kojoj Bogdanić piše: *Nikoli Bogdanichu precienjenomu Roditelju svojemu – Precienjeni Roditelju – Komechu dragi Roditelju prikazati ovo djello moje nego TEBI – koi poslie kadſimi bitje dao, nastojaoſi ono ſveudilj ne samo meni ugodno, veche i opchenomu Domoroſtvu nashemu ucsiniti prudno. U posliednjemu ovomu akoprem moxebiti nisi mogao Tvoj xudjeni kraj dohittiti, nishtanemanje shto TEBE gleda izpunioſi i ſavishe duxnost Oca i Pucsanina, Er ſ-velikiem troshkom, brigom i raſipom xivota uzderxavaoſime do danaſ, i nishtor niſi uſtegnuo, shto ſudjashe dache pomochi razvitti i izvarshiti vlasti duha mojega. Ali ako nisam odlucsenju i uffanju TVOJEMU odgovorio, oprosti dragi Roditelju, ſamo volja i prignutje dushe jesu vlaſnost moja, i ovaſu jur davno prikazana Domoroſtvu i TEBI; oſtalaſu ſreche, koja nitinam ſlava jest imati, niti prikor nejmati. Shto dakle u vlasti mojoj lexi, primi dragovoljno precienjeni Roditelju ovo djello, ne kao ſtvar doſtojanſtvu Domoroſtva prikladnu, ili kao podpor ſtarosti TVOJE davno odlucsenu, da ſluxi za oſvietlanje ſina, koi ne traxi csest ſvoju u uxivanju ſtvarieh, prid koim zablishteno mloxtvo pada za lice ſvoje, veche u krepkoj uzdanoſti, daſi zadovoljan ſ-chudi i ſ-prignutjem ſina, koi dok karvi u njemu bude, neche pristati TEBE csaſtiti i TEBI svom dushom haram biti – TVOJ Precienjeni Roditelju Ponizni ſin Daniel Emir Bogdanich."* Iz posvete je jasno da je iz roditeljskog doma ponio razvijeni osjećaj rodoljublja i domoljublja, koji se dalje razvijao i nadograđivao druženjem sa sunarodnjacima iz raznih krajeva Hrvatske, u Budimu, Pešti, Velikom Varadinu, Beču, a vjerojatno i u Zagrebu. Može se pretpostaviti da je Bogdanić već kao dječak u roditeljskom domu stjecao uvid u složenu vojničku, političku, gospodarsku i inu situaciju nakon oslobođenja Slavonije od Turaka i razjedinjenja Hrvatske, a po daljnjem djelovanju može se zaključiti da je uz djela stranih autora čitao i djela hrvatskih pisaca ili tijekom školovanja ili samostalnim odabirom. Bogdanićev otac je, čini se, bio dobro upućen u stanje u Hrvatskoj. U posveti knjizi *Dogodjaji svieta* Bogdanić naglašava očevo domoljublje i odgoj sina koji će služiti ''*opchenome Domoroſtvu"* (Bogdanich 1792, posveta). Do sada najpouzdaniji povijesni izvor, Bogdanićeva knjiga *Dogodjaji svieta,* sadrži navod da je Viroviticu napustio kad mu je bilo najviše 11 godina. Možda je otac dobio premještaj pa je cijela obitelj napustila Viroviticu i Slavoniju ili ga je možda otac poslao na školovanje u neki konvikt, kako je to u ono doba bilo uobičajeno. O tom razdoblju njegova života, sve do 1781., nisu još pronađeni izvori koji bi potvrđivali je li na školovanju bio kod isusovaca u Zagrebu ili se školovao u Mađarskoj. Već u 17. st. Vitezović[8] je, kao povjesničar te svojim kalendarima i pučko-prosvjetnim radom, u Zagrebu postavio temelje budućem općem kulturnom središtu Hrvata (Kombol i Novak 1992), a isusovačka škola u Zagrebu usađivala je svojim učenicima svijest o vrijednosti znanja, ali i nacionalne pripadnosti.

U 18. st. hrvatski je narod bio rascjepkan na više država: na Bansku Hrvatsku (Hrvatska i dio Slavonije s Viroviticom),

5 U doba carice Marije Terezije dolazi do osnivanja muških škola i škola za djevojčice. Na području uže Hrvatske 1774. godine radilo je 17 muških škola, od kojih jedna i u Virovitici, u kojima se učio vjeronauk, biblijska povijest, čitanje, njemački jezik, račun, etika i gospodarstvo (Pavlica 1986). U virovitičkom franjevačkom samostanu održavao se od 1771. do 1782. studij filozofije, što znači da su franjevci držali školstvo akademskog značaja, a njihovi studenti učili su i hrvatski i mađarski i latinski (Cvekan 1986). No 1771. Bogdanić je imao 11 godina i već se sigurno školovao izvan Virovitice (Bogdanich 1792, pridgovor).

6 Prema virovitičkim matičnim knjigama Nikola Bogdanić imao je desetero djece: Evu, Mirka, Anu, Mariju, Julijanu, Julijanu, Katarinu, Magdalenu, Francisku i Magdalenu. Ponavljanje imena Julijana i Magdalena upućuje na to da su prvorođene djevojčice istog imena umrle. Mirko je, dakle, bio jedini sin (Reisz, Lemić 2010)

7 Budući da je bio jedini sin, nije logično da bi ga otac usmjerio svećeničkom pozivu, a za vojnički vjerojatno nije imao smisla, nego ga je privlačila znanost.

8 Pavao Ritter Vitezović (1652–1713) prvi je među hrvatskim piscima govorio o obnovljenoj Hrvatskoj (*Croatia rediviva)*. Njegovo glavno pjesničko djelo je *Opsida sigetska*. Vitezovićev ilirski grb iz njegove *Stematografije* postao je grb Gajevih iliraca. Bio je upraviteljem zagrebačke tiskare od 1694. i tiskao prve latinicom pisane kalendare na hrvatskom jeziku.

no other Bogdanić family was recorded in Virovitica (Sršan 2005). When Bogdanić was only three years old, in 1763, the Empress's field marshals suggested a survey of the land in all the countries of the Hapsburg empire to Maria Theresa. This led to the rapid development of geodesy in these countries, including Croatia. Such systematic surveys were being carried out, or had been almost complete, in other European countries such as France, Prussia and Bavaria (URL 3). This led to the development of more precise maps of the countries under the Hapsburg crown. It required precise astronomical measurements. The task was completed nearly four decades later. Thanks to this situation, Bogdanić was appointed to measure latitudes and longitudes. He was brought up and educated during the tumultuous upheavals of the reign of Empress Maria Theresa and co-regency of Joseph II (from 1765 onwards), when the age of reforms began throughout the empire, including Croatia. In 1767, most of the executive powers of the Croatian Parliament were abolished, and the Royal Council of Croatia, Dalmatia and Slavonia, based in Varazdin, was founded. The model for this Council was the Regency Council in Hungary, and it operated on an equal footing, yet independently of Hungary. However, the Croatian upper classes and orders were not satisfied and demanded a closer relationship with Hungary, believing their common interests would result in joint, more effective opposition to Vienna. In 1773, when Bogdanić was 13, Joseph II abolished the Jesuit order, which led to many upheavals, not only in clerical circles. The Jesuit order had been the main stronghold of the education system. After its abolition, their schools and universities were sequestrated, including the Jesuit Academy in Zagreb. Joseph II wanted to introduce secular education of the same kind in all the countries of the Empire (Horvat 1980). Many Jesuits, including Rudjer Bošković[10], had to change their circumstances in order to adapt to the changes (Kren 2002). During his studies and later, Bogdanić was surrounded by (former) Jesuits who were university professors, observatory astronomers and others, for example, Joseph (Josip) Mitterpacher, János (Ivan) Horvat, Ferenc Taucher, Ferenc (Franjo) Bruna, who will be discussed later. During this time, the rapid development of the bourgeoisie was generated, but also increasing discontent with the empire. It was characterised by the actions of the French Encyclopaedists, the Enlightenment and, at the end of the century, the Jacobin revolution in France. According to Franjo Fancev (Fancev 1941) and Vilko Bužek (Bužek 1941), Bogdanić began his schooling in Zagreb and received a humanist education at the Jesuit Academy in Zagreb, which he left in 1780 armed with an extensive knowledge of Croatian history, literature and so on. According to Laszlo Bendefy, he enrolled in 1778 in Pešt (Dadić 1986). Bužek says that Bogdanić attended grammar school and studied philosophy in Zagreb, then went on to Budapest University to study science, also studying privately. He does not mention sources but says that he discovered details by chance at the National University Library in Zagreb. Bogdanić's words from the preface to *Dogodjaju svieta* could be interpreted to mean he left Virovitica at the age of ten and that he grew up in Hungary. But it is possible that his father, as a convinced patriot, sent him to Zagreb, the cultural centre of Croatia. Considering that in Zagreb the Kaikavian dialect was prevalent, although it is possible to argue for the trend of accepting the Stokavian dialect as the literary language, it was possible that this was what Bogdanić referred to when he spoke of his separation from Slavonia and the Stokavian dialect for over twenty years. In his book, he called Slavonian Stokavian (Croatian) "our native tongue" a term Croats often used for the Croatian language in later times too. The Virovitica area was complex in terms of spoken language. In Virovitica, the Ikavian and Jekavian dialects were used and in its vicinity, other Croatian dialects were represented (Lončar and Fink 1986).

As a boy, Bogdanić would have noted differences in these forms of Croatian and the need to introduce a unified literary language for all Croats. His good knowledge of the political situation and Croatian literature support the view that he was educated in Zagreb, although it is possible that he received information on the situation in Zagreb and other places from his fellow Croats while studying in Buda and Pešt, and later in Vienna. János Paskvić of Senj, before coming to the university, was a clergyman in the County of Zagreb, Ferenc Bruna and Ferenc Joseph Domin were citizens of Zagreb, and so on.

3. Bogdanić's Studies in Buda and Pešt

In 1757, the ban on teaching about the motion of the Earth was lifted, which in Croatia marked a turning point in the educational curriculum. Immediately afterwards, the Jesuits accepted the Copernican system, while the Franciscans still found it unacceptable. Until the abolition of Franciscan philosophy in northern Croatia in 1783, when Bogdanić was already studying in Hungary, attitudes to the heliocentric system and Bošković's and Newton's doctrines were identical in Franciscan philosophy and the Jesuit schools, including the Academy, and in secular schools, created after the abolition of the Jesuit order (Kren 2002). Whether Bogdanić gained his knowledge in this area in Zagreb or in Hungary, it was based on the heliocentric system and Newton's and Bošković's doctrines. He was 21 when Herschel[11] discovered Uranus, a new planet in the solar system, in 1781. Studying the heavens became the focus of research and all the major observatories watched and followed the movement of Uranus, the other planets and celestial phenomena. Bogdanić was surely thrilled by this discovery. He had an inclination for the natural sciences, astronomy and mathematics. In his preface, he wrote that for most of his life he had been interested in mathematics (Bogdanić 1792). Perhaps this important astronomical discovery motivated him to study physics, mathematics and astronomy. There is reliable information that in 1781 he was residing in Graz as l*ogicus* at the Faculty of Philosophy (Reisz, Lemić 2010) and from 1782 to 1785, he studied physics, mathematics and astronomy at the University of Buda and Pešt. This was during the reign of Emperor Joseph II and his decades of drastic reforms, which shook the empire and led the Hungarian nobility to the brink of revolt against imperial rule. The Jesuit University in Trnava, founded by Cardinal Pázmány in 1635, after the abolition of the Jesuit order in 1773, was secularised, like the Academy in Zagreb. Joseph II opposed the Church's monopoly of education. In 1777, the University of Trnava was transferred to Buda as the Royal Hungarian University, and 1784 moved to Pešt. In Zagreb, the temporary status of the Academy continued until 1776, when everything was prepared for its new organisation and curriculum. However, it was not made into a university, due to a decision of government that one university, in Pešt, was enough (Dadić 1982). Even so, in 1776, Academy had

10 The great Croatian scientist and Jesuit Rudjer Bošković (1711–1787) from Dubrovnik, found his material circumstances changed with the abolition of the Jesuit order. He went to Paris, where he became director of optics for the Navy.

11 Frederick William Herschel (1738–1822) discovered Uranus, the seventh planet of Solar system in 1781, and later, in 1787, found two satellites of Uranus and in 1789, two satellites of Saturn. He determined the movement of the solar system through the system of our galaxy

Vojnu granicu (krajinu) pod direktnom austrijskom upravom, Istru i Dalmaciju pod mletačkom upravom, Ugarsko primorje, Dubrovačku Republiku te Bosnu i Hercegovinu pod Turcima (Horvat 1980, karta: Hrvatske zemlje potkraj XVIII st.). U Slavoniji, krajem 17. st. oslobođenoj od Turaka, carica Marija Terezija naredila je 1745. godine osnutak triju novih slavonskih županija: virovitičke, požeške i srijemske. Virovitička je bila podijeljena na tri manja okružja: virovitičko, osječko i đakovačko, a Virovitica je postala županijskim sjedištem. Bojeći se germanizacije slavonski su feudalci 1751. godine u Požunu odlučili da se Slavonija odcijepi od Hrvatske i pripoji Ugarskoj te je postala zavisnom od Ugarske, u čvrstoj sprezi sa službenom ugarskom politikom u Slavoniji. U takvoj Virovitici rodio se 1760. godine Bogdanić i u njoj je proveo djetinjstvo. U Virovitici su mu zacijelo ostali roditelji ili se možda vratili nakon umirovljenja oca časnika jer je poznato da je za vrijeme obavljanja mjerenja geografskih širina i dužina po Hrvatskoj 1799. godine, nakon mjerenja u Dubici otišao u posjet rodnome gradu, u kojem nisu bila predviđena mjerenja, a u popisu stanovnika iz 1804. zabilježen je Miko Bogdanić[9], najvjerojatnije Mirkov otac jer, kako je prije rečeno, drugi Bogdanići nisu zabilježeni u Virovitici (Sršan 2005).

Kada je Bogdanić imao tek tri godine, 1763. godine, carici Mariji Tereziji su njezini feldmaršali predložili da u svim zemljama Habsburške Monarhije izmjeri zemljište. To je potaklo nagli razvoj geodezije, također i u Hrvatskoj, a takve su sustavne izmjere bile u tijeku ili djelomično gotove i u drugim europskim zemljama, npr. u Francuskoj, Pruskoj i Bavarskoj (URL 3). To je vodilo i izradi preciznijeg zemljovida zemalja habsburške krune, što je bilo povezano s preciznim astronomskim mjerenjima. Do realizacije je došlo gotovo četiri desetljeća poslije, zahvaljujući čemu je posao na izmjeri geografskih širina i dužina dobio Bogdanić. Odrastao je i školovao se u doba burnih previranja za vladavine carice Marije Terezije i suvladarstva Josipa II. od 1765., kada zapravo počinje doba jozefinizma odnosno doba aktivnih reformi u cijelom carstvu, time i u Hrvatskoj. Godine 1767. ukinut je najveći dio izvršne vlasti Hrvatskog sabora, a osnovano Kraljevsko vijeće Hrvatske, Slavonije i Dalmacije sa sjedištem u Varaždinu. To je vijeće bilo po uzoru na Namjesničko vijeće u Ugarskoj, ali potpuno ravnopravno i neovisno o ugarskome. No hrvatski staleži i redovi bili su nezadovoljni i željeli su što tješnju vezu s Mađarskom, vjerujući u zajedničke interese i zajedničku veću snagu suprotstavljenu Beču. Bogdanić je imao 13 godina kada je 1773. godine ukinut isusovački red, što je dovelo do brojnih potresa, ne samo u crkvenim redovima. Isusovački red bio je dotad glavni nositelj nastavnog sustava. Ukinućem reda oduzete su im škole i sveučilišta, pa tako i Zagrebačka isusovačka akademija. Josip II. želio je svjetovno školstvo koje će biti jednako u svim zemljama carstva (Horvat 1980). Brojni isusovci, među njima i Ruđer Bošković,[10] imali su zbog te odluke velikih problema i morali mijenjati životne uvjete da bi se prilagodili ukinuću reda. (Kren 2002) Tijekom studiranja i u daljnjem životu Bogdanić je bio okružen (bivšim) isusovcima koji su bili profesori na sveučilištu, astronomi na zvjezdarnicama i drugo, na primjer Josip Mitterpacher, Ivan Horvat, Ferenc Taucher, Franjo Bruna i dr., o kojima će biti govora poslije. To je vrijeme generiralo ubrzani razvitak građanske klase, ali i njeno sve snažnije nezadovoljstvo postojećim monarhističkim stanjem. Obilježeno je djelovanjem francuskih enciklopedista, prosvjetiteljstvom i pred kraj stoljeća jakobinskom revolucijom u Francuskoj.

Prema Franji Fancevu (Fancev 1941) i Vilku Bužeku (Bužek 1941) Bogdanić je započeo školovanje u Zagrebu i završio ga 1780. na Zagrebačkoj akademiji, gdje je stekao humanističku naobrazbu i sve dostupno znanje o hrvatskoj povijesti, književnosti i drugo, a po Laszlu Bendefyju već je godine 1778. učio u Pešti (Dadić 1986). Bužek navodi da je Bogdanić gimnaziju i filozofiju polazio u Zagrebu, a nauke nastavio na budimpeštanskom sveučilištu te se i privatno usavršavao. Ne navodi izvore, ali kaže da je podatke o njemu slučajem našao u zagrebačkoj sveučilišnoj biblioteci. Prema Bogdanićevim riječima iz predgovora knjizi *Dogodjaji svieta* moglo bi se zaključiti da je s desetak godina napustio Viroviticu i domovinu i odrastao u Mađarskoj. No možda ga je otac, kao uvjereni domoljub, poslao u Zagreb, koji je bio središte hrvatskoga kulturnog života. S obzirom na to da je Zagreb bio kajkavski, premda se već može govoriti o tendencijama prihvaćanja štokavštine kao književnog jezika, moguće je da je Bogdanić na to mislio kada naglašava odvojenost od jezika i države, odnosno Slavonije, više od dvadeset godina. U knjizi *Dogodjaji svieta* Bogdanić za hrvatski jezik, zapravo slavonski štokavski, upotrebljava sinonime *domaći jezik* i *naš jezik*, koje su Hrvati često rabili za hrvatski jezik i u kasnijim razdobljima. No i virovitičko je područje bilo složeno u pitanju govora. U Virovitici se govorilo ikavsko-ijekavski, a u okolici su bili zastupljeni ijekavsko-šćakavski govori, kajkavski i istočnohercegovački, uz govore slavonskog dijalekta, glogovničko-bilogorskoga i drugih (Lončarić i Finka 1986), te je Bogdanić već kao dječak mogao zapaziti jezične razlike hrvatskih govora i potrebu uvođenja jedinstvenoga književnog jezika za sve Hrvate. U prilog zagrebačkog školovanja govori njegovo dobro poznavanje političkih prilika i hrvatske književnosti, premda postoji mogućnost da je informacije o stanju u Zagrebu i drugim dijelovima Hrvatske dobivao preko svojih kolega i sunarodnjaka, tijekom studija u Budimu i Pešti te poslije u Beču. Tako je Senjanin Ivan Paskvić bio prije dolaska na sveučilište kapelan u zagrebačkom okrugu, Franjo Bruna i Franjo Josip Domin bili su Zagrepčani itd.

