FROM PERIPHERY TO CENTRE: THE ROLE OF MARCUS ANTONIUS DE DOMINIS IN THE 16th AND 17th CENTURY SCIENTIFIC AND INTELLECTUAL MOVEMENTS

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Abstract

Marcus Antonius de Dominis (1560–1624), primarily known for his controversial ecclesiological activity, also left a mark on early modern scientific movements. Leaving a promising academic career in Italy in his early stage of life, he turned his activity to political and ecclesiological issues, giving up natural philosophy and dealing with it later only occasionally. However, this thesis focuses on problems concerning his natural philosophy and his surroundings among men of letters of late 16th and early 17th centuries.

During his life, Dominis published two books on natural philosophy, which serve as the main source for the research. The first one is *De radiis visus et lucis in vitris perspectivis et iride: tractatus Marci Antonii de Dominis, per Ioannem Bartolum in in lucem editus* (Venice, 1611) and the other one is *Euripus seu De fluxu et refluxu maris* (Rome, 1624). In the former, inspired by Galileo's presentation of the spy glass in Venice in 1609, Dominis firstly discusses lenses, trying to give a theoretical explanation of the spectacle and spy glass function. Keeping the focus on optics, the second part of his treatise analyzes the appearance of a rainbow. The latter work, published in the last year of Dominis' life, is focused on the phenomenon of ebbs and tides, and the shape of the Earth. Following early modern methods developed in natural philosophy, the thesis shows the extent Dominis adopted novelties and how much he relied on old authorities, such as Euclid, Vitello and other antic and medieval scholars.

In order to give a complete picture of a late 16th and early 17th century scholar, Dominis' role in the broader scope of the early modern republic of letters is also presented. His connections and acquaintances with Galileo, Bacon and other scholars of the time are introduced primarily through the analysis of various letters.

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1. Introduction

On 9th September 1624 a cleric accused of heresy by the Inquisition died in his cell in the dungeon of St. Angelo's Castle in Rome during the investigation of his case. Some two months later, he was proclaimed guilty. Accordingly, on 21st December of the same year, the public on Campo de Fiore witnessed the process of execution by burning at the stake the heretic's dead body, together with his portrait and some of his writings. The deceased was Marcus Antonius de Dominis, a priest, theologian, politician, philosopher and physicist, in other words one of the many Renaissance *homines universales*.

Born on the island of Rab in Dalmatia and coming from a noble family, during his life Dominis traveled throughout Europe. Educated in Italy, he was a bishop in the Dalmatian city of Senj becoming an archbishop in Split a couple of years later. However, his anti-papal writings forced him to leave his position and run all the way to London, where he stayed for six years before deciding to return to Rome as a penitent. Nevertheless, besides these important ecclesiological, and therefore to a large extent political affairs, Dominis also dealt with natural philosophy, which was his true profession and early interest, that he was actually studying and teaching at Italian universities. Moreover, after all the vicissitudes he passed during his disputations with Rome, he concluded his life with one work in natural philosophy, just before he was imprisoned.

Regarding his writings, Dominis' work on the matters of natural philosophy was overshadowed by his heretical writings. That should not be surprising, since the majority of Dominis' texts are connected with the subject of the Church and the pope, and these were during his life proclaimed heretical by the Inquisition. He dealt with these questions most of

his life and left an astonishing opus entitled *De republica ecclesiastica*[1] containing ten books, together with some smaller texts. Talking about his written heritage in natural philosophy, he wrote and published two works, *De radiis visus et lucis in vitris perspectivis et iride: tractatus Marci Antonii de Dominis, per Ioannem Bartolum in in lucem editus* (Venice, 1611) and *Euripus seu De fluxu et refluxu maris* (Rome, 1624).[2] The first one deals with the problem of lenses and the second one discusses tides. Unfortunately, apart from these published books, most of his notes were probably burned by the Inquisition or lost in some other way.

No matter how much the Catholic Church wanted Dominis to be forgotten, he stayed familiar not only to scholars but to later intellectuals in general to the present days. Therefore, the year 2010 UNESCO proclaimed the year of Marcus Antonius de Dominis,[3] and his life and work stayed known in the centuries following his death. The 19th century brought both fictional and scientific works about him. The most popular novel where Dominis appears is *Čuvaj se senjske ruke* (*Beware of the Fist of Senj*)[4] written by the 19th century Croatian writer August Šenoa. In his romantic manner of creating a picture of the glorious fight of the late 16th century Uskoks for Croatian independence against both the Venetian and Habsburg threat, Šenoa depicted Dominis as a rather negative character, presenting him as a sort of national traitor. Yet, besides Šenoa, one 19th century English scholar, John Mason Neale, traveling through Dalmatia visited Split and dedicated almost

[1] Marcus Antonius de Dominis, *De republica ecclesiastica.* Heidelbergae; Francofurti ad Moenum; Francofurti: cura Iohannis La/n/cellotti: sumptibus Rulandiorum, typis Ioan. Friderici Weiss: sumptibus viduae Jonae Rosii, 1618-1658.

[2] Marcus Antonius de Dominis, *De radiis visus et lucis in vitris perspectivis et iride: tractatus Marci Antonii de Dominis, per Ioannem Bartolum in in lucem editus*. Venetiis: Apud Thomam Baglionum, 1611; reprint – Split: Umjetnička akademija, 2002; Marcus Antonius de Dominis, *Euripus seu De fluxu et refluxu maris*. Romae: Apud Andream Phaeum, 1624. Both works, together with Latin transcription and Croatian translation, can be found in the book: Marko Antun de Dominis, *Opera physica*, Ante Maletić and Darko Novaković (eds.) Split: Lamaro; Zagreb: HAZU, 2005.

[3] Mijo Korade, "Djela i sudbina Marka Antuna de Dominisa (1560.–1624.). Uz 450 obljetnicu rođenja (Works and the destiny of Marko Antun de Dominis (1560–1624). For the 450th anniversary of his birth)", *Gazophylacium*, year XV, no. 3-4 (2010), 9.

[4] August Šenoa, *Čuvaj se senjske ruke* (*Beware of the Fist of Senj*). Zagreb: Matica hrvatska, 1964.

the whole chapter of his later published travelogue to Dominis, admiring him and sympathizing with his unfortunate destiny.[5] Another famous Croatian writer, Tin Ujević, in a text from the 1930s said how he could not enter the cathedral in Split without remembering Dominis, and emphasized that discussion about this archbishop of Split was a rather popular topic in the early 20th century city's educated circles. Today, Dominis is not a model for fictional literature, but is definitely a suitable topic for scholars, as it will be shown in more detail in the following chapter.

After the introduction to the life of this member of the late 16th and early 17th century intelligentsia, it is shown how Dominis' case might be good material for historical research, thus already being investigated resulting in some works. And indeed, it is. However, there is a rather big scholarly gap between the interest in his ecclesiological and scientific work. Whilst a certain number of Croatian and Western European historians, Noel Malcolm or Vesna Tudjina–Gamulin[6] to mention the most representative ones, dealt with Dominis' heretical writings, his scientific work was of interest only for physicists and mathematicians interested in the history of their own disciplines. Although the work of the latter ones explained Dominis' scientific work, it still awaits to be placed into a broader historical context. Therefore, that will be the main goal in this thesis.

Considering the structure of this thesis, the study will begin with theoretical considerations of some fundamental issues unavoidable for understanding this topic properly. Hence, this part of the work is conceived as a short discussion of some basic terms such as the scientific revolution or the meaning of periphery, and as an overview of the

[5] About this chapter, see: Tamara Tomić–Grčić, "Marko Antun de Dominis i Split u putopisu Johna Masona Nealea" (Marcus Antonius de Dominis and Split in the itinerary of John Mason Neale), *Kulturna baština* (*Cultural Heritage*), vol. 36, (Split: Društvo prijatelja kulturne baštine, 2010), 83-112.

[6] Noel Malcolm, *De Dominis (1560–1624): Venetian, Anglican, Ecumenist and Relapsed Heretic* London: Strickland & Scott Academic Publications, 1984; Vesna Tudjina – Gamulin wrote many articles about Dominis. Lots of them will be used and therefore quoted in the thesis, thus just for general information, see her editorial work: Vesna Tudjina–Gamulin (ed.), *Marko Antun de Dominis. Splitski nadbiskup, teolog i fizičar* (*Marcus Antonius de Dominis. The Archbishop of Split, Theologian and Physicist*). Split: Književni krug Split, 2006.

literature both on science in general and on Dominis specifically. Firstly, the significance of the late 16th and early 17th century science in comparison with previous and later periods will be discussed. Subsequently, the boundaries of periphery and centre will be defined, with a special view to this particular case. Furthermore, introducing the most important literature and evaluating scholars' contributions, I shall consider the place of intellectual history and a history of science in overall modern historiography. Regarding this discussion concerned more with theoretical problems, mostly focused on contemporary historiographical achievements, Dominis' work will be incorporated in the overall picture of history of science. Therefore, besides the general historiographical overview of the early modern science, the results of Croatian and Western historiography which have dealt with Dominis' life and work will be presented here.

Although not the main topic here, Dominis' theological work cannot be excluded whenever he is discussed, and the chapter after theoretical considerations will deal with this part of his work. The main attention will be paid to the very important role of theology on his intellectual life and his ideas about the Church. Thus, without necessarily going too deep into analyses of his extremely comprehensive ecclesiological work, his main ideas will be summarized. Special attention will be paid to the questions about irenicism and connections between religion and science in Dominis' case, referring to some other scientists of that time who dealt both with religious and scientific matters, such as Galileo or Newton, to mention a few. However, in order to avoid purely summarizing when presenting this in fact major part of his life, one significant idea he followed and which brought him closer to the broader early modern intellectual thought, will be emphasized through a short case study. More precisely, the already mentioned idea of irenicism, which he developed during his stay in England, will be pointed out here. Moreover, for some reason this poorly documented, but rather important issue has never been in the focus of the scholars dealing with Dominis'

ecclesiological thoughts, thus the thesis will bring some contributions to this aspect of Dominis' life and work.

After the analysis of his ecclesiological ideas and problems he faced because of them, the next chapter, a real start of the case study, will begin with an insight into the European scholarly atmosphere during Dominis' time, to some extent already discussed in the theoretical chapter. Nevertheless, there will be an overview of the university centers, libraries and the mobility of men of letters. However, the some word will be on the intellectual atmosphere in Dalmatia, the surrounding environment Dominis came from and other individuals whose life path might be considered similar to that of Dominis.

After presenting the context in which Dominis worked, the main chapter of the thesis will be divided in two levels. The first will be more chronological and will separately discuss his life as a scientist and an intellectual before his departure to England, during his stay in the English court and his last days in prison where he wrote his second book on physics. The other level will be of a more analytical nature, comparing his work with other physicist contemporaries to Dominis. His career will be firstly introduced with the time of his studies and lectures at Italian universities, more as a kind of introduction to the focus of his future scientific work, since there is not much material for this period of his life. After that, I will focus my study on his scientific activity during his episcopal activity in Dalmatia. Thereafter, knowing that he was very well received in the English court during his years in London, I am planning to show the atmosphere around him and his contribution to the intellectual life there. For the purpose of illuminating his portrait as a full man of letters, correspondence circulating around him at that time will be of great help. At the end, the final stage of his life, his last years of work in Rome, will be discussed.

The other level of the main chapter will be more of an analytical nature, comparing his work with others related to natural philosophy during his life and in the period of the

17th century. Thus, in order to understand Dominis' ideas better, this part will investigate his knowledge of previous material written on the subjects of his interest and his reception of these works. Furthermore, some discussions on the work of his contemporaries will be shown as well. It is known that he knew about Galileo (and vice versa) and he had an imaginary discussion with another Dalmatian intellectual, Franjo Petrišević (Franciscus Patricius), in his second work on physics, *Euripus*.[7] All in all, the major point considering the source analysis will be to describe the importance of these two texts for the general scientific society of that time.

Although not crucial for this subject, Dominis' political career and problems with the Inquisition cannot be avoided as it is emphasized above, but his biography will not be presented here more than necessary as a background for the major question. However, by setting him in the broader context of 16th and 17th century intellectual community and using him more as an example, my goal will be to show how people from the European periphery and a rather underdeveloped intellectual environment managed to achieve memorable results in their fields of interest. Thus, together with portraying his intellectual character, the major objective of this thesis is to discover the real significance of Dominis' scientific achievements by analyzing and comparing them with other contemporary works, and showing their influence on the scientists directly succeeding Dominis. According to that, the question to what extent his work was new and how much it still follows traditional thought of previous age is also going to be in the focus.

[7] For instance, see: Matija Berljak, "Veza Marka Antuna de Dominisa s Galileom Galileijem i Hugom Grotiusom (Marcus Antonius de Dominis' connection with Galileo Galilei and Hugo Grotius)", in: *Marko Antun de Dominis*, 299-326; Franjo Zenko, "Marko Antun de Dominis u svjetlu sukoba metoda u renesansnoj "novoj" filozofiji prirode (Marcus Antonius de Dominis in the methodological confrontations of the Renaissnace "new" natural philosphy)", in: *Zbornik radova o Marku Antunu Dominisu i znanstvenoj prošlosti otoka Raba* (*Collection of papers concidering Marcus Antonius de Dominis and scientific history of Island of Rab*), Žarko Dadić (ed.) (Zagreb: Kućna tiskara Nacionalne i sveučilišne biblioteke, 1976), 73-84.

2. Theoretical considerations and literature review

Before starting with the research itself, some further introductory notes should be made. In the first place, it should be more closely explained what the scientific revolution means; second, what exactly is considered as a periphery in this context. Also, some information about previous historiographical achievements on this topic and the history of science altogether will be introduced, as well as the more concrete problems concerning the literature about Dominis, especially those of the modern Croatian historiography.

2.1. Some methodological explanations

While interdisciplinarity pose a great challenge to the historian, requiring a lot of effort into gaining a huge amount of knowledge to understand various questions related to all kinds of human activity in the past, it is perfectly clear that it is unavoidable for historical research. Emphasizing the complexity of the historian's craft, Marc Bloch accurately stated that there are few sciences which are forced to use so many dissimilar tools at the same time as historians have to.[8] Accordingly, I am not truly competent to discuss physics in any other way but through a historical approach here. Thereby, there will be no new contribution to the science of physics itself, the text will only raise an issue about the context in which scientists used to work in early modern Europe and show various specificities concerning that matter through a case study. However, Dominis' scientific work is not so complicated and does not make the discussed physical problems too demanding for a non-professional, thus it is possible for a historian to discuss Dominis' scientific work in some detail.

Secondly, why focus on one individual instead of exploring many significant moments related to science in this period, especially when the attempt is to talk about the

[8] Marc Bloch, *The Historian's Craft* (Manchester, Manchester University Press, 2004), 56-57.

process of changes in the intellectual life of Europe? Focusing on a certain individual who was part of the educated world is not just important for improving knowledge in history of science and intellectual history. Peter Burke, one of the best known contemporary historians of early modern Europe, has shown that in his book *A Social History of Knowledge*.[9] The author generally focuses on the social impact of knowledge on Western society, giving many "miniature" case studies including various individuals. Covering the period from Gutenberg to Diderot, his specific approach sheds new light on many questions concerning early modern intellectual life, from education through libraries to the commercial background of intellectual work. Together with the valuable introduction, where a bibliography and useful methodology for dealing with these issues can be found, this book brings interesting discoveries about the early modern European intellectual life in general. Moreover, besides its usefulness as a background, Burke does not neglect "periphery" either and talks about Central Europe and Venice, which should be useful for comparison with Dominis' case.

Furthermore, when pursuing such a study, the historian should always have in mind a total picture of the time he deals with. Therefore, dealing with an individual, one must put him, although not necessarily directly, into the broader social context of his life and work. When discussing professions in history, both for individuals and in general, in any context of historiographical research, much attention should be given to people's social background. Men of letters often depended on patronage of any kind. Although coming from a wealth and respectable family, at one point in his life Dominis had to search his earnings in that way too.

Preceding the section about the general secondary literature crucial for forming the method and structure of this thesis, one thing should be pointed out about the source which

[9] Peter Burke, *A Social History of Knowledge*. Cambridge: Polity Press, 2000.

will be analyzed in more detail in the central part of the thesis. Namely, since Dominis was writing on both ecclesiological and scientific matters, a certain division is needed by subject criteria. An often inevitable procedure, it had been done by most scholars dealing with Dominis. Thus, in order to prevent too broad description, I had to decide which of his texts exactly I am going to investigate.[10] It is not a quantitative imbalance of the type of sources that prompted my decision, but the fact that his interest in theological questions has already attracted a certain number of scholars, resulting in a certain amount of modern scientific publications about this part of his work. Nevertheless, although the major focus in this thesis will be Dominis' scientific activity, in order to give an overall picture of him as the intellectual and genuine *homo universalis* of the early modern period, his ecclesiological activity will not be neglected either.

The major method used for structuring the thesis will be the combination of investigating primary sources and secondary literature in order to give the possibly most detailed answer to the questions stated in the thesis. At this moment another specificity of the sources should be emphasized. The scientific language for all the intellectuals coming from any part of Croatian lands,[11] no matter under which rule being or when, was Latin. Therefore, all Dominis' texts are written in this language. His works used here have been recently translated into modern Croatian, thus easily accessible in Croatian libraries. However, I will definitely use the original written in Latin as well. Clearly, as a highly educated man, Dominis used Latin successfully and is considered one of the best Latinists in the rich Croatian literary heritage, which makes reading it much easier.[12]

[10] Some other authors dealing with Dominis emphasized similar puzzles. See, for instance: Malcolm, *De Dominis*, v.

[11] By the phrase „Croatian lands" is meant the territory which was populated by Croatian ethnic element, no matter under what rule they were, Venetian, Habsburg or Ottoman. See: Paul Robert Magocsi, *Historical Atlas of East Central Europe* (Seattle & London: University of Washington Press), 31-66.

[12] For Croatian Latinism, see: *Hrvatski latinisti/Croatici auctores qui latine scripserunt* (*Croatian Latinists*), 2 vols., in: *Pet stoljeća hrvatske književnosti* (*Five Centuries of Croatian Literature*, henceforth: *PSHK*), books 2

2.2. Notions about the intellectual atmosphere in early modern Europe

Although the image of the Middle Ages is popularly considered as some sort of an antipode to the Renaissance, the world picture of the Renaissance scholar did not actually so much differ from that of the medieval. As Steven Shapin points out, changes were not so revolutionary as it was thought before, which is evident from the continuity of natural philosophy from medieval times all the way to the 17th century.[13] Moreover, as Peter Burke suggests when talking about the phenomenon of the Renaissance throughout his book *The European Renaissance: Centres and Peripheries*, medieval and early modern had actually much in common.[14] Thus, the true changes in science happened a bit later. Scientific and intellectual thought at the beginning of the 17th century developed an extensive amount of new ideas and achievements, which gradually led to a scientific revolution, in the full sense of the term. Encouraged by intellectuals like Francis Bacon, step by step other natural philosophers replaced the old peripatetic way of thinking with new empirical methods.

Talking about intellectual movements regarding the period of the 16th and 17th centuries, some previous scholarly achievements should be taken into account for creating the broader context for the case researched here. Thus, although being in the focus of many studies since Jacob Burckhardt's wrote his book *The Civilization of the Renaissance in Italy*[15] in 1860, the Renaissance as a period is still a popular topic in recent historical research. Trying to present this period as a whole, taking into account and criticizing Burckhardt's work on the Renaissance at the same time, Burke gives an interesting and innovative presentation of the period. Following the idea of some historians of science, such as Floris Cohen, Steven Shapin and John Henry, about the long-term "scientific revolution",

and 3, Veljko Gortan and Vladimir Vratović (eds.). Zagreb: Matica hrvatska, 1969/1970. Especially for Dominis' Latinism, see: *Hrvatski latinisti*, vol. 2, in: *PSHK*, book 3, 9-14.

[13] Steven Shapin, *The Scientific Revolution* (Chicago and London: The University of Chicago Press, 1996), 4. Shapin in this context considers the 18th and 19th centuries revolutions in chemistry and biology as the original scientific revolutions, see: on the same place.