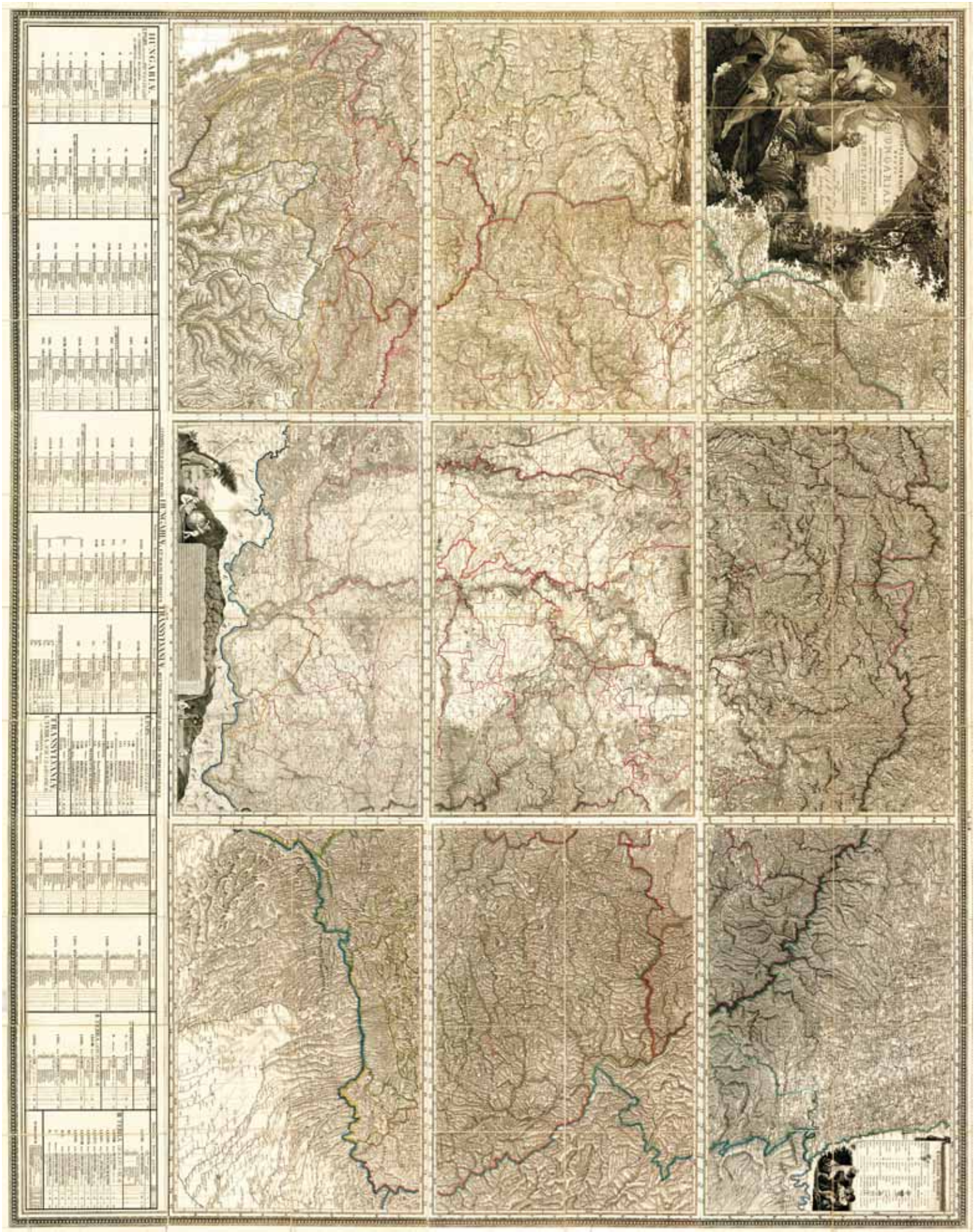
3. Studiranje u Budimu i Pešti

Godine 1757. ukinuta je zabrana učenja o gibanju Zemlje koja je i u Hrvatskoj značila prekretnicu u školskim programima. Isusovci odmah nakon ukinuća zabrane prihvaćaju Kopernikov sustav, dok ga npr. franjevci još uvijek ne drže prihvatljivim, no do ukinuća franjevačkih filozofija u sjevernoj Hrvatskoj, 1783. godine, kada je Bogdanić već bio na studiju u Mađarskoj, stajališta o heliocentrizmu te Boškovićevu i Newtonovu naučavanju bili su istovjetni u franjevačkim filozofijama i isusovačkim školama, na Zagrebačkoj akademiji te u svjetovnim školama, nastalim nakon ukinuća isusovačkog reda (Kren 2002). Bilo da je znanje prije studija stjecao u Zagrebu ili u Mađarskoj, ono se temeljilo na heliocentrizmu, Newtonovu i Boškovićevu naučavanju. Imao je 21 godinu kada je 1781. godine Herschel[11] otkrio novi planet u Sunčevu sustavu, Uran. Nebeski svod je time postao žarište istraživanja i sve važne zvjezdarnice motrile su i pratile kretanje Urana i ostalih planeta te druge nebeske pojave pa je sigurno i Bogdanić bio oduševljen tim otkrićem. Kako je osjećao sklonost prirodoslovlju, astronomiji i matematici jer u predgovoru knjizi *Dogodjaji svieta* piše da je ''*vechji dio xivota u teegu mathemat[komu proveo"* (Bogdanich 1792), možda ga

9 U popisu stanovništva iz 1804. g. naveden je Miko Bogdanics. Najvjerojatnije je riječ o ocu Nikoli (Miko), koji je dvije godine nakon sinove prerane smrti živio u Virovitici.

10 Veliki hrvatski i svjetski znanstvenik isusovac Ruđer Bošković (1711–1787), Dubrovčanin, nakon ukidanja isusovačkog reda našao se u materijalnim neprilikama pa je otišao u Pariz, gdje je postao upraviteljem optike u službi mornarice.

11 Frederick William Herschel (1738–1822) je godine 1781. otkrio sedmi planet Sunčeva sustava Uran, 1787. dva Uranova satelita, a 1789. dva Saturnova satelita. Ustanovio je kretanje Sunčeva sustava kroz sustav naše galaktike.



J. Lipsky: Mappa generalis regni Hungariae ..., 1806, map is kept in the Collection of Maps and Atlases of the National and University Library in Zagreb

J. Lipsky: Mappa generalis regni Hungariae ..., 1806, karta se čuva u Zbirci zemljopisnih karata i atlasa Nacionalne i sveučilišne knjižnice u Zagrebu

je i taj važni astronomski događaj usmjerio i motivirao za studij fizike, matematike i astronomije. Pouzdano je da je 1781. boravio u Grazu kao *logicus* na Filozofskom fakultetu (Reisz, Lemić 2010), a od 1782. do 1785. godine polazio je studij fizike, matematike i astronomije na budimskom odnosno peštanskom sveučilištu, u vrijeme vladavine cara Josipa II. i njegova desetljeća drastičnih reformi koje su uzdrmale carstvo, a ugarsko plemstvo dovele na rub pobune protiv carske vlasti. Isusovačko sveučilište koje je godine 1635. u Trnavi utemeljio kardinal Pazmany, ukinućem isusovačkog reda 1773. godine postalo je svjetovno, slično kao i zagrebačko, u skladu s borbom Josipa II. protiv prosvjetnog monopola Crkve. Od 1777. godine trnavsko sveučilište prebačeno je u Budim kao Kraljevsko mađarsko sveučilište, a 1784. godine u Peštu. U Zagrebu je privremenost Akademije trajala do 1776., kada je sve bilo pripremljeno za novi program i organizaciju Akademije, ali ona nije prerasla u sveučilište kao u Mađarskoj jer je prema vladinoj odluci bilo dovoljno jedno sveučilište, i to u Pešti (Dadić 1982). Dapače, 1776. je Akademija imala tri fakulteta: filozofski, pravnički i bogoslovni, ali je Josip II. bogoslovni fakultet ubrzo prenio u centralno sjemenište pa je do 1850. Akademija djelovala s dva fakulteta, kao jedino visoko učilište u hrvatskim zemljama (Kombol i Novak 1992). To je također bilo razlogom da hrvatski znanstvenici odaberu djelovanje na Sveučilištu u Pešti, a ne u Zagrebu.

3.1. Hrvatski znanstvenici u Bogdanićevu okružju

U Bogdanićevo doba Hrvati su djelovali i susretali se u europskim gradovima, a pogotovo u gradovima Monarhije, koje je Hrvatska bila sastavni dio odnosno nasljedna kraljevina, pa su na različitim funkcijama i smjenjivali jedan drugoga. Hrvati su po javnom carskom natječaju imali sva prava i uvjete za stjecanje profesure na akademijama i sveučilištima, i u Hrvatskoj, i u Austriji i Mađarskoj (URL 4). Stoga su mnogi hrvatski znanstvenici djelovali na sveučilištima u Trnavi, Budimu i Pešti, na Terezijanskoj viteškoj akademiji, Sveučilištu u Beču, na više akademija u Mađarskoj i u Velikom Varadinu u Transilvaniji, današnjoj Rumunjskoj, a izvan granica Habsburške Monarhije osobito u Italiji i Rusiji, misijama[12] i drugdje. Pojedini Hrvati su godinama imali važan utjecaj u nastavi matematike i fizike na Sveučilištu u Budimu i Pešti, kao i u astronomskom radu na zvjezdarnici. Prvi profesor matematike na peštanskom sveučilištu od 1784. do smrti 1788. bio je hrvatski znanstvenik iz Baranje Josip Mitterpacher[13], kojeg je naslijedio Senjanin Ivan Paskvić[14]. Paskvić se od 1782. tri godine usavršavao na Sveučilištu u Budimu kao redoviti repetent s odličnim uspjehom te se ondje susreo s Bogdanićem[15], koji mu je bio student jer je Paskvić kao repetent sa studentima proračivao građu koju su studirali. Pouzdano je da ih je u daljnjem životu vezala zajednička ljubav i strast prema matematici i astronomiji, ali i prijateljstvo, što potvrđuje i Zachov nekrolog Bogdaniću, u kojem kao Bogdanićeve prijatelje navodi Ivana Paskvića i Tobiasa Bürga, pristava bečke zvjezdarnice (Dadić 1986). Bogdanić je bio Mitterpacherov učenik te je kod njega izradio disertaciju sa sadržajem iz matematike i astronomije koja je nagrađena na Sveučilištu. Na budimskoj zvjezdarnici, koja se od 1777. do 1815. nalazila u Kraljevskom dvoru u Budimu, kao asistent astronom dvadesetak godina je radio Zagrepčanin Franjo Bruna[16], sve do prelaska na peštansko sveučilište 1797. godine. Bruna je motrio pomrčine Jupiterovih satelita, okultacije zvijezda i planeta s Mjesecom i drugo, većinom usmjereno na određivanja geografskih dužina, kao jedan od najvažnijih problema koji je rješavan u tim vremenima nakon otkrića precizne ure, kronografa. Bogdanić je tijekom studija pohađao zvjezdarnicu, no uspio je dobiti mjesto drugog asistenta tek znatno poslije, 1797. godine, nedugo prije nego što je Bruna iz budimske zvjezdarnice prešao na peštansko sveučilište. Krajem 1791. za profesora fizike i mehanike na Sveučilištu u Pešti izabran je Zagrepčanin Josip Franjo Domin[17], koji je naslijedio gradišćanskog Hrvata, isusovca Ivana Horvata[18], poznatog po udžbenicima fizike, pisanima u duhu njutonizma i dijelom na temelju Boškovićeve teorije. Ti su udžbenici imali veliki utjecaj na školstvo u austrijskoj monarhiji, također i u Hrvatskoj. Horvat je napisao i matematički udžbenik, u kojem je prvi svezak sadržavao aritmetiku i algebru, a drugi geometriju i presjeke stošca. Svim se tim udžbenicima sigurno koristio i Bogdanić. Poznato je da su Mitterpacher, Bruna, Horvat, Paskvić i Domin bili članovi znanstvenoga kruga vezanog uz budimsko, odnosno peštansko sveučilište, a kao student i poslije, u doticaju s njima bio je i Bogdanić. Uz taj znanstveni krug u Budimu je djelovao franjevački kulturni krug, u kojem je značajnu ulogu imao Hrvat, franjevac

12 Za astronomiju su najznačajniji misionari u 18. st. Ferdinand Konšćak i Ignacije Szentmartony. Varaždinac Ferdinand Konšćak (1703–1759), isusovac, bio je ugledni matematičar, astronom, prirodoslovac, geolog, graditelj putova i nasipa i nadzornih svih isusovačkih redukcija u Meksiku. Dokazao je da je Kalifornija poluotok. Njegovo ime nosi jedan otok na sjeveru Kalifornijskog zaljeva (URL 5). Ignacije Szentmartony (1710–1793) iz Kotoribe bio je jedan od najučenijih matematičara i astronoma i prvi hrvatski istraživač Amazone, sudionik znanstveno-istraživačke ekspedicije portugalskoga kralja Josipa I. Obavljao je astronomska motrenja za izradu preciznih karata istraživanih područja (Kren 2002).

13 Isusovac Josip Mitterpacher (1739–1788) rođen je u Belju, a umro u Pešti (URL 6).

14 Značajan hrvatski i mađarski astronom i matematičar, Senjanin Ivan Paskvić (1754–1829.) bio je nakon završene teologije kapelan u zagrebačkom okrugu, potom od 1778. praktikant na Sveučilištu u Grazu, a od 1782. repetent na budimskom sveučilištu, te asistent profesora Ivana Baptiste Horvata. Nakon smrti profesora Mitterpachera preuzeo je 1788. katedru iz više matematike, do 1797., kada je zatražio umirovljenje. Otišao je u Beč, gdje se bavio astronomijom i geodezijom. Reaktivirao se 1803. i došao za asistenta u zvjezdarnicu u Budimu, a poslije postao i upraviteljem. Bio je vrsni opažač prvih otkrivenih asteroida te su se njegovim proračunima koristili matematičar Gauss i dr. Osnovao je novu zvjezdarnicu na Gellert brdu (Budim) i bio ravnateljem do 1824. Umro je u Beču 1829. (Dadić 1982). Korado Korlević otkrio je iz Višnjana asteroid pod brojem 11191 kojem je 1998. dao ime Paskvić: (11191) Paskvić.

15 Paskvić i Bogdanić možda su se upoznali već prije, 1781. u Grazu, gdje je Bogdanić bio student, a Paskvić praktikant od 1778. do 1782.

16 Matematičar i astronom, isusovac Franjo Bruna (1745–1817) rođen je u Zagrebu 1745., a umro u Pešti 1817. Oko 1780. postao je asistentom astronomom u budimskoj zvjezdarnici. Brojna vrijedna motrenja objavljivao je u *Ephemerides astronomicae*. Godine 1797., kada je Paskvić zatražio umirovljenje, preuzeo je njegovo mjesto profesora više matematike.

17 Zagrepčanin Josip Franjo Domin (1754.-1819.) doktorirao je 1777. u Trnavi kod Ivana Baptiste Horvata. Djelovao je na Akademiji u Győru te Pečuhu kao profesor eksperimentalne fizike, mehanike, kozmologije i gospodarstva. Godine 1792. naslijedio je profesora Ivana Horvata i djelovao devet godina kao profesor fizike i mehanike na Filozofskom fakultetu Sveučilišta u Pešti. S Franjom Brunom uredio je prirodoslovni kabinet. Bio je dekan Filozofskog fakulteta (1794.-1796.) i rektor Sveučilišta u Pešti (1798.). Godine 1800. imenovan je zagrebačkim kanonikom, preselio se u Zagreb i djelovao kao rektor Zagrebačkog biskupskog sjemeništa u župi sv. Marije i nije se više bavio znanstvenim radom. Umro je 1819. i sahranjen u zagrebačkoj katedrali (URL 4).

18 Ivan Horvat (1732.-1799.) je najvjerojatnije bio gradišćanski Hrvat, rođen u Kisegu u Gradišću. Bio je prefekt u Isusovačkom konviktu u Trnavi, a zatim predavao dvije godine filozofiju. Kada je Trnavsko sveučilište preseljeno u Budim, predavao je u Budimu te u Pešti fiziku i mehaniku do 1792., kada je postavljen za opata Sv. Marije u Epereisu. Umro je u Pešti 1799. Na Sveučilištu je njegova predavanja preuzeo Franjo Josip Domin (Dadić 1982).

three departments: philosophy, theology and law, but Joseph II soon transferred the Faculty of Theology to the central seminary, so the Academy operated with two departments, as the only institution of higher education in the Croatian lands, until 1850 (Kombol and Novak 1992). This was the reason why Croatian scientists chose to work at the University of Pešt, rather than in Zagreb.

3.1. Croatian scientists in Bogdanić's circle

In Bogdanić's time, Croats worked and gathered in European cities, especially in the cities of the Empire, of which Croatia was a part and a hereditary kingdom. They held different positions and often replaced each other. In the imperial public job system, Croats held the right to became professors at colleges and universities in Croatia, Austria and Hungary (URL 4). So, many Croatian scientists worked at the universities in Trnava, Buda and Pešt, Maria Theresa's Military Academy and the University of Vienna, at several academies in Hungary and Veliki Varadin and beyond the borders of the Hapsburg empire, especially in Italy and Russia, in missions[12] and more. Some Croats had a significant impact in teaching mathematics and physics at the University of Buda and Pešt over the course of many years, and in astronomical work at the observatory. The first Professor of Mathematics at the University of Pešt (from 1784 until his death in 1788), was a Croatian scientist, Joseph Mitterpacher[13]. He was succeeded by the Croat János Paskvić[14] from Senj. From 1782, Paskvić studied for three years as a "repeater" (assistant charged with carrying out exercises with students) with great success at the University of Buda. There he met Bogdanić[15], who was his student. (Paskvić's job included "repeating" the material treated in lectures with students. Bogdanić and Paskvić became very good friends, sharing a passion for mathematics and astronomy. In Bogdanić's obituary, Zach mentions János Paskvić and Tobias Bürg, assistant at the Vienna Observatory, among his friends (Dadić 1986). As Mitterpacher's student, Bogdanić wrote a thesis on mathematics and astronomy which won a University award. From 1777 to 1815, the Buda Observatory was located at the Royal Palace in Buda. Ferenc Bruna[16] from Zagreb worked for twenty years as an assistant astronomer at the Buda Observatory. In 1797, he became Professor of Mathematics at Pešt University. Bruna observed the eclipses of Jupiter's satellites, occultation of stars and planets with the Moon, and other phenomena, mostly focusing on determining longitudes, which was one of the most important issues resolved at that time, after the invention of the precise clock, or chronograph. At the time of his studies, Bogdanić visited the observatory. But he only managed to get the post of second assistant much later, in 1797, shortly before Bruna left the observatory. At the end of 1791, the Professor of Physics and Mechanics at the University of Budapest was Joseph Ferenc Domin[17] from Zagreb, who succeeded the Jesuit János Horvat[18], a Burgenland Croat. Horvat's physics textbooks were written in the spirit of Newton's doctrine and partly on the basis of Bošković's theory. These textbooks had a major impact on education in the Austrian Empire and in Croatia. Horvat also wrote a mathematical textbook. The first volume contained arithmetic, algebra and geometry, and the second geometry and the cross-section of the cone. Bogdanić probably used Horvat's textbooks. It is known that Mitterpacher, Bruna, Horvat, Paskvić and Domin were members of the scientific circle associated with the University of Buda and Pešt. Bogdanić was in contact with them as a student and later. In Buda, a Franciscan cultural circle was also active, in which the Croat Ignatius Martinović[19], a Franciscan friar, played an important role. In 1779, he held a chair at the higher school of philosophy in Buda, and from 1783 to 1791, he taught physics at the University of Lvov, before his tragic death in 1795. Bogdanić had probably met him before, possibly in Vienna. Martinović was supporter of Joseph II. He worked

12 In astronomy, the most important missionaries in the 18th century were Ferdinand Konščak (Consag) and Ignatius Szentmartony. The Jesuit Ferdinand Konščak (1703–1759) from Varaždin was a prominent mathematician, astronomer, naturalist, geologist, builder of roads and embankments and supervisor of all the Jesuit settlements in Mexico. He proved that California was a peninsula. One of the islands in the northern Gulf of California bears his name (URL 5). Ignatius Szentmartony (1710–1793) from Kotoriba was one of the most learned mathematicians and astronomers and the first Croatian to research the Amazon. He participated in the scientific-research expedition under the auspices of the Portuguese King Joseph I. He published astronomical observations for the creation of precise geographical maps of the areas explored (Kren 2002).

13 Jesuit Joseph Mitterpacher (1739–1788) was born in Belje and died in Budapest (URL 6).

14 The prominent Croatian and Hungarian astronomer and mathematician Janos Paskvić (1754–1829), after studying theology, was a clergyman in the district of Zagreb, then in 1778 became a practitioner at the University of Graz and in 1782, an assistant for exercises at Buda University and assistant to Professor Janos Baptista Horvat. Upon the death of Professor Mitterpacher, he assumed the Chair of Higher Mathematics from 1788 to 1797. In 1797 he sought retirement and went to Vienna, where he worked in astronomy and geodesy. He took another position in 1803 as an assistant at the observatory in Buda, and later became its director. He was a skilled observer of the first asteroids to be discovered. His calculations were used by mathematicians like Gauss and others. He established a new observatory on Gellért Hill (Buda) and was its director until 1824. He died in 1829 in Vienna (Dadić 1982). Korado Korlević discovered an asteroid (number 11191) from the Višnjan Observatory in 1998 and named it Paskvić.

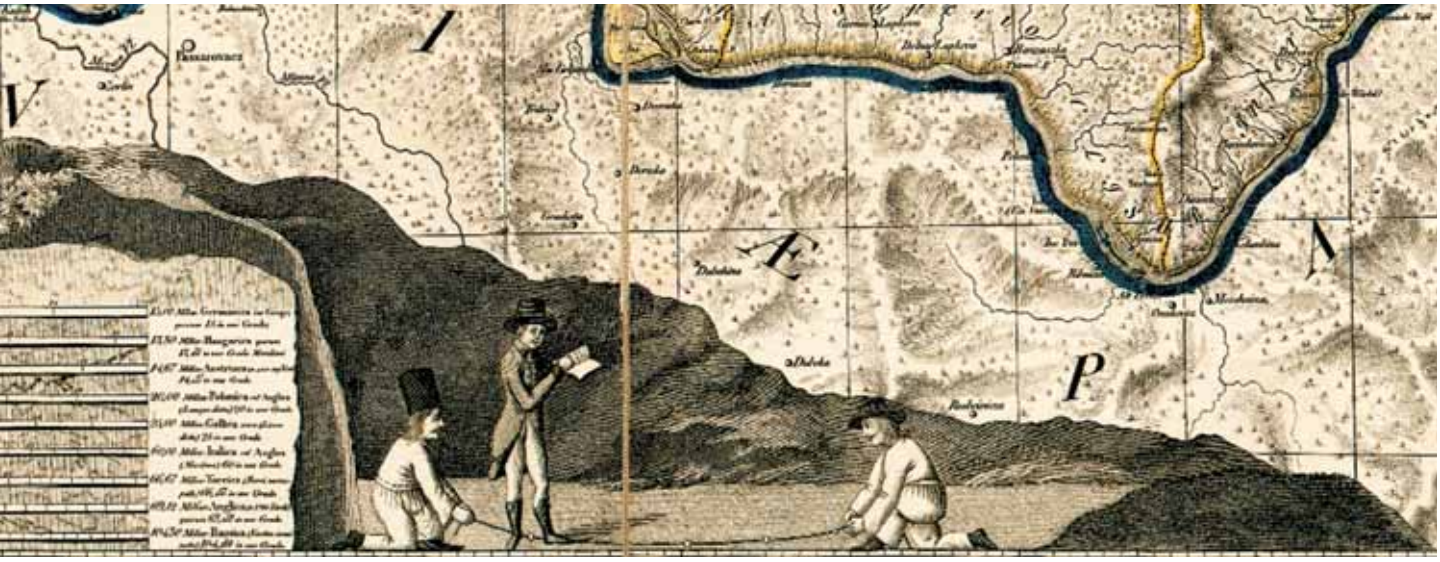
15 Paskvić and Bogdanić may have met previously in Graz in 1781, when Bogdanić was a student there. Paskvić was a practitioner at Graz University from 1778 to 1782.

16 The Jesuit mathematician and astronomer Ferenc Bruna (1745–1817) was born in Zagreb and died in Budapest. In about 1780, he became an assistant astronomer at the Buda observatory. He published many valuable observations in *Ephemerides astronomicae*. In 1797, when Paskvić requested retirement, he took over the position of Professor of Higher Mathematics.

17 Josip Franjo Domin (1754–1819) from Zagreb received his doctorate in 1777 in Trnava. He worked at the Academy in Gyor and Pecs as Professor of Experimental Physics, Mechanics, Cosmology and Economics. In 1792, Domin replaced Professor Ivan Horvat and worked for nine years as Professor of Physics and Mechanics at the University of Pešt. Domin and Bruna together catalogued the natural history collection. Domin was Dean of the Faculty of Philosophy (1794–1796) and Rector of the University of Budapest (1798). In 1800, he was appointed a canon of Zagreb Cathedral. He moved to Zagreb and acted as Rector of the Zagreb Diocesan Seminary in the Parish of St. Mary and was no longer engaged in scientific work. He died in 1819 and was buried in Zagreb Cathedral (URL 4).

18 Ivan Horvat (1732–1799) was most likely was a Burgenland Croat, born in Kőszeg in Burgenland. He was Prefect of the Jesuit School in Trnava, and then taught philosophy for two years, when Trnava University moved to Buda. He taught physics and mechanics in Buda and Pešt University until 1792, when he was appointed Abbot of St. Mary in Epereisu. He died in Budapest in 1799. His lectures at the University were continued by Domin (Dadić 1982).

19 Fr. Ignjat Martinović (1755–1795) was a Croat from Budapest. Ordained in Ilok in 1772, he received his doctor's degree in Buda in 1778 and in 1779 accepted a chair at the higher philosophical school in Buda, where he stayed until 1781. He left the Franciscan order and became a military chaplain in Bukovina (URL 4).



Ignjat Martinović[19], koji je 1779. držao katedru na visokoj filozofskoj školi u Budimu, od 1783. do 1791. predavao je fiziku na Sveučilištu u Lavovu, a potom 1795. tragično skončao. Bogdanić ga je možda osobno upoznao već i prije, a vrlo vjerojatno u Beču jer je aktivni jozefinac Martinović bio dvorski kemičar cara Leopolda II. u Beču od 1791. do 1792., baš u doba Bogdanićevih napora oko tiskanja svjetske povijesti na hrvatskom jeziku, o čemu će poslije biti više riječi. Sigurno je Bogdanić bio upoznat s njegovim stajalištima te se koristio njegovim knjigama iz matematike i fizike.[20] Martinović se nakon 1791. i smrti cara Josipa II. politički angažirao i priklonio jakobincima te pokušao organizirati mađarske i hrvatske jakobince. Osuđen je na smrt u Beču i pogubljen 1795. u Pešti. Te je godine Bogdanić još bio na studiju u Beču.

4. Na Kraljevskoj akademiji u Velikom Varadinu

Fiziku i matematiku Bogdanić je završio s odličnim uspjehom i položio javni ispit. Dvije godine radio je kao asistent primijenjene više matematike u Budimu te u Pešti, a od ljeta 1785. do kraja kolovoza 1788. godine bio je profesor gramatike i starogrčkog jezika, a poslije i hidraulike na Višoj gimnaziji i Akademiji u Velikom Varadinu, mađarskom Nagyvaradu. Danas je to Oradea u Rumunjskoj. Također je besplatno predavao geometriju časnicima pukovnije Vinz, stacionirane u Velikom Varadinu. Naime, naredbom Josipa II. od 2. ožujka 1785. asistenti budimske akademije premješteni su u kraljevske više gimnazije da predaju starogrčki jezik (Reisz, Lemić 2010). Uz grčki i latinski Bogdanić je znao hrvatski, mađarski, njemački i francuski jezik te se koristio talijanskim i engleskim (URL 1). Na akademiji u Velikom Varadinu kao profesor matematike djelovao je još jedan hrvatski znanstvenik, Križevčanin Franjo Staindl (1746–1818) (URL 4). Bogdanić se nadao asistentskoj stipendiji, koju nije dobio te je očito nevoljko prihvatio premještaj jer u vlastoručnoj izjavi o prihvaćanju namještenja u Velikom Varadinu piše: "*Dolje potpisani s poniznošću javljam uredu akademije, da unatoč tome što se bavim ozbiljnom znanošću (s prirodnim znanostima), te sam sve ostale prilike zbog toga propustio, prije svega sam bio željan takovog života gdje bih bio od koristi za matematiku i filozofske znanosti, no, "Visoko vijeće" je dobrostivo donijelo odluku da idem u Nagyvarad za pomoćnog nastavnika gramatike i humanističkih predmeta, stoga rado prihvaćam namještenje kao znak milosti Visokog Vijeća."* Godine 1787. natjecao se za mjesto predavača matematike na Lemberškom sveučilištu (Lavov), ali nije primljen, a također nije uspio dobiti ni mjesto profesora fizike na Kraljevskoj akademiji u Velikom Varadinu 1790. godine (Reisz, Lemić 2010).

Bužek (1941) navodi da se Bogdanić kao humanist po duhu i naobrazbi bavio književnošću i umjetnošću te je pisao latinske pjesme. Latinsku poeziju spominje i Kučera (1900) te navodi da se u Bogdanić njome bavio u Velikom Varadinu s velikim uspjehom. Bartha (URL 2) ga opisuje kao čovjeka širokih zanimanja koji je volio astronomiju i matematiku, ali i pjesništvo te je pisao ode. Nije zapostavio matematiku pa je za službovanja u Velikom Varadinu 1786. izdao u Pešti raspravu *Formulae pro spatiis rectilineis aut que in haec resolvi possunt per lineas parallelas dividendis (Formule za pravolinijske prostore ili one koji se mogu na njih rastaviti, ako se podijele na paralelne pravce).* Bužek (1941) je smatrao da je Bogdanić željan nauke napustio Veliki Varadin i otišao u Beč na daljnje usavršavanje, a Dadić je pretpostavio (Dadić 1986) da Veliki Varadin nije mogao zadovoljiti Bogdanića i da se vjerojatno osjećao suviše udaljenim od središta znanstvenih zbivanja pa je možda to bilo razlogom da je 1791. godine bio u Beču. U to doba trajao je rat s Turcima od 1787. do 1791. godine[21], jakobinska revolucija 1789., stanje blisko revoluciji u Ugarskoj i Hrvatskoj, smrt Josipa II. 1790. godine, na vlast je došao Leopold II., a 1791. je potpisan mirovni sporazum s Turcima (Horvat 1980). Sačuvani dokumenti međutim pokazuju da je Bogdanić od 1788. do 1790. sudjelovao u hidrološko-regulacijskim radovima u županiji Bihar. Prema nekim podacima 1791. je na poticaj Dvorske komore postao stipendist peštanskog sveučilišta na zvjezdarnici pri bečkom Sveučilištu te je to, čini se, bio razlog napuštanja Velikog Varadina i dolaska u Beč (Reisz, Lemić 2010). U Beču ga nalazimo u

19 Franjevac Ignjat Martinović (1755.-1795.) bio je Hrvat, rođen u Pešti. Zaređen je u Iloku 1772. Doktorirao je u Budimu 1778., a 1779. je preuzeo katedru na visokoj filozofskoj školi u Budimu do 1781., kada je napustio franjevački red i bio vojni svećenik u Bukovini (URL 4).

20 U Budimu, dok je predavao na filozofiji, Martinović je napisao teze za svoje studente, objavljene u Osijeku 1781. godine, a godinu prije toga u Budimu je izašlo njegovo djelo *Opća teorija jednadžbi svih stupnjeva (Theoria generalis aequationum omnium graduum)*. U Lavovu je 1787. izašlo njegovo djelo *Uvodne lekcije iz fizike (Praelectiones physicae)*. Martinović je slijedio njutonizam i Boškovićevu teoriju, slično kao i njegovi suvremenici u Budimu (Dadić 1982).

21 Ne treba zaboraviti da mu je otac bio časnik te je možda sudjelovao u vojnama protiv Turaka.

as a chemist at the court of Emperor Leopold II in Vienna from 1791 to 1792, just at the time when Bogdanić was attempting to publish his book of world history in Croatian. Bogdanić certainly was familiar with his views and used his books on mathematics and physics[20]. After 1791 and the death of Emperor Joseph II, Martinović became a political activist, an adherent of the Jacobins. He tried to organise the Hungarian and Croatian Jacobins. Martinović was sentenced to death and executed in 1795 in Budapest. In that year, Bogdanić was still studying in Vienna.

4. At the Royal Academy in Veliki Varadin

Bogdanić graduated in physics and mathematics and passed the public examination with great success. For two years, he worked as an assistant in applied mathematics in Buda and Pešt. From the summer of 1785 to the end of August 1788, Bogdanić worked as a teacher of Ancient Greek, and later, hydraulics, at the Higher Secondary School and Academy in Veliki Varadin. He also taught geometry without remuneration to the officers of the Vinz Regiment, stationed in Veliki Varadin. On the orders of Joseph II (March 2 1785), the assistants at Budapest Academy were moved to royal grammar schools to teach ancient languages (Reisz, Lemić 2010). Bogdanić had a good knowledge of Greek and Latin, Croatian, Hungarian, German and French, and knew some Italian and English (URL 1). Another Croatian scientist, Ferenc (Franjo) Staindl (1746–1818) from Križevci, was a teacher of mathematics at the Academy of Veliki Varadin, (URL 4). Bogdanić hoped to receive a scholarship, but was unsuccessful. He was apparently reluctant to accept a transfer, because in his statement of acceptance for the post in Veliki Varadin, he wrote, "*I, the undersigned with humility notify the office of the Academy that, despite the fact that I deal with serious science (the natural sciences) and have passed over many other opportunities because of it, since above all things, I have been eager for a life in which I would be of benefit to mathematics and the philosophy of science, the High Council has graciously decided to send me to Nagyvarad as an assistant teacher of grammar and the humanities. Therefore, I am happy to accept this post as a sign of grace the High Council.*" In 1787, he competed for the post of mathematics lecturer at University of Lvov, but was not appointed, and he also failed in 1790 to get the post of physics professor at the Royal Academy in Veliki Varadin (Reisz, Lemić 2010).

Bužek (Bužek 1941) says that Bogdanić, as a humanist in spirit and by education, dealt with literature and art and wrote Latin poems. His Latin poetry is also mentioned by Kučera (Kučera 1900), who says that in Veliki Varadin, Bogdanić met with great success. Bartha (URL 2) describes him as a man of broad interests, who loved astronomy and mathematics, but also wrote poetry. He did not neglect mathematics, and during his service in Veliki Varadin published in 1786 in Pešt *Formulae spatiis rectilineis aut que resolve in haec possunt per lineas parallelas dividendis (Formulas for rectilinear spaces or those that can be broken down into them, if they divide along parallel lines)*. Bužek (Bužek 1941) thinks that Bogdanić left Veliki Varadin and went to Vienna for further study. Dadić (Dadić 1986) assumes that Veliki Varadin did not fulfil Bogdanić's ambitions and probably felt too distant from the centre of scientific developments. Perhaps this was why he was in Vienna in 1791. At that time, the war with Turks was raging (1787–1791).[21] In France, the Jacobin Revolution took place in 1789. In Hungary and Croatia, there was a state of affairs close to revolution. In 1790, Joseph II died. Before his death, in an act dated 28 January, he re-established the constitutional rights valid prior to his ascent to the throne and was succeeded by Leopold II. In 1791, a peace treaty was signed with the Turks (Horvat 1980). However, surviving documents show that, from 1788 to 1790, Bogdanić participated in hydrological-regulation works in the Bihar County. According to some sources, he was encouraged by the Royal Chamber to become a scholar of Pešt University at the University Observatory of Vienna. This seems to be the real reason for his leaving Veliki Varadin and arriving in Vienna in 1791 (Reisz, Lemić 2010). In Vienna, he adopted a completely new role, which was a reflection of his views in the tumultuous age of Joseph II.

5. Educational Activity and Study of Astronomy in Vienna

The most powerful figure in Croatian life in the late 18th century was Bishop Maximilian Vrhovac (1752–1827), who embodied the spirit of the age, was a supporter of Joseph II's reforms, and became a prominent educator.[22] In 1775, he was appointed Rector of the seminary of Zagreb, and 1787, Joseph II appointed him Bishop of Zagreb. He was the first modern organiser of cultural development in Zagreb. Vrhovac's greatest contribution to the cultural development of the Croats was the print works he bought in 1794. After the death of Joseph II, he continued his enlightenment and other activities, but did not fall into the trap of Jacobinism. In Croatia, the ideas of the French Jacobin revolution did not fall on fertile ground, because the bourgeois constituted only a little more than four percent of the population. The campaigning of Fr. Ignatius Martinović, who became a Jacobin and led a group of supporters, was therefore primarily aimed at rousing the peasantry against the nobility. After Martinović was executed, the court circles of Franz I tried to link Bishop Vrhovac with Martinović, but did not succeed. Bishop Vrhovac soon became an anti-revolutionary leader who opposed Napoleon's activities in the Croatian regions. The Croatian nobility was even more radical than the Hungarian in their overthrow of Josephinism, and wanted closer links with Hungary. The Croatian aristocracy and noble families, in an attempt to resist Vienna and Germanisation, decided in the Croatian Parliament in 1790 to adopt a closer relationship with Hungary. They agreed to take orders from the Hungarian Regent until the unification of the Croatian lands. By 1791, Hungarian had become optional subject in Croatian schools and a quarter of a century later, became compulsory. Soon, there proved to be a new danger, from Hungarisation, and the dispute began regarding the official state language. The Hungarian Parliament insisted that Hungarian should become the official language in Croatia. In response, in Croatia, the idea of making Croatian the diplomatic and political language instead of Latin arose for the first time. Bishop Vrhovac did not want to

20 In Buda, while lecturing in philosophy, Martinović wrote a thesis for his students. It was published in Osijek in 1781. In 1782 he published his *Theoria generalis omnium aequationum graduum* (*General Theory of equations of all degrees)* in Buda). In 1787 he published *Praelectiones physicae* (*Introductory lesson in physics)* in Lvov). Martinović was an adherent of Newtonism and Bošković's theories, like his contemporaries in Buda (Dadić 1982).

21 We should not forget that his father was an officer and probably involved in the war against the Turks.

22 In Zagreb he built the Bishop's Palace and garden in Vlaška Street and the great Maksimir Park. He founded an orphanage, and built a hospital. He renovated and modernized Stubičke Toplice, for the use of all classes in society, etc. (Horvat 1980).

potpuno novoj ulozi, koja je odraz njegovih stajališta u burno doba jozefinizma.

5. Prosvjetiteljsko djelovanje i studij astronomije u Beču

Najjača ličnost u životu Hrvatske krajem 18. st. bio je biskup Maksimilijan Vrhovac (1752–1827), čovjek duha svoga vremena, pristaša jozefinizma, istaknuti prosvjetitelj. Godine 1775. postao je u Zagrebu rektorom zagrebačkog sjemeništa, a 1787. ga je car Josip II. imenovao zagrebačkim biskupom (1787–1827). Bio je prvi moderni organizator kulturnog stvaranja u Zagrebu i graditelj[22], a najveće je Vrhovčevo djelo za kulturni razvitak Hrvata njegova tiskara, koju je kupio 1794. godine. Nakon smrti Josipa II. nastavio je prosvjetiteljsko i drugo djelovanje, ali nije pao u zamku jakobinstva. U Hrvatskoj ideje francuske jakobinske revolucije nije imao tko prihvatiti jer je građanstvo tvorilo samo nešto više od četiri posto pučanstva. Agitacija opata Ignjata Martinovića, koji je od jozefinca postao jakobincem i predvodio grupu istomišljenika, bila je stoga ponajprije namijenjena seljaštvu, a protiv plemstva. Nakon pogubljenja Martinovića dvorski su krugovi cara Franje I. pokušali i biskupa Vrhovca dovesti u vezu s Martinovićem, ali u tome nisu uspjeli. Biskup Vrhovac je poslije bio stožer proturevolucionarne i protunapoleonske djelatnosti u hrvatskim krajevima. Hrvatsko je plemstvo, međutim, u razgrađivanju jozefinizma bilo čak radikalnije od ugarskoga i težilo je što tješnjem povezivanju s Ugarskom. Hrvatski staleži i rodovi, želeći se oduprijeti Beču i germanizaciji, odlučili su se 1790. na hrvatskom saboru na još tješnju vezu s Ugarskom, pristavši primati naredbe od ugarskog namjesništva dok se ne sjedine hrvatske zemlje. Već 1791. godine mađarski je postao neobvezatni predmet u školama, a četvrt stoljeća poslije postao je obvezatan. Uskoro se pokazala nova opasnost, od mađarizacije, jer je počeo spor o državnom jeziku pa je mađarski sabor zahtijevao da mađarski postane službeni jezik i u Hrvatskoj. U Hrvatskoj kao protuteža prvi put niče ideja da bi i hrvatski jezik mogao biti diplomatski i politički jezik. Biskup Vrhovac protivio se zamjeni latinskog jezika mađarskim i radio je na osposobljavanju hrvatskog jezika za administrativnu službu (Horvat 1980). U takav povijesni okvir ulaze Bogdanićevi


FORMVLAE
PRO
SPATIIS RECTILINEIS,
AVT
QVAE IN HAEC RESOLVI POSSVNT
PER
LINEAS PARALLELAS
DIVIDENDIS.
AVCTORE
DAN. EMERICO BOGDANICH.
PESTINI,

bečki napori oko pisanja svjetske povijesti na hrvatskom jeziku.