[14] Peter Burke, *The European Renaissance: Centres and Peripheries*. Oxford: Blackwell Publishers Ltd., 1998.

[15] Jacob Burchkardt, *The Civilization of the Renaissance in Italy*. London: Penguin Books, 1990.

Burke also discusses the Renaissance as a long process lasting from the middle of the 14th to the middle of the 17th century, in other words, between Petrarch and Descartes. Accordingly, Burke prefers to talk about gradual changes through the Renaissance, rather than adopting the classical distinction of the Renaissance and Mannerism. Furthermore, instead of just material culture, he points out the nonmaterial Renaissance heritage, the ideas created at that time. Therefore, this notion might be very useful whenever science is discussed.[16]

2.3. Modern historiography about early modern science

The problem of science has its place in historiographical research. Its role in history is recognized among many historians today, and there is a great amount of literature dealing with that subject about any period of history.[17] In this context, the book *The Scientific Revolution: A Historiographical Inquiry*,[18] written by a Dutch historian Floris H. Cohen should be highlighted here. An expert on the history of science, Cohen and his idea, together with some other modern historians concerned about the understandings of this period, will be mostly taken into account in this thesis. His comprehensive work deals with the problematique of science through the early modern period and discusses its place in modern historiography. Divided into three major parts, this book gives a detailed overview of previous achievements on this topic and critically deals with the concept of the scientific revolution. Naturally, such an extensive analysis of bibliography is certainly of great value for collecting some other and more specific works relevant for the case study.

Nevertheless, despite all the achievements in the field of the history of science in the last few decades, there are still many debates on various questions of the field. Related to

[16] Burke, *The European*,1-9.
[17] See: Steven P. Weldon (ed.), "Current Bibliography of the History of Science and Its Cultural Influences", *Isis*, vol. 102, no. S1 (2011), 1-327.
[18] H. Floris Cohen, *The Scientific Revolution: A Historiographical Inquiry*. Chicago & London: The University of Chicago Press, 1994.

that, one of the major topics is the problem of defining the scientific movements of the early modern period in Europe, popularly called "the scientific revolution". This term in singular is considered a bit problematic today, and the phenomenon is now understood more as a long-term process than a sudden change.

Besides Cohen, another main supporter of this point of view is Steven Shapin. He emphasizes how inaccurate the term "revolution" for 16th and 17th century science can be already in the very first sentence in his book *The Scientific Revolution.*[19] Furthermore, the author states how the phrase itself was coined in the first half of the 20th century, probably by Alexandre Koyré in 1939, and it first became a book title in A. Rupert Hall's *The Scientific Revolution* of 1954. Yet, this idea of revolution in science has its "prehistory" coming from the 18th century French Enlightenment philosophers. Shapin states how today's historians generally reject the notion that the 17th century even had a single coherent cultural entity called "science" to undergo revolutionary change. These multiple cultural entities were not so revolutionary as thought before, even showing more continuity with the medieval past. In fact, what is today considered the original scientific revolution, are the 18th and 19th centuries revolutions in chemistry and biology.[20]

Another historian of science, John Henry, supplements Shapin's opinion by emphasizing that while knowledge of the natural world was quite different in the 1500s from the1700s, the exact date when the "revolution" started is not important anyway.[21] Following this idea of a long-term process in scientific development, Henry moves one step further, talking about the problem of looking at the past from the present point of view. Raising this problem as a serious matter, he states how the tendency to judge the history of science (or any part of history at all) from today's point of view and seeing thereby some

[19] Shapin, *The Scientific*, 1.
[20] Shapin, 1-4.
[21] John Henry, *The Scientific Revolution and the Origins of Modern Science* (Basingstoke, Hampshire and London: MacMillan Press LTD, 1997), 1-2.

anticipations of later achievements should be avoided by all means. For this practice in historical research, the author even used a term "whiggism". Accordingly, the author sees the *raison d'être* of history of science essentially as a way to try to understand why and how science became such a dominant presence in our culture.[22]

Following the discussion on the literature and the problem of phrasing and terminology, the meaning of the term "science" in the 16th and 17th centuries should be explained too. According to Henry, the term "science" itself is problematic for the early modern period, because today's meaning of the word is an invention of the 19th century. Therefore, the early modern world did not use this term in our way, hence a more appropriate one should be "natural philosophy". As Henry further explained, these two terms – science and natural philosophy – are by no means equivalent and even natural philosophy is not the best solution, but since it was used at the time for describing and explaining the entire system of the world, it is still more appropriate than "science".[23] Furthermore, talking specifically about the universities of the Italian Renaissance, Paul F. Grendler in his book *The Universities of the Italian Renaissance* also emphasized this problem, explaining that natural philosophy in the Italian Renaissance universities meant science, differing from the modern conception.[24]

Moreover, the meaning of periphery in this context should also be explained more closely. Evidently, the European notion of periphery changed drastically by the discovery of the New World and the process of colonization, although it stayed Eurocentric.[25] However,

[22] Henry, 2-3.
[23] Henry, 3-5.
[24] Paul R. Grendler, *The Universities of the Italian Renaissance* (Baltimore: John Hopkins University Press, 2002), 267.
[25] About the understandings of periphery in the connection to scientific movement, for instance see: Burke, *A Social*, 53-81; David Wade Chambers and Richard Gillespie, "Locality in the History of Science: Colonial Science, Technoscience, and Indigeneous Knowledge", *Osiris: Nature and Empire. Science and the Colonial Enterprise*, vol. 15 (2000), 221-240; Kapil Raj, *Relocating Modern Science. Circulation and the Construction of Scientific Knowledge in South Asia and Europe*. Oxford: Permanent Black, 2006; Charles W. J. Withers, "Geography, Science and the Scientific Revolution", in: *Geography and Revolution*, David N. Livingstone and Charles W. J. Withers (eds.) (Chicago and London: The University of Chicvago Press, 2005), 75-105; Steven

Europe did not become the centre as a whole, its peripheries still existed, as they do today. More about this kind of a periphery in the early modern period can be found in Peter Burke's work *The European Renaissance* and, as does Henry for the term "science", Burke also shows how problematic can terms "periphery" and "centres" be. Shedding new light on many issues of the Renaissance, Burke also talks about the role of the European periphery. Therefore, he points out how all these changes, crucial for European intellectual and scientific progress, attracted not only people from the centres, but many intellectuals from the peripheries of Europe as well.[26] In most cases educated in developed intellectual centres of Europe, they were well informed about the new scientific trends. Acquainted with cultural and scientific movements in Europe from the times of the Middle Ages in the first place by strong Italian influence, besides other Central Europeans, intellectuals from the Croatian lands (especially from Dalmatian cities) from time to time also contributed to these movements.[27] One of these intellectuals was Marcus Antonius de Dominis.

Yet, the question what made Dalmatia a periphery should be discussed. Being a part of the territory of the Venetian Republic, Dalmatia was naturally strongly influenced by Italy. Moreover, it developed a practice of adopting novelties coming from the early modern Italian cultural centers in a rather short time. However, it should be emphasized that this was not a one way influence but rather a mutual correspondence (although respecting the primacy of the centre), thus a Slavic element in a wide range from culture to everyday life

J. Harris, "Confession-Building, Long-Distance Networks, and the organization of Jesuit Science," *Early Science and Medicine. A Journal for the Study of Science, Technology and Medicine in the Pre-Modern Period*, vol. 1, no. 3 (1996), 287-318; Harold Cook, *Matters of Exchange. Commerce, Medicine, and Science in the Dutch Golden Age*. New Heaven & London: Yale University Press, 2007; Patricia Seed, *Ceremonies of Possession in Europe's Conquest of the New World, 1492–1640*. Cambridge: Cambridge University Press, 1995.

[26] Burke, *The European*, 12-13. About the centres and peripheris in Europe, also see: Chambers and Gillespie, „Locality", 223-224.

[27] Especially for Croatian scholars from the Middle Ages to the 17th century, see: Žarko Dadić, *Povijest egzaktnih znanosti u Hrvata* (*A History of the Exact Sciences Among the Croats*), vol. 1 (Zagreb: Sveučilišna naklada liber, 1982), 15-231.

brought by the people coming from the Eastern Adriatic coast can be often found in Italy, especially in the Venetian case.[28]

Since the Ottoman threat affected the Republic of Venice, due to its geography, Dalmatia was naturally directly exposed to military attacks which caused serious devastation of the land and population, causing not only a significant decrease in number but also the gender and age imbalance. Even more, as an indirect consequence of constant military threat, warfare frequently caused epidemic diseases, which decimated the population further on. Just for illustration, before the wars with the Ottoman Empire, on the eastern Adriatic coast under Venetian rule (part of *Stato da Màr)* there lived approximately 100 000 people. After the War of Cyprus (1570–1573) the population fell to around 60 000. These wars especially affected rural parts, causing the increment of urban population, although insignificantly, thus any serious change is out of the question.[29] Furthermore, many people obviously left their homes, running from the danger across the Adriatic.[30] Nevertheless, despite all these troubles, life in Dalmatian cities continued, and cultural flourishing under the influence of the Italian Renaissance is visible from architecture to music, and especially in rich Latin and vernacular literature.[31] Yet, although gravitating to its centre – Venice, Dalmatia was still, if not culturally, but then politically, economically, and because of the closeness of Ottoman border even geographically, probably closer to European periphery than its centres. Therefore, many people left abroad, not primarily running from the Ottomans, but in order to find better opportunities in life.

[28] More about this topic, see: Lovorka Čoralić, *U Gradu Svetoga Marka* (*In the City of Saint Mark*). Zagreb: Golden marketing, 2001. Generally about newcomers and strangers in Venice, see: Gherardo Orthali, Giorgio Cracco, Gaetano Cozzi and Michael Knapton, *Povijest Venecije* (*A History of Venice*), vol. 1 (Zagreb: Antibarbarus, 2007), 416-418.

[29] See: Josip Vrandečić and Miroslav Bertoša, *Dalmacija, Dubrovnik i Istra u ranome novom vijeku* (*Dalmatia, Dubrovnik and Istria in the early modern ages*) (Zagreb: Leykam International, 2007), 24-27. For the War of Cyprus, see: Orthali, Cracco, Cozzi and Knapton, *Povijest*, vol. 2, 75-81.

[30] For the emigration, see: Kvetoslava Kučerová, *Hrvati u srednjoj Europi* (*Croats in Central Europe*), Zagreb: Matica hrvatska, 1998.

[31] For Dalmatian humanism and the Renaissance, see: Nikica Kolumbić, *Hrvatska književnost od humanizma do manirizma* (*Croatian Literature from Humanism to Mannerism*), Zagreb: Matica hrvatska, 1980.

2.4. Marcus Antonius de Dominis in Croatian historiography: contributions and misinterpretations

Generally speaking, the history of science in Croatian historiography is not nearly enough present and lives more through the interest of a small number of individual scholars rather than as some kind of a project. It might be stated that the most comprehensive work so far has been done by the mathematician and historian of science, Žarko Dadić.[32] At the beginning of his synthesis, *Povijest egzaktnih znanosti u Hrvata*, the author described the place of the history of science in Croatian scholarly circles as completely marginal and minor, especially attacking previous 19th and early 20th century works for being biased and programmatic, criticizing especially cultural historians who were not well informed in the wider context of broader scientific movements and science itself.[33] Although this claim cannot be rejected, objectively speaking it is evident throughout his writings that Dadić, lacking any self-criticism, has the same problem of missing the broader social and cultural context himself. Therefore, his work primarily represents a reliable and comprehensive source of information, but his mistakes constitute exactly what is hopefully going to be avoided in this thesis. Yet, his contribution to Croatian history of science is undoubed, and his mistakes should not be exaggerated. Dadić is just one among several scholars who to a certain extent fell under "whiggism" and "whiggish" way of investigating history.

Regarding specifically the interest in Dominis, despite his disagreements with the Church, he was not completely forgotten throughout the period after his death, as it was already said in the introduction. However, as Šime Ljubić correctly noticed a long time ago in his biography of Dominis, most of the writings preceding him were based on false

[32] Besides his two volumed major work *Povijest egzaktnih znanosti u Hrvata* already quoted in the introduction, see: Žarko Dadić, *Egzaktne znanosti hrvatskog srednjovjekovlja* (*Exact Sciences in Croatian Middle Ages*). Zagreb: Globus, 1991; Žarko Dadić, *Hrvati i egzaktne znanosti u osvitu novovjekovlja* (*Croats and Exact sciences at the Dawn of the Early Modern Age*). Zagreb: Naprijed, 1994; Žarko Dadić, *Egzaktne znanosti u Hrvata u doba prosvjetiteljstva* (*Exact sciences among the Croats in the Age fo the Enlightenment*). Zagreb: Matica hrvatska, 2004.
[33] Dadić, *Povijest*, vol. 1, 6-13.

sources (or were not based on any), or bias because of Dominis' controversial teachings, and were mostly short and partial.[34] Anyhow, the first research on Dominis' life and work in Croatian historiography dates from the beginnings of the 19th century. More precisely, in Dubrovnik in 1811 the book by Antonije Radoš Michieli– Vitturi, entitled *Saggio sopra Marcantonio de Dominis* was published.[35] It was soon followed by some smaller works, but the really extensive job of collecting and analyzing archival sources was done again by Šime Ljubić in 1870. Besides writing Dominis' detailed biography, Ljubić published a collection of many new sources he found in the Venetian archives in the paper entitled *Prilozi za životopis Markantuna de Dominisa Rabljanina, spljetskog nadbiskupa* (*Contributions to the biography of Marcus Antonius de Dominis from Rab, archbishop of Split*)[36] and two years later added some new documents in another paper, *Prilog k razpravi o Markantunu Dominisu Rabljaninu* (*Contribution to the discussion on Marcus Antonius de Dominis from Rab*).[37] Soon after Ljubić, another distinguished 19th century Croatian historian, Franjo Rački, also got interested in Dominis and published his research in the journal *Vijenac* (*The Garland*).[38]

The 20th and 21st centuries brought some new research and publications on Dominis' life and work, however still mainly dealing with his ecclesiological ideas. In a few words, the two most comprehensive works, one written by a British historian and the other by a group of Croatian scholars, will be presented in the following paragraphs. The book *De Dominis (1560–1624): Venetian, Anglican, Ecumenist and Relapsed Heretic* written by Noel Malcolm first of all represents a significant contribution to Dominis' life and work

[34] Šime Ljubić, "O Markantunu Dominisu Rabljaninu" (About Marcus Antonius de Dominis from Rab), *Rad* (*Work*), book X (Zagreb: Jugoslavenska akademija znanosti i umjetnosti (henceforth: JAZU, 1870), 1-2.
[35] Korade, "Djela", 10.
[36] Ljubić, "O Markantunu", 1-159; Šime Ljubić, "Prilozi za životopis Markantuna de Dominisa Rabljanina, spljetskog nadbiskupa (Contributions for the biography of Marcus Antonius de Dominis from Rab, archbishop of Split)", *Starine* (*Antiquities*), book II (Zagreb: JAZU), 1870), 1-260.
[37] Šime Ljubić, "Prilog k razpravi o Markantunu Dominisu Rabljaninu (Contribution to the discussion on Marcus Antonius de Dominis from Rab)", *Starine*, book IV (Zagreb: JAZU, 1872), 1-19.
[38] Franjo Rački, „Marko Antun de Dominis", *Vijenac* (*The Garland*), 6 (1874), 761-832.

from one foreign historian's point of view. Free from any possible nationalistic bias, Malcolm quite minutely follows Dominis' life critically, observing his role in religious matters all the way from his political and ecclesiological activity in Dalmatia through his heresy in England, getting finally to his penitence and return to Rome. Unfortunately, this study is strictly focused on Dominis' religious concerns, therefore not presenting any discussion on his scientific activity. Nevertheless, based on all relevant primary sources, this text brings some questions significant for his intellectual environment in England, especially his relations with Francis Bacon, which are important for the evaluation of Dominis' place in the intellectual circles of his own time. Talking concretely about Bacon, chapter VIII entitled "Translation of Bacon" [39] discusses the possibility of correspondence between these two contemporaries during Dominis' stay in England, which will be further analyzed in comparison with some later discoveries in recent Croatian historiography.

Furthermore, the most recent collection of papers, already mentioned in the introduction, is *Marko Antun de Dominis, splitski nadbiskup, teolog i fizičar*. This collection of papers from a conference organized in the year 2002 in honour of the 400th anniversary of Dominis' election for the archbishop of Split, is the most recent collection of studies on his life and work. The 22 published lectures cover most of the subjects concerning Dominis, from the problem of his name itself to the analysis of his portrait. Clearly, articles dealing with his scientific work are of the greatest significance here, and there are altogether six texts that could be useful for the thesis. These articles either talk directly about Dominis' physics or discuss his connections with other intellectuals of that time, opening some new questions and reconsidering the old ones as well. Besides the secondary literature, the most important achievement from the beginning of the 21st century is definitely the project of the

[39] Malcolm, *De Dominis*, 47-54.

Lamaro publishing house from Split, which republished, translated and analyzed the majority of Dominis' works followed by other scholarly work about him.[40]

Although it might seem that a decent amount of literature has been produced so far, problems concerning modern scholarly literature produced in Croatian historiography about Dominis' physics from primarily the historian's perspective should be emphasized again. Nevertheless, some literature exists anyway, thus some useful works which might be of a help in achieving the main goal of the thesis will be presented here. According to that, together with some other works, the already mentioned *Zbornik radova o Marku Antunu Dominisu i znanstvenoj prošlosti otoka Raba* will be of great use. Unlike the rest of the works which basically always deal with his ecclesiological writings and theological activity, this collection of papers is actually the only book entirely dedicated to Dominis' scientific work. After Josip Torbar's article "Ob optici Markantuna de Dominisa (About the Optics of Marcus Antonius de Dominis)" published in *Starine* in 1878,[41] there were only a few new shorter works about this part of his activity. Thus, it is evident that his scientific work was constantly subjected to the ecclesiological-theological one.

Containing twelve articles based on lectures which Croatian and Serbian scholars gave on the conference on the island of Rab in 1976, this collection of papers, *Zbornik*, brings some valuable explanations and discussions on the mathematical, physical, geometrical and even geodesian ideas in Dominis' works. Furthermore, two interesting articles on his philosophy and views in natural science talk about his acquaintance with contemporary European scientific movements. An especially significant article for explaining Dominis' awareness of other scientists' discoveries might be the one entitled

[40] Together with already quoted publication of Dominis' works on physics, see: Marcus Antonius de Dominis, *Izabrani radovi* (*Selected Works*), 2 vol. Split: Lamaro, 2002-2003; Marcus Antonius de Dominis, *De republica ecclesiastica libri X*, 7 vol. Split: Lamaro, 2003-2006; Marcus Antonius de Dominis, *Retractationum M. Antonii de Dominis archiepiscopi Spalatensis libri X in totidem ipsius De republica ecclesiastica libros.* Split: Lamaro, 2009.

[41] Josip Torbar, "Ob optici Markantuna de Dominisa", *Starine*, book XLIII (Zagreb: JAZU, 1878), 196-219.

Prirodoznanstveni i filozofski pogledi Marka Antuna Dominisa (*Marko Antun Dominis' views on natural sciences and philosophy*) written by Vjekoslav Bajsić.[42] The author here emphasizes Dominis' contribution to optics, comparing it with Galileo's work. Although not quite recently published, this collection of papers still presents a good help for a non-physicist or non-mathematician when it comes to interpreting purely scientific matters in Dominis' work.

Altogether, the major objection to the literature about Dominis analyzed so far (excluding Noel Malcolm), is that it mainly presents him as an anticipator of both later ecclesiastical and scientific movements, glorifying him as a great Croatian contributor to European intellectual thought. Thus it is quite common in modern Croatian historiography to talk about his life and work as being a prophet of future 19th and 20th century changes in the Church, sometimes even negating his conversion to Anglicanism (severely lacking real arguments),[43] or as an anticipator of later scientific ideas.[44] Another problematic notion regarding his national Croatian feelings deserves reexamination.[45] Naturally, this text will try to resolve at least some of these problematic interpretations, especially concerning his scientific role, and put Dominis' life and work in its proper place, without exaggerating the importance of his achievements in the early modern science.