5.1. Pokušaj stvaranja narodnih novina na hrvatskom jeziku

Vidljivo je da je Bogdanić bio čovjek svog doba, zanesen prosvjetiteljstvom i kao znanstvenik sklon enciklopedistima te da se na svoj način priklonio idejama prosvjetiteljstva i jozefinizma, no zasigurno nije mogao prihvatiti germanizaciju Josipa II., odnosno njegovu ideju o jednom jeziku unutar monarhije koji će, kako je Josip II. vjerovao, riješiti brojne probleme i ujediniti monarhiju pa je 1784. uveden njemački jezik kao službeni u cijeloj državi jer ta je ideja značila zatiranje nacionalnih jezika, time i hrvatskoga (Kren 2007). U Hrvata još nije bio iskristaliziran književni jezik, a jezik se i različito naziva. Fancev (Fancev 1937) navodi da se već u 16. st. u Posavskoj Hrvatskoj usporedno upotrebljavaju nazivi Hrvat-Ilir-Slaven te da to pokazuje da su na cjelokupnu prostranstvu drevnoga hrvatskoga kraljevstva imena hrvatsko, slavensko (slovensko, slovinsko) i ilirsko bila potpuno istovjetnog značenja. Navodi dokaze iz gradačkih matrikula gdje se isti pitomci jednom navode kao Ilirci[23], jednom kao Hrvati, jednom kao Slaveni, a jednako je i s matrikulama na bečkom sveučilištu. U drugoj polovici 18. st. u gradačkim matrikulama pretežito se upotrebljava hrvatska ili(i) dalmatinska narodna pripadnost. Kaže kako vjerovanje u ilirstvo Hrvata i Južnih Slavena pa i Slavena uopće i njihova autohtonstva u stranama starog Ilirika datira davno prije ilirizma.

U stalnom dodiru s Mađarima, koji su itekako čuvali i njegovali svoje nacionalne osjećaje i suprotstavljali se germanizaciji[24], udaljen od domovine, Bogdanić je osjećao potrebu za očuvanjem i razvijanjem hrvatskoga jezika, kulture i gospodarstva koji su bili razapeti između njemačkog i mađarskog utjecaja. Dugo se smatralo da je on 1791. tražio dozvolu za izdavanje narodnih novina na hrvatskom jeziku za Hrvatsku, Slavoniju i Dalmaciju, koja je dobivena u veljači 1792. godine. Međutim, u dozvoli je naveden Franjo Bogdanić te je ustanovljeno da nije riječ o pogreški, nego je doista riječ o drugoj osobi, Franji Bogdaniću, vjerojatno njegovu stricu ili bratiću, o kojem tek treba naći relevantne podatke. Tako je Brešić pisao (Brešić 1986): *''Malo je i mnogo trebalo da upravo jedan Virovitičanin bude začetnik hrvatskoga narodnog preporoda. Prepriječila se tome francuska revolucija iz 1789, a povijesni tok nije mogla skrenuti ničija volja. Dodamo li k tome ne samo za Hrvate fatalni kompleks Austro-ugarske monarhije, u kojoj je i najmanji proplamsaj nacionalnog očuvanja i očitovanja određenih joj nacija značio samo taktički potez Beča ili Pešte, onda bi trebalo i previše slučajnosti da se prilike za jedan nacionalni preporod pomaknu unatrag za (samo ili čak?!) pedesetak godina.''* Franjo Bogdanić tražio je dozvole za izdavanje narodnih novina na hrvatskom jeziku, koju je dobio 29. veljače 1792. godine. Beč je vjerojatno izdao privilegij po kojem je mogao pokrenuti predloženi list, kao protutežu mađarskim težnjama. Franjo Bogdanić je želio uz pomoć takvih novina poraditi na narodnoj svijesti te poboljšanju poljodjelstva i seoskoga gospodarstva u Hrvatskoj, na tragu onoga što su hrvatskom narodu svojim knjigama zacrtali Kačić[25] i Relković[26]. U rješenju

22 Dao je sagraditi biskupski dvor s vrtom na Vlašku ulicu, Maksimirski perivoj, osnovao je zagrebačko sirotište, dao sagraditi bolnicu milosrdne braće, obnovio je i modernizirao Stubičke toplice, namijenivši ih svim društvenim slojevima, i dr. (Horvat 1980).

23 I Bogdanića u dokumentima nazivaju ilircem, a hrvatski jezik ilirskim.

24 Gonilo se carske činovnike, dokidao se uvedeni njemački službeni jezik, nisu se izvršavali jozefinski zakoni, a cara Josipa II. su zasipali predstavkama (Horvat 1980).

25 Franjevac Andrija Kačić Miošić (1704–1760) rođen je u Bristu kraj Makarske. U Budimu je studirao filozofiju i bogoslovlje. U zaostroškom samostanu predavao je filozofiju, a potom deset godina bogoslovlje u Šibeniku. Potom je bio gvardijan samostana na Braču, a u samostanu u Zaostrogu je napisao djelo na hrvatskom jeziku *Razgovor ugodni naroda slovinskoga, Mleci 1756.* koje je doživjelo veliku popularnost u narodu. Riječ je o pučkoj kronici, zapravo zbirci pjesama, "pismarici", u kojoj su nanizani važni događaji u povijesti "naroda slovinskoga" od najstarijih vremena do Kačićeva doba (Kombol i Novak 1992).

26 Graničarski kapetan Matija Antun Relković (1732–1798) rođen je u Svinjaru (danas Davor) na Savi. Sa šesnaest godina stupio je u vojničku službu. U sedmogodišnjem

Latin to be replaced by Hungarian and he worked on making Croatian suitable for administrative purposes (Horvat 1980). Bogdanić's efforts in Vienna to write a history of the world in Croatian fit into this historical framework.

5.1. Attempts to create a national newspaper in Croatian

It is clear that Bogdanić was a man of his time, fired by the Enlightenment. As a scientist, he tended towards the Encyclopaedists and inclined toward the ideas of the Enlightenment and of Joseph II's reforms, but certainly could not accept Germanisation. Joseph II had the notion of a single language within his territories, which, he believed, would solve many problems and unite the empire. In 1784, German was introduced as the official language throughout the state. This meant the eradication of national languages, including the Croatian language (Kren 2007). The Croats did not yet have a fully formed literary language, and Croatian was known by different names. Fancev (Fancev 1937) says that, in the 16th century, in Posavian Croatia, the terms Illyrian, Croatian or Slavic were used, and that this showed that throughout the entire expanse of the ancient Croatian kingdom, Croatian, Slavic and Illyrian had identical significance. He cites evidence from matriculation records in Zagreb (Gradec), which show that the same student was entered as Illyrian[23], Croat or Slav, and the same was true of the matriculation records of the University of Vienna. In the second half of the 18th century in Zagreb (Gradec), the matriculation records refer predominantly to Croatian or (and) Dalmatian national affiliation. He says that the belief in the Illyrian roots of the Croats and the South Slavs, perhaps even the Slavs in general, dated back long before the Illyrian movement of the 19th century. In constant contact with Hungarians, who guarded and cherished their national sentiments, and opposed Germanisation[24], and far from home, Bogdanić felt the need to preserve and develop the Croatian language, culture and economy, torn between German and Hungarian influences. It has long been considered that, in 1791, he sought permission for a national newspaper for Croatia, Slavonia and Dalmatia, in Croatian, permission which he obtained in February 1792. However, the permit specified Franz (Franjo) Bogdanić and this has been discovered not to be an error, but really a reference to another person, probably his uncle or cousin, about whom we have no relevant information. Brešić (Brešić 1986) writes, "*It would have taken so little, and yet so much, for a citizen of Virovitica to become the founder of the Croatian national revival. This was thwarted by the French Revolution of 1789 and the course of history could not be changed by will-power. If we add the fatal complex of the Austro-Hungarian empire, in which the slightest flare of national conservation and observations by the subordinated nations resulted in a tactical response from Vienna or Budapest,, then too many coincidences would have been needed to shift the opportunity for a national revival forward by even fifty years.*" Franjo Bogdanić sought permission for a national newspaper in Croatian and received it on 29 February 1792. Perhaps Vienna granted this privilege as a countermeasure to Hungarian aspirations. Franjo Bogdanić wanted his newspaper to raise national awareness and advance agriculture and the rural economy in Croatia, following guideline laid down by Kačić[25] and Relković[26]. The ruling issued to him declared, "*The successor to the throne gives permission to Franz*[27] *Bogdanić to publish a weekly newspaper in Croatia, Slavonia and Dalmatia in Cyrillic and Roman script*". The original is kept in the State Archive in Vienna.[28] Šišić writes that, even before Ljudevit Gaj requested and received from the Viennese central government approval for the publication of newspapers, Franjo Bogdanić had been granted the same in 1792, as had Antun Nagy from Požega in 1814. Antun Nagy was the chief book censor in Buda. His newspaper was to have been called *The Slavonian and Croatian Phoenix*. Jure Šporer of Karlovac received permission in 1818 for his *Illyrian Advertiser*. Šišić says that all three intended to publish theirs newspapers in the "Illyrian" language, namely the Stokavian dialect, and Bogdanić even proposed using "Cyrillic and Roman scripts for Dalmatia, Croatia and Slavonia". Their programme was almost the same as Ljudevit Gaj's was to be later, for his newspaper *Danica Ilirska* (Illyrian Morning Star) (Šišić 1937). Leopold II reigned for only two years, from 1790 to 1792, at the same time as Franjo Bogdanić's efforts. The licence was issued to Franjo Bogdanić one day before the emperor's death. The long reign of Franz I followed. Although the Josephine reforms were in the process of being rescinded, it seemed that launching a newspaper in Croatian was a too bold move at the time. Bužek, who is convinced that Mirko Danijel was the Bogdanić in question (Bužek 1941), writes, ''Although he received official permission from the Viennese government, he never carried out his intention. Probably the work of the observatory attracted him more.'' Brešić (Brešić 1986) believes that Bužek's assumption is unfounded. ''Bogdanić simply deduced correctly that the time for a national newspaper had not yet arrived''. However, Fancev (Fancev 1941) notes that, in 1791, Bogdanić intended to run a Croatian newspaper printed in Roman script, *Ephemerides Illyricae Latinis Litteris* and that his petition, which has not survived, was first considered

23 In some documents Bogdanić is also called Illyrian and the Croatian language Illyrian.

24 Imperial bureaucrats were persecuted, German as the official language was abolished, the laws of Joseph II were not carried out and the Emperor was showered with petitions (Horvat 1980).

25 Fr. Andrija Kačić Miošić (1704–1760) was born in Brist near Makarska. He studied philosophy and theology in Buda. At the monastery in Zaostrog, he taught philosophy and theology and then taught theology for ten years in Šibenik. He was the guardian of the monastery on the island of Brač. In the monastery in Zaostrog, he wrote a work in Croatian, *Razgovor ugodni naroda slovinskoga (Pleasant Conversation of Slavic People)*, Venice 1756. This book enjoyed great popularity among the Croatian people. It was a folk chronicle, or collection of poems about important events in the history of the Slavic people from ancient times to the time in which Kačić lived (Kombol and Novak 1992).

26 Frontier captain Matija Antun Relković (1732–1798) was born in Svinjar (today Davor) on the River Sava. At the age of sixteen, he entered military service. In the seven years of the hereditary war (1741–1748), in which the Empress Maria Theresa lost Silesia, Parma, Piacenza and Guastalla, he was captured and imprisoned in Frankfurt am Oder. His time in Germany was of great significance for his literary work. He died in 1798 in Vinkovci. In 1762 in Dresden, he published *Satyr or a wild man,* a book of practical instruction on the value of contemporary reform, which became very popular. Its purpose was to raise educational and economic awareness in Slavonia. He praised the farming class and aimed to teach the Croatian peasant how to work. His satyr depicted the beauty of Slavonia and the former happy state of affairs before the Turkish occupation, then showed the people all their former vices and how they could be corrected (Kombol and Novak 1992).

27 Bužek writes about Franjo Bogdanić and gives a biography of Danijel Mirko Bogdanić; even other authors do not doubt that Danijel Mirko Bogdanić was the person in question. Only Kučera never mentions Bogdanić's newspaper.

28 *Illyrische Hofkauzlei 1792 Nr. 1017 Circulandum* (Šišić 1937).

izdanom Franji Bogdaniću piše: *Nasljednik prijestola Franjo daje dopuštenje Franji*[27] *Bogdaniću za izdavanje tjednika za Hrvatsku, Slavoniju i Dalmaciju ćirilskim i latinskim slovima* itd. Original se čuva u državnom arhivu u Beču[28]. Šišić piše da su već prije Ljudevita Gaja zatražili i dobili od bečke centralne vlasti dopuštenje za izdavanje novina: 1792. godine Franjo Bogdanić, 1814. Požežanin Antun Nagy, tada vrhovni cenzor knjiga u Budimu, čije su se novine trebale zvati "Slavonski i hrvatski phoenix", te 1818. Karlovčanin Jure Šporer s ''Oglasnikom ilirskim''. Kaže da su sva trojica svoje novine kanili izdavati ''ilirskim'' jezikom, naime štokavskim dijalektom, a F. Bogdanić, čak i ''*ćirilskim i latinskim pismenima za Dalmaciju, Hrvatsku i Slavoniju*'', a program im je bio gotovo jednak kao poslije Gajevih ''Novina'' i ''Danice'' (Šišić 1937). Car Leopold II. vladao je samo dvije godine, od 1790. do 1792., baš u doba navedenih napora Franje Bogdanića i dobivanja dozvole dan prije njegove smrti, a slijedila je dugogodišnja vladavina Franje I. Premda se propašću jozefinskih reformi sve polako počelo vraćati u predjozefinske okvire, to nije bilo ni lako ni jednostavno. Novine na hrvatskom jeziku bile su, čini se, presmioni pokušaj. Bužek, smatrajući da je riječ o Mirku Danijelu Bogdaniću (Bužek 1941), piše: *''Premda je dobio službeno dopuštenje od bečke vlade, tu namjeru nije ostvario. Vjerojatno ga je rad na zvjezdarnici više privlačio.''* Brešić (Brešić 1986) smatra da Bužekova pretpostavka nije utemeljena, nego *''Bogdanić je jamačno sam pravilno ocijenio da za narodne novine vremena još nisu stigla''*. Međutim, Fancev (Fancev 1941) donosi navod da je Bogdanić potkraj 1791. zamislio pokrenuti hrvatske latiničke novine *Ephemerides Illyricae latinis Litteris* te da je njegova molba, koja nije sačuvana, bila u veljači 1792. najprije proučavana u Ilirskoj dvorskoj kancelariji, a zatim mu je podijeljena i dozvola, no kako mu je nakon toga za cenzora novina bio imenovan episkop Petrović[29], Bogdanić je prekinuo nastojanja oko njihova izdavanja. O tome Kombol navodi da je prvi u Hrvata već 1792. molio dozvolu za izdavanje hrvatskih novina Danijel Mirko Bogdanić, pisac povijesnog djela *Dogodjaji svieta*, ali ga je spriječila nastranost cenzure (Kombol i Novak 1992). Pokušaj Franje Bogdanića u izdavanju novina na hrvatskom jeziku dogodio se više od jednog stoljeća nakon Vitezovićevih kalendara[30], te dva desetljeća nakon pojavljivanja prvih novina u Hrvatskoj, 1771. godine, ali ne na hrvatskom nego na latinskom jeziku, *Ephemerides Zagrebienses*. Slijedile su 1786. i 1789. dvoje režimske novine na njemačkom jeziku, *Agramer deutsche Zeitung* i *Kroatischer Korrespondent* (Brešić 1986). Pretpostavlja se da je Franjo Bogdanić bio dobro upoznat sa stanjem u Hrvatskoj i stanjem novinstva te je stoga želio pomoći svojem narodu tiskanjem novina na hrvatskom (ilirskom) jeziku, *''ćirilskim i latinskim pismenima za Dalmaciju, Hrvatsku i Slavoniju''*. Njegova molba nije sačuvana, a s obzirom na Fancevljeve navode, moguće je da je ćirilica dodana u rješenju, u svjetlu dodjeljivanja episkopa Petrovića kao cenzora.[31]

5.2. Svjetska povijest na hrvatskom jeziku ''Dogodjaji svieta''

Na tragu razmišljanja Franje Bogdanića nalazi se i povijesno djelo Mirka Danijela Bogdanića. On je iste te, 1792. godine, u Beču tiskao prvi svezak svjetske povijesti na hrvatskom jeziku pod naslovom *Dogodjaji svieta*, koje je sigurno dulje vremena pripremao, a u kojem obrađuje razdoblje od Adama, odnosno biblijskog stvaranja svijeta, do Kira. Opisivao je događaje prema Bibliji i tada poznatim povijesnim podacima, do oko 6. stoljeća prije Krista. Knjižica


REPERTORIUM
LOCORUM OBJECTORUMQUE
IN XII
TABULIS MAPPAE REGNORUM
HUNGARIAE,
SLAVONIAE, CROATIAE,
ET
CONFINIORUM MILITARIUM
MAGNI PRINCIPATUS
TRANSYLVANIAE
OCCURRENTIUM.
AERI INCISAS VULGAVIT
JOANNES LIPSZKY DE SZEDLICSNA
BUDÆ,
TYPIS REGIÆ UNIVERSITATIS PESTANÆ.

je ''džepnog'' formata ili mala osmina i sadrži 15 poglavlja na 132 stranice. U prvom dijelu, kako je u knjizi navedeno, trebala su biti još 5 poglavlja: o Kartagi, o Indiji te tri poglavlja o Egiptu. Ovo bi povijesno djelo na hrvatskom jeziku, s obiljem zgusnuto napisanih podataka, trebalo biti zanimljivo za istraživanje hrvatskim povjesničarima, ali i znanstvenicima drugih struka, posebice geografima. Tako na primjer Egejsko more Bogdanić naziva bijelim morem, Jadransko more je Adriansko, ali u bilješci piše More Slovinsko ili Dalmatinsko, Kaspijsko more naziva Hvalinsko i drugo. Vjeruje da su Feničani poznavali Ameriku, a za Noinu arku (korablju) kaže da je pristala u Indiji, na istočnoj strani rijeke Indus i Ganges i drugo. Matematiku Bogdanić naziva brojoznanjem i kaže da su Feničani bili *''parvi nashaoci brojoznanja''* (Bogdanich 1792).

5.2.1. Bogdanićevo astronomsko nazivlje

Bogdanićeva povijesna knjiga zanimljiva je i za astronomiju jer obrađuje astronomska znanja starih Babilonaca i Feničana, a tumači i što astronomski znači geografska širina nekoga mjesta. Za neke stare države u opisu položaja navodi i geografske širine na kojima su se nalazile. Za taj astronomski i geografski pojam bit će vezano i njegovo najvažnije djelovanje u daljnjem životu. Knjiga *Dogodjaji svieta* zanimljiva je i toga što se Bogdanić u njoj koristio hrvatskim astronomskim nazivljem za pojedine pojmove, a većina se tih naziva, kako je pokazao Dadić, podudara ili su

nasljednom ratu (1741–1748), kojim Marija Terezija gubi Šlesku, Parmu, Piacenzu i Guastalu, bio je zarobljen i zatočen u Frankfurtu na Odri, a taj boravak u Njemačkoj imao je veliko značenje za njegov književni rad. Umro je u Vinkovcima 1798. g. U godini Bogdanićeva rođenja, 1762., tiskao je u Dresdenu knjigu praktične poduke o vrijednosti suvremenih reformi "Satir iliti divji čovik", koja je postala veoma popularnom narodnom knjigom. Njegova namjera je prosvjetno i gospodarsko podizanje Slavonije. On uznosi ratarski stalež i želi učiti hrvatskog seljaka raditi. Njegov satir prikazuje Slavoncu ljepotu Slavonije i nekadašnje sretno stanje prije Turaka, pokazujući mu zatim sve njegove tadašnje poroke i način kako bi ih mogao popraviti (Kombol i Novak 1992).

27 Bužek piše o Franji Bogdaniću i daje u potpunosti životopis Danijela Mirka, a ni drugi autori ne dvoje da se radi o Danijelu Mirku Bogdaniću. Jedino Kučera nigdje ne spominje Bogdanićeve novine.

28 Illyrische Hofkauzlei 1792 Nr. 1017 Circulandum (Šišić 1937).

29 Petar Petrović (? – 1800, Temišvar), rodom iz Srijemskih Karlovaca bio je episkop gornjokarlovački od 1774. do 1784., a 1791. je premješten u Beč za referenta za srpska pitanja pri Ilirskoj dvorskoj kancelariji. Kada je 1792. ukinuta Ilirska kancelarija, premješten je na jednaki položaj pri Ugarskoj pridvornoj kancelariji (URL 8).

30 Vidjeti bilješku 4.

31 Budući da je Franjo Bogdanić bio spriječen, prve novine na hrvatskom jeziku bile su dvojezični propagandni službeni tjednik Napoleonove ilirske provincije "Kraljski Dalmatin", od 1806. do 1810., koji sadržajno nije bio hrvatski, a u Beču 1813. počinju izlaziti "Novine serbske", prvi srpski dnevnik studenata D. Davidovića i D. Frušića (Brešić 1986).

at the Illyrian court office in February 1792, followed by the issue of the permit. When Bishop Petrović[29] was appointed as the newspaper censor, Bogdanić ceased his efforts. Kombol states that Mirko Daniel Bogdanić, the author of the historical work *Dogodjaji svieta,* was the first Croat to seek permission for a Croatian newspaper in 1792, but was prevented by the eccentricity of the censor (Kombol and Novak 1992). Franjo Bogdanić's attempt occurred more than a century after Vitezović's calendars[30], and two decades after the first appearance of newspapers in Croatia, in 1771, which were not in Croatian but Latin, *Ephemerides Zagrebienses*. In 1786 and 1789, two regime-backed newspapers in German followed, *Agramer Deutsche Zeitung* and *Kroatischer Korrespondent* (Brešić 1986). It is assumed that Franjo Bogdanić was well acquainted with the situation in Croatia and the state of affairs in journalism, and therefore wanted to help his people by printing a newspaper in Croatian (Illyrian), using ''Cyrillic and Roman script for Dalmatia, Croatia and Slavonia''. His application has not been preserved, and with respect to Fancov's claims, it is possible that Cyrillic was interpolated in the ruling, in the light of the orthodox Bishop Petrović's appointment as censor.[31]

5.2. A history of the world in Croatian: *Dogodjaji svieta* (*World Events*)

Mirko Danijel Bogdanić's history book followed the same trend as Franjo Bogdanić's efforts. In the same year, 1792, he published in Vienna his first volume of world history in Croatian, *Dogodjaji svieta*, which had been in preparation for a very a long time. It deals with the period from Adam and the creation to the Persian ruler, Cyrus. He describes the events of the Bible and the known historical data up to about the 6th century BC. The book was printed in a pocket format, or octavo, and contains 15 chapters comprising 132 pages. In the first part, as stated in the book, there should have been another five chapters on Carthage, India and three chapters on Egypt. This history book in Croatian, with a great deal of densely written information, would make an interesting topic of research for Croatian historians, scientists and other professions, especially geographers. For example, Bogdanić called the Aegean Sea the *White Sea*, the Adriatic Sea *Adriansko*, but in a footnote added the name *Slovinsko* or *Dalmatian Sea;* he called the Caspian Sea *Hvalinsko* and so on. He believed that the Phoenicians had known of the existence of America, and that Noah's Ark had landed in India, on the east side of the Rivers Indus and Ganges, and so on. Bogdanić called mathematics *brojoznanje* (knowledge of numbers) and said that the Phoenicians were the first to develop mathematics (Bogdanić 1792).

5.2.1. Bogdanić's astronomical terminology

Bogdanić's history book is also interesting to astronomers because it deals with the astronomical knowledge of the ancient Babylonians and Phoenicians. He interpreted the astronomical significance of the latitudes of certain geographical points. For some of the old countries, he added the latitudes of their locations to the descriptions of their positions, Later, this astronomical and geographical term (latitude) would be related to his most important work. It is interesting that Bogdanić used Croatian astronomical nomenclature for some concepts, while most of these names, as Dadić shows, are matches or similar to the names in Ivan Belostenec's *Gazophilacium*[32]. The coincidence of names is shown in the following comparative table (Table 1) taken from Dadić (Dadić 1986).

Equivalent or similar names were certainly known and used in common speech. A greater disparity between Belostenec and Bogdanić can only be seen in the nomenclature of the planets. It is interesting that Bogdanić himself perhaps created the word for the equator – *takmenodjelnik* – but Dadić says that the term *takmen*, the notion of equivalence, is later found in the dictionary of Joachim Stulli *Rjecsosloxje*, published in Dubrovnik in 1806, and in Bogoslav Sulek's *Rječniku znanstvenog nazivlja (Dictionary of scientific terminology)*, published in Zagreb in 1874–75. The expression *takmen* was in use in Croatia to mean 'equal', as is evident in Bogdanić's book, in the section in which he writes about the equality of the Jews. Bogdanić had a well-developed sense of language and the importance of introducing Croatian names for astronomical, mathematical and other terms. He tried to give them Croatian names, using the Croatian dictionaries available in his time. This is even more significant when we remember that Bogdanić was working in Vienna, in the heart of an empire which bound together several nations and languages, with dominant German and Hungarian influences that threatened to destroy the other less numerous and less powerful nations.

5.2.2. Language and orthography in Mirko Daniel Bogdanić's book

Regarding his knowledge of Croatian, Bogdanić wrote in the preface to the book, in the old form of Croatian, which was common before the reforms of the 19th century, that his Croatian was probably unsatisfactory. He begged his readers to understand that he had left his homeland more than twenty years earlier and that his primary interest was mathematics. Fancev says that the book is written using the Stokavian Jekavian dialect, and is unpolished in many places (Fancev 1941), but there are also traces of Ikavian dialect, as indicated in the preface (*Pridgovor*, not *Predgovor*), in which Bogdanić says that the Earth is only one part of the world (the universe), and the world consists of the Sun, Earth, Moon and all the unnumbered bodies at immeasurable distances, which are static or move over us. He went on to say that his book looked at only one noble aspect of Earth, humankind and its history.At a sensitive period, when the Jacobin revolution was taking place in France, in a brutal conflict with Christianity, and the reign of Joseph II, who was in even greater conflict with the Church had just ended in Austria, Bogdanić testified to his religious beliefs and justified his social and scientific attitudes.

In the time before the Illyrian Revival in the 19th century, an attempt at orthography was made, particularly to decide

29 Petar Petrović (? – 1800, Timisoara), born in Srijemski Karlovci, was Bishop in the Eparchy of upper Karlovac. In 1791, he moved to Vienna, as the Serbian representative at the Illyrian court office. When the Illyrian office was abolished in 1792, he was transferred to a similar position at the Hungarian court office (URL 8)

30 See note 4.

31 Given that Franjo Bogdanić was prevented from publishing, the first newspaper in Croatian was the bilingual propaganda official weekly of the Napoleonic Illyrian Provinces, *Kraljski Dalmatin,* between 1806 and 1810. The contents did not include Croatian affairs, and in Vienna in 1813, *Novine serbske* appeared, the first Serbian newspaper produced by students D. Davidović and D. Frušić (Brešić 1986).

32 The Paulist Ivan Belostenec (1595–1675) from Ozalj wanted to merge three Croatian dialects into one language, after the practice of combining dialects seen in the works of writers from the Ozalj cultural circle, based around Count Petar Zrinski, Katarina Zrinski and Fran Krsto Frankopan. He completed his dictionary in 1670, but because of the execution of Petar Zrinski and Fran Krsto Frankopan in Wiener Neustadt, it was not published. Belostenec's Latin-Croatian and Croatian-Latin dictionary was published 65 years after his death. It was prepared for press by the Paulist Jerolim Orlović (1695–1746) and published in 1740, as *Gazophylacium* (Kombol and Novak 1992).

Tablica 1. Usporedba Bogdanićevih i Belostenčevih astronomskih naziva

Latinski naziv:	Bogdanić:	Belostenec:
Sol	*ſunce*	*szunce*
Luna	*mieſec*	*meszecz*
stellae fixae	*zvjezde ſtojeche*	*zvezde sztojeche*
stellae errantes	*zvjezde ganutive*	*zvezde bludne*
latitudo	*shirina*	*sirina*
meridies	*poludne*	*poldan, poldne*
meridies noctis	*ponoch*	*polnochi*
defectio	*pomarcsanje*	*pomerchanye*
circulus	*kollo*	*krug, kolobar*
gradus	*oblodio*	-
aequator	*takmenodjelnik*	-

slični Belostenčevim nazivima iz *Gazophilaciuma*[32]. Podudarnost naziva pokazuje usporedna tablica (Tablica 1) preuzeta iz Dadićeva rada (Dadić 1986).

Podudarajući ili slični nazivi bili su sigurno poznati i korišteni u narodnom govoru, a veća se razlika može primijetiti samo u nazivu za planete, koji su kod Bogdanića *zvjezde ganutive*, a u Belostenca *zvezde bludne*. Zanimljiv je njegov naziv za ekvator, koji je možda sam stvorio – *takmenodjelnik*, no Dadić navodi kako izraz *takmen*, za pojam ekvivalentnosti, nalazimo poslije i kod Joakima Stullija u *Rjecsosloxju,* Dubrovnik 1806., i Bogoslava Šuleka u *Rječniku znanstvenog nazivlja,* Zagreb 1874–75. Da je izraz *takmen* bio u upotrebi u Hrvata, u smislu jednak, u knjizi je vidljivo i iz teksta o Židovima, gdje piše o jednakosti Židova. Bogdanić je imao razvijen osjećaj za jezik kao i za važnost uvođenja hrvatskog nazivlja za astronomske, matematičke i druge pojmove te im je nastojao dati hrvatski naziv služeći se hrvatskim rječnicima dostupnima u njegovo doba. To je još važnije kada se zna da je Bogdanić djelovao u Beču, u srcu monarhije koja je u sebi vezala više nacija i jezika, s dominantnim njemačkim i mađarskim utjecajem, koji su prijetili uništiti ostale malobrojnije i manje snažne nacije.

32 Ozaljski pavlin Ivan Belostenec (1595–1675) želio je stopiti tri hrvatska dijalekta u jedan jezik na praksi dijalekatskog prožimanja koje je bilo posvjedočeno u djelima pisaca tzv. ozaljskoga kruga oko grofa Petra Zrinskoga, Katarine Zrinske i Frana Krste Frankopana. Dovršio je rječnik 1670., ali zbog pogubljenja Zrinskog i Frankopana u Bečkom Novom Mjestu, rječnik nije bio tiskan. Belostenčev latinsko-hrvatski i hrvatsko-latinski rječnik priredio je za tisak 65 godina nakon Belostenčeve smrti pavlin Jerolim Orlović (1695–1746) te je tiskan 1740. pod naslovom "Gazophylacium" (Kombol i Novak 1992).

5.2.2. Jezik i grafija u knjizi Mirka Danijela Bogdanića

U vezi svog znanja hrvatskog jezika u predgovoru knjizi (Bogdanich 1792) Bogdanić piše: *''Shto pako jezik gleda, xeliobi vechju ſpravnost u njemu imati, nego shto imam; u mlogo mjeſtieh nisam ni ſebi zadovoljio, josh manje uffamse dachu zadovoljiti shtiocem mojim; ali koi promisli daſam priko dvadeset godinah, to jest od djetinjſtva mojega oddaljen od rodjene darxave: i daſam vechji dio xivota u teegu mathematskomu proveo: onajchemi ovo nastojanje moje za dobro primiti znati''*. O jeziku kojim je knjiga pisana Fancev kaže da je ijekavska štokavština, mjestimice ponešto opora (Fancev 1941), no u knjizi je i puno tragova ikavice, što pokazuje i sam *Pridgovor*, u kojem piše da je Zemlja samo jedan dio svijeta (svemira), a svijet su Sunce, Zemlja, Mjesec i sva neizbrojena tjelesa na neizmjernoj daljini koja iznad nas stoje ili se kreću. Nastavlja da njegova knjiga gleda samo jedan plemeniti dio Zemlje, čovječanstvo, te kaže: *''dakle mlogovarſna kraſnutja i cseznutja narodah: osobite csasti, ſreche, pogibja i oſtala izgledna tvorenja njihova, koliko moguche bude, izvarsno prid ochi od pocsela do dnih nashieh postaviti, to bude duxnost moih Dogodjajah ſvieta.''* U osjetljivim vremenima, kada u Francuskoj traje jakobinska revolucija koja surovo obračunava s kršćanstvom, a u Austriji je netom završilo jozefinsko razdoblje koje je bilo u velikim sukobima s Crkvom, on svjedoči svoju vjeru i opravdava svoja znanstvena stajališta pa u predgovoru piše: *''Otajſtva dakle i pripetjenja ſvarhunaravna ovdi nejmaju mjeſto; od kuda pako ne ſliedi, kao da bi neprijatelj otaiſtvom bio, veche da xelim, da ono, shto za istinu radi otajſtva darximo, i u onoga razuma iſtina bude, koi iz nebogomilloſti ſva ona za izmiſlenja i nashastja ſparenog mozda darxi, koja ſ-razumom ſvoim nie moguche dohititi.''*

U vremenu prije Ljudevita Gaja i ilirskog preporoda grafija je nastojala hrvatske glasove č, ć, đ, dž, š, nj, i lj na najbolji način izraziti kombinacijom latinskih slova. U sjevernim hrvatskim krajevima korištene su njemačka i mađarska grafija. U Bogdanićevoj knjizi slovo š je označeno sa sh, ž sa x, ć je ch, č je cs, đ je dj, dž je cx, s je većinom ſ i drugo. Takvu grafiju koristio je u istom razdoblju i sin Matije Josipa Relkovića, Josip Stipan Relković (1754–1801) u *Kućniku*, svojevrsnoj poljodjelskoj enciklopediji iz 1796. godine, tiskanoj u Osijeku (Relkovich 1796 – pretisak 1989, pogovor knjizi), a koja je odraz jednakih stremljenja koja su vodila Mirka Danijela Bogdanića da napiše svjetsku povijest na hrvatskom jeziku, kao i pokušaja Franje Bogdanića da izda novine na hrvatskom jeziku. Čini se da je Bogdanić stekao dobar uvid u stariju hrvatsku književnost i dobro poznavao hrvatsku književnost svojega doba. Isusovac Juraj Habdelić[33] je stoljeće prije u svoju knjigu *Zrcalo Mariansko* na početak stavio *Opomene k oveh knjižic ogovorniku*, u kojem polemizira s onima koji bi prigovarali jeziku i tome da miješa riječi iz raznih hrvatskih dijalekata, te njegovu pravopisu pa im poručuje neka se njegove knjige ne laćaju, već neka sami stvore bolju. Po njegovu mišljenju dijalekatske su razlike neznatne i nevažne za razumijevanje njegova jezika (Kombol i Novak 1992). Nasuprot Habdeliću Bogdanić se u predgovoru svojoj knjizi ispričava čitaocima zbog eventualnih grešaka jer je bio više od dvadeset godina izvan svoje države i jer mu je osnovno zanimanje bilo usmjereno matematici, a ne jeziku. Habdelić je 1670. u Grazu tiskao hrvatsko-latinski

33 Juraj Habdelić (1609–1678) rođen je u Starim Čičama. Gimnaziju je završio u Zagrebu, filozofiju u Grazu, a teologiju u Trnavi. Bio je učitelj u Rijeci, Zagrebu i Varaždinu, a zatim rektor isusovačkoga kolegija i upravitelj sjemeništa u Zagrebu.

Table 1. Comparison of astronomical names according to Bogdanić and Belostenec

Latin Name	Bogdanić	Belostenec
Sol	*ſunce*	*szunce*
Luna	*mieſec*	*meszecz*
Stellae fixae	*zvjezde ſtojeche*	*zvezde sztojeche*
stellae errantes	*zvjezde ganutive*	*zvezde bludne*
latitudo	*shirina*	*sirina*
meridies	*poludne*	*poldan, poldne*
meridies noctis	*ponoch*	*polnochi*
defectio	*pomarcsanje*	*pomerchanye*
circulus	*kollo*	*krug, kolobar*
gradus	*oblodio*	–
aequator	*takmenodjelnik*	–

the best combination of Roman letters for the Croatian phonemes *č, ć, đ, dž, š, nj*, and *lj*. In the northern Croatian lands, German and Hungarian orthography were used. The letter *š* was written as *sh*, *z* as *x*, *č* as *ch*, *ć* as *cs*, *đ* as *dj*, *dž* as *cx*, and *s* mostly as ſ or s. This orthography was used during the same period by Matija Josip Relković's son, Josip Stipan Relković (1754–1801) in his book *Kućnik (The Householder).* This was a kind of agricultural encyclopaedia, published in 1796 in Osijek (Relković 1796 – reprint of 1989, afterword), which reflected the similar aspirations that led Mirko Danijel Bogdanić to write his world history in Croatian, and Franjo Bogdanić to publish a Croatian newspaper. It seems that Bogdanić had a good knowledge of old Croatian literature and was familiar with the Croatian literature of his time. The Jesuit Juraj Habdelić[33], a century earlier, in the introduction to his book *Zrcalo mariansko (Marian mirror)* wrote some *Warnings to the critics of this book*, in which he engaged in polemics with those who objected to his language, which combined words from various Croatian dialects, as well as his punctuation. He told them not to criticise his book but write better ones themselves. In his opinion, dialect differences were insignificant and irrelevant to an understanding of a language (Kombol and Novak 1992). Contrary to Habdelić, in the preface to his book, Bogdanić apologised to readers for any errors, since he had spent more than twenty years away from his homeland and because his primary interest was mathematics, not language. In 1670 in Graz, Habdelić printed his Croatian-Latin (Kaikavian-Latin) *Dikcionar ili reči slovenske (Dictionary or Slavic Words)*, which was probably used by Bogdanić, although he relied even more on Belostenec's dictionary[34]. These books formed the basis of the education of some very important writers of the age, including Tituš Brezovački, Matija Petar Katančić, Antun Kanižlić and others, and of course Bogdanić, and this is especially evident in the Croatian astronomical terminology he used in his book. After the fruitless period of the first half of the 18th century, the age of Joseph II saw the rise of a great literary output in the Croatian northern regions, and Bogdanić was obviously familiar with all the important events of his time.

5.2.3. Bogdanić's Enlightenment efforts

At the end of his preface, Bogdanić revealed himself as a propagator of Enlightenment values. He said that he had written his world history while thinking about the advancement of all Croatians and the task of disseminating knowledge in order for society to make progress. He wrote that each citizen should be prepared to work on his own personal progress and the progress of society. In the preface, he said he had made use of foreign literature in compiling his world history. He apologised to readers again, and said that the events of the past needed to be related truthfully, not invented, and that anyone who wanted to write about the past needed to consult old books to discover the truth. He hoped no-one would complain if they found the events mentioned in his book in other books and languages too. Although he had gleaned his information on past events from other sources, the opinions and considerations expressed in the book were his alone.

5.3. Astronomy studies in Vienna

A year after publishing his first volume of world history in Croatian, which he never finished, something happened which turned Bogdanić back to his studies. Perhaps his fellow-countrymen (Bruna, Domino, and others) promised to help him gain work at the Buda Observatory if he improved his knowledge of astronomy. Specifically, the Jesuit Ferenc Taucher[35], who after the abolition of the

Jesuit order and the transfer of Trnava University to Buda and the Pešt, came to the Budapest Observatory, turned down Bogdanić's application for the post of second assistant at the Buda Observatory in 1792 (URL 1). The opinion of 12 November 1792 of the Regency Council delivered to the Emperor has survived, in which it is explained that Bogdanić was longer considered appropriate for the Department of Mathematics, and that the Observatory already had enough staff (Reisz, Lemić 2010). At the age of 33, Bogdanić therefore continued to study astronomy at the University of Vienna and between 1793 and 1795, attended lectures given by the Professor of Astronomy at the University of Vienna, Franz de Paul von Triesnecker (1745–1817). From 1792, Triesnecker was the Director of the

33 Juraj Habdelić (1609–1678) was born in Staro Čiče. He graduated from high school in Zagreb, then studied philosophy in Graz and theology in Trnava. He was a teacher in Rijeka, Zagreb and Varaždin, and then Rector of the Jesuit College and Director of the Seminary in Zagreb.