For the end of this discussion, one more question should be raised – Marcus Antonius Dominis' name. In Croatian literature, his first and middle name are usually Croatized in several variations such as "Markantun (most probably from Italianized version Marc'Antonio, which Noel Malcolm also adopted)", "Marko Antonije" or recently the most

[42] Vjekoslav Bajsić, „Prirodoznanstveni i filozofski pogledi Marka Antuna Dominisa (Marko Antun Dominis' views on natural sciences and philosophy)", in: *Zbornik radova*, 61-71.
[43] For instance, see: Korade, „Djela", 26-27.
[44] For instance, see: Mijo Korade, Mira Aleksić and Jerko Matoš, *Isusovci i hrvatska kultura* (*Jesuits and Croatian Culture*) (Zagreb: Hrvatski povijesni institut u Beču, 1993), 174.
[45] About the meaning of the "nation" before the 19th century from the perspective of Croatian historiographical criticism for instance, see: Petar Korunić, "Fenomen nacije: porijeklo, integracija i razvoj (Phenomenon of nation: genesis, integration and development)", *Historijski zbornik* (*Historical Almanac*), 53 (2000), 49-100.

approved "Marko Antun".[46] However, since in the primary sources can be found only the Latin version Marcus Antonius,[47] I decided to accept this version as absolutely original and the most plausible for multilingual readership (although Latin is far from being *lingua franca* today). Regarding his surname, there is no question about it, although some older scholars even tried to Croatize Dominis into "Gospodnetić".[48] Fortunately, unsuccessfully. Speaking of the names more generally, whenever Dalmatians are mentioned in the thesis, I shall try to put more versions of their name, since various humanists already from the 15th century used bilingual or even three-lingual (Italian) versions.[49]

[46] See: Vesna Tudjina, „Predgovor (Preface)", in: *Marko Antun de Dominis*, 5 and 8.
[47] His Italian version can be found only in one document, see: Ljubić, „Prilozi", 36. There is a great possibility that he used this version as well, but there are no written proofs for that. Interestingly, Fulgenzio Micanzio's letters to William Cavendish translated into English by Thomas Hobbes never mention his first name, see: Fulgenzio Micanzio, *Lettere a William Cavendish (1615–1628) nella versione inglese di Thomas Hobbes*. Roma: Istituto storico O.S.M., 1987.
[48] Although he does not use it throughout his text, Šime Ljubić puts it at the beginning of his study on Dominis, see: Ljubić, „O Markantunu", 2; critique on this version, see: Malcolm, *De Dominis*, 7. In Micanzio's letters, the surname is mentioned only in the first one, in the rest of them, he calls Dominis just Archbishop of Spalato: "He is borne of a principall family of Dalmatia called in that tongue Dommianick which we would call *de dominis*.", Micanzio, *Lettere*, 60.
[49] As an example can be used famous Dalmatian humanist Marko Marulić (1450–1524). In his latin works, such as *Evangelistarium*, he signed himself as Marcus Marulus Spalatensis and in Croatian work *Judita*, as Marko Marul (Marulić is modernized version) Splichianin.

3. The life path of Marcus Antonius de Dominis within religious and political surroundings of the time

Dominis' intensive life, as it will be shortly presented, tells much about the early modern intellectual and his struggling with his own time, leaving a vast space for historical research. Being so interesting and rich, his entire life path thus requires a long study in order to grasp all his ideas. Naturally, neither this chapter nor the whole thesis have the intention to achieve this goal. However, this part of the thesis will definitely try to give a small contribution to some crucial questions concerning Dominis' ecclesiological ideas. Therefore, together with summarizing the major points of his life besides the natural philosophy which will be analyzed in the following chapter, the focus in this one will be on one single detail from Dominis' stay in London, namely his brief attempt to reunite the Eastern and Western Churches.

3.1. Early years

The Dominis family from the island of Rab is a very old one. Their origin cannot be located with certainty, although some older scholars tried to connect it with the family Frankopan, dukes of Krk or with the old Dalmatian Romans. However, according to Miroslav Granić, some traces can be found in the late 11th and followed with greater certainty from the late 14th century. Together with the line from Rab, one line can also be found among the Zadar nobility, and as a result of marriages, part of the Dominis family was situated in the city of Šibenik.[50] This family raised many significant individuals who participated in the city government or even in the court, or gained important positions in the

[50] For Dominis family, see: Miroslav Granić, "Rod splitskoga nadbiskupa Marka Antuna de Dominisa (Family of the archbishop of Split, Marcus Antonius de Dominis)", in: *Marko Antun de Dominis*, 9-20.

Church hierarchy. Yet, the most distinguished member of this family before Marcus Antonius is Ivan. He was present at Sigismund's coronation as Holy Roman Emperor in 1433, and was his attorney at the Council of Basel in 1436. Therefore, as an act of gratitude, in 1434 Sigismund gave him a new coat of arms and many other benefits in 1437, such as choosing notaries, judges and proclaiming lawful nobles' illegitimate children. Gaining thus the title *comites palatine* (palatine counts) (…) *in perpetuem* (forever) granted the Dominis family the function of the Emperor's delagates, and were at that time often acting against the Venetian rule.[51]

Born in 1560 on the island of Rab, Dominis' good family background and firm connections in high Venetian circles gave him all predispositions for a successful life. His father was a lawyer from Rab and made a successful career in Venice and mother was Venetian by birth. Thus, through them Dominis was connected with numerous Italian families. Therefore, as Noel Malcolm claims, Dominis can more or less be considered as Venetian.[52] Yet, that does not mean that he did not speak Croatian (Illyrian), which is evident from his Episcopal activity in Split and his library in Venice, examined by the Inquisition in 1616.[53] Nevertheless, being a member of the old Dalmatian nobility, he followed the path of many other Dalmatians. On the initiative of his uncle Antonius Dominis, Marcus Antonius went from the Eastern shore of the Adriatic coast to the Italian lands in order to gain his education. Becoming a member of the Jesuit Order while studying in Illyrian Colleges, he was educated and worked as a teacher in the Jesuit Colleges firstly in

[51] Granić, 15. Emperor Sigismund's charter from 1434 granting the Dominis family nobility, together with the coat of arms in kept in Državni Arhiv u Zagrebu (the Croatian State Archives in Zagreb), see: HR-HDA-710, doc. no. 1. For the transliteration, see: Ljubić, "Prilozi", 1-2; more about the functions granted by the charter of 1437, see: Dubravko Knežić, "Marko Antun de Dominis kao promotor bilježnika 'Imperiali auctoritate' (Marcus Antonius de Dominis as a promoter of notaries 'Imperiali auctoritate')", in: *Marko Antun de Dominis*, 21-32.

[52] Malcolm, *De Dominis*, 7.

[53] Slavko Kovačić, "Marko Antun de Dominis na čelu splitske crkve (Marcus Antonius de Dominis at the helm of the Church of Split)", in: *Marko Antun de Dominis*, 57; Bratislav Lučin, "Pogled u knjižnicu Marka Antuna de Dominisa (A look into the library of Marcus Antonius de Dominis)", in: *Marko Antun de Dominis*, 244, 251 and 260.

Padua and then in Brescia. Although an important episode, his years of education and academic career will be analyzed in more detail and in a different context in the next chapter.

In spite of his successful beginnings as a teacher, his career was disrupted by his return to Dalmatia in 1596 to take over the seat of the bishopric of Senj, which was vacant since his above-mentioned uncle Antonius, the bishop of Senj, had died or had been captured trying to liberate the fortress Klis near Split from the Ottomans in 1596.[54] Receiving news about his uncle, Marcus Antonius instantly went to Split in order to save him from captivity. However, as Malcolm pointed out writing about this episode, information about Dominis' actions became rather scanty and there is not much to find out. The next certain thing is that he went to Graz and further on in Prague on Rudolf II's court in winter 1596–1597 to present his case for succeeding his uncle in the bishop's see, since Senj was ruled by the Habsburgs. Becoming bishop of Senj, the Society of Jesus freed Dominis of his vows to them.[55]

3.2. Dominis in Dalmatia

It is possible that Marcus Antonius already made occasional visits to his uncle in Senj to help him with some business. Although already seated in Senj, due to long procedure from both the Emperor and the pope, Dominis gained official status of the bishop on 13th August 1600.[56] However, because of the problem with the half-military half-pirate group the Uskoks,[57] he understood his service more as a diplomatic than a pastoral one. Anyhow, according to Dominis' report, he found the bishopric and the city of Senj in a

[54] Malcolm, *De Dominis*, 9.
[55] Malcolm, 10-11.
[56] Mile Bogović, "Biskupije senjska i modruška u vrijeme Dominisove uprave (Bishoprics of Senj and Modruš during Dominis' rule)", in: *Marko Antun de Dominis*, 34-35.
[57] About the Uskoks, see: Catherine Wandy Bracewell, *The Uskoks of Senj: Piracy, Banditry and Holy War in the Sixteenth-Century Adriatic*. Ithaca: Cornell University Press, 1992.

rather poor condition. Senj's cathedral was completely neglected and, apparently, parts of the ceilings were falling down. Furthermore, there were not enough priests , and sermons were kept in "Illyrian language". All these problems were caused by the loss of land during the wars and what was left of the bishopric territory was ruined and almost completely depopulated. The speculations about the population of the city are around 400 households or 1000 people. Another issue for Dominis was the bishopric of Modruš, at the very border with the Ottoman Empire and with an empty bishopric seat. With the deal between the Emperor and count Zrinski who possessed that land, this bishopric was given to the bishop of Senj, but since it never came to the full legal unification, that presented a special problem resulting in constant quarrels between bishops and the count. Moreover, priests in that land were mostly uneducated, disobeyed orders and kept sermons in "Illyrian language".[58]

Regarding the Uskoks, Dominis had a plan to create of them not only warriors but peasants as well, so they could do something in times of peace. However, his plan ended in complete failure. In 1598 Pope Clement VIII engaged him as an arbitrator between Venice and the Habsburgs in the question of the Uskoks. Since that moment, Dominis spent more time traveling on a relation Rome–Venice–Graz–Prague, than living in Senj. Balancing between two powers in order to solve the Uskok problem, Dominis was considered an enemy among the Uskoks, unwilling to accept any compromises, and had to hide in Rome from them. [59] Although older historiography attacked Dominis for his acts towards the Uskoks, more recent scholars, reconsidering his deeds, much approve of Dominis' attempts to solve this problem.[60] While hiding in Rome, Dominis was elected archbishop of Split.

After this unpleasant episode in Senj, he became the archbishop in 1602. According to Dominis' own notes from the visitation to Split he took two years after he was established

[58] Bogović, "Biskupija", 36-37.
[59] Bogović, 37-38.
[60] See: Bogović, 39; Malcolm, *De Dominis*, 17.

for the archbishop,[61] the city was rather squalid with a neglected cathedral and many other small churches in the same state. Thereby, he decided to change the situation and ordered renovation, primarily focusing on the cathedral. Admiring the city's ancient architecture, Dominis himself invented many innovations into the cathedral, changing its medieval interior to contemporary early baroque fashion. Moreover, he dedicated much attention to the whole city and tried to modernize this poor archbishopric, although his actions were not always welcomed.[62] Yet, the city stayed small and its urban development was limited by the boundaries of the old Roman palace, therefore its overall outlook stayed generally unchanged with the dominance of narrow streets and tall serried houses.[63]

However, gradually recovering after the wars between Venice and the Ottoman Empire at the end of the 16th century, the city population grew to 4 000. Unfortunately, spreading from Sarajevo through Dalmatinska Zagora (Dalmatian hinterland), in 1606 the plague struck the city. Apparently, during the epidemic, Dominis showed great courage, being personally engaged in helping fellow citizens and ordering the building of a new lazaretto.[64] Despite all the difficulties, the after-war period brought new opportunities for the city and Split started developing into one of the most important commercial cities on the Eastern Adriatic coast. Many newcomers from the hinterland and Venice came and the city started getting the multicultural appearance of a trade centre. Even Split's otherwise conservative nobility entered business affairs, which gave the city a new strength.[65]

[61] About this visitation and other Dominis' reports about Split, see: Kovačić, "Marko Antun", 41-79.
[62] Nevenka Bezić–Božanić, "Split u doba Marka Antuna de Dominisa (Split during the time of Marcus Antonius de Dominis", in: *Marko Antun de Dominis*, 347-349. For Dominis' attitude towards disobedience, see: Kovačić, "Marko Antun", 63. His rights as a metropolitan, see: Vicko Kapitanović, "Marko Antun de Dominis kao metropolit (Marcus Antonius de Dominis as a Metropolitan)", in: *Marko Antun de Dominis*, 81-103; Marko Trogrlić, "Odnosi splitskog kaptola s nadbiskupom Markom Antunom de Dominisom (The relations of the Split chapter with the archbishop Marcus Antonius de Dominis)", in: *Marko Antonije de Dominis*, 105-117.
[63] Bezić–Božanić, "Split", 352.
[64] Bezić – Božanić, 347; Vrandečić and Bertoša, *Hrvatska*, 24.
[65] Bezić–Božanić, "Split", 348; Kovačić, "Marko Antun", 55.

Understanding the position of his bishopric on the border with the Ottoman Empire, Dominis even supported the vernacular liturgy to attract the broader population which caused him problems with Rome.[66] However, all Dominis' attempts to develop the poor archbishopric were mainly obstructed by problems of financing, which significantly marked his stay in Split. These financial issues caused serious struggles with the Tragurian bishop Marzio Andreuzzi. Namely, his constant efforts to avoid, or at least partially cut, the obviously impossible obligation of giving 500 Venetian ducats to the bishop, led to occasional struggles with Rome. Due to the lack of Rome's understanding, Dominis got a personal interdict, causing his ban from entering the church. Although he explicitly supported Venice in the problem of the interdict pronounced on the Republic in 1606–1607, trying now to get the support from Venice he just deteriorated his position, since the Republic was not ready for another possible dispute with the pope.[67] Naturally, all these quarrels disappointed him and apparently at that time he started working on his "opus magnum", *De republica ecclesiastica*. Finally, in 1616 Dominis resigned from the archbishopric place.[68]

3.3. English years and the end in Rome

Soon after, with the help of the English ambassador in Venice, William Cavendish, Dominis managed to flee to England. However, his case was not unique in Italy, therefore it should be stated that Dominis was just one of the many from Venetian lands troubled by the official teachings of the Church who searched their answers in the new Protestant teachings. Paolo Sarpi, one of Dominis' acquaintances, was just one of them. Furthermore, Dominis

[66] Malcolm, *De Dominis*, 23.
[67] More about the interdict, see: William J. Bouwsma, *Venice and the Defense of Republican Liberty* (Berkly, Los Angeles and London: University of California Press, 1984), 339-482; Orthali, Cracco, Cozzi, Knapton, *Povijest Venecije*, vol. 2, 115-119. Especially for Dominis' role in it, see: Branko Jozić, "Marko Antun de Dominis u sporu između Mletačke Republike i pape Pavla V. (Marcus Antonius de Dominis and his conflict with the Republic of Venice and the Pope Paul V.)", in: *Marko Antun de Dominis*, 119-133.
[68] For these problems, see: Kovačić, "Marko Antun", 59-67; Malcolm, *De Dominis*, 21-24.

was not the only one from Dalmatia either. According to Lovorka Čoralić, there are around ten cases of common people from Dalmatia accused of heresy, noted in Venice, in the period from the middle of the 16th century to 1662. Besides Dominis, the most problematic theologian from Dalmatia is probably Matija Vlačić–Ilirik (Matthias Flacius Illyricus) (1520–1575).[69] Anyhow, on his travel to London, Dominis published a short text *Marcus Antonius de Dominis, archiepiscopus Spalatensis, suae profectionis consilium exponit*.[70] Unsurprisingly, this publication was immediately put on *Index librorum prohibitorum*, with a note saying that all his future works would face the same procedure.[71]

Finally reaching London at the beginning of 1617, Dominis was very well received in English high society. Words on the engraving of his portrait can illustrate his receptance:

> Well-come grave Primate, from the thérronious Kolde
> Of Romish Babel, into CHRIST his Folde:
> They learned Workes The Beast shall deadly wound,
> Confute his Errors, and this Pride confound.
> Therefore, conuerted (vender Faithś Défendér)
> Strenghten thy Brethren, and confirm 'y tender.[72]

Converted to Anglicanism, Dominis lived the life of one of the major anti-papal activists in England at that time and eventually published most of his *De republica ecclesiastica*[73] there. As a member of the courtly English society gathered around King James I, Dominis was elected for the important function the dean of Windsor, he kept sermons in the Italian church Mercers' Chapel, visited by many important people of that

[69] For the question of religious movements in Venice, see: *Povijest Venecije*, vol. 2, 47-62, 95-106 and 183-205. For Croatian heretics, see: Lovorka Čoralić, "Dalmatinski 'protestanti' Dominisova doba – tragom procesa mletačke Inkvizicije (16–17 st.) (Dalmatian 'protestants' of Dominis' times – the process of the Venetian Inquisition (16th–17th centuries))", in: *Marko Antun de Domninis*, 271-282. About Matija Vlačić Ilirik, see: *Matija Vlačić Ilirik: zbornik radova sa znanstvenog skupa*, Stanko Jambrek (ed.). Labin: Grad Labin, 2004.
[70] For English translation, see: Dominis, *A Manifestation*, 27-61.
[71] Korade, "Djela", 15.
[72] Ivana Prijatelj–Pavičić, "Prilog poznavanju portreta Marka Antuna de Dominisa (A contribution to the portrait of Marcus Antonius de Dominis)", in: *Marko Antun de Dominis*, 369, the engraving is at the end of the article, unpaginated.
[73] Volumes 1-6 were published in London from 1617 to 1620, volumes 7 and 9 during 1622 in Frankfurt am Main and Hannau. Volumes eight and ten stayed in the manuscript, but were lost and probably burned together with his corpse in Rome, see: *Hrvatski latinisti*, vol. 2, in: *PSHK*, book 3, 10-11.

time including the king, and participated in the synod of Dort in 1618-1619. Although gaining many supporters among English high society such as Francis Bacon or the king himself, he was also criticized for his idea of uniting the Churches. Therefore, disappointed because his plans were unrealized and met a lack of understanding, Dominis started making plans for his return to Rome. At the end, the disappointment was mutual. Even the king abandoned Dominis, ordering him in 1622 to leave England in 20 days and never to return.[74]

Finally, when his old friend Alessandro Ludovisi got elected as the new pope, Gregory XV, Dominis definitely decided to return to Italy as a penitent, writing another text *Marcus Antonius de Dominis, archiepiscopus Spalatensis, sui reditus ex Anglia consilium exponit*.[75] Unluckily, the pope died soon upon Dominis' arrival and was followed by Urban VIII. Not favouring Dominis, the new pope started a procedure against him, which appeared to be fatal for Dominis, at that time already old and rather ill.[76]

3.4. Changing and uniting religions: Marcus Antonius de Dominis and his letter to Cyril Loukaris, the Patriarch of Alexandria

Although rather well researched, unlike his scientific background, some aspects of Dominis' ecclesiological work are still not completely discovered. Most of the scholars dealt with his chief work *De republica ecclesiastica*, some progress has been made on analyzing his writings about the reasons of shifting from one religion to another and back, yet one short but also rather important moment in his religious struggles stayed neglected – Dominis' brief correspondence with the patriarch of Alexandria. Thereby, before continuing towards the issue of natural philosophy, Dominis' letter to Cyril Patriarch of Alexandria and

[74] Detailed description of his stay in England and actions conserning religious matters can be found in: Malcolm, *De Dominis*, 41-74. Also see: Vesna Tudjina, "Dominis u Engleskoj (Dominis in England)", in: *Marko Antun de Dominis*, 135-142. For the broader political situation in 17th century England, for instance see: *The Stuart Court and Europe*, R. Malcolm Smuts (ed.). Cambridge: Cambridge University Press, 1996.
[75] For the English translation, see: Dominis, *A Manifestation*, 127-183.
[76] For the last years of Dominis' life in Rome, see: Malcolm, *De Dominis*, 75-79.

his response to Dominis, will be analyzed in order to get a better insight into his major intellectual activity in England.[77]

It is hard to tell when Dominis started questioning the Catholic Church, but some indications are already given in the section above. Yet, one detail from his student and teaching days should be pointed out. At the time when Dominis was in Italy, a struggle between the Jesuit College and the University at Padua occurred. Jesuits complained to the Council of Ten at Venice about heresy supported at the University. Apparently, some teachings there were connected to heretical religious indifferentism, and Malcom emphasizes the possibility that some of these teachings inspired young Dominis' later ecclasiological ideas.[78]

Accordingly, Dominis' first attack was on the Papal claims to "potestas interdicta" over temporal rulers, arguing that temporal power devolves immediately onto princes by divine right, and extends to all external actions of the people, whilst the jurisdiction of the church is spiritual, internal and ministerial.[79] Interestingly, although conceived before his stay in England, these ideas coincide with King James I's understandings of the ruler's power. James I was one of the most influential British political writers of the early modern period and his texts, *The Trew Law of Free Monarchies*, *Basilicon Doron* and others, bring the combination of absolutist principles with an emphasis to law and the public good; the king's political philosophy was a nuanced, moderate absolutism. Furthermore, the king also

[77] 19th March 1622, *A Letter Sent by Antonio de Dominis to Cyril Patriarch of Alexandria*, http://anglicanhistory.org/misc/spalato1.html (last time checked, 21st April 2012); *A Letter to the celebrated Archbishop of Spalato*, in: John Mason Neale *A History of the Holy Eastern Church*, vol. II (London: Joseph Masters, Aldersgate street, 1847), 391-400. For the exact date of Dominis' letter, see: Vesna Gamulin, "Regesta dokumenata iz arhiva Public Record Office u Londonu koji su ezani uz boravak Marka Antonija de Dominisa u Engleskoj (Calendar of documents from the Public Record Office in London concerning the sojourn of Marcus Antonius de Dominis in England)", *Zbornik za povijesne znanosti istraživačkog centra JAZU* (*Almanach for the Historical Sciences of the Research Centre JAZU*), vol. 13 (1983), 213.
[78] Malcom, *De Dominis*, 8-9.
[79] Malcolm, 27.

discussed the papal power, trying to prove from the Scripture that the pope is Antichrist.[80] It is not known whether Dominis knew about these texts partially published before his arrival to London, but this coherence of ideas was certainly an advantage for Dominis' position on the royal court.

Anyhow, Dominis' major work, *De republica ecclesiastica*, most clearly shows his standpoint towards the pope. Only to summarize for the purpose of this study, some of his basic theses in this work are focused on the unity of all Christians based on equality of bishops, denying hence the universality and primacy of Rome and the pope. Therefore, he considered that all the power in the Church belongs to the bishops as heirs of the Apostles and claimed how the power of the Church must be only spiritual and thus should not be involved in a profane rule. Yet, his most important principle for the thesis is his emphasis on tolerance between all Christians, expressing thereby an important idea among intellectuals of the time of reformation – irenicism.[81]

In these times turbulent for Western Europe, primarily marked by religious struggles, the Orthodox Church also played its role. The most significant moment from this point of view was the Venetian success on the Eastern Mediterranean. Gaining many territories including islands, Venice encountered mainly Orthodox Greek populations and,

[80] See: King James VI and I, "Political Writings", *Cambridge Texts in the History of Political Thought*, Johann P. Sommerville (ed.) (Cambridge: Cambridge University Press, 1994), xv-xxviii. Although not the topic of this thesis, this issue would be important and interesting for some future research on Dominis' thought.

[81] For the debates about early modern European tolerance and irenicism, for instance see: Ole Peter Grell "Introduction", in: *Tolerance and Intolerance in the European Reformation*, Ole Peter Grell and Bob Scribner (ed.) (New York: Cambrdige University Press, 1996), 1-12; Henry Kamen, *The Rise of Toleration* (New York: McGraw-Hill, 1967), 7-21; Hans J. Hillerbrand "Relligious Dissent and Toleration: Introductory Reflections, in: *Tolerance and Movements of Religious Dissent in Eastern Europe*, Béla K. Király (ed.) (New York: Columbia University Press, 1975), 1-8; *Conciliation and Confession*, Howard P. Louthan and Randall C. Zachman (eds.). Notre Dame, Indiana: University of Notre Dame Press, 2004. The most concise summary of Dominis' ideas in *De republica ecclesiastica* can be found in: *Hrvatski latinisti*, vol. 2, in: *PSHK*, book 3, 12; especially abou t his attitude towards the pope, see: Mladen Parlov, "Papin primat u misli M.A. de Dominisa (The priority of the pope in M. A. de Dominis' ideas)", in: *Marko Antun de Dominis*, 201-220.

naturally, met new, or maybe more correctly said forgotten, ideas.[82] Therefore, Venice was highly aware of the importance of the Orthodox Church for the overall religious movements of the time. Although the interaction between Catholics and Orthodox was not on a high level in the case of Venice, it was definitely present. Speaking of the broader context, connections between the Papal state and Constantinople and furthermore with the Near East Christians were reestablished in the 16th century. The Catholic Church sent missionaries to the East and the Greek congregation was founded in Rome in 1573. Interaction between Catholics and the Orthodox was most intense in the Balkans and in the Danube region.[83] However, relations differed from region to region, and Catholics were not always welcomed. That can especially be said for the Jesuit activity, but the Greek congregation in Rome was not very well perceived by the Orthodox authorities either.[84]

Accordingly, the Protestants saw their chance there and raised an idea about unity in order to fight against the Catholics together. The key figure in these Protestant-Orthodox relations was Cyril Loukaris, the patriarch of Alexandria. Elected patriarch in 1601, he immediately made connections with the Protestants in order to stop the Catholic advancement to the East. Significantly, in the early stage he turned to England exchanging ideas with two successive archbishops of Canterbury, George Abbot and William Laud. The result was the opening of a course of Alexandrine church theological training and in 1617 Matrophanses Kritopoluos, Greek theologian, was sent to England as a professor. All in all,

[82] About the Venetian conquests, its estates in the Eastern Mediterranean during the late Middle Ages and early modern period, including immigrants to Venice, see: Orthali, Cracco, Cozzi, Knapton, *Povijest Venecije*, vol. 1, 259-356, 416-417,443-462, 567-578; vol. 2, 237-304, 357-432.

[83] More about these connections, see: Michail V. Dimitriev, "Western Christianity and Eastern Orthodoxy", in: *The Cambridge history of Christianity*, vol. 6, R. Po-Chia Hsia (ed.) (Cambridge: Cambridge University Press, 2007), 321-342.

[84] More about these connections, see: Paschalis M. Kitromilides, "Orthodoxy and the west: Reformation to Enlightenment", in: *The Cambridge History of Christianity*, vol. 5, Michael Angold (ed.) (Cambridge: Cambridge University Press, 2006), 187-209.

Cyril Loukaris wanted to rearrange his church by the Anglican model of simplicity based on the authority of the scriptures and the Holy Spirit.[85]

First of all, it should be emphasized that Dominis was not the first from Protestant lands to correspond with the Orthodox leaders in order to discuss the unity. Joasaph II, the patriarch of Constantinople was in contact with Philip Melanchthon during 1559, but their attempts brought no results. A more successful correspondence was established between professors at Tübingen University and the patriarch in Constantinople. However, although it started promisingly, this project also failed. Nevertheless, these latter attempts yielded some results; the main one can be considered Martin Crusius's work *Turcograecia*.[86]

Speaking of Dominis' letter, this text is rather short and does not go into any details. Actually, its major significance is in the fact that it brings us the information how Dominis: "…of these my works, the *De Republica Ecclesiastica*, the first birth being lately published, I send herewith to your Lordships (most religious Father) as a pledge of my hearty desire to enter communion with your Fatherhoods."[87] Therefore, we know that Cyril Loukaris received and, as it will be seen from his response, read this volume. Furthermore, Dominis does not hide his earlier background. He admits that he was a member of the Catholic Church, justifying hereby his attacks on it. He even rather illustratively compares the pope and the Papal state with ancient Egypt and Pharaohs: "I therefore being born and bred and promoted within the Romish verge and having of long time endured that ancient Egyptian

[85] About Cyril Loukaris and his endeavors for uniting the Churches, see: Kitromilides, "Orthodoxy", 193-194; Dimitriev, "Western Christianity", 334. Same as for Dominis' researcher, Šime Ljubić and his 19th century work, John Mason 's book, although being old, still carries some valuable information, see: Neale, *A History*, vol. II, 356-405. Regarding Loukaris' life, one detail might be significant for the thesis. Namely, he was influenced by Italian humanism brought by Venice and even gained an education at the University of Padua graduating in 1595, around the same time that Dominis was there. Although this fact raises some questions about the possibility of the two knowing each other, there is no indication that they ever met during that time of their academic careers.
[86] Kitromilides, "Orthodoxy", 188-190.
[87] *A Letter*.

darkness under the Western Egypt and accursed Pharaoh..."[88] As it is said, Dominis does not discuss much the unity between the Churches, but refers to the book where all his ideas are explained. He only:

> ...pray and beseech you on all the bowels of Christ that you will enter into serious consideration of uniting your Eastern Churches with this most noble and flourishing Church of England. For by making such a union agaist Pharaoh, or rather Anti-Christ, we shall more easily prevail against him and remove his tyranny far from the Church of Christ.[89]

Cyril Loukaris was apparently very grateful for the book and the letter, writing many compliments on it.[90] However, he had some complaints and, interestingly, called for a better understanding of the problems and differences between the three Churches, although being throughout his letter constantly sympathetic towards Protestant teachings. For himself, he said: "…I invoked earnestly the assistance of the Holy Ghost, and for three years compared the doctrine of the Greek and the Latin Church with that of the Reformed."[91] Therefore, he points out some of the major inequalities between the Orthodox and Protestant teachings, such as the question of the Holy Eucharist and idolatry, supporting the Protestant interpretation again.[92] Yet, he rejects any possibility of complete suppressions, but upholds the more rational methods, as can be seen in the case of idolatry: "Not that I think that Images should absolutely speaking to be condemned, since when not adored they cannot occasion any mischief; but I abhor the idolatry which they cause to these blind worshippers."[93] Furthermore, he sees the main reason for idolatry in general ignorance,[94]

[88] *A Letter*. He also considers the Ottomans more tolerant and a smaller threat to Christianity: "But yet he [another Pharaoh, i.e. the sultan] doth not offer to take the service of God from you, nor use any such impediments of it, but that you may offer to God entire and pure sacrifice (though not with pomp and splendour to the sight of men) and enjoy peace and content in your exercises of religion which I hear of with much delight.", *A Letter*.
[89] *A Letter*.
[90] *A Letter to the Celebrated*, in: Neale, *A History*, vol. II, 397.
[91] *A Letter to the Celebrated*, 398.
[92] *A Letter to the Celebrated*, 399-400.
[93] *A Letter to the Celebrated*, 400.
[94] On the same place.

which can be explained with his aims to raise the education among the people during his life and work. At the end of his letter, Cyril Loukaris asks Dominis to send him another volume of his book as soon as it is published.[95]

Evidently, nothing more came out of this correspondence and both correspondents continued their fights for unity separately, experiencing however a similar destiny at the end. It is not even known whether Dominis ever sent his other volume to the patriarch. Yet, this may be possible, since Dominis was not a missionary (although was a former member of the Jesuit order), but he primarily acted through his writings. None the less, before any further discovery is made, this can stay only as a hypothesis. Although not yielding any results, this interesting episode of the irenicist movement can contribute to the overall understanding of irenicism itself and stays a significant guideline for better understanding Dominis' religious ideas.

* * *

Evidently, Dominis' ecclesiological activity played a major role in his life. He was neither praised, nor prosecuted because of his works on natural philosophy but for his ecclesiological writings. That is the reason why his appearance in the republic of letters is primarily connected with his religious teachings, as it will be seen in the next chapter. However, his religious ideas certainly influenced his scientific views, although due to the lack of sources, this claim can be hardly proved and analyzed in more detail. Still, some indications exist and, no matter how scarce they might be, they will be pointed out in the proceeding whenever possible. There is no doubt that, although not of the same intensity, his interweaving of theology and science is visible through his whole life.

[95] On the same place.

Religion and science in Europe coexisted and underpinned each other much more than colliding throughout the history. Therefore, it is hard and wrong to divide science and religion when talking about the early modern period,[96] as early modern scientists did not see themselves as distinct from religion. Speaking in general, natural philosophers often drew parallels between the experience of a scientific vocation and certain forms of religious experience.[97] Two 17th century eminent figures can serve as an example. Galileo Galilei's words that "the book of nature is a book written by the hand of God in the language of mathematics"[98] stands as an evident proof of the inseparability of religion and science. In a similar manner, René Descartes said:

> [F]rom the mere fact that God gave pieces of matter various movements at their first creation, and that He now preserves all this matter in being in the same way as He first created it, He must likewise always preserve in it the same quantity of motion.[99]

Furthermore, Isaac Newton himself remarked that it was part of the business of natural philosophy to discuss such questions as the attributes of God and His relationship to the physical world.[100]

Besides he gained a doctorate in theology, Dominis' education was firmly connected with the Jesuits, an order which extraordinary contributed to the early modern science.[101] Thereby, connected with his abovementioned statement about the reasons why he studied so intensively, his views in natural philosophy must have also been connected to religion. Although this connection is hardly visible from the available sources on Dominis' natural philosophy, one detail from his *The Second Manifesto* gives a clue about his attitudes to that

[96] For this connection, for instance see: Rodney Stark, *For the Glory of God* (Princeton and Oxford: Princeton University Press, 2003), 121-172; John Hadley Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge: Cambridge University Press, 1991), 16-151.
[97] Brooke, 31.
[98] Stark, *For the Glory*, 165.
[99] René Descartes, *Principles of philosophy*, quoted in: Brooke, *Science* 75.
[100] Brooke, 7. Also see: Stark, *For the Glory*, 167-172.
[101] For Jesuit science, see: Harris, "Confession-Building, 287-288.

matter. Vindicating himself from his previous heretical writings, he says: "…and human Philosophy neither can, nor ought to measure the divine power. Let natural philosophy judge what may be done by nature; but let her reverence and not judge those things that be above the nature."[102] Interestingly, this shows a relatively uncommon early 17th century scholarly opinion. However, Dominis' distinction should be understood primarily as the emphasis on the hierarchy in which natural philosophy is subjected to divine powers, rather than an attempt to divorce them.

[102] Dominis, *A Manifestation*, 153.

4. Marcus Antonius de Dominis as a student, teacher, physicist, intellectual in a full circle: Italy, Dalmatia, England and back to Italy

After presenting Dominis' theological activity, the central chapter of the thesis will analyze his scientific life in more detail. At the same time, the whole complexity of the world he lived and acted in will be presented as well, thus it might seem that Dominis will not always be in the centre of the story. However, such a procedure is inevitable if we want to get a deeper insight of his work within a broader context. After a short introduction about the overall scientific movements in Europe, Dominis will be observed strictly through his scientific work during his academic career in Italy and his tenure as archbishop of Split. Moreover, connections he had with other men of letters, mainly during his stay in England, will be taken into account, primarily in order to grasp his character as an early modern scholar.

Following Dominis' life trajectory, his young days when natural philosophy was his major activity at the Jesuit schools in Italy will be the first topic. Hereafter, his later life when he, already deeply involved in political and ecclesiological matters, managed to publish his first book on physics, will be presented. Although not concerned with problems related to natural philosophy while staying in England, at least not actively, he was still surrounded by major English men of letters. Therefore, thanks to the correspondence left from some of Dominis' acquaintances, this second part will try to paint his portrait as seen by the others. The last part will deal with his second work and will show the peculiarity of his return to natural philosophy after so many years of struggling with the Church. Therefore, the notion of inseparability of religion and science in early modern scholar's mind will become clearer.

Before starting the analysis, something should be said about the primary source material. The major sources for the main part of this chapter, hence for the thesis in total, are Dominis' only two preserved works on physics (as far as we know), *De radiis visus* published in 1611 and *Euripus* published in 1624. The original editions are rather rare and hardly accessible, but both works are easily available in the bilingual edition of the *Opera physica*, including the Latin original and a translation into modern Croatian. Besides these published sources, this book contains an introduction entitled "Dominisov rad na problemima fizike" (Dominis' work on the problems of physics) written by Žarko Dadić and an annotated bibliography on Dominis' discussions about his *De radiis visus et lucis* and *Euripus* made by Ivica Martinović, both of them useful materials. The nature of Dominis' works will be discussed further in the text.

4.1. Who were the early modern natural philosophers?

In spite of abandoning the interpretation of 16th and 17th century scientific movements as a sudden revolutionary change, historians generally agree that these movements brought about many important transformations. Still deeply connected to the previous period, early modern science surely brought certain novelties. First of all, when observed in the broader context of European expansion, scientists evidently did not work only within their narrow professional circle. In fact, they were engaged in many other more pragmatic features of all kinds of human activities, such as business, exploration, military, engineering and so forth, also playing a role in social issues.[103] Obviously, it would be too much to discuss all these features of the early modern science in detail here, therefore this

[103] For instance, see: Shapin, *The Scientific*, 9-11 and 123-127; Henry, *The Scientific*, 14-15; George Basalla, "The Spread of Western Science" *Science* (May 5, 1967): 611-622; David N. Livingstone, "Knowledge, space and the geographies of science", in: David N. Livingstone, *Science, space and hermeneutics* (Heidelberg: University of Heidelberg, 2002), 7-40; Peter Harrison,"The cultural authority of natural history in early modern Europe", in: *Biology and Ideology from Descartes to Dawkins*, Denis R. Alexander and Ronald L. Numbers (eds.) (Chicago and London: The University of Chicago Press, 2010), 11-35; Harry Liebersohn, *The Traveler's World. Europe to the Pacific* (Cambridge, Mass.: Harvard University Press, 2006), 1-20.

section will only bring some general information on this early modern scholarly atmosphere within itself. Accordingly, based on the secondary literature, the following paragraphs will shortly present the characteristics of early modern world of science.

The assertion that early modern science was in a firm relation to antiquity and the Middle Ages means that modern natural philosophers still saw their major idols in ancient philosophers like Pythagoras and even more Plato. Thereby, it does not surprise that Johannes Kepler was one of the most full-blooded mathematical Platonists.[104] Furthermore, natural philosophers' engagement in occult and magic also clearly shows that they did not turn their backs on the traditional ways of trying to understand the world. Actually, magic probably most visibly presents the connection between the Middle Ages and the Renaissance. Some of the scholars who are today considered the most prominent, like astronomers Tycho Brahe and Johannes Kepler or physicists Isaac Newton and Robert Boyle, combined the new methods with the old ones. Furthermore, despite many criticisms of magic at that time, natural magic was still courtly science *par excellence*.[105]

However, alienation from the Aristotelian philosophy, the mechanization of the world view and the rise of mathematization may be considered as the ground evidence which confirms gradual changes throughout the period. For instance, Galileo's observation of sunspots with the telescope presented a serious challenge to the traditional Aristotelian natural philosophy.[106] Furthermore, since the notion of mechanization became rather popular, nature was observed as a machine, although this proves the connection with antiquity again because the idea originally comes from Aristotle's *Physics*. Thus, it is hardly surprising that the clock and the air pump were the most popular instruments among the natural philosophers of the time. Moreover, in connection to mechanics, mathematics also

[104] Shapin, *The Scientific*; 58-59; H. Floris Cohen, *How Modern Science Came Into the World* (Amsterdam: Amsterdam University Press, 2010), 161-178.
[105] See: Henry, *The Scientific*, 42-55.
[106] Cohen, *How Modern Science*, 178-195.

became important. Yet, as Shapin points out, although scholars were aware of the importance of mathematics, very little of the mechanical philosophy was actually mathematized, hence this relation between the 17th century mathematics and mechanism stays a bit problematic.[107]

However, maybe the most significant change happened in the natural philosophers' attitude towards previous intellectual authorities. Abandoning the Aristotelian system, the importance of observation and personal experience became more relevant to the new natural philosophers than referring to old authors. Therefore, they relied not on the testimony of humans but the testimony of nature, which led to intellectual individualism and the rejection of authorities in the pursuit of natural knowledge. Yet, not everyone was reliable to give a testimony and reports on the scientific achievements, and the question of accuracy of instruments occurred as another serious problem. Since it is known that some of Galileo's contemporaries refused to look through his telescope, it is evident that not even the greatest authorities were spared of doubts on their discoveries.[108] Only the process of acknowledging a telescope by broader scholarly community lasted for around half a century. After it was introduced in Europe around 1608 it was more a craft product, until in the 1660s improvements were achieved and made its measurements more reliable.[109] Moreover, in order to prove the reliability of his experiments, a scholar had to avoid bias, replicate examinations, eliminate or correct errors and impurities, make his experiments in front of the educated and informed audience, and possibly publish his outcomes.[110]

[107] Shapin, *The Scientific*, 30-41 and 58-62.
[108] Shapin, 68-94; Henry, *The Scientific*, 5. Especially for the problem of instruments, see: Cohen, *The Scientific*, 189-191; Albert Van Helden and Thomas L. Hankins, "Introduction: Instruments in the History of Science", *Osiris: Instruments*, vol. 9 (1994), 1-6. For Galileo's case, see: Mario Biagioli, *Galileo's Instruments of Credit: Telescopes, Images, Secrecy*. Chicago and London: The University of Chicago Press, 2006; Mario Biagioli, *Galileo Couritier*. Chicago and London: The University of Chicago Press, 1993.
[109] For telescope, but also other devices such as musical instruments, microscope and an air pump, see: Cohen, *How Modern Science*, 448-462.
[110] Cohen, 484-494; Cohen, *The Scientific*, 184-189.