34 See note 26.

35 The Jesuit Ferenc Taucher (1738–1820) was born in Koloszvar and died in Budapest. He was the Director of Budapest Observatory from 1785 to 1806. He was succeeded by Janos Paskvić, who founded a new observatory on Gellert Hill in Buda (URL 9).

(kajkavsko-latinski) *Dikcionar ili reči slovenske*, kojim se Bogdanić sigurno koristio, a još se više vezao uz rječnik pavlina Ivana Belostenca[34]. Iz tog su djela učili za to doba veoma značajni pisci Tituš Brezovački, Matija Petar Katančić, Antun Kanižlić i drugi, ali i Bogdanić, što je posebno vidljivo, kako je prije rečeno, iz hrvatskog astronomskog nazivlja kojim se koristi u svojoj knjizi. Nakon besplodnog razdoblja prve polovice 18. st., u vrijeme jozefinizma javila se snažna književnost u gornjohrvatskim krajevima, a Bogdanić je očito bio upoznat sa svim važnim događanjima svojega doba.

5.2.3. Bogdanićevo prosvjetiteljsko nastojanje

Na kraju Bogdanićeva predgovora (Bogdanich 1792) otkriva se Bogdanić prosvjetitelj jer saznajemo da je svjetsku povijest pisao misleći o napretku svih hrvatskih pučana i o zadatku širenja znanja radi napretka cijelog društva: ''…*zato dogodjaji ſvieta imaju u izgledu pokazati, koliko je opchena csest slucsena ſ-csesti ſvakoga gradjana, da na ovi nacsin ſvakki pucsanin, koi po naravi ſtvarieh ljubi napredovanja ſvoja, ſpravan bude ſveudiljno tvoriti o napredku cieloga druxtva, i radi iſtoga uzroka podloxitiſe ſvojevoljno naredbam njegovim."* U predgovoru također navodi da se koristio stranom literaturom iz svjetske povijesti. I ovdje se ispričava pa kaže da prošle događaje prošlih vremena nije moguće izmisliti ako hoćemo da budu istiniti te se onaj tko želi pisati o prošlosti mora služiti starim knjigama. Zato se nada da mu nitko neće uzeti za zlo ako se događaji koje je u domaćem jeziku pobilježio nalaze i u drugim knjigama i drugim jezicima. Ipak, iako stari događaji u njegovoj knjizi moraju biti tuđi *''ali gdikoje miſli, i gdikoja razmotrenja mognu nishtanemanje biti moja."*

5.3. Studij astronomije u Beču

Godinu dana nakon tiskanja prvog sveska svjetske povijesti na hrvatskom jeziku, koju nije nastavio, dogodilo se nešto što je Bogdanića ponovno skrenulo na studij. Možda su mu sunarodnjaci (Bruno, Domin i drugi) obećali pomoći da dobije mjesto na budimskoj zvjezdarnici ako proširi svoje znanje iz astronomije. Naime, isusovac Ferenc Taucher[35], koji je nakon ukinuća isusovačkog reda i prebacivanja sveučilišta iz Trnave u Budim pa u Peštu, došao na mjesto upravitelja budimske zvjezdarnice, odbio je 1792., kako navodi Vargha (URL 1), Bogdanićevu molbu za mjesto drugog pristava na budimskoj zvjezdarnici. Sačuvano je i mišljenje Namjesničkog vijeća upućeno vladaru od 12. listopada 1792., u kojem je obrazloženo da Bogdanića smatra prikladnijim za katedru matematike ako bi se ondje oslobodilo mjesto, a da zvjezdarnica ima dovoljno osoblja (Reisz, Lemić 2010). U dobi od 33 godine, Bogdanić je stoga nastavio studiranje astronomije na bečkom sveučilištu te je u razdoblju od 1793. do 1795. slušao predavanja iz astronomije kod profesora bečkog sveučilišta i od 1792. upravitelja bečke zvjezdarnice, Franza de Paula von Triesneckera (1745–1817), kod kojeg je poslije objavljivao svoja astronomska mjerenja u astronomskom almanahu *Ephemerides astronomicae*. Godine 1794. Bogdanić se natjecao za upražnjeno mjesto na Katedri za matematiku peštanskog sveučilišta, ali je Namjesničko vijeće ocijenilo mjesto nepotrebnim te odbilo Bogdanića. Kako je navodio u svojim molbama za namještenje, Bogdanić je od 1792. do 1797. bio bez stalnog zaposlenja (Reisz, Lemić 2010), a iz posvete knjizi *Događaji svieta* vidljivo je da ga je otac cijelo vrijeme pomagao, u okviru svojih mogućnosti (Bogdanich 1792).

6. Bogdanićev astronomski rad

Studij astronomije u Beču bio je svakako presudan za Bogdanićevo primanje 1797. godine, u dobi od 37 godina, na mjesto drugog pristava na budimskoj zvjezdarnici. Čini se da je u dogovoru s Franjom Brunom, koji je bio prvi pristav na zvjezdarnici, te Josipom Franjom Dominom, koji je bio dekan Filozofskog fakulteta, odlučeno da se pokrene postupak za osnutak zvanja i radnog mjesta drugog pristava na zvjezdarnici kako bi Mirko Danijel Bogdanić mogao početi astronomski rad. Cijeli je slučaj zanimljiv i dobro dokumentiran. Bogdanić je 19. ožujka 1796. podnio molbu Namjesničkom vijeću za službu asistenta na zvjezdarnici u Budimu, u kojoj je među ostalim napisao: *''Dolje potpisani, već sam se od ranije, kada sam se počeo baviti ozbiljnim (egzaktnim) znanostima, toliko odao matematici, da sam zanemario svoje svakodnevne brige, i samo se njome bavio. Budući da jedva postoji takva oblast matematike koju nisam izučavao i prakticirao, astronomska proučavanja su postala tolika nasušna potreba za me, da me ništa ne može odvratiti od njihova izučavanja bez obzira na moju sudbu."* U dodatnoj molbi od 11. travnja 1796. naveo je da je njegov otac, sin domovine, službovao u Virovitičkoj županiji, a nakon toga više od trideset godina u službi Njegova Veličanstva (Reisz, Lemić 2010). Molbi je priložio i uvjerenje dekana Josipa Franje Domina o strogom ispitu (rigorozu) iz matematike, u kojem je Domin napisao: *''Potvrđujemo da je na današnji dan Mirko Danijel Bogdanić podrijetlom iz Ilirije – Virovitice, rimokatoličke vjere, položio na našem fakultetu ispite iz diferencijalnog i integralnog računa. On je postavljene mu zadatke riješio odlično i s lakoćom, tako da je iz ovoga jasno da on ove znanosti izvrsno poznaje i ustrajno se njima bavi. Također potvrđujemo da je na našem fakultetu studirao tri semestra primijenjenu geometriju, te da je koncem svakog polugodišta osvajao nagradu iz nje."* Molbi je Bogdanić priložio i svoju disertaciju *O stazama kometa (De orbis cometarum).* Dadić navodi da se istim tim problemom teorijske astronomije nekoliko godina prije bavio Bošković pa bi Bogdanićeva rasprava bila zanimljiva za usporedbu (Dadić 1986).

U obrazloženju Magistrata sveučilišta u Pešti od 5. siječnja 1796. navodi se da je zbog poodmaklih godina i mnoštva obveza asistent Bruna zatražio osnivanje radnog mjesta drugog asistenta, jer je prijeko potrebno da se netko na vrijeme poduči radnim zadacima kako ne bi došlo do zastoja razvoja astronomije u Ugarskoj. Magistrat je za to radno mjesto preporučio Bogdanića. Namjesničko vijeće, potom Ugarska kancelarija te car Franjo I. prihvatili su argumentaciju i odobrili osnutak nove službe. Godine 1796., 12. srpnja, Namjesničko vijeće raspisalo je natječaj za mjesto drugog asistenta u budimskoj zvjezdarnici, ujedno i asistenta profesoru astronomije kao i prefektu zvjezdarnice. Namještenje je osiguravalo godišnju plaću od 400 forinti i besplatni smještaj. Međutim, upravitelj Ferenc Taucher u ocjeni natječaja od 20. veljače 1797. ponovno je odbio Bogdanića[36], kao i 1792., te i ostala tri kandidata, a za mjesto asistenta predlagao je bečke astonome Melzera ili Apelthauera. Na Bogdanićevu žalbu Magistrat sveučilišta je 2. ožujka 1797. izrazio neslaganje s mišljenjem ravnatelja Ferenca Tauchera, smatrajući Bogdanića u svakom pogledu podobnim za to radno mjesto, navodeći: *''Kraljevski magistrat drži da je od natjecatelja jedino ovaj mladić podoban i naročito zaslužan da, po milosti Njegovog Veličanstva, dobije službu*

34 Vidjeti bilješku 26.

35 Isusovac Ferenc Taucher (1738–1820) rodio se u Koloszvaru, a umro u Budimu. Bio je upraviteljem budimske zvjezdarnice od 1785. do 1806. Naslijedio ga je Ivan Paskvić, koji je utemeljio novu budimsku zvjezdarnicu na Gerhardovu brijegu (Gellérthegy) (URL 9).

36 Ne treba zaboraviti da je Bogdanić bio civil pa je i to možda bio razlog Taucherova nepovjerenja u vremenu postjozefinizma i jakobinstva.

Vienna Observatory. Bogdanić later published his astronomical measurements in Triesnecker's astronomical almanac *Ephemerides astronomicae*. In 1794, Bogdanić applied for a vacant position in the Department of Mathematics of Budapest University, but the Regency Council considered the post superfluous and rejected Bogdanić. As stated in his application, Bogdanić was without regular employment between 1792 and 1797 (Reisz, Lemić 2010). From the dedication to his book, it is evident that his father continued to help him as far as he could (Bogdanić 1792).

6. Bogdanić's Astronomical Work

His astronomy studies in Vienna were certainly crucial to Bogdanić being appointed, in 1797, at the age of 37, as second assistant at the Buda Observatory. This seems to have been in agreement with Ferenc Bruna, the first assistant at the Observatory, and Joseph Ferenc Domin, the Dean of the Faculty, who initiated proceedings for creating the post of second assistant at the Observatory, so that Mirko Danijel Bogdanić could begin his astronomical work. The entire matter is interesting and well documented. On 19 March 1796, Bogdanić submitted to the Regency Council an application for the post of assistant at the observatory in Buda, in which, among other things, he wrote, "*I, the undersigned, have from a much earlier time, when I started studying the exact sciences, paid so much attention to mathematics that I have neglected my daily cares, and dedicated myself to mathematics alone. Since there is hardly a branch of mathematics which I have not studied and practised, astronomical studies have become a pressing need for me and nothing can distract me from them, regardless of my fate.*" In his supplementary application of 11 April 1796, he said that his father, a true son of the homeland, had served in the Virovitica County and then given more than thirty years of service to His Majesty (Reisz, Lemić 2010). He submitted his application along with Dean Josip Franjo Domin's certificate that he had passed a strict examination in mathematics, in which Domin wrote: "*We acknowledge that on this day, Mirko Danijel Bogdanić, originating from Illyria – Virovitica, a Roman Catholic, took our university examinations in differential and integral calculus. He resolved the given tasks easily, so it is clear that he knows this great science and approaches it with perseverance. We also confirm that he studied three semesters of applied geometry at our faculty, and was presented with an award in this subject at the end of each semester.*" Bogdanić also submitted with his application a dissertation on the paths of comets (*De orbis cometarum*). Dadić states that Bošković had tackled the same problems of theoretical astronomy a few years earlier, so it would be interesting to compare Bogdanić's argument (Dadić 1986).

According to the statement of the University Magistrate in Budapest of 5 January 1796, the explanation was given that, due to his age and many other commitments, the assistant Bruna had requested that the post of second assistant be created, in order for him to train someone to carry out tasks, so as to avoid delays in the development of astronomy in Hungary. The magistrate recommended Bogdanić for the position. The Regency Council, followed by the Hungarian Office and finally the Emperor Franz I, accepted the arguments and approved the creation of the new post. On 12 July 1796, the Regency Council advertised the post of second assistant at the Buda Observatory, with the additional duties of Assistant Professor of Astronomy and Prefect of the Observatory. The post carried an annual salary of 400 florins and free accommodation. But when the director, Ferenc Taucher, reviewed the applications on 20 February 1797, he again rejected Bogdanić, along with three other candidates.[36] Instead, he suggested Melzer or Apelthauer, astronomers from Vienna. Bogdanić appealed and in March 1797, the University Magistrate expressed disagreement with the opinion of the Director, Ferenc Taucher, considering Bogdanić in all respects fit for this position, and stating, "*The Royal Magistrate maintains that this young man is the only suitable applicant and particularly deserving, by the grace of His Majesty, to receive the post of second assistant in practical astronomy*" (Reisz, Lemić 2010). It seems that Domin had to come from Vienna for this case (URL 1). The Regency Council agreed with the assessment of the University Magistrate, as did the Hungarian Office, and the Emperor Franz I approved the proposal and appointed Bogdanić as second assistant on 16 June 1797. After many years of unsuccessful efforts, Bogdanić had finally been given the job he wanted and resolved his material status. When Ferenc Bruna was awarded the professorship in higher mathematics at the University of Budapest on June 26 1798, Bogdanić took over the post of first assistant. Bogdanić and György Schmidt from Košice competed with Bruna for the post of professor of mathematics (Reisz, Lemić 2010).

As Taucher's assistant, Bogdanić made astronomical observations, especially of the eclipses of Jupiter's satellites. They observed them all separately, using a Newton-type 4-foot telescope of about 122 cm, and then comparing the results of observations. These observations were at the time of great significance. By comparing observations of different locations, the difference between the latitudes of these locations could be determined. The occultation of stars was also used for the same purpose, as were the passage of Mercury or Venus in front of the Sun, etc. (Dadić 1986). Such determinations, which were the main focus of the work of the observatory, were very important in determining geographical coordinates. A few decades earlier, the Jesuit Rudjer Bošković, who wanted to prove his hypothesis about the irregularities of the earth's meridians due to irregularities of the interior of the Earth and inequalities on Earth's surface, had tried to do so using the exact determination of astronomical maps and measurements[37]. With his assistant, Christofor Maire, Bošković performed measurements and published them in his work, published in Rome in 1755. With some amendments to the footnotes, it was published in Paris in 1770, entitled *Voyage astronomique et géographique* (*Astronomical and geographical voyage*). It is assumed that Bogdanić was familiar with Bošković's book.

After all the problems he had encountered regarding employment at the Buda Observatory, Bogdanić proved an excellent assistant and earned Taucher's trust, which is evident from the fact that Bogdanić applied for the vacant position of first assistant, with a corresponding salary of 600 florins, after Bruna left for the Department of Mathematics at the University. In his application, Bogdanić explained that the post of second assistant had been created purely for him to take the place of the first assistant after the latter's departure. Taucher, the Director of the Observatory supported

36 We should not forget that Bogdanić was a civilian and this was perhaps the reason Taucher mistrusted him, in the times after Joseph II and Jacobinism.

37 When the Portuguese king Joseph I decided to send a scientific research expedition to Brazil to create new geographical maps of the area in Brazil which he intended to exchange with the Spanish, Bošković was eager to join the expedition. Due to a combination of circumstances, another Croat, Ignacije Szentmartony of Kotoriba, took part in the expedition – see note 8 (Kren 2007).

drugog asistenta praktične astronomije." (Reisz, Lemić 2010). Čini se da je Franjo Josip Domin zbog tog slučaja morao doći iz Beča. (URL 1). Namjesničko vijeće složilo se s ocjenom Magistrata sveučilišta, kao i Ugarska kancelarija, te je prijedlog odobrio car Franjo I. i imenovao 16. lipnja 1797. Mirka Danijela Bogdanića za drugog asistenta, čime je nakon višegodišnjih neuspješnih napora Bogdanić konačno dobio željeno zaposlenje i riješio svoj status. Kada je Franjo Bruna dobio mjesto profesora više matematike na Sveučilištu u Pešti, 26. lipnja 1798., Bogdanić je preuzeo mjesto prvog pristava. Za mjesto profesora više matematike osim Franje Brune natjecali su se i Bogdanić te György Schmidt iz Kasse (Košice) (Reisz, Lemić 2010).

Kao Taucherov asistent obavljao je Bogdanić astronomska motrenja, a osobito pomrčine Jupiterovih satelita. Motrili su svaki zasebno, teleskopom Newtonova tipa od 4 stope (oko 122 cm), a onda bi uspoređivali rezultate motrenja. Ta su motrenja imala u to doba veliku važnost jer se uspoređivanjem jednakih motrenja u različitim mjestima mogla odrediti razlika geografskih dužina među tim mjestima, a za istu svrhu su korištena i motrenja okultacije zvijezda, prolaz Merkura ili Venere ispred Sunčeve ploče i drugo (Dadić 1986). Takva su određivanja, na koja su zvjezdarnice bile velikim dijelom usmjerene, bila veoma važna za određivanje geografskih koordinata te s time u svezi s točnim astronomskim određivanjem zemljovida, a u mjerenjima takve vrste okušao se nekoliko desetljeća prije Bogdanića i isusovac Ruđer Bošković, koji je želio dokazati svoju pretpostavku o nepravilnosti zemaljskih meridijana zbog nepravilnosti Zemljine nutrine i nejednakosti Zemljine površine[37]. Kardinal Valenti ponudio je Boškoviću da željena mjerenja obavi u Papinskoj državi, što je Bošković prihvatio. S pomoćnikom, Christoforom Maireom, Bošković je obavio mjerenja i objavio ih u djelu koje je izašlo 1755. godine u Rimu, a s nekim dopunama u bilješkama bilo objavljeno u Parizu 1770. godine pod naslovom *Astronomsko i geografsko putovanje* (*Voyage astronomique et geographique*). Može se pretpostaviti da je Bogdanić bio upoznat s tim Boškovićevim djelom. Da se Bogdanić nakon svih problema oko zaposlenja na budimskoj zvjezdarnici dokazao odličnim asistentom i zadobio Taucherovo povjerenje, pokazuje molba kojom je Bogdanić zatražio imenovanje na upražnjeno mjesto prvog asistenta s pripadajućom plaćom od 600 forinti, nakon što je Franjo Bruna prešao na Katedru za matematiku na Sveučilištu. Bogdanić je u molbi obrazložio da je mjesto drugog asistenta utemeljeno upravo stoga da nakon odlaska prvog asistenta drugi asistent preuzme njegovo mjesto. Ravnatelj zvjezdarnice Taucher podupro je njegovu molbu, na što je slijedilo pozitivno rješenje Magistrata sveučilišta, Kancelarije te cara Franje I. Dana 30. studenoga 1798., u dobi od 38 godina, Bogdanić je postao prvi asistent na budimskoj zvjezdarnici (Reisz, Lemić 2010).

6.1. Suradnja s kartografom Lipszkym

Od 1782. do 1785. godine u Mađarskoj su se obavljale vojne izmjere za potrebe izrade zemljovida. U tome su sudjelovali najbolji vojni inženjeri geodeti, ali su načinjeni zemljovidi držani u najvećoj tajnosti, a mogle su ih koristiti osobe u vojnoj službi. Vojni stručnjaci bili su uključeni i u katastarsku izmjeru. U 18. st. se, međutim sve više javlja potreba i za civilnom, komercijalnom kartografijom. (Reisz 2002) U austrijskoj monarhiji se dugo vremena razvijala ideja o izradi točne karte Mađarske i Hrvatske, na temelju preciznih astronomskih motrenja. Osobito su se za izradu takve karte zauzimali poznati onovremeni astronom Franz Xaver von Zach (1754–1832), sa zvjezdarnice Seeberg kod Gothe, te Ludwig von Schedius (1768–1847), profesor filologije i estetike na Sveučilištu u Pešti i kartograf, koji je revidirao dotad postojeće karte. Iz njihove je prepiske godine 1798. vidljivo da se mađarski husarski

37 Kada je portugalski kralj Josip I., odlučio poslati u Brazil znanstveno-istraživačku ekspediciju radi izrade nove zemljopisne karte područja u Brazilu koja je htio zamijeniti sa Španjolskom, Bošković se želio pridružiti ekspediciji. Stjecajem okolnosti, međutim, u toj je ekspediciji sudjelovao drugi Hrvat, Ignacije Szentmartony iz Kotoribe – vidjeti bilješku 8 (Kren 2007).

this request, which was followed by an affirmative decision by the University Magistrate, the Hungarian Office and the Emperor Franz I. On November 30 1798, at the age of 38, Bogdanić became the first assistant at the Buda Observatory (Reisz, Lemić 2010).