Analyzing all these influences of old and new, it should be clear that no visible gap between tradition and novelties existed. Naturally, disputes between traditionalists and moderns were frequent, but it cannot be said that moderns rejected the past, as it was already shown in the introductory part of the thesis. Moreover, they considered some new notions, such as heliocentrism, as an ancient understanding corrupted by time, which can be also firmly connected with the humanistic practice of searching for original texts and knowledge.[111] Therefore, old and new coexisted in the 16th and 17th century natural philosophy and, as it will be shown below, Dominis himself is an interesting example.

4.2. Studying and teaching: Dominis' academic career in Italy

When one focuses on the problem of education, universities are especially a case in question: given the complete lack of proper educational centres in Dalmatia, peregrination to various Italian universities, not necessarily Venetian ones, was common. Therefore, this section will through Dominis' case analyze connections between the Eastern and Western Adriatic coasts in order to present the significance of Italian influence on future Dalmatian intellectuals studying in the period of the 16th and 17th centuries. Coming from the island of Rab and being both a student and a lecturer in Italy, he can serve as a good example of these Eastern-Western relations. Furthermore, since the Jesuit Order played a significant role in the overall educational system of the time, the section will also point out some of the major characteristics of their influence on schools and universities. After all, since Dominis was, up to one moment, a Jesuit himself, that fact can certainly be useful for better understanding the period of his university career.

Although some possibly existing primary sources which could shed more light on this period of Dominis' life are yet to be found, it is known exactly where and when he

[111] Shapin, *The Scientific*, 65-68 and 75-76.

studied and lectured. Therefore, using the deductive method, it is possible to construct the surroundings and conditions in which he worked. The main source for the research will be Dominis' major work on physics *De radiis visus et lucis in vitris perspectivis et iride: tractatus Marci Antonii de Dominis, per Ioannem Bartolum in in lucem editus*. Since this work is actually a collection of his lecture notes edited and published after he moved from Italy back to Dalmatia, this text should help understand what the program for students, in this case specifically physics, was and how it was presented.

4.2.1. Education of Croats within competitive institutions: traditional Italian universities and the Society of Jesus

Going back to the Middle Ages, it is widely known that Italy, together with France, is considered to be the cradle of universities. Bologna and the Sorbonne were the pioneering educational institutions dating from the 12th and 13th centuries, soon to be followed by many others all over Europe simultaneously with the rise of cities. Functioning as a sort of corporations, they had legal privileges, including independence and the monopoly of higher education in their region, and they recognized one another's degrees.[112] Regarding the early modern period, Paul F. Grendler in his comprehensive study *The Universities of the Italian Renaissance* gave the most detailed insight in all spheres of these universities, from the historical overview, organization system, program and statistics to everyday life, considering both students and professors.

Discussing the meaning of university in the period of the late Middle Ages and the Renaissance, Grendler explains that Italian universities differed from other European ones: the very term *Italian university* is defined as a teaching institution that awarded doctorates, holding minimally six to eight professors. Following Bologna, sixteen other universities

[112] For the universities in the Middle Ages, see: Jacques Le Goff, *Intellectuals in the Middle Ages*, Oxford: Blackwell Publishers, 1993; Burke, *A Social*, 33.

were founded in the period between the first half of the 13th century and 1601.[113] Regarding the teaching program, it included natural philosophy, the medical curriculum, theology, philosophy, mathematics and law.[114] Regarding the main interests in the thesis, natural philosophy and mathematics will be observed in more details in the proceeding.

During the 16th century, universities strongly emphasized natural philosophy which was studied mainly to acquire an understanding of the physical world as the foundation for the study of medicine, especially medical theory. Aristotle remained the foundation of natural philosophy in all its parts as he had been in the Middle Ages and his *Physics* served as the basic principles, whilst the initiative of incorporating Platonism in the curriculum failed. The most controversial issue of natural philosophy was the attempt to define the human intellective soul, and the problem of its immortality was exactly the matter which caused argues between Jesuits and members of traditional universities.[115]

Firmly attached to natural philosophy and medicine, from the 15th century mathematics gradually became a more independent discipline studied for its own sake or applied in the physical world used in calendar reform, mechanics, motion, perspective, the study of tides, or military fortifications. Regarding the material taught, by the end of the 15th century almost all ancient Greek mathematical texts were rediscovered, although contemporaries did not use them much. Hence, the most important Greek scholars were Euclid and Archimedes, whilst medieval ones were Sacrobosco and Fibonacci. Despite the fact that mathematics was a part of all Italian universities' curriculum, the strongest centres were Padua and Bologna.[116]

[113] Grendler, 3-5. For Italian universities serving as a model for the rest of Europe, see: Burke, *The European*, 89.
[114] Grendler, *The Universities*, 143-144. For a detailed study on each of these programs, including the role of humanists in the education, see: Grendler, 199-473.
[115] Grendler, 267-313.
[116] Grendler, 408-429.

How did these universities function? Ordinary professors of civil law, medical theory, medical practice, and natural philosophy were the university's most important men. There was often more than one professor for each subject, therefore competition for the students existed. Furthermore, extraordinary professors mattered less than ordinary ones, but as practice differed from university to university, it is hard to make any generalization. Usually, professors gave one lecture a day.[117] All in all, professors were the most important part of the university, building its reputation. Naturally, trying to raise their expertise in order to get a job at better universities where the salary is higher, they had a good financial reason for improving their skills and knowledge. Intellect, good memory and fluent Latin were recognized as the most important features a professor obliged to possess in order to keep his reputation.[118]

Due to the demands for various clerical and secular professions, the number of students rose during the 16th and early 17th centuries.[119] There were neither social nor national[120] restrictions for enrolling students, at least not officially, and universities even assured a certain amount of money for the most promising poor students. Of course, money played an important role in the students' life, not only regarding their living standards. Coming from different social ranks, students' reasons for learning differed, and whilst rich and noble students wanted to strengthen their social status, those of a lower rank wanted to climb the social ladder.[121] Anyhow, students generally had lectures throughout the day. The size of a class spanned from ten to more than a hundred.[122] Although having little formal power, organized in groups annually electing their leaders, students still influenced the

[117] Grendler, 144-146.
[118] Grendler, 159-161. Interestingly, Burke's observation on practice of using notebooks from the 16th century onwards, confronts this notion on the importance of memorizing, see: Burke, *A Social*, 181.
[119] Burke, 23.
[120] Italy attracted many foreigns, not only to the universities, but in general, firstly to learn about antiquity and later on about modern Italian cultural achievements as well, see: Burke, *The European*, 82, 87 and 112-113.
[121] Grendler, *The Universities*, 166-169.
[122] Grendler, 146, 151.

university through persuasion. Students' capability of fighting for their rights can be seen rather clearly in the case of Naples where on one occasion some 300 armed students marched through the city protesting against a rise in the cost of doctorates.[123] Probably the most interesting privilege for students was the right to bear arms; all attempts by civil authorities to restrict this were unsuccessful.[124]

However, with the foundation of the Society of Jesus in 1540, traditional universities got a competitor.[125] Unsurprisingly, instead of welcoming the new teachers and colleagues, professors saw them only as a threat to their work. Spreading rather quickly, offering free Latin humanistic schooling for boys and offering classes in logic, philosophy and mathematics,[126] the Jesuits presented the greatest danger and caused struggles which turned into serious riots initiated and led by students in Padua in 1591. Finally, these disputations were resolved by the highest authorities in Venice, the Venetian Senate.[127] Although Jesuit defense against the attacks from the University failed, these happenings showed that Jesuit educational and methodological organization was on a high level and threatened the traditional university at Padua. Put in concise terms, the major advantage of Jesuit schools consisted not in making new components in the program, but in the successful combination of existing ones in a way and on the scale that had never been seen before.[128]

Founding schools by the Jesuit Order was followed by all kinds of obstacles, both common for the all 16th century educational institutions and those unique such as struggles with other institutions and mistrust of the authorities. In spite these problems, it took them

[123] Burke, *A Social*, 23. Besides fighting for themselves, students also participated in political revolts, such as rebellion in Naples against Spain in 1647-8, see: on the same place.
[124] Grendler, *The Universities*, 157-159. For importance of certain student organizations, in this case German one, see: Grendler, 150.
[125] For Jesuit schols in general, see: John W. O'Malley, *The First Jesuits* (Cambridge Massachusetts: Harvard University Press, 1993), 200-242.
[126] By 1630 there were around eighty Jesuit schools only in Italy, see: Grendler, *The Universities*, 479-480.
[127] Grendler, 480-481; Christopher Carlsmith, "Struggling toward Success: Jesuit Education in Italy, 1540–1600", *History of Education Quarterly*, vol. 42, no. 2 (summer, 2002), 229-231. More about the riots, in the text bellow.
[128] See: Grendler, *The Universities*, 481-482; O'Malley, *The First*, 225-227; Carlsmith, "Struggling toward Success, 221.

ten years to develop their educational institution from small residences for the members of the Order to full-scale schools for lay students. [129] Combining humanist and Christian elements, their curriculum was conceived as five years of grammar, poetry, history and rhetoric. Completing this program, students had the opportunity to continue their studies with the third level, consisted of philosophy (e.g. logic, metaphysics) and the natural sciences (e.g. mathematics, natural history). One of the earliest colleges was established in Padua in 1542, offering a three-year philosophy curriculum, consisting of logic, natural philosophy with an emphasis on physical science and metaphysics, all based on Aristotle. However, the most significant feature of Jesuit schools was pedagogy which they developed on a high level. Discipline, clear curriculum, small groups and exercise increased their efficiency of learning and teaching.[130]

The educational system in Croatian lands had existed already for a long time before the period analyzed here, but it is hardly enough to say that it was completely underdeveloped. Significantly supported by the Church, the tradition of education can be followed all the way to the early Middle Ages, but never reaching the level of university.[131] Not much changed at the beginning of the early modern period, therefore many people from Dalmatia were forced to leave their place and seek education abroad, studying philosophy, theology, law, medicine, philology, music, mathematic, physic etc. often staying there and never returning, especially those who dealt with natural philosophy. Therefore, scientists coming from the Croatian lands can be found from Western Europe to Russia, having

[129] See: Carlsmith, 226-241.
[130] Carlsmith, 222-223; Grendler, *The Universities*, 479-483. Especially for Jesuit pedagogy, see: Judi Loach, "Revolutionary Pedagogues? How Jesuits Used Education to Change Society", in: *The Jesuits. Cultures, Sciences, and the Arts 1540–1773*, vol. II, John W. O'Malley et. al. (eds.) (Toronto: University of Toronto Press, 2006), 66-85.
[131] About the role of the Church in Croatian education, see: *Uloga katoličke crkve u razvoju hrvatskog školstva* (*The Role of the Catholic Church in the Development of Croatian education*), Marko Pranjić, Nedjeljko Kujundžić, Ivan Biondić (eds.). Zagreb: Hrvatska akademija znanosti i umjetnosti, 1994; About the education in Croatia during the Middle Ages, see: Franjo Šanjek, „Kažotićeva katedralna škola u Zagrebu i počeci višeg i visokog školstva u Hrvatskoj (Kažotić's Cathedral school in Zagreb and beginnings of higher and high education in Croatia)", *Nastavni vjesnik* (*The Teacher's Courier*), no. 5-6 (October, 1997): 9-16.

naturally the main center in Italy.[132] For Dalmatians the most popular university was the one at Padua, whilst people from the Republic of Dubrovnik usually went to Bologna. Some of the most prominent 16th century scientists in Padua (besides Marcus Antonius de Dominis) might be considered Federik Grisogono (1472–1538), Franjo Petrišević or Faust Vrančić (lat. Verantius) (1551–1617). Amongst those from the Republic of Dubrovnik going to Bologna, the most distinguished ones to be mentioned are Lujo Gjurašević (lat. *Georgireus*) (1520–1565), Nikola Gaudenzi, Arkanđeo Gučetić (Ita. Gozze) (1533–1610) and Ambroz Gučetić (1563–1632).[133]

Playing a significant role in European intellectual movements, as well as developing an influence in the New World, Jesuits did not avoid the Croatian lands either. Following Church tradition, they left a significant mark on cultural life during the early modern period in general, introducing therefore their educational system in the Croatian lands. Clearly, not only foreign Jesuits operated there. As a matter of fact, indigenous people becoming Jesuits played a major role in these cultural movements.[134] However, the strengthening of the Jesuit Order's position in the Croatian lands did not go smoothly. In fact, they faced many obstacles organizing their colleges, either because of financial reasons or resistance of the local nobility, as was the case in the city of Ragusa (Dubrovnik). Therefore, their first colleges were founded only at the beginning of the 17th century, situated in Zagreb, Varaždin, Dubrovnik, Rijeka and followed by colleges in Osijek and Požega later in the same century.[135]

[132] Literary every Croatian medieval or early modern intellectual studied abroad. Since it would be too much to enumerate all of them, as a general insight for instance, see: *Hrvati predavači na inozemnim (sve)učilištima* (*Croats as Teachers at Foreign Colleges and Universities*), Ivan Kosić (ed.). Zagreb: Nacionalna i sveučilišna knjižnica, 2003.

[133] See: Dadić, *Povijest*, vol. 1, 36-38, 61, 75-77, 106-107 and 124. For Dalmatian students at the University at Padua, also see: Grendler, *The Universities*, 37.

[134] For the first Croatian Jesuits, some of them entering the order during Ignatius of Loyola's life, see: Miroslav Vanino, *Isusovci i hrvatski narod* (*Jesuits and Croatian people*), vol. 1 (Zagreb: Frafički zavod Hrvatske, 1969), 3-13.

[135] About all these colleges and especially their schools, see: Vanino, *Isusovci*, vol. 1, 79-197; vol. 2, 67-75, 214-224, 399-398 and 537-556.

Furthermore, Jesuit care for the Catholic Slavic people from the Eastern Adriatic coast and even further from the Balkans under Ottoman rule, was reflected in the organization of colleges in Italy. Accordingly, the first institution of that kind was the "Illyrian college" founded in Loretto in 1580 by Pope Gregory XIII.[136]

4.2.2. Dominis as a student and professor in Italy

Before he started writing against the papacy, Dominis had led a successful academic life, which is for some reason rather neglected in the above-mentioned studies about him. This should not surprise us, since the interest in such subjects is marginal on a broader scholarly level.[137] Just for illustration, in the latest collection of papers, *Marko Antun de Dominis*, there is not a single article dealing with his studying and teaching days. In another collection of papers, *Zbornik radova o Marku Antunu Dominisu*, there cannot be found a single article focused on his academic career.

In spite of the general lack of interest in his early academic life, Dominis' education and later teaching career was a subject of some research. Coming from a respectable Dalmatian noble family, Dominis followed the usual path of other members of the Dalmatian higher class. Although there was an elementary school in Rab,[138] the beginnings of his education can be found at the Illyrian College in Novellara,[139] where he confirmed his vocation in 1579. After that, he passed to the Society's college at Verona and then to the Jesuit College at Padua,[140] where he studied philosophy, including natural science. Meanwhile, in 1585 he even sent a request for going on a mission to the Indies, but was

[136] Korade, Aleksić, Matoš, *Isusovci*, 40.
[137] See: Antonella Romano, "Teaching Mathematics in Jesuit Schools: Programs, Course Content, and Classroom Practices", in: *The Jesuits*, 355.
[138] See: Žarko Dadić, „Rab i egzaktne znanosti (Rab and exact sciences)", in: *Zbornik*, 5-6.
[139] Instead of Novellara, older historiography cites Loretto, compare: Malcolm, *De Dominis*, 7 and Korade, Aleksić, Matoš, *Isusovci*, 173.
[140] Established in 1542, Padua was one of the first Jesuit houses in Italy. More about Paduan Jesuit college, see: Grendler, *The Universities*, 480.

rejected b the Jesuits.[141] Three years later, in 1588, he started studying theology, being at the same time appointed to the College's chair in mathematics. However, instead of finishing his studies in theology in Padua, he did that in Brescia in 1595, since the Jesuits had to transfer their higher faculties of the "Antigymnasium" to that town due to the conflicts between them and the University. Besides graduating there, he also extended the range of his lecturing to rhetoric, logic and philosophy.[142] Although his studies were rather successful and he started building a promising academic career, his future life took a different direction, moving him away from academic and scientific life forever. In 1596 he went to Dalmatia to take over the seat of the bishop of Senj, withdrew from the Jesuit Order and began a controversial political and ecclesiological life as shown in the previous chapter.

Anyhow, let us return to Dominis' academic life. The above-mentioned struggles between Jesuits and the University at Padua affected students as well, thus they also participated in their own way, brutally interrupting each others' lectures and fighting in the streets, breaking windows, writing graffiti and even firing guns.[143] Although happening in his time (1591), it seems that Dominis managed to avoid these riots, since he joined some classes held at the University despite the problems.[144] However, being a remarkable student and thus probably well known by both other students and professors, it is possible that he was also engaged in these struggles. Since sources about that are missing, this remains only a hypothesis.

Yet, another potentially significant moment for his later life happened at that time. Namely, the Jesuits complained to the Council of Ten at Venice about heresy at the University, because apparently, some teachings there were connected to heretical religious

[141] Malcolm, *De Dominis*, 9.
[142] Malcom, 7-9
[143] Interestingly, many of the participants were from Venetian prominent noble families, see: Grendler, *The Universities*, 480. About the students' role in all kinds of revolts, also see: Burke, *A Social*, 23. Besides fighting for themselves, students also participated in political revolts, such as rebellion in Naples against Spain in 1647-8, see: on the same place.
[144] Malcom, *De Dominis*, 8.

indifferentism. Malcolm emphasizes the possibility that some of these teachings inspired Dominis' later ideas.[145] Indeed, looking into his *A Manifestation of the Motives*, one sentence that indicates his urge for knowledge can be attached to this claim:

> This consideration, this compassion, [caused by the Church disunity] so just, so necessary, has in deep measures seized upon me, possessing my heart with no small anxiety and ceases not daily but yet more and more to grow upon me. That was the major stimulation for studying.[146]

However, it is more likely that he was referring primarily to his studies in theology rather than natural philosophy.

Although leaving the teaching profession basically at the beginning of his career, it seems that Dominis never actually lost interest in science. No matter how much he was occupied with politics and later with ecclesiological questions which brought him in exile all the way to London, he would from time to time return to physics. While being the archbishop of Split, he made some experiments trying to explain the refraction of light in lenses and even managed to publish his first work on physics, *De radiis visus et lucis*, twenty years after he had left schools. Ironically, after dealing with religious questions for such a long time, he ended his life writing about physics – the other work concerning physics, *Euripus seu De fluxu et refluxu maris*. Unfortunately, it is not known whether he dealt with physics during his London years, but since he was a member of the highest social and intellectual group there, this speculation stays plausible. Furthermore, in his "Manifestation of the motives", in which he explained his reasons for leaving the Continent as well as the Catholic Church, he was grateful for his years with Jesuits because they:

[145] Malcom, 8-9.