6.1. Cooperation with the cartographer Lipszky

Military surveys were carried out in Hungary between 1782 and 1785, for the purpose of creating geographical maps. The best military engineers and surveyors were engaged, but the maps they made were kept in the utmost secrecy, and could only be consulted by persons in military service. Military experts were also involved in the cadastral survey. However, in the 18th century, there was an increasing need for civilian, commercial cartography (Reisz 2002.) Within the Austrian empire, the idea of making accurate maps of Hungary and Croatia, based on precise astronomical observations, had long been developing. In particular, the famous, contemporary astronomer, Franz Xaver von Zach (1754–1832), advocated the preparation of such maps, along with the observatories in Gotha and Seeberg and Ludwig von Schedius (1768–1847), Professor of Philology and Aesthetics at the University of Pešt and a cartographer, who had revised previous maps. From their correspondence during 1798, it can be seen that the Hungarian First Lieutenant Hussar officer, Slovak János Lipszky of Szedlicna (1766–1826), had spent ten years trying to improve existing maps. Franz I entrusted him with the creation of accurate maps of Hungary. Lipszky, who had been collecting maps for many years, wanted them to be combined into a single, accurate map of Hungary and its associated countries. He realised that this could not be done well, because the number of correct coordinates according to certain astronomical measurements was too small to make a new, accurate geographical map. He needed an astronomer who would assist him in determining the geographical coordinates of many more cities and towns, and suggested Bogdanić. Franz I appointed Bogdanić to this important post. On 6 November 1798, the Regency Council informed the University Magistrate and asked Bogdanić to provide them with the necessary information on the duration and cost of such an astronomical project. Bogdanić assessed that the work planned would take five months, with expenses amounting to 670 florins. Bogdanić's actual costings, sent to the Regency Council and dated 6 February 1800, show that the journey lasted 400 days and cost 482 florins more (Reisz, Lemić 2010). Zach's letters reveal that he met the famous mathematician Janos Paskvić in the summer of 1798 in Leipzig. Paskvić convinced Zach that Bogdanić was a great genius and probably one of the top mathematicians in the Austrian empire. As Zach, Schedius and Lipszky were negotiating the map production, this may have been crucial in their selection of Bogdanić (Dadić 1986). Bogdanić took on the demanding and arduous field work, which included night observations and mathematical calculations, well aware of the importance and value of the work he was doing. In particular he was certainly attracted by the fact that some of the observations were to be made in his native land, Croatia (Kren 2007).

6.1.1. Bogdanić's year of night field work

On 5 December 1798, the Regency Council notified the border regiment of Bogdanić's astronomical expedition. They also requested the supreme command of Banovina, Slavonia, Banat, Karlovac, Varaždin and the Governor of Rijeka to grant him free movement in carrying out the planned work (Reisz, Lemić 2010). Bogdanić embarked on his travels with one servant and began work in Rijeka in January 1799. He took with him a 2.5 degree French Quadrant, an achromatic Dollond telescope and a precise clock pendulum, made by Seifner of Pešt. Tests in the Buda observatory had shown that it was very accurate. However, he was unable to get hold of Hadley's sextant or either Emery's or Arnold's chronometer. Later work showed that he really could have used these devices. He sent Schedius his observations, who in turn informed Zach by letter. Zach published Bogdanić's observations in his journal *Allgemeine Geographische Ephemeriden* and in *Monatliche Correspondenz*. The correspondence between Schedius and Zach has been preserved and is the source of our information about Bogdanić's activities. Bogdanić's daily observations and calculations of latitude and longitude have also survived. Žarko Dadić published an extensive, documented discussion on Bogdanić as an astronomer published in the Virovitica Anthology (Dadić 1986). In 2002, Reisz T. Csaba reconstructed Bogdanić's travels from 16 December 1798 to 19 January 1800, based on Lypski's reports on the first expedition, and before him, Lajos Glaser did the same thing, in 1938. Both drawings were published in Reisz's book, including pictures of Prilog (Reisz 2002). The first observation Bogdanić performed, on 13 January 1799, was in Trsat, near the old Frankopan castle, in front of the rectory. It was an observation of the occultation of the star *mi Pisces* with the Moon. He failed to note the rising of the Moon, since the contour was not clear, due, as he wrote, to strong evaporation from the sea. He compared his observations with observations of the same occultation made from Göttingen, Vienna, Buda and Kremsmünster, for which the longitudes were known. He calculated the temporal distance between those cities and Rijeka, then the longitude of Rijeka. Bogdanić achieved much more accurate results for the latitude of Rijeka than those known in his time. In Trsat, he determined the zenith distance of many stars in the meridian and calculated the height of the celestial pole, and based on this, Zach concluded that Rijeka had been incorrectly located on all previous maps (Kren 2007). Indeed, he recorded that the positions of many islands in the Pacific Ocean, inhabited by savages, had been better and more accurately determined by geographical and astronomical means than many royal and commercial capitals in civilised Europe (Reisz, Lemić 2010). Bogdanić's observations, performed repeatedly at night during the harsh January winter, resulted in a serious fever, and since he continued to work without sparing himself, after a year of fieldwork, he contracted tuberculosis. Letters from Zach to Schedius show evident concern for Bogdanić's health. "He is harming himself and science with his enthusiastic diligence. He would achieve more if he worked longer, rather than so quickly over a short period". After making observations in Senj, Bogdanić went to Karlobag, where he had problems with the ignorant population, who believed that the measurement process would attract evil to their town. So, through Bogdanić's letters, we can learn indirectly about Croatia at that time. In a letter to Schedius, it was evident that he was considering the benefits of his work for Croatia. He wrote, "You will be surprised at my endurance when you see my observations. And yet I have never been healthier than now and it seems indeed that my physical strength is greater. Indeed, I have accustomed my body to this way of life by not giving in to exhaustion. Also, the knowledge that I am being useful to my country gives me new strength". He made observations in Gospić and then moved on to Dubica. Not everything went according to plan, as he watched the passage of Mercury across the Sun from Dubica, rather than Osijek, as planned. In one letter, he painted an interesting picture of the Croatian people's occupation with astronomical phenomena. "I had to leave my telescope for a moment to clear the quadrant of curious people who were

Rekonstrukcija Bodanićeva puta (Reisz, 2002)
Reconstruction of Bagdanić's travel (Reisz, 2002)

časnik, natporučnik, Slovak Ivan (János) Lipszky od Szedlicne (1766–1826), tada već deset godina bavio pokušajima poboljšavanja postojećih karata, te je car Franjo I. upravo njemu povjerio izradu precizne zemljovida Mađarske. Lipszky koji je niz godina sakupljao zemljovide i želio ih sjediniti u jedinstvenu preciznu kartu Mađarske i njoj pridruženih zemalja, shvatio je da to ne može kvalitetno učiniti jer je broj točnih koordinata određenih astronomskim mjerenjima bio premalen da bi nova karta bila precizna. Trebao je astronoma koji će mu biti pomoćnikom za određivanje geografskih koordinata više mjesta i gradova te je predložio Bogdanića. Austrijski car Franjo I. imenovao ga je za taj važan zadatak te je 6. studenoga 1798. Namjesničko vijeće o tome obavijestilo Magistrat sveučilišta, a od Bogdanića su traženi podatci o trajanju i trošku astronomske ekspedicije. Bogdanić je ocijenio da će za obavljanje planiranog posla trebati pet mjeseci i da će materijalni izdatci iznositi 670 forinti. Pokazalo se, prema Bogdanićevu obračunu troškova za Namjesničko vijeće, od 6. veljače 1800., da je putovanje trajalo 400 dana i da je Bogdaniću trebalo isplatiti još 482 forinte (Reisz, Lemić 2010). Iz Zachovih pisama je vidljivo da je tada već slavni matematičar Ivan Paskvić, kada su se u ljetu 1798. upoznali u Leipzigu, uvjerio astronoma Zacha da je Bogdanić osobiti genij i zacijelo jedan od prvih matematičara u austrijskoj monarhiji. Kako su Zach, Schedius i Lipszky bili u dogovorima oko izrade zemljovida, možda je baš to bilo presudno za Bogdanićev izbor (Dadić 1986). Bogdanić je prihvatio zahtjevan i naporan terenski posao, s noćnim motrenjima te matematičkim proračunavanjima, znajući važnost i vrijednost tog rada, a zasigurno ga je privuklo to što je dio motrenja trebao izvršiti u svojoj domovini Hrvatskoj (Kren 2007).

6.1.1. Bogdanićev jednogodišnji noćni terenski rad

Namjesničko vijeće obavijestilo je 5. prosinca 1798. (po)granične pukovnije o Bogdanićevoj astronomskoj ekspediciji. Također su zamoljena vrhovna zapovjedništva Banovine, Slavonije, Banata, Karlovca i Varaždina te Riječki gubernij da mu omoguće nesmetano kretanje i obavljanje planiranog posla (Reisz, Lemić 2010). Bogdanić je krenuo na put s jednim slugom i započeo rad u Rijeci, u siječnju 1799. godine, a sa sobom je ponio francuski kvadrant od 2,5 stope, akromatični Dollondov dalekozor i preciznu uru njihalicu koju je izradio peštanski obrtnik Seifner, a ispitivanja na budimskoj zvjezdarnici pokazala su da je vrlo točna. No tada još nije mogao dobiti Hadleyev sekstant i Emeryjev ili Arnoldov kronometar, a u kasnijem se radu pokazalo da su mu te sprave jako nedostajale. Svoja je motrenja slao Schediusu, a on je o njima u pismima obavještavao Zacha, koji ih je objavljivao u svom časopisu *Allgemeine Geographische Ephemeriden* i u časopisu *Monatliche Correspondenz*. Ta je korespondencija sačuvana i izvor je saznanja o Bogdanićevu djelovanju. Također je sačuvan njegov dnevnik motrenja i izračunavanja geografskih širina i dužina. Veoma opsežnu i dokumentiranu raspravu o Bogdaniću kao astronomu objavio je Žarko Dadić u Virovitičkom zborniku (Dadić 1986). Bogdanićev put od 16. prosinca 1798. do 19. siječnja 1800., na osnovi izvještaja Janosa Lipszkoga s prve ekspedicije, rekonstruirao je Reisz T. Csaba, a prije njega Lajos Glaser 1938. godine. Oba su crteža objavljena u Reiszovoj knjizi, među slikama u Prilogu (Reisz 2002). Prva je motrenja Bogdanić obavio 13. siječnja 1799. godine na Trsatu, blizu staroga Frankopanskoga grada, pred župnim dvorom. Bilo je to motrenje okultacije zvijezde *mi* Riba s Mjesecom,

J. Lipsky: Mappa generalis regni Hungariae ..., sheet VIII, 1806, map is kept in the Collection of Maps and Atlases of the National and University Library in Zagreb

J. Lipsky: Mappa generalis regni Hungariae ..., list VIII, 1806, karta se čuva u Zbirci zemljopisnih karata i atlasa Nacionalne i sveučilišne knjižnice u Zagrebu

Table 2. Deviation in Bogdanić's measurements of geographic latitude and longitude
Tablica 2. Odstupanja Bogdanićevih mjerenja geografskih dužina i širina

	lambda Greenwich	Dlambda	Fi	Dfi
Fiume – Tersato	14° 21´ 46"	–303"	45° 20´ 10"	+4"
Carlopago	(15° 14´ 32")	–309"	44° 33´ 32"	–11"
Dubica	16° 50´ 32"	+126"	45° 11´ 30"	+4"
Zimony	20° 50´ 40"	–144"	44° 50´ 06"	+34"
Ó-Orsova	(22° 25´ 10")	–200"	44° 41´ 59"	+4"
Déda	22° 26´ 06"	–311"	47° 19´ 10"	+28"
Szatmár(németi)	22° 53´ 03"	–234"	47° 47´ 47"	+14"
Máramarossziget	23° 52´ 32"	–370"	47° 56´ 10"	–20"
Tokaj	21° 23´ 37"	–63"	48° 07´ 12"	+25"
Kassa	21° 16´ 20"	–35"	48° 43´ 21"	+1
Csáca	(18°47´ 06")	20"	49° 26´ 46"	+44"
Szakolca	17° 11´ 29"	–120"	48° 50´ 56"	+37"
Szeged, Alsóváros	20° 10´ 35"	+234"	46° 14´ 57"	+56"

crowding into it. On my return, I found Mercury already in front of the Sun". Because of this, he could not determine exactly the first point of contact. After Dubica he visited Virovitica, as previously stated, where he did not intend to perform observations. On June 15 1799, he was in Petrovaradin, and then in Zemun, where measurements were carried out near the Catholic church in the square behind the tavern by the Danube. On this trip, he also visited Orsova, Szegedin, Szathmári, Szigeth, Tokaj and Košice, Csatza, Skalica and Pozsony (Bratislava) (Kren 2007). On December 17 1799, as reported by Kučera (Kučera 1900, pp. 587), Bogdanić wrote, ''My impatience has turned me into a skeleton. I did not expect so unfavourable a climate. During this month, all the occultations of stars and eclipses of Jupiter's satellite have occurred without me being able to make use of them''. He returned to Buda on January 19 1800, seriously ill. The observations which Bogdanić performed represented a task of great importance and value at that time. Comparisons show that Bogdanić had an enviable number of more accurate results than others known at that time. This relates in particular to latitudes. In his letters, Bogdanić told Zach of the problems he had encountered in observing the height of the celestial pole in some places, such as the choice of stars for determining zenith distance in the meridian. In fact, for the most part, he was unable to select those whose distance from the pole was best known, but had to use those which were most visible at the time of observation (Kren 2007).

6.2. Astronomical observations at the Buda Observatory

Although in poor health, Bogdanić carried out a series of valuable astronomical observations at the Buda Observatory in 1800. Up to early April 1800, and also from September 20 to May 22 1801, he watched eclipses of Jupiter's satellites and their entry into and exit from the shadows, along with Taucher and his assistant Huliman. In March 1800, he recorded that he had observed with Lipszky the occultation of stars with the Moon and other occultations (Dadić 1986). During that year, he and Lypszky processed and arranged the data from his travels (Dadić 1982). In the autumn of 1800, Bogdanić observed the opposition of Mars on 6, 9, 10 and 12 November at Buda Observatory, and published the data in *Ephemerides Astronomicae*. Using Zach's tables for the Sun, he calculated that Mars was located in the ascending node on 11 November 1800 at 11 minutes past nine, and the length of the node of Mars's path was measured in 1800: 48^0 00' 34,4''. These results compared with the observation of Tycho Brahe made in 1595, so he was able to calculate the annual motion of the node. The astronomer Zach was thrilled with his determination of the ascending node of Mars' path. In *Monatlich Correspondenz* he wrote that Bogdanić's result had filled him with joy, and that he was delighted to know such a talented young scientist, of whom much could be expected (Kren 2007). In July 1800, Bogdanić submitted to the Regency Council an application for taking the degree of Doctor of Philosophy without sitting the prescribed examination, claiming that this had been the practice earlier, that his post was at the level of professor, and he was had passed a strict examination three years earlier. He cited the results of his previous research and the results of his astronomical expedition. His application was supported by the University Magistrate and the Regency Council, on condition that he wrote and defended a dissertation on a subject which the Faculty would propose. At that time, he would be expected to sit a rigorous examination in philosophy, mathematics and history. In spite of his good results, the Hungarian Office refused his request on 29August 1800 (Reisz, Lemić 2010).

In addition to his other astronomical observations, in early 1801 Bogdanić observed the opposition of Saturn on 8, 9, and 11 February. From Zach's tables, he calculated the data for Saturn's opposition, and these were his last observations in Buda. At the beginning of March 1801, as requested by the Royal Governor's Office in Buda, he continued astronomical work for the creation of maps. His second trip was greatly delayed because of his health , and he did not set off until June 1801. This time, he took with him an Emery chronometer, purchased in England and donated for the purpose by Count Ferenc Széchzény, and a Hadley sextant, which Zach had purchased with the financial participation of Baron Jozsef Podmaniczky and sent to Buda. In a letter to Zach, Schedius praised Emery's chronometer as an excellent timepiece.

a izlazak nije uspio motriti jer Mjesečev rub nije bio jasan zbog, kako piše, jakog ishlapljivanja mora. Motrenja je usporedio s motrenjima iste okultacije iz Göttingena, Beča, Budima i Kremsmünstera, za koje je bila poznata geografska dužina. Izračunao je vremensku udaljenost tih gradova od Rijeke te geografsku dužinu Rijeke. Za geografsku širinu Rijeke Bogdanić je došao do mnogo točnijih rezultata od onih poznatih u njegovo doba. Na Trsatu je određivao zenitne udaljenosti više zvijezda u meridijanu i izračunao visinu pola, na temelju čega je Zach zaključio da je Rijeka na svim kartama postavljena pogrešno (Kren 2007). Dapače je konstatirao da su mnogi otoci u Tihom oceanu, nastanjeni divljacima, bolje i točnije geografski i astronomski određeni nego *''neki glavni, prijestolni i trgovački gradovi u civiliziranoj Europi"* (Reisz, Lemić 2010). Bogdanićeva motrenja koja je obavljao uzastopce noću po oštroj zimi, u siječnju, rezultirala su ozbiljnom groznicom, a kako se ni na daljnjem putu nije nimalo štedio, iscrpljivanja tijekom godine dana terenskog rada rezultirala su oboljenjem od tuberkuloze. Iz Zachova pisma Schediusu vidljiva je zabrinutost za Bogdanićevo zdravlje: "*On šteti sebi i znanosti svojim vatrenim marom. On bi djelovao više kad bi djelovao duže, nego što bi djelovao ako djeluje kratko i brzo."* Preko Senja Bogdanić je došao u Karlobag, u kojem je imao nevolja s neukim pukom, koji je vjerovao da svojim mjerenjima navlači zlo na njihov grad. Tako nam Bogdanićeva pisma posredno govore i o Hrvatskoj toga vremena. U pismu Schediusu vidljivo je da je u svom djelovanju na umu imao i korist od toga rada za Hrvatsku. On piše: *"Vi ćete se čuditi kad vidite moja motrenja kako sam mogao izdržati. A ipak ja nisam nikada bio zdraviji nego sada i izgleda dapače, da se moje tjelesne snage time pojačavaju. Što više ja sam svoje tijelo neumornošću navikao na ovaj način života. Također osjećaj da je to korisno mojoj domovini daje mi nove snage".* Nakon Gospića Bogdanić je krenuo u Dubicu. Nije sve išlo po planu pa je prolaz Merkura preko Sunčeve ploče pratio iz Dubice, a ne iz Osijeka, kako je planirao. U pismu je ostavio zanimljivu sliku o zanimanju hrvatskoga puka tog vremena za astronomske pojave: "*Ja sam morao ostaviti moj dalekozor na trenutak da radoznali puk udaljim od kvadranta prema kojem se je previše gurao. Kod povratka sam našao Merkur već na Suncu."* Prvi dodir zato nije mogao potpuno točno odrediti. Nakon Dubice posjetio je, kako je prije rečeno, Viroviticu, gdje nije trebao obavljati motrenja, 15. lipnja 1799. godine nalazio se u Petrovaradinu, a zatim u Zemunu, gdje je mjerenja obavljao nedaleko od katoličke crkve na trgu pokraj pivnice uz Dunav. Potom je na svom putu nanizao Staru Orsovu, Szegedin, Szathmar, Szigeth, Tokaj i Košice, Csatzu, Skalicu i Požun (Bratislava). (Kren 2007) Iz Skalice je 17. prosinca 1799., kako navodi Kučera (Kučera 1900, str. 587), pisao: *''Nestrpljivost me učinila skeletom; tako nepovoljnoj se klimi nijesam nadao. Sva pokrića zvijezda i sve pomrčine Jupiterovih trabanta u ovom mjesecu proðoše neupotrebljive."* U Budim se vratio teško bolestan, 19. siječnja 1800. Motrenja koja je obavljao Bogdanić bila su u to doba zadatak velike važnosti i vrijednosti. Usporedbe pokazuju da je Bogdanić došao do zavidnog broja rezultata točnijih od onih poznatih u to vrijeme. Posebno se to odnosi na geografske širine. U pismima Zachu Bogdanić je navodio i probleme s kojima se susretao prilikom motrenja visine pola u pojedinim mjestima, kao na primjer o izboru zvijezda za određivanje njihove zenitne udaljenosti u meridijanu. Naime, većinom nije mogao odabrati one za koje je bila najbolje poznata udaljenost od pola, nego one koje su bile vidljive u vremenu motrenja (Kren 2007).