[146] „Qui me dolor et nimia tristitia mirum in modum conficiebat et in dies magis conficit, indeque ad fervens studium incitabar.", Dominis, „Marcus Antonius de Dominis, Archiepiscopus Spalatensis suae profectionis consilium exponit", in: *PSHK*, vol. 2, book 3, 17. Interestingly, in English translation the last and the most crucial part of the same passage is by some reason omitted, see: Dominis, *A Manifestation*, 36.

> …employed me to read the public Humanity Lecture in the Schools at Verona. Before my entrance into the Order of Priesthood I was by then made the public Reader of the Mathematics Lecture at Padua; where I received good encouragement by the fullness of my Auditory. At Brescia they made me Professor first of Rhetoric, then of Logic and lastly of Philosophy.[147]

Now, after this overview of Dominis' education and teaching years, the further analysis will focus on the particular source, his first work on physics, *De radiis visus et lucis in vitris perspectivis et iride*. Published in 1611 and comprised of 18 chapters, the *De radiis visus* brings many questions and ideas about optics, including a theoretical discussion about the spyglass and the rainbow.[148] However, what does this study mean for education? The work is actually a compilation of some old notes of Dominis: "…made twenty years ago while he was, firstly in Padua and then in Brescia, in the then famous colleges of Society of Jesus, together with philosophy also teaching mathematics…"[149] to which he "added one or two chapters."[150] Although the courses on mathematics were not fully established yet and were often led by non-specialists, Dominis' work proves that he was not one of these half-trained mathematicians.[151]

Unfortunately, there are no direct lecture notes by Dominis from his time of teaching. However, even if the notes that were used for writing the *De radiis visus et lucis* were not assigned primarily for the lectures, but were the beginning of the scientific study which Dominis finally managed to finish and publish, they can still indirectly reflect some notions about natural philosophy taught at that time. Unfortunately, the final editing for the

[147] Marcus Antonius de Dominis, *A Manifestation of the Motives* (Zagreb–Split: Croatian P.E.N. Centre, 1997), 36-37.

[148] About this work from the physicist's point of view, for instance, see: Ernest Stipanić, "Matematika u Dominisovu djelu 'De radiis visus' (Mathematics in Dominis' work 'De radiis visus')", in: *Zbornik*, 13-22; Zdravko Faj, "Osnovni zakoni i pojmovi geometrijske optike u Dominisovu djelu (Basic laws and terms of geometrical optics in Dominis' work)", in: *Zbornik*, 23-32; Ljudevit Barić, "Marko Antun Dominis i problem duge (M. A. Dominis and the rainbow problem)", in: *Zbornik*, 33-48; Dadić, *Povijest*, 130-138.

[149] "…ante viginti annos ab eo conscriptos, dum primum Patavii, deinde etiam Brixiae publice in Gymnasiis tunc celeberrimis Societas Jesu, cum Philosophia Mathematicas etiam, animi tantum, et delectionis tcausa, profiteretur disciplinas…", Dominis, *Opera*, 6-8.

[150] "…adito uno aut altero capite suo tractatui prisco perspective", Dominis, *Opera*, 8.

[151] On the problems of mathematic on Jesuit colleges, see: Romano, "Teaching", 359-361.

publishing, finally done in 1609, also probably changed, corrected or removed various older parts. However, it should be taken into account how many other Jesuit teachers published their works not only for the purposes of developing teaching methods, therefore a certain amount of original notes from his earlier days must have stayed in Dominis' work as well.[152]

Interestingly, although for today's not even necessarily extremely talented pupils, the observations brought by Dominis should not be too complicated, in his time these matters were discussed in the highest scholarly circles, since some contemporary common knowledge, such as the general mathematical law for the exact refraction of light, was yet to be discovered.[153] To help the reader in understanding his ideas as much as possible, Dominis included some additional apparatus – 34 geometrical drawings. Furthermore, at the beginning of the study, he announced how he will: "…[e]qually deal with mathematical and physical observations..."[154] The way of writing is direct: throughout the work he talks directly to the reader using the second person singular.

However, besides the easy material, in the work it can be seen, firstly, how Dominis' practice of teaching combined both peripatetical and empirical explanations. Although constantly relying on Aristotle, in a manner of Paduan Jesuit educational program, he also refers to the proof brought by experiments, emphasizing this kind of approach to problems from the very beginning. Besides just mentioning them to support his claims, Dominis also describes some of these experiments. Thus, in one of his explanations, he explained how he used a glass full of water and water filled glass spheres made especially for his experiments.[155] Other descriptions of experiments can be found further in the text either

[152] Moreover, Antonella Romano emphasizes how the history of ideas and history of pedagogy and education should not be separated in the case of Jesuit intellectual activity, see: Romano, "Teaching", 363-364.
[153] For this problem in 16th century physics, see: Dadić, *Povijest*, 134.
[154] "Negotium hoc non minus mathematicae quam physicae erit considerationis…", Dominis, *Opera*, 14-15.
[155] Dominis, 40-41.

with the same kind of primitive instruments like water filled glass spheres[156] or even simpler techniques, such as that one where you should just: „[a]djust a wooden ruler...“[157] However, among these descriptions the most significant is the one where the author, in order to assure the reader, suggests doing the experiment himself using some linen, giving him instructions how to do it.[158] Often not completely satisfied with his own explanations, Dominis is obviously aware of his limitations, thus occasionally expressing self-criticism.

Analyzing *De radiis* one cannot get a deeper insight of the lectures' structure or Dominis' pedagogical methods, but some notion about the topics can be revealed. Thus, focusing on optics, besides the spyglass and the rainbow, Dominis discusses some issues necessary to understand these two major topics. Explaining the way the lenses work and taking into account the way the human eye functions, Dominis teaches the audience about both the theoretical and the practical use of lenses, touching upon medical problems when talking about deviations in the eyesight.[159]

Lastly, according to the literature used in his work, it is evident that Dominis was well acquainted with the material, written by both ancient authors and his contemporaries.[160] Although the usual literature used for the lectures still relied much on medieval authorities,[161] Dominis consulted a much wider range of literature, using many other works besides the medieval ones. Therefore, if these authors were not dubious from the aspect of the faith, there is no reason to cast aside the idea that Dominis used them in his lectures as well. However, on the one hand he might have used some "forbidden" authors during his lectures anyway and remove them for publishing, since his *De radiis visus* was strictly

[156] Dominis, 60-67.
[157] "…regulam aliquam rectam ligneam…", Dominis, *Opera*, 126-127.
[158] Dominis, 70-71.
[159] About Dominis' explanations of the eyesight, see: Dominis, *Opera*, 24-31, 42-59 and 80-88. A discussion from mathematical perspective, see: Vladimir Dugački, „Marko Antun Dominis i problemi vida (Marcus Antonius de Dominis and problems of the eyesight)", in: *Zbornik*, 8591.
[160] For the full bibliography used in *De radiis visus et lucis*, see the list made by Ivica Martinović: Dominis, *Opera*, 181-187.
[161] Romano, "Teaching", 359.

checked by the Father Inquisitor, approved by the Council of Ten and signed by Joannes Baptista Breatto, the head of the Office against blasphemy" in Venice.[162] Yet, on the other hand, the question remains how secure is it to present the Jesuit students heretical natural philosophers in class.

This section has given a short overview and some basic suggestions how many issues are left in discovering Dominis' academic life. The amount of sources for researching the knowledge concerning other intellectuals does not differ much from Dominis' case. It has already been emphasized that a certain number of Croats who later gave their contributions to various fields of science and culture, was educated throughout Europe. However, there are not many sources left from that period useful for discovering how people generally dealt with knowledge in their early stage of intellectual activity. Nevertheless, although written as a serious study on physics, it cannot be ignored that Dominis' work was in fact made out of lecture notes. Although valuable in that respect, unfortunately, it is the only trace we can follow to understand Dominis' academic life better, at least for now, and therefore any comparative approach remains impossible.

4.3. Natural philosophy between politics and the Church

The lack of universities in Dalmatia was emphasized in the previous section. However, it can be sure that Dominis did not return in order to teach but to become bishop of Senj and later archbishop of Split. Thus, it is evident that his plans were not of academic nature. Nevertheless, although mainly compiled from his old notes made in Italy, despite all other business and problems he was dealing with, Dominis managed to publish his *De radiis*, exactly during his stay in Split. Therefore, moving away from his academic career,

[162] "…Cons[ilium] dal Padre Inquisitor […] Off[icium] contra Blasph[emiae]", Dominis, *Opera*, 10-11.

this section will bring a deeper insight into the problems he was dealing with in *De radiis*, together with his other treatise, *Euripus*.

The broader picture of Dalmatia as a rather underdeveloped environment for education and science has already been presented. Unfortunately, it is not known whether Dominis dealt with natural philosophy during his tenure as bishop in Senj. Intensive political and ecclesiological engagement definitely did not leave him much time to deal with anything else, probably not even to teach the local youth in order to prepare them for further education abroad. To the grim picture of Senj already presented in the third chapter the only point that can be added is that the city did not have any schools at all, which caused a great deal of ignorance among both common people and priests.[163]

However, Dominis frequent travels while serving in Senj can tell something about his connections with other scholars. Although primarily for other purposes, these journeys might have brought him an opportunity to meet many interesting individuals and provided him with new knowledge.[164] Besides other cities through his Italian and Central European journeys, he visited Rudolf II in Prague. Leaving aside the diplomatic significance this happening had for Dominis, it should be pointed out how important Rudolf's court for men of letters was. Besides all kind of scholars and artists, many famous natural philosophers were attracted by the city at Rudolf II's time, such as Tycho Brahe or Johannes Kepler.[165] The fact that Dominis was also there might raise the possibility of his getting into contact with some of the scientists living in Prague. Since it is known that Kepler was most interested in Dominis' departure to London, it is possible they got acquainted on Rudolf II's

[163] Bogović, "Biskupija", 36.
[164] About the importance of travels in the 16th and 17th centuries, see: Justin Stagl, *A History of Curiosity. The Theory of Travel 1550–1800* (Chur: Harwood Academic Publishers, 1995), 47-153.
[165] See: Lee Hendrix, „Natural History Illustration at the Court of Rudolf II", 157-171; Beket Bukovinská, "The *Kunstkammer* of Rudolf II: Where it Was and What it Looked Like", 199-209; Paula Findlen, "Cabinets, Collecting and Natural Philosophy", 209-219; Nicolette Mout, "The Court of Rudolf II and Humanist Culture", 220-223; György E. Szönyi, "Scientific and Magical Humanism at the Court of Rudolf II", 223-230; Penelope Gouk, "Natural Philosophy and Natural Magic", 231-237, all in: *Rudolf II and Prague: the Court and the City*, Eliška Fučíková (et al.). London: Thames and Hudson, 1997.

court.[166] Moreover, connections with Kepler can be found in one of the letters written by Francesco Sagredo, Galileo's friend. Writing to Galileo about Dominis' *De radiis*, Sagredo says: "…I have bought this booklet [*De radiis*] from Kepler..."[167] Therefore, there is no doubt that Kepler knew about Dominis' scientific work. Furthermore, in his book about Rudolf II's court, Robert J. W. Evans gives short overview of Dominis' personal contacts with the theologian and logician Jan Opsimathes, the alchemist Joachim Morsius, and tells about his friendship with another Dalmatian, Faust Vrančić. Furthermore, he states that Kepler admired Dominis' irenicist ideas.[168] Yet, despite all the probability, due to the lack of any further sources nothing more can be said about these connections of Domins at Rudolf II's court in Prague.

His activity in the field of natural philosophy also cannot be traced during his period in England. Despite the fact that he moved in the highest social and intellectual circles there, almost all that is known about his activity is based on ecclesiological issues. Nevertheless, Dominis gained new acquaintances there and was, as it will be presented, active in the republic of letters, either directly or indirectly. Therefore, this period of his life will be of a great use to find out how he was seen by others as a thinker and person in general.

Regarding Dominis' works, as Vjekoslav Bajsić noticed, neither of his treatises talk directly about his philosophical and natural philosophical views. Therefore, the only possible method for revealing them is to find out his scholarly attitudes indirectly, through the analysis of his texts.[169] Therefore, the main goal of the following sections will be to see

[166] Stipanić, "Matematika", 13; Berljak, "Veze", 308, note 36.
[167] "...ho comprato il libretto del Keplero...", see: Matija Berljak, "Neslaganja Marka Antuna de Dominisa i Galilea Galileja o optici, plimi i oseci (A Discussion between Marcus Antonius de Dominis and Galileo Galieli about optics, and high and low tides)", *Croatica Christiana Periodica*, year XXVI, no. 51 (2003), 4-5, note 16.
[168] Robert John Weston Evans, *Rudolf II and His World* (London: Thames and Hudson, 1997), 115, 136, 187 and 284. However, Malcolm emphasizes that only one of these, Vrančić, is likely to have known Dominis in that period, see: Malcolm, *De Dominis*, 101, note 83.
[169] Bajsić, "Prirodoznanstveni", 61.

where Dominis exactly fits regarding the picture of the natural philosopher and scientific surroundings described above.

4.3.1. Dominis in Split. *De radiis visus et lucis*: natural philosophical ideas

Unlike in Senj, it is well known that Dominis dealt with physics in Split and participated in a circle of educated people there. We even have some notion about his engagement in having a small group of pupils, although he probably did not have any more free time than while living in Senj. All the care for the archbishopric and conflicts with Tragurian bishop definitely took a lot of time and energy. Although, according to Dominis' visitation records, a municipal public gymnasium was in function when he came to Split, most of the local clergy was still illiterate. Therefore, in order to improve their education and the school system in Split in general, Dominis lectured logic, mathematics and theology privately in his palace.[170] Apart from teaching, Dominis had some friends among educated newcomers with whom he might have talked about natural philosophy. They included the respectable citizens and merchants Giovanni and Augustin Capogrosso, the former interested in natural philosophy and the latter apparently a supporter of Dominis' ecclesiological ideas.[171] Although of a minor relevance, these details at least slightly improve a poor image of intellectual atmosphere in this Eastern Adriatic city.

Dominis' work on the publication of his first treatise gives further information about his scientific activity in Split. Since the structure of the *De radiis* was already mentioned in the previous section, this part of the thesis will try to explain some of Dominis' main ideas which he developed in this work. The title clearly speaks about the content: *De radiis visus et lucis in vitris perspectivis et iride. Tractatus Marci Antonii de Dominis* (*On rays of eyesight and light in lenses, and about the rainbow. Treatise by Marcus Antonius de*

[170] Bezić–Božanić, "Split", 350; Kovačić, "Marko Antun", 53-55.
[171] Bezić–Božanić, "Split", 351-353. Possibly influenced by Dominis' eclesiastical ideas, Augustin was accused of heresy by the Inquisition in 1619, see: Bezić–Božanić, 353.

Dominis). The book was published in Venice in 1611 on the initiative of Dominis' friend Giovanni Bartoli from Lucignano,[172] who wrote a foreword and dedicated the work to: "…sir Ioanni Baptistae, marquis of Monte a Santa Maria, chief commander of Venetian infantry etc., most honourable gentleman…"[173] While these introductions were mainly of the apologetic genre, Bartoli also reveals the exact motives for publishing the work and what kind of material was used, saying:

> I knew very well that he [Dominis] lectured all parts of philosophy and thereby mostly contributed to mathematics. Thus, I asked him several times on his opinion about the new device that was apparently invented and in Venice presented by our compatriot Galileo, acknowledged mathematician, for the purposes of observing distant objects. […] He [Dominis] gave me some old dusty papers written twenty years ago during his days of lecturing philosophy and mathematics in Padua and Brescia…[174]

In the proceedings, Bartoli announces the main topic, optics, and thanks Dominis who, despite the lack of time due to many obligations in the archbishopric, managed to add to this old discussion on optics one or two new chapters. Furthermore, later in the text, Dominis himself said that he dealt with optics in his younger days to: "…exercise the spirit for entertainment…"[175]

After the foreword, several introductory chapters bring some generalities about the topic. The first chapter gives an insight into what Dominis considered relevant for this treatise in natural philosophy. Talking about the nature of five senses, he emphasizes the eyesight as the: "…first among others, but distracted by innumerable obstacles it was

[172] Bartoli was Dominis' student in Padua, see: Ernest Stipanić, "Matematika u Dominisovom djelu 'De radiis visus' (Mathematics in Dominis' work 'De radiis visus')", in: *Zbornik*, 13; Faj, "Osnovni zakoni", 23.
[173] "…D.D. Ioanni Baptistae Marchioni Montis Sanctae Mariae, totius Venetae militae pedestris praefecto generali etc. Domino Colendissimo…", Dominis, *Opera*, 6-7.
[174] "Non eram nescius eum iuventute omnes publice professum fuisse partes Philosophiae, ac proinde etiam Mathematicis rebus splendorem maximum addidisse;sciscitari saepius placuit, quidnam novo Instrumento illo sentiret, quod nuper ad inspicienda quae sunt remotissima a Nostrate Viro insigni Mathematico Galileo in lucem editum ferebatur, et Venetiis potissimum publicatum. [...] commentarios quosdam veterrimos, ante viginti annos ab eo conscriptos, dum primum Patavii, deinde etiam Brixiae...", Dominis, *Opera*, 6-7.
[175] "...delectationis cause mentem exercui...", Dominis, *Opera*, 88-89.

always, and still is today, in the centre of discussions among educated people."[176] Thus, eyesight is the major topic of his analysis. The next four chapters are dedicated to general explanations of physical and mathematical, primarily geometrical, achievements necessary for further discussion on the main topic. Furthermore, in this part of *De radiis* Dominis' sources and method are revealed. Although referring to Aristotle at the very beginning,[177] he moves away from the Aristotelian model and uses other authors such as Vitello and Euclid,[178] emphasizing however throughout the work his own experiments as the most relevant support to his claims. In the analysis of the sources Dominis referred to, one can find 13 authors from antiquity to his present days.[179] In spite of the possibility that he knew Kepler's work, he does not mention his achievements on optics in *De radiis*. After the introductory notes, *De radiis* is basically divided into two major parts. The first one is focused on the lenses explaining two devices – spectacles and spy glass, and the second one tries to explain the phenomenon of a rainbow. Three key problems which Dominis tries to solve are eyesight, theoretical explanation of the spy glass and explanation of the appearance of the rainbow and its colours.[180]

As present-day scholars, mainly physicists and mathematicians, who dealt with Dominis' work, noticed so far, his method significantly differs from scholasticism. Therefore, regarding the previous presentation of early modern natural philosophy, it can be said that Dominis followed and adopted new attitudes in natural philosophy, especially the experiment, rather than staying a pure traditionalist. Dominis' method, put in the

[176] "…principem inter reliquos [...] ita difficultatibus pene innumeralilibus obsitus, semper maxime omnium sensuum et vexavit ingenia philosophantium et vexat adhuc in dies magis.", Dominis, *Opera*, 12-13.
[177] See: Dominis, *Opera*, 14-15.
[178] See: Dominis, *Opera*, 14-17.
[179] See: Ivica Martinović, "Izvori Marka Antuna de Dominisa u raspravi *De radiis visuset lucis in vitrisperspectivis et iride* (Marcus Antonius de Dominis' sources for treatise *De radiis...*)", in: Dominis, *Opera*, 181-187.
[180] See: Faj, "Osnovni zakoni", 23-32.

mathematicians' terms, is axiomatically-deductive.[181] Accordingly, his emphasis on the equality and balance of physics and mathematics in research and explanation is also of a great importance for understanding his methods. Starting his discussion of the rainbow, he states: "Truly, the number of heads corresponds with the number of interpretations, most of them inconsistent. By that I mean that some of the scholars think too much in terms of physics, whilst others give too much attention to mathematics."[182] However, since he is constantly referring to Vitello and Euclid, it is obvious that he has not yet abandoned all former authorities. Hence, he brought his conclusions both by the combination of making experiments and consulting older authors.

Clearly, Dominis is not right in all his statements.[183] Yet, he is aware of his limits and sometimes admits that he does not know the right answer, or is not satisfied with the one he found in spite all the experiments he undertook. Thus, talking about how the convex and dispersive lenses function, he confesses: "[T]he reason for that might be explained by those who know and understand, but to me it is unfamiliar for now."[184] On another place, concluding the discussion on the spy glass, he states again: "[I]f anyone might say anything more about this issue [the spy glass], I would be glad to learn from him, since I am not satisfied with all I have said and explained so far."[185] Whilst he makes some errors talking about the lenses and fails to give a theoretical explanation of the spy glass, the most valuable part of this work of Dominis is the explanation of the rainbow. Dealing with a new instrument and still lacking the understandings of physical laws on the refraction of rays discovered only later, Dominis, unacceptable for a proper explanation of the spy glass,

[181] About Dominis methods explained by a mathematician, see: Stipanić, "Matematika", 16-22.
[182] "…ut re vera, quot sunt horum capita, tot sint sententiae et plurimum inter se discrepantes. Ex eo puto quod aliqui nimis physice n re maxima ex parte mathematica philosophentur, aliqui vero plus fortasse quam par sit mathematice procedant, cum tamen physica etiam egeant speculation.", Dominis, *Opera*, 100-101.
[183] Already one 18th century scientist, Ruđer Bošković, criticized his work, see: Barić, "Marko Antun Dominis", 38-41.
[184] "…causam huiusrei assignet qui scit et potest, mihi enim hactenus est ignota.", Dominis, *Opera*, 86-87.
[185] "…si quis meliora afferret, libenter discerem; nam et mihi ipsi in quibusdam hactenus dictis et explicates plene non satisfeci.", Dominis, *Opera*, 98-99.

resorts to Aristotle's teachings. Talking about the appearance of the rainbow, he accurately concluded that this phenomenon occurs as a result of reflection of the Sun rays in the inner side of rain drops. Even though this explanation is still not sufficient, it was the most plausible at that time.[186]

All in all, it is clear that his empirical method is not yet properly developed. Accordingly, the main disadvantage might be considered the inconsistency in making experiments, therefore the lack of proper measuring. However, this methodological disarray is exactly the proof of coexistence of the old and the new methods, and gradual development of scientific methods in early modern natural philosophy.

Nevertheless, *De radiis* did not stay unknown to scholarly public. Galileo Galilei whose presentation of the spy glass was the major motive for publishing *De radiis*, was informed about this Dominis' work. Generally speaking, the spy glass was an instrument of a great interest to the early 17th century scholars and many of them tried to explain its function theoretically. Hence, it does not surprise that this instrument intrigued both Dominis and Galileo; thanks to it they were informed about each other's work. Despite the fact that both of them lectured mathematics in Padua around the same time, it cannot be sure they knew each other personally.[187] Dominis, as a first professor of mathematics at the Jesuit College in Padua, lectured till 1592 when he moved to Brescia, while Galileo started his teaching career at the University of Padua in the same year.[188] However, it is known that he possessed Dominis' work, although we cannot be sure whether he ever read it or not.

[186] More about these problems, see: Žarko Dadić, "Prirodnofilozofski i metodološki temelj Dominisovih fizikalnih radova (The natural-philosophic and methodological basis of Dominis' physical works)", in: *Marko Antun de Dominis*, 328-329.

[187] Regardless the problems of natural philosophy, Dominis' death also plays a role in the relation between these two scholars. Galileo stayed in Rome for two months whilst Dominis' trial was in process and although it is not sure whether he was informed about the matter at that time, he definitely found out about Dominis' death. Moreover, he got a detailed report from one of two physicians who made an autopsy on Dominis' body, Johannes Faber. See: Berljak, "Veze", 307. About this epizode from broader context of the history of medicine, see: Silvia de Renzi, "Medical competence, anatomy and the polity in seventeenth-century Rome", *Renaissance Studies*, vol.21, no. 4 (2007): 551.

[188] About Dominis as a first professor of mathematics, see: Berljak, "Veze", 301-302. For Galileo's teaching, see: Grendler, *The Universities*, 418-419.

Namely, Francesco Sagredo with whom Galileo exchanged letters, asked for Galileo's opinion about Dominis' work three times, even sending him the copy of *De radiis*. However, Galileo's response remains unknown.[189] Furthermore, one merchant, Bartolomeo Imperiali, sent a letter to Galileo asking him for advice about that instrument in order to understand it and start production for business. In this letter, Imperiali mentions Dominis: "I was told that the Archbishop of Split wrote a whole book [about the spy glass]; yet, since I think it is forbidden, I will not put any effort in finding it."[190]

Finally, how did early modern scholars cope with the problem of the spy glass? Although some anonymous glass grinders accidentally discovered convex lenses already in the 13th century, Johannes Kepler's work *Ad Vitellionem paralipomena* from 1604 was the first to give a plausible explanation of lenses' function. Yet, Kepler's achievements were rather complicated for that time, and even Galileo said that his work *Dioptrice* is so incomprehensible that even the author himself probably does not understand it. The first spy glasses were probably made in Flanders in 1604, gradually becoming a more and more popular device, available for a small price. However, they were mostly useless toys. Therefore, the significance of Galileo's instrument was not its novelty, but its technical perfection.[191] As it was already suggested, some scholars had the lack of understanding and stayed rather reserved concerning Galileo's observations. Apparently, his colleague, Cesare Cremonini, refused to even look through Galileo's spy glass.[192] Therefore, it was necessary to stop improving this instrument by the trial and error method, and give a theoretical explanation of the principles on which it functions. As many others, including Dominis, Galileo also had the problem of explaining the spy glass theoretically. Thus, his only option

[189] Berljak, "Veze", 304. For the letters, see: Berljak, "Neslaganja", 4-5, notes 14, 15 and 16.
[190] "Mi dicono che il vescovo di Spalatro n'ha composto un libro intiero; ma perché intendo esser proibito, non mi prendo briga di cercarlo.", see: Berljak, "Neslaganja", 5, note 17.
[191] Bajsić, "Prirodoznanstveni", 62-64.
[192] Grendler, *The Universities*, 311.

was to put more and more effort in making new instruments, and send them all over Europe to prove his claims through observations made by other observers.[193]

4.3.2. Dominis in England: the republic of letters

Constantly in motion and writing a lot, Dominis was permanently surrounded by people. Hence, it is clear that he made many acquaintances. About the ordinary people he met during his pastoral activity in Senj and Split nothing is known, but about the scholars both on the continent and in England something can be said. Although no sources which could indicate Dominis' work on natural philosophy in England have yet been found, one cannot ignore his intellectual surroundings in general. In fact, being active in the republic of letters, his name often appears in the correspondence of various scholars, especially during his years in England.[194] Although scattered through archives all over Europe as parts of various collections, some of the letters valuable for the topic on Dominis are already found and bring us valuable information about Dominis seen by the others. Accordingly, two most complete collections will be analyzed more closely in this section.

The most valuable and extensive collection of letters for Dominis' period in England belongs to the English diplomat Sir Dudley Carleton, who helped him on the departure to London. This collection is completely preserved and was already examined by the Croatian historian Vesna Gamulin who made a list of 121 letters of which Dominis is either the sender or receiver, or just a subject of discussion.[195] Interestingly, from the first letters dated in 1614, one can see that Dominis' plans differed from what he really experienced in England. Namely, in the letter of 7th September 1614, besides describing to Carleton his

[193] Bajsić, "Prirodoznanstveni", 64-65.
[194] About the republic of letters, see: Anthony Grafton, *World Made by words* (Cambridge, Massachusetts and London: Harvard University Press, 2009), 9-34 and 114-136; Robert Mayhew, "Mapping Science's Imagined Community: Geography as a Republic of Letters 1600–1800", *Journal for the History of Science*, vol. 38, no. 1, (March, 2005), 73-92. Especially for England, see: Robert Mayhew, "British Geography's Republic of Letters: Mapping an Imagined Community 1600–1800", *Journal for the History of Science*, vol. 65, no. 2 (April, 2004), 251-276.
[195] Gamulin, "Regesta", 197-218.

ecclesiological attitudes, he emphasized his wish to live peacefully at one of the English universities.[196] On 15th December the same year, he got a positive answer, the king's decision granting him a peaceful life at one of the universities.[197] Although from this brief information it might seem that Dominis wanted to return to his academic career, this should be taken with reservation, since his first goal was to publish *De republica ecclesiastica*, not to hide for the rest of his life from the Inquisition. Furthermore, becoming the dean of Windsor, Dominis actively used his new powers. However, he did not completely forget his former preoccupation, now his "hobby". Settled in London, Dominis met with the mathematician Henry Savile, and they made a plan to visit Oxford.[198] It is known from further letters that Dominis visited English universities at Oxford and Cambridge, and was well accepted there, even receiving a doctorate in theology at the University of Cambridge.[199]

Yet, after this early period of Dominis' stay in England, no information related to his work other than in the strictly ecclesiological field appears in further letters, thus they are not of an importance for this topic. Nevertheless, one general characteristic of all the letters concerning Dominis' English years should be pointed out. As a result of many struggles, almost absolutely positive comments about Dominis seriously degraded, presenting him at the end as a terrible hypocrite and pure opportunist. Although to some extend probably exaggerated, Dominis definitely cannot be considered completely innocent for such a treatment. His governance on the Windsor estate reveals manipulations which gained him enemies among the local gentry, especially Sir John Kidderminster.[200]

[196] 7th September 1614, a letter to Carleton, Gamulin, "Regesta", letter (henceforth: L) 4, 199.
[197] 15th December 1614, Abbot to Carleton, Gamulin, "Regesta", L 6, 199.
[198] 23rd February 1617, Savile's to Carleton, see: Gamulin, „Regesta", L 25, 202.
[199] Eight letters dated from 5th July to 16th October 1617, see: Gamulin, "Regesta", L 32-34, 37-39 and 41-42, 203-204.
[200] Fifteen letters dated from 4th October 1618 to April 1620, see: Gamulin, "Regesta", L 60-61, 63, 67-68, 71, 73-81, 207-209.

Following the same pattern as the previous one, another valuable collection of correspondence concerning Dominis is the one between Fulgenzio Micanzio and William Cavendish. Of Micanzio's altogether 76 letters sent to Cavendish, Dominis is mentioned in 31, dating from 24th February 1617 to 12th July 1624.[201] What is more, originally written in Italian, these letters were translated into English by Thomas Hobbes. Therefore, it can be stated with certainty that Hobbes knew about Dominis. Despite some positive indications, whether he knew Dominis personally stays uncertain.[202] Micanzio had known Dominis for eight years at the time Dominis ran to England, and at that moment gave a detailed description of his character:

> He is a man of great Integryte […] the Innocent and exemplary life he hath lead makes him esteemed such a Prelate for Integrity as the Church hath few. For learning he is much more learned than subtile. He hath read all Antiquities of Fathers, Councells, and Historians. For this 8 years that I have bene familiarly acquainted with him he hath lived the most temperately and also very frugally buryed in reading and writing. In his discoursing I have ever found him stiffe but reasonable, and in defence of superstitious opinions he would with greediness, and sudden zeale resolve according to what he had read to those purposes, or else (which was more Ordinary) he tooke tyme to examine the matter & then with all Reality he would yeild unto the truth. […] In generall the worst that is thought of him is that he is in love with his owne bookes.[203]

This first letter of Micanzio is rather flattering and shows Dominis as a great scholar, educated and wise, modest and, apart from his own books, unattracted by earthly pleasures. Furthermore, in the same letter he warns that Jesuits are printing an unfriendly biography of

[201] Micanzio, *Lettere*, L V, VII, VIII, X, XII, XV, XVI, XXV, XXVI, XXVIII, XIX, XXX, XXXI, XXXII, XXXIII, XXXIV, XXXVII, XXXIX, XLI, XLII, XLIII, XLIV, XLV, XLVII, XLVIII, XLIX, L, LI, LXII, LXIV, 60-64, 69-76, 80-83, 88-91, 97-105, 144-152, 156-184, 190-194, 198-202, 205-225, 229-247, 281-284, 289-292. About these letters and Fulgenzio Micanzio, see: Vesna Gamilin Tudijna, "Dominis u pismima suvremenika Fulgentia Micanzia u prijevodu Tomasa Hobbesa (Dominis in the light of letters of his contemporary Fulgentio Micantio in the translation of Thomas Hobbes)", *Zbornik odsjeka za povijest znanosti Zavoda za povijesne i društvene znanosti HAZU* (*Section for History of Science's Almanach, Department of historical and social sciences HAZU*), vol. 20 (2003), 180.

[202] There are other proofs of Hobbes awareness of Dominis' work, for instance the list of books from Cavendish library composed by Hobbes himself where all Dominis' published works can be found, see: Gamilin Tudijna, "Dominis u pismima", 180. About the possibility of their personal acquaintance, see: Gamulin Tudjina, 180-181; Malcolm, *De Dominis*, 49.

[203] 24th February 1617, Micanzio, *Lettere*, L V, 60-61.

Dominis in Flanders.[204] However, a gradual change in opinion towards Dominis can be noticed in further letters again. Yet, he still sympathizes with Dominis for some time and defends him against attacks, always emphasizing his fine erudition: "[A]nd I shall never be perswaded that that most learned & religious Prelate…"[205] Even after Dominis had started his struggles in England and was considering the possibility of returning to Rome, Micanzio claimed that many of these stories were invented, accusing especially Jesuits and seeing him as an instrument of the Spanish diplomacy in London, pointing out ambassador Count Gondomar's role in this issue.[206] Since these letters do not go into detail, it cannot be said whether Dominis was really involved in some affairs or what was exactly Jesuits' role. However, that he communicated with Gondomar about his return to Rome and that Jesuits were truly engaged in Dominis' defamation, stays as the fact.[207] Nevertheless, at one point Micanzio's understanding reached its limits and in one of the letters he entitled Dominis: "y^{e} most wicked Satyre of the world",[208] accusing him in the other one for changing his "…[G]enius fro[m] Archiepiscopall to Jesuiticall…"[209] At the end, a complete disappointment can be easily noticed from Micanzio's words: "[A]rchBishop of Spalato of whom I shall not need to speake any further."[210] As one of the last remarks on his character, Fulgenzio says: "[H]e confounds himselfe every day more than other in fiction, lyes and infamy."[211]

Concerning Dominis' ecclesiological endeavours in England, another important 17th century figure, the Dutch jurist Hugo Grotius, also corresponded with him. They met in

[204] On the same place.
[205] 1st December 1618, Micanzio, *Lettere*, L XII, 90.
[206] February (no date) and 24th February, 6th, 13th and 20th May 1622, Micanzio, *Lettere*, L XXVI, XXVIII, XXX-XXXII 150, 157, 164-165, 170-171 and 175.
[207] About correspondence between Dominis and Gondomar, see: Francisco Javier Juez y Gàlvez, "Tri Dominisova pisma Grofu od Gondomara (Three Dominis' letters to Count Gondomar)", in: *Marko Antun de Dominis*, 143-153; Gamulin, "Regesta", L 110 and 111, 205. For Jesuit activity against Dominis, see: Malcolm, *De Dominis*, 5.
[208] 27th May 1622, Micanzio, *Lettere*, L XXXIII, 180.
[209] 3rd June 1622, Micanzio, *Lettere*, L XXXIV, 183.
[210] 15th July 1622, Micanzio, *Lettere*, L, XXXVII, 190.
[211] 16th September 1622, Micanzio, *Lettere*, L , XLI, 207.

Rotterdam on Dominis' way to England, and Grotius was extremely attracted by Dominis' ecclesiological ideas, owning a copy of his book *De republica ecclesiastica* himself. Interestingly, Grotius stayed devoted to Dominis' ideas even after the author faced troubles and disagreements in England. Despite being disappointed by his departure back to Rome, Grotius respected him, and was interested in his work after Dominis' death. All in all, in his letters, Grotius always kept a positive attitude towards Dominis.[212]

However, Grotius was more an exception. Dominis' life was monitored from England till his death,[213] and analysis of his character can be concluded with two works which contribute to general diametrically opposed picture from the one at his arrival. The title of a collection of documents *M. Ant. de Dominis Arch-bishop of Spalato, his Shiftings in Religion. A Man of Many Masters* and published by Richard Neile in 1624,[214] speaks for itself. The other work is Thomas Middelton's comedy *A Game at Chess* dating in the same year. Dominis is here presented as an evil character, "a fat bishop" and his figure is even put on the front page illustration, together with Count Gondomar.[215] Evidently, the presentation of Dominis' character varies from extremely positive to completely negative. Thereby, to which extent was it unbiased must stay unanswered. Yet, it can be concluded that Dominis' behaviour did not always contribute to his position in society. Obviously quite stubborn, never ready for compromises, he was often misunderstood and at the end despised by his contemporaries. However, his education and intelligence were always emphasized as a virtue, staying the bright side of his appearance, even when everything else was presented negatively.

However, letters do not reveal only Dominis' character. Some of them inform about his other interests than those of ecclesiological nature and one of them can be manifested

[212] See: Berljak, "Veze", 321.
[213] For instance, see Micanzio's letters: 10th May and 12th July 1624, Micanzio, *Lettere*, L LXII and LXIV, 282-283 and 290.
[214] See: Malcolm, *De Dominis*, 1.
[215] See: Prijatelj–Pavičić, "Prilog", 370-373.

through Dominis' connections with Francis Bacon. However, it must be again firstly considered what is not known rather than what is. In the collection of Bacon's letters there is not a single word about Dominis, or the (arch)bishop from Split as Dominis was usually called in England,[216] although it is known that they knew each other personally. In the first months of 1618 Bacon gave a present to Dominis and attended his sermons.[217] That Dominis was informed about Bacon's work, we can see from Micanzio's letter where he, trying to acquire Bacon's *Sapientia veterum*, *The Essays* and *The Advancement of Learning* to Italy, says that: "…the other [way of acquiring the books] that the ArchBishop of Spalato […] a good number of them sent hither by sea…"[218] Soon after, Micanzio informs Carleton that Dominis promised him a shipment with the required books.[219] It is true that Dominis translated *De sapientia veterum* into Italian, despite the fact he never really learnt English. Thus, the question how Dominis made the translation and who were his assistants, remains an open one. Besides Cavendish, it is possible that Thomas Hobbes contributed to that work.[220] As for any translation of some other of Bacon's essays, we can only speculate.

Apart from translation, during his stay in England, Dominis also edited Paolo Sarpi's *Historia del Concilio Tridentino*.[221] Thus, despite the lack of any information on his scientific activity, it is evident that he did not deal only with preaching and his own works, but was engaged in translational and editorial business; nevertheless, clearly in the first place again for the purposes of spreading his ecclesiological ideas.

[216] See: *Letters, Speeches, Charges, Advices of Francis Bacon*, Thomas Birch (ed.). London: printed for Andrew Millar in the Strand., 1863.
[217] Malcolm, *De Dominis*, 53.
[218] 24th February 1617, Micanzio, *Lettere*, L V, 62.
[219] See: 10th November 1617, Micanzio, *Lettere*, L VII, 71.
[220] Malcolm, *De Dominis*, 53-54. About his translations, see: Vesna Tudjina Gamulin, "Marko Antun de Dominis kao prevoditelj Baconovih eseja (Marcus Antonius de Dominis as a translator of Bacon's essays)", in: *Rasprave iz hrvatske kulturne prošlosti* (*Discussions on Croatian Cultural Past*), book 1, Tomislav Raukar (ed.) (Zagreb: Odsjek za povijesne znanosti Zavoda za povijesne i društvene znanosti HAZU, 1998), 113-120.
[221] Malcolm, *De Dominis*, 55-57. More about Sarpi's work, see: Bouwsma, *Venice*, 556-623.

Yet, despite all other preoccupations, Dominis certainly did not completely retire from natural philosophy. Even though there is no record which would prove Dominis' activity on these matters in England, one cannot exclude his acquaintances with the most prominent English scholars of the time. As a translator of Bacon's essay, it is likely that Dominis read his other works including *The Advancement of Learning*.[222] This Bacon's treatise on knowledge might have inspired some discussions between them. However, unlike Bacon, Dominis is wholly pragmatic in his writings on natural philosophy. Any of his justifications of knowledge similar to Bacon's, or at least concerns about the place of natural philosophy in comparison to other sciences, do not exist. Nevertheless, some parallels can still be found.