6.2. Astronomska motrenja na budimskoj zvjezdarnici

Sa zvjezdarnice u Budimu, premda je bio lošeg zdravstvenog stanja, obavio je 1800. niz vrijednih astronomskih motrenja. Do početka travnja motrio je zajedno s Taucherom i pristavom Hulimanom pomrčine Jupiterovih satelita i njihove ulaske i izlaske iz sjene te također od 20. rujna 1800. do 22. svibnja 1801. U ožujku 1800. zabilježeno je da je motrio okultacije zvijezda s Mjesecom te još neke okultacije zajedno s Lipszkym (Dadić 1986). S njime je tijekom te godine razrađivao i sređivao podatke s putovanja (Dadić 1982). U jesen 1800. Bogdanić je s budimske zvjezdarnice obavio motrenje opozicije Marsa, i to 6., 9., 10. i 12. studenoga, a podatke je objavio u *Ephemerides astronomicae.* Koristeći se Zachovim tablicama za Sunce izračunao je da se Mars u uzlaznom čvoru nalazio 11. studenoga 1800. u 9 sati i 11 minuta, a za duljinu čvora Marsove staze dobio je rezultat 1800: 48^0 00' 34,4". Svoje je rezultate usporedio s motrenjem Tycha Brahea iz 1595. te je izračunao godišnje gibanje čvora. Astronom Zach bio je oduševljen njegovim određenjem uzlaznog čvora Marsove staze pa je u *Monatliche Correspondenz* napisao da ga je Bogdanićev rezultat ispunio srećom što postoji tako talentiran mladi znanstvenik, od kojeg se može mnogo očekivati (Kren 2007). U srpnju 1800. Bogdanić je Namjesničkom vijeću podnio molbu za oslobađanje od polaganja propisanih ispita za stjecanje stupnja doktora filozofije, kao razlog navodeći da je to bila praksa i prije, da je njegovo namještenje u rangu profesora, da je prije tri godine položio strogi ispit. Naveo je svoje dotadašnje rezultate istraživanja, kao i rezultate astronomske ekspedicije. Njegovu je molbu podržao Magistrat sveučilišta, a zatim i Namjesničko vijeće uz primjedbu da napravi i obrani disertaciju na temu koju mu predloži fakultet. U to je vrijeme trebalo polagati strogi ispit (rigoroz) iz filozofije, matematike i povijesti te je unatoč povoljnim ocjenama Ugarska kancelarija 29. kolovoza 1800. odbila njegov zahtjev (Reisz, Lemić 2010).

Osim drugih astronomskih motrenja, početkom 1801. Bogdanić je 8., 9. i 11. veljače 1801. motrio opoziciju Saturna i pomoću Zachovih tablica izračunao podatke za Saturnovu opoziciju, a to su bila i njegova posljednja motrenja u Budimu jer je početkom ožujka 1801. godine, po nalogu kraljevskog namjesništva u Budimu, morao nastaviti astronomski rad na stvaranju zemljovida. Zbog zdravstvenog stanja na put je pošao s velikim zakašnjenjem, tek u lipnju 1801. godine. Ovoga puta ponio je na put Emeryjev kronometar, koji je nabavio u Engleskoj i u tu svrhu darovao grof Ferenc Széchzény, te Hadleyev sekstant, koji je uz materijalnu pomoć baruna Jozsefa Podmaniczkog nabavio Zach i poslao u Budim. Schedius je u pismu Zachu hvalio Emeryjev kronometar kao izvrstan, a Bogdanić ga je više mjeseci iskušavao u svojim motrenjima, kao i sekstant (URL 2).

Zbog tuberkuloze koja je prešla u težu fazu s izbacivanjem krvi, Bogdanić se morao vratiti u Budim već nakon mjesec dana. Nije više mogao praktično raditi ni na zvjezdarnici, jer se držalo da bi mu i zrak ondje štetio. Kučera navodi da je bio samac pa je na poziv svog prijatelja, peštanskoga knjižara Adama Killiana otišao na liječenje u Peštu. Iz Schediusova pisma Zachu vidljivo je da su ga u Pešti liječila dva liječnika, a Kučera navodi da ga je Killian punih osam mjeseci besplatno njegovao (Kučera 1900). Kako nije mogao biti besposlen, posvetio se teorijskim astronomskim problemima, radeći na djelu *Nebeska mehanika (Mechanica Coelestis)*[38]. Bužek piše da iz njegove nebeske mehanike struji snaga duha jednog La Placea[39], ali je dospio završiti samo deset araka (Bužek

38 Dadić navodi da je Bogdanić došao samo do desetog lista. Tražio je rukopis u budimpeštanskim knjižnicama, ali ga nije našao (Dadić 1986).

39 Pierre Simon, Marquis de La Place (1749–1827), francuski astronom i matematičar, poznat je po radovima iz područja nebeske mehanike, teorije elektriciteta, znanosti o toplini, teorije vjerojatnosti i dr.

Bogdanić tried both it and the sextant out in his observations over several months (URL 2). However, his tuberculosis developed to the stage in which he was coughing up blood, and he was forced to return to Buda after only a month. He could no longer work properly in the Observatory, because it was considered that the air in the observatory would further damage his health. Kučera writes that he was unmarried and at the invitation of his friend Adam Killian, the Budapest bookseller, went to Pešt for treatment. Schedius wrote to Zach that two doctors in Buda treated him. Kučera says that Killian took care of him for eight months without any charge (Kučera 1900). Since he found it impossible to be idle, he devoted his time to theoretical astronomical problems, working on his *Nebeska mehanike (Mechanica Coelestis)*[38]. Bužek says that this work was imbued with the strength of spirit of a La Place[39], but he completed only ten double sheets (Bužek 1941). He died on 31January 1802, at the age of 41. In *Monatliche Correspondenz*, Zach published part of Schedius's letter and wrote that Bogdanić's death was a great loss to astronomy. Although not personally acquainted with Bogdanić, he had judged his ability and talent from his correspondence and papers, and especially from what he had heard of him from his friends Paskvić and Bürg. The newspaper *Intelligenzblatt* in Leipzig published a full obituary. In the obituary, Schedius wrote, ''He possessed a great genius, combined with a good and honest heart, which was incapable of causing offence, and an extraordinary strength of spirit, which was accompanied by a particular sense of delicacy and modesty, which made him a man respected by all his friends and never to be forgotten by them.'' (Kučera 1900). Bužek quotes Bogdanić's epitaph: ''He measured with an undying eye / the immense celestial spaces; / Yet his early grave / ah, traveller/ measures three paces only! /The Seine and Thames also knew him /as did the Hungarian government / and his ungrateful native land/ yet he was so easily forgotten.'' (Bužek 1941).

38 Bogdanić only completed ten double sheets. Dadić searched for the manuscript in the libraries of Budapešt, but it has never been found (Dadić 1986).

39 Pierre Simon, Marquis de La Place (1749–1827), French astronomer and mathematician, famous for works in the field of celestial mechanics, the theory of electricity, the science of heat, probability theory, etc.

7. Conclusion

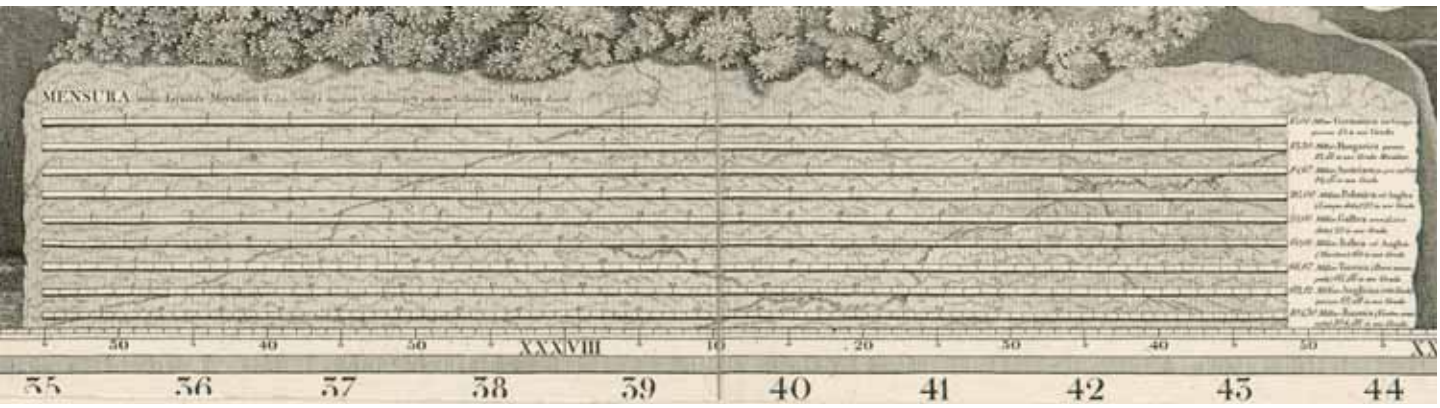
Bogdanić carried out extensive, highly useful work, and determined more than 150 accurate latitudes, while he had weaker results for longitudes, due to the lack of precision of the instruments he used. In 1818, the astronomer Johann Joseph von Litrow (1781–1840), who became Director of the Vienna Observatory, visited the Buda Observatory. The Director at the time was Janos Paskvić. Litrow wrote a paper on predicting eclipses and refraction, and also on Bogdanić's determination of the celestial pole. His paper was printed in 1818 in the *Berlin Astronomical Yearbook* for 1821. He found that Bogdanić's measurement of the height of the pole, and his determinations of latitude, were the best possible which could have been achieved using the instruments available. He concluded that Bogdanić successfully united theoretical talent, practical skill and diligence, and that his premature death was a great loss to astronomy (Dadić 1986).

The table 2. (URL 2) shows the deviation in Bogdanić's measurements of geographic latitude and longitude.

The additional observations necessary for mapmaking, which Bogdanić did not manage to carry out, were performed by Janos Paskvić. He came out of retirement in 1803 and worked as an assistant at the Buda Observatory. With the help of collaborators, Lipszky completed his map, which consisted of nine tables and three appendices, entitled *Mapa Generalis Regni Hungariae partiumque adnexarum Croatiae Slavoniae et Confinionum Militarium Magni item Principatus Transylvaniae geometricis partium dimensionibus, recentisimisque astronomics observationibus superstructa , adjectis finibus Provinciarum Bucovivinae, Galliciae, Silesiae, Austriae, Styriae, Carinthiae, Carnioliae, Dalmatiae, Bosniae, Seviae, Valachiae Moldaviae et quam principis honoribus Serenissima Regio Joseph Archiducis Palatine dedicet Joannes de Lipszky Legionic Caes et Reg. Equestris Hungaricae Lib.; Pesthini Anno 1806th* (*General map of the Kingdom of Hungary and associated parts of Croatia, Slavonia and the Military Frontier ...*). An invaluable index of all the territories covered was compiled by Lajos Schedius, and printed in the University print works in Buda. The counties were requested to carry out corrections of the indices of names in their regions. The engravings were produced by the Pole Gottfried Prixner and the Hungarian Ferenc Karancs. The plates were printed in the university print works. *Mappa Generalis* (*Repertorium*) was printed between 1804 and 1808, and *Tabula* Generalis in 1810. Lipszky recorded that the total costs between 1797 and 1812 amounted to more than 60 000 florins, while revenues from sales exceeded 89 000 florins. The map was a financial success. At first, Kilian's bookstore in Pešt was in charge of distribution. In two places, the map depicts an astronomer carrying out measurements, which is taken to represent Bogdanić. This was probably the mapmaker's way of honouring the memory of Bogdanić, his prematurely dead colleague (Reisz, Lemić 2010).

Interest in Bogdanić and his work seems to have only fully developed recently, and is partially due to increasing interest on the part of cartographers, and also amateurs, in Lipszky's beautifully crafted old map of Hungary[40]. The map also played an important historical role. In particular, Napoleon Bonaparte used it in his military campaigns, and its author, Lipszky, was a Hussar officer who served in the Austrian army against Napoleon.

40 A DVD is available via the Internet containing Lispszky's complete map (URL 13).



1941). Umro je 31. siječnja 1802. godine, u četrdeset drugoj godini života. U *Monatliche Correspondenzu* Zach je objavio dio Schediusova pisma i napisao da je Bogdanićeva smrt veliki gubitak za astronomiju te iako nije osobno poznavao Bogdanića, upoznao je njegove sposobnosti i talent iz njegove korespondencije i radova, a osobito iz pričanja njegovih prijatelja Paskvića i Bürga. List *Intelligenzblatt* u Leipzigu donio je opširan nekrolog. Schedius je u nekrologu napisao: *''Njegov izvrsni genij, sastavljen s poštenim i dobrim srcem, koje nije moglo nikoga uvrijediti, njegova izvanredna snaga duha, koju je pratila osobita delikatesa i skromnost, učiniše ga čovjekom kojega su svi njegovi prijatelji štovali i kojega za stalno ne će zaboraviti.''* (Kučera 1900). Bužek navodi Bogdanićev nadgrobni epitaf: *''On mjeraše neumrlim okom / nebeski neizmjerni prostor;/ ipak mjeri tri koraka samo / putniče, ah! njegov rani grob./ Poznavaše ga Seina, Themza također, / ugarska postavljena vlada; / a ipak, tako ga lako zaboravi / nezahvalna domovina.''* (Bužek 1941).

7. Zaključak

Bogdanić je obavio velik i koristan posao i odredio više od 150 točnih geografskih širina, dok je sa geografskim dužinama imao slabije rezultate, s obzirom na nedovoljno precizne instrumente koje je imao. Godine 1818. astronom Joseph Johann von Litrow (1781–1840), koji je postao upraviteljem bečke zvjezdarnice, došao je na budimsku zvjezdarnicu kojom je tada upravljao Ivan Paskvić. Napisao je rad o izračunavanju pomrčine, refrakciji i o Bogdanićevu motrenju visine pola, tiskan 1818. u Berlinu, u Astronomskom godišnjaku za 1821. godinu. Utvrdio je da su Bogdanićeva mjerenja visine pola, odnosno određivanje geografske širine, među najboljima koja se mogu učiniti spravama kojima je Bogdanić raspolagao i da je Bogdanić u sebi sretno ujedinio teorijski talent, praktičnu vještinu i živu revnost te je njegova prerana smrt bila velik gubitak za astronomiju (Dadić 1986).

Sljedeća tablica (URL 2) pokazuje odstupanja Bogdanićevih mjerenja geografskih širina i dužina:

Dodatna motrenja potrebna za kartu, koja Bogdanić nije stigao obaviti, vjerojatno je obavio Ivan Paskvić, koji se 1803. reaktivirao i zaposlio kao asistent na budimskoj zvjezdarnici. Lipszky je, uz pomoć suradnika, u Pešti dovršio i izradio kartu, koja se sastoji od devet tabli i tri dodatka pod naslovom *Mapa Generalis Regni Hungariae partiumque adnexarum Croatiae, Slavoniae et Confinionum Militarium Magni item Principatus Transylvaniae geometricis partium dimensionibus, recentisimisque astronomics observationibus superstructa, adjectis finibus Provinciarum Bucovivinae, Galliciae, Silesiae, Austriae, Styriae, Carinthiae, Carnioliae, Dalmatiae, Bosniae, Seviae, Valachiae et Moldaviae quam honoribus Serenissimi Principis Regii Josephi Archiducis Palatini dedicet Joannes de Lipszky Legionic Caes et Reg. Equestris Hungaricae Lib.; Pesthini Anno 1806. (Opća mapa kraljevine Mađarske i pridruženih dijelova Hrvatske, Slavonije i Vojne krajine…).* Vrijedno kazalo imena svih obuhvaćenih zemalja sastavio je Lajos Schedius, a tiskano je u budimskoj sveučilišnoj tiskari. Županije su bile pozvane obaviti ispravke kazala naziva s njihova područja. Rezbarske radove izveli su Poljak Gottfried Prixner i Mađar Ferenc Karancs. Ploče su tiskane u kućnoj tiskari. U razdoblju od 1804. do 1808. tiskana je Mappa generalis (Repertorij), a 1810. Tabula generalis. Lipszky je zabilježio da su ukupni troškovi od 1797. do 1812. iznosili više od 60.000 forinti, a prihodi od prodaje više od 89.000 forinti te je karta i financijski bila veoma uspješna. U prvo vrijeme je peštanska knjižara Kilian obavljala distribuciju karte Ugarske. Na karti je na dva mjesta crtež astronoma koji obavlja mjerenja, a koji predstavlja Bogdanića te se smatra da je time vjerojatno odano priznanje prerano umrlom Bogdaniću (Reisz, Lemić 2010).

Zanimanje za Bogdanića i njegov rad čini se da tek danas doživljava svoju potpunu afirmaciju, čemu pridonosi veliko zanimanje kartografa, ali i laika, za prekrasno izrađenu staru Lipszkyjevu kartu Mađarske[40]. Karta je zanimljiva i zbog svoje povijesne uloge. Naime, koristio se njome u svom ratnom pohodu Napoleon Bonaparte, a njezin autor Lipszky, husarski časnik, vojevao je u austrijskoj vojsci protiv Napoleona.

40 Putem interneta može se nabaviti DVD koji sadrži kompletnu Lipszkyjevu kartu (URL 13).

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XLIV
B
C
D
E
F
G
H
EXPLICATIO SIGNORUM
(Erklärung der Zeichen)
CIVITATES Lib. Reg. vel Montanæ — König. freye und Berg-Städte
PRÆSIDIA vel Munimen — Festungen
URBES Episc. et Oppida — Bischöfl. Städte und Marktflecken
Pagi et Vici — Dörfer
Prædia — Prädien
Arces — Schlösser
Arces desolatæ vel Rudera — Zerfallene Schlösser
Ecclesiæ solitariæ — Einzelne Kirchen
Claustra — Klöster
Domus solitariæ — Einzelne Häuser
Diversoria vel Popinæ — Wirthshäuser
Allodia — Mayerhöfe
Domus venatoriæ — Jägerhäuser
Officinæ vitrariæ — Glashütten
Balnea — Bäder
Aquæ minerales vel Acidulæ — Mineralwässer oder Sauerbrunn
Molæ — Mühlen
Ferri cusoriæ — Eisenhämmer
Aggeres — Dämme
Aggeres antiqui Romani — Römer Schanzen
Viæ stratæ — Gemachte Strassen (Chausséen)
Viæ postales — Post Strassen
Viæ commerciales — Commercial Strassen
Viæ ordinariæ — Ordinäre Wege
Stationes postales — Post Stationen
Limites REGNI — Landes Gränzen
Limites COMITATUUM — Comitats Gränzen
Limites Processuum — Gerichts Bezirks Gränzen
Montes et Colles — Berge und Hügeln
Antra — Höhlen
Sylvæ — Waldungen
Plagæ sabulosæ — Sandige Gegenden
Fluvii majores — Flüsse
Amnes et Rivi — Bäche
Canales — Canäle
Trajectus — Überfahrten
Pontes — Brücken
Lacus — Seen
Plagæ inund. aquæ obnoxiæ — Überschwemmungen
Plagæ paludosæ — Moräste
Clades et Conflictus — Schlachten
Nrus COMITATUUM I. II. &c. der Gespannschaften
Nrus DISTRICT. Privil. A. B. &c. der Privil. Distr.
Nrus Processuum 1. 2. &c. der Gerichts Bezirke
Woloszyska
Tarnoruda
Satanow
Husiatyn
Zbryz
Skala
Borszczow
Krzywcze
Michalkow
Kudrynce
Mielnice
Kytaygrod

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