First of all, since Dominis was grateful to the Jesuit Order for his education and Bacon admired them for the same matter,[223] they both obviously shared a positive attitude towards this aspect of Jesuit activity, despite their negative views on the Catholic Church. Moreover, Bacon's discussions of errors which occur when people choose the wrong reasons for learning may be attributed to Dominis' statement about his own agenda of gaining knowledge, as I have already mentioned previously. Thus, according to these Bacon's understandings, Dominis' idea of studying in order to contribute to the Church reunion might be among those who learned for benefit of men, belonging hence to the highest stage.[224] Furthermore, Bacon's extensive categorization of philosophies on divine, natural and human and their subdivisions[225] are lacking in Dominis' texts. In his explanation of methods for *De radiis*, unlike Bacon, Dominis even emphasizes the equal importance of physics and mathematics for his own research. In fact, glorifying optics as an important

[222] For the thesis, the following edition is used: Francis Bacon, "Advancement of Learning", vol. VI and "Of the Dignity and Advancement of Learning", vols. VIII and IX, in: *The Works of Francis Bacon*, vols. I-XV, James Spedding, Robert Leslie Ellis, Douglas Dnon Heath (eds.). Boston: Houghton, Mifflin and Company, 1864.
[223] For Bacon's views on the Jesuit education, see: Bacon, "Advancement", vol. VI, 109-110 and 143.
[224] See: Bacon, 134.
[225] Bacon, 169; Bacon, "Of the Dignity", vol. VIII, 470-519.

science and almost unique in its perplexity, Dominis immediately skips any further theoretical discussion and moves directly to the research of his problems saying: "[Y]et, I have neither intention nor time for further discussion on such a comprehensive matter [optics]."[226] However, regarding the aforementioned divisions, both scholars agree with the distinction between the divine and the natural and their positions in a hierarchy of knowledge.

Naturally, Bacon does not ignore another important issue concerning natural philosophy – the old authorities and experiments. According to him, the "dictatorship" of the old authorities is responsible for the backwardness of science and his attitude towards them, namely Aristotle, Plato, Democritus, Hippocrates, Euclides, Archimedes, is clear: "…a man who is learning must be content to believe what he is told […] when he has learned it he must exercise his judgment and see whether it be worthy of belief…"[227] It has already been shown how dichotomous Dominis' views were regarding the problem of the old authorities and experiments. Hence, despite Dominis' emphasis on the value of experiments, he evidently do not use them systematically, whilst Bacon**'s** great effort to show the importance of the experiment in natural philosophy is evident in *The Advancement of Learning*, as he dedicates it a crucial position in research.[228]

Lastly, both of these scholars paid significant attention to the appearance of ebbs and tides. However, even if they had discussed the matter, they completely disagreed in their explanation**s** and any mutual agreement cannot be traced. Whilst Dominis in his second treatise *Euripus*, which will be analyzed subsequently, attributes a great influence to the Sun and especially to the Moon regarding the appearance of this phenomenon, Bacon completely

[226] "Nunc mihi sane neque mens est, neque otium de tota hac tam ampla material plene disserendi,…", Dominis, *Opera*, 12-13.
[227] "…oportet discendem credere […] oported edoctum judicare…", Bacon, "Advancement", 128-129.
[228] See: Bacon, "Of the Dignity", vol. IX, 64-83.

rejects the lunar theory in his works *The New Organon* (1620) and finally in *On the Ebb and Flow of the Sea* (1624).[229]

Nevertheless, if Bacon appreciated knowledge so much, he most likely respected Dominis as a scholar, since even the fiercest critiques have never denied Dominis' erudition. Thus, despite their disagreements, there is a great possibility that they discussed the problem of ebbs and tides, since Dominis observed the river Thames for that reason, applying these observations later in *Euripus*.

Before the final part of the thesis, analysis of Dominis' second treatise *Euripus*, one last feature should be added to his profile as a man of letters. Namely, for any scholar, the library is certainly an important detail that reveals much about his interests and intellectual affinities. Thus, thanks to Dominis' prosecutors, the list of books from his confiscated library in Venice from the period after he fled to London is preserved. This list brings 181 titles in 242 volumes. Greek and Roman classics, only one Bible, many polemics, historical, juridical, theological works and texts in Croatian which were on the list of *Index's* forbidden books comprise a large part of his library. Naturally, one can also find many works on natural philosophy: geometry, astronomy, geography and optics from classical authors to his contemporaries. However, despite this list, the destiny of the library itself is unknown. It is only sure that it was not burned with his body on Campo de' Fiori. In fact, just a small sack of books published by Dominis himself was apparently burned with him.[230]

[229] See: Bacon, "The New Organon", , in: *The Works*, vol. VIII, 59-350; Bacon, "On the Ebb and Flow of the Sea", in: *The Works*, vol. X, 317-340. The latter work is probably written before 1616, but was published after *The New Organon*, in 1624. For Bacon's ideas in general, see: B. H. G. Wormald, *Francis Bacon. History, Politics and science, 1561–1626*. Cambridge: Cambridge University Press, 1993; for the publishing years of both works, see: Wormald, 23 and 146-147; especially for natural philosophy, see: Julian Martin, *Francis Bacon, the State and the Reform of Natural Philosophy* (Cambridge: Cambridge University Press, 1992), 141-171.

[230] For Dominis' library, see: Bratislav Lučin, "Pogled u knjižnicu Marka Antuna de Dominisa (A look into the library of Marcus Antonius de Dominis)", in: *Marko Antun de Dominis*, 231-270.

4.3.3. Last years in Rome: Euripus seu de fluxu et refluxu maris

Since there has been no mention about Dominis' second work on natural philosophy so far, some introductory notes will be given now. *Euripus* was published in Rome in 1624, the last year of his life, and dedicated to: "[I]llustrious lord Francesco Barberini, cardinal of the Holy Roman Catholic Church, Pope Urban VIII's nephew.[231] Talking in the preface about the topic of this treaty, Dominis emphasizes the method of: "…extensive thinking and observing the experiments…"[232] As in the case of *De radiis*, instead of any extensive discussion on the answers Domninis gave here, the question what methods he used in this work in comparison with early modern natural philosophy practice will be in the focus of this section.

However, before the analysis of natural philosophy matters, just a small digression should be made in order to reveal the background important for understanding the reason for writing the treatise. Although he was not yet arrested by the Inquisition at the moment he wrote *Euripus* (the date at the end of the foreword is 15th October 1623), from his pious attitude, awareness of the pope's reluctance towards him is evident, and he tries to change it: "[L]et by the ebb your grace, and through you the grace of your most holy uncle, return to me, I beg."[233] Naturally, since writing in such manner, this text was too, like *De radiis*, considered "without any contradictions towards the faith and Christian teachings" and approved by the Church authorities, namely Andrea Bisconi, *Ordinis Praedicatorum.*[234]

After this foreword, the work is structured in the following way. First, Dominis gives 26 statements[235] and then elaborates six questions: about the intensity of ebbs and tides,[236]

[231] "Illustrissimo Principi Francisco S[ancta] R[omana] E[cclesia] Cardinali Barberino", Dominis, *Opera*, 192-193.
[232] "…longa mentis agitation et experimentorum observatione…"Dominis, *Opera*, 194-195.
[233] "…ad me vero a per te per refluxum tue ae per te sanctissimi patrui gratia redeat, quam ambio.", Dominis, *Opera*, 194-195.
[234] "…nihilique in eo offendi aut a recta fide, aut a Christianis moribus alienum…", Dominis, *Opera*, 196-197.
[235] Dominis, 198-257.

about their geographical motion,[237] about the number of that phenomenon during one day,[238] about the inequality of their daily intervals,[239] about the inequality of their intensiveness even in the same place in different part of the day[240] and about the diversity of their level in the same hour of a day, both in the same and distant places.[241] Furthermore, as in *De radiis*, eleven illustrations follow the text.

First of all, it should be emphasized that Dominis' attempt to explain the phenomenon of ebbs and tides is just one among many in the 16th and 17th century. Many other scholars of the time, such as the Dalmatian Frederic Grisogono or the Ragusian Nikola Sagroević (around 1500–1573),[242] or the Spaniard Pedro Sagrina and Galileo Galilei, dealt with the same problem. To put Dominis' ideas in simple terms, he built his theory following the common opinion that magnetic power of the Sun and the Moon is the main factor for the appearance of ebbs and tides, applying the existing knowledge about magnetism on his theory.[243] Furthermore, he paid more attention to the Moon, considering it much more powerful than the Sun, which made his theory more complicated.[244] Besides ebbs and tides, Dominis was in *Euripus* also concerned about the shape of the Earth, believing that the Earth is a perfect sphere. He tried to prove this by arguments from geometry, but in a peripatetic way and respecting existing older speculations again. Dealing with this problem

[236] "Cur aliqua maria multo plus quam aliqua alia et cur aliqua etiam aut nihil, aut parum admodum intumescunt et detumescunt?", Dominis, *Opera*, 258-263.
[237] "Cur fluxus et refluxus maris non fit simper ab oriente in occidentem?", Dominis, *Opera*, 262-271.
[238] "Cur ordinarie bis in die naturali aquaeintumescunt et bis detumescunt, per quasi sena horarum spatia, alicubi vero saepius in die?", Dominis, *Opera*, 270-273.
[239] "Cur alicubi tempora fluxus et refluxus sibi invicem respondentium sunt inaequalia?", Dominis, *Opera*, 272-275.
[240] "Cur in eodem etiam loco diversis temporibus intumescentia et detumescentia maris est inaequalis?", Dominis, *Opera*, 274-281.
[241] "Cur non eadem diei hora aqua sit ubique et altissima et depremissima, sed magna sit in hoc horarum diversitas, tum edem loco, tum etiam diversis, quoad initium tam fluxus, quam refluxus comparatis?", Dominis, *Opera*, 280-293.
[242] About Sagroević, see: Dadić, *Povijest*, vol. 1, 97-106.
[243] Dominis, *Opera*, 202-203.
[244] Dominis, 210-211.

he leads imaginary discussion with a Dalmatian neoplatonist scholar, Frane Petrić,[245] who was already dead at the time when Dominis wrote his text. Dominis severely attacks Petrić's ideas negating the round shape of the Earth. Dominis: "…would not mind his [Petrić's] weak arguments, but Otto Casmannus recently published his work *Marinarum quaestionum* in which he firmly relies on Petrić's fiction…"[246] Thus, obviously irritated by this book, his main target is not only Petrić, but Casmanuss as well.

Comparing *De radiis* and *Euripus*, many similarities between in the methods Dominis used can be found. At the beginning of this second treaty, he emphasizes the comparative approach again: "…for this matter [analysis of the topic] is necessary neither just physics nor only astronomy, but the support of both."[247] Yet, being disabled for making any experiments and observations by himself at the moment he wrote *Euripus*, he was forced to rely much on previous authors. Nevertheless, Dominis again gave the primacy to observations. Thus, discussing his third question, he admits being unable to give an answer, since: "…for any observations one should spend a long time at these places [sea channels] to observe all the possible changes, which never happened to me."[248] Although facing problems with extensive observations, he does not give up making some simpler experiments. Hence, explaining the separation of salt and sweet water, he points to the experiment with water and wine:

[245] Dominis adresses him: "Our fellow Dalmatian Franciscus Petrissevich, or de Petris, or Patricius, from Cres..." ("Noster tamen Dalmata Franciscus Petrissevich, seu de Petris, seu Patricius, Crepsensis..."), Dominis, *Opera*, 212-213. On Petrić's neoplatonism, see: Grendler, *The Universities*, 300-306.
[246] "Illus ego debiles argumentationes contempsissem, nisi nuper Otho Casmannus quaestiones suas marinas vel maxime Patricianis commentis...", Dominis, *Opera*, 212-213.
[247] "...quia neque ex sola physica res haec pendet, neque ex sola astronomia, sed utriusque scienciae adminiculo opus est.", Dominis, *Opera*, 202-203.
[248] "...sed diu esset in locis immorandum, ut varietates omnes observantur cum suis circumstantiis, quod mihi numquam cognit.", Dominis, *Opera*, 272-273.

> [I]f we wet a glass, and leave particles of water on the inner side of the glass which will slowly descend to the bottom, and then pour some wine in the glass, water particles will withdraw from the wine and return to the edges of the glass.[249]

Unlike *De radiis*, we cannot be sure that this treatise is based on his old notes. Yet, it is obvious that he recorded his observations on many occasions in different places from the Adriatic coast all the way to England, combining them with various reports from the Black and the Red Seas or many places on the Mediterranean or Northern seas, admitting however he had never visited any of them.[250] Anyhow, explaining the spheral shape of the Earth, he pointed to his observation while traveled by boat: "…I experienced that I can easily recognize masts and sails of large ships at a five or six miles distance. Hull however, under the water, was invisible."[251] Furthermore, talking about the time difference in various parts of the Earth, he analyzes seamen's reports from their journeys, although being cautious and criticizing their unreliability.[252]

In the bibliography Dominis used for this text, one can also find various authors. However, besides Petrić and Casmannus, Dominis basically does not give any names but Aristotle, and even that only once.[253] He also refers to Arabic astronomical achievements, not mentioning any particular names though.[254] Nevertheless, as for *De radiis*, Ivica Martinović managed to find 35 scholars and their works which served Dominis for writing *Euripus*. Again, the whole line from ancient to modern names can be found here, from Plato

[249] "Si enim poculum viterum aqua diluatur, ita ut maneant in lateribus interioribus poculi particulae aquae, adhuc ad fundum poculi sensim descendentes et infundatur paulatim vinum in poculum, particulae illae aquae retrahunt se et fugiunt a vino atque versus poculi orificia ascendint...", Dominis *Opera*, 290-293.
[250] See: Dominis, *Opera*, 264-265, 268-269, 272-273 and 278-279.
[251] "...expertus sum me malos et vela passa grandium navigorum, a me non plus quam quinque aut sex milliaribus distantium, clare cernere; corpus vero navigii, quasi sub aquis esset submersum, videre non posse.", Dominis, *Opera*, 229.
[252] For instance, see: Dominis, *Opera*, 238-241. Yet, on another place gives us a bit doubtful claim that on a clear morning he managed to see Dalmatian mountains from Ancona, see: Dominis, 231.
[253] Dominis, 264-265.
[254] Dominis, 204-205.

and Euclid through Marco Polo to Copernicus.[255] Interestingly, talking about the differences of water and land, besides logical conclusions based on peripatetic model, Dominis refers to the Bible.[256] Since there is no mention of the Bible in *De radiis*, it might be assumed that Dominis used it here in order to show his devotion to Christian teachings to the Church, necessary for his position at that time.

All in all, Dominis' conclusions in *Euripus* are not revolutionary ones, but still make a contribution to early modern considerations on the discussed phenomenon.[257] Not much progress in the method is visible here in comparison to *De radiis*. However, being old and ill, and probably already under suspicion of the Church authorities, he was unable to do any serious observations, which would have been indispensable for the discussed topic. Thus, he relied more frequently on other authors mainly due to his inability to observe himself, rather than from a respect, which can be seen from the harsh criticism addressed to Petrić and Casmannus.

Talking at the end about the reactions to *Euripus*, we should return to Galileo once more. He was informed about this work as well, this time by his friend Mario Guiducci, and possessed *Euripus*. However, he disagreed with Dominis' statements. In one of his letters, dating three days before Dominis died, Guiduci informed him about *Euripus*.[258] Later on, in his *Dialogo sopra i due massimi sistemi del mondo* from 1631 where he explains the phenomenon of tides as a consequence of the motion of the Earth, Galileo talks about Dominis' discoveries even ironically, calling it "trattatello".[259] Nevertheless, if we compare Galileo's theory on ebbs and tides, which says that this phenomenon is a result of the

[255] See: Ivica Martinović, "Izvori Marka Antuna de Dominisa u raspravi *Euripus seu de fluxu et refluxu maris*, in: Dominis, *Opera*, 294-324.
[256] See: Dominis, *Opera*, 246-247.
[257] For more detailed explanation of Dominis' interpretations, see: Žarko Dadić, "Marko Antun Dominis i problem plime i oseke (Marcus Antonius de Dominis and the problem of an ebb and tide)", in: *Zbornik*, 49-53.
[258] Berljak, "Neslaganja", 5.
[259] Berljak, "Veze", 305-306; Berljak, "Neslaganja", 7.

Earth's combined rotation and revolution, with Dominis' one, it is clear that both of them were equally close and distant to today's understandings.[260]

[260] On modern oceanographic explanation of the ebbs and tides phenomenon, see: Ivo Derado, "De Dominis i Galileo o plimi i oseci (De Dominis and Galileo on the tides)", in *Marko Antun de Dominis*, 342-343. About Galileo's theory in comparison to Dominis' one, see: Andrea Frova and Mariapiera Marenzana, *Thus Spoke Galileo* (Oxford: Oxford University Press, 2006), 211-241.

5. Conclusion

Coming from a small community in the Eastern Adriatic, and shifting from Mediterranean through Central Europe all the way to England, Marcus Antonius de Dominis' life path is extraordinarily rich and interesting. Pursued by ambition (and the Inquisition), he found himself in some of the central affairs which reflected political and religious storms of the time. Perceived sometimes maybe more as a curiosity than a serious thinker, his ideas were not always accepted well, which inevitably led him to a tragic end. Consequently, as a whole life, his death also remains one peculiar and dramatic moment in history.

However, where is Dominis' place in the early modern scholarly community? Besides a number of interesting details, it cannot be said that Dominis' works on natural philosophy influenced much the further development of science. Evidently, his ecclesiological work is more interesting and significant than his scientific results. Nevertheless, although not a key figure of early modern science, Dominis was constantly present among the men of letters, either physically like in Prague and London, or in the correspondence. Therefore, he cannot be considered a marginal scholar whose achievements were not recognized during his time, but were only rediscovered centuries later. He was in fact rather active in 16th and 17th century scholarly circles. Accordingly, together with all his specificities, Dominis serves as a good example for painting a picture of an early modern scholar. Still balancing between old authorities and new methods, combining other authors with his own experiments, sometimes confusing and inconsistent in doing his observations, his work illustrates the gradual changes that were taking in science.

Abandoning his academic career in order to dedicate his life to ecclesiological activity, Dominis' work is abundant and miscellaneous, which makes any analysis of his

activities more complex. Yet, focusing on one aspect of his work, one simply cannot ignore others. In fact, strictly dividing his scientific and ecclesiological ideas is impossible, as it was emphasized in the thesis. However, even his work on natural philosophical matters can be overviewed from different levels, again one inseparable from the other: the early stage when he actively dealt with science and the later one when he dedicated most of his time to ecclesiological problems of his time. Actually, from what can be seen, it might be stated that his career shows more what he missed than what he really did in science. On the one hand, since he abandoned his academic career, it can be marked as unsuccessful, but on the other, this short period of his life revealed his rather successful and rapid advancement in academic society. Although he did not exert any significant influence on his successors at the Jesuit College, without any doubt, Dominis presented a great intellectual potential.

After this analysis of Dominis' attitudes in natural philosophy and the ways how he dealt with various problems in physics and mathematics, a few final remarks about his work should be given. First of all, his methods have a certain static character. The chronological gap between the publications of his only two works on natural philosophy is thirteen years and no serious progress is visible in his methodology. The reason for this may possibly be in the fact that, after abandoning a promising academic career in Italy, he dealt with natural philosophy only occasionally. Occupied by other problems, he did not have time to develop his methods in the post-teaching period of his life and dealt with natural philosophy primarily for the purposes of relaxation and as a sort of intellectual exercise, staying always more concentrated on ecclesiological questions.

Unfortunately, the limited amount of sources prevents any further insight into Dominis' scientific thought. Furthermore, the nature of these sources, their strict focus on the stated problems of natural philosophy, leaves any possibility for researching the background of Dominis' writings hardly possible. Yet, further archival work may still hold

out potentials. Although scholars have focused their effort on finding material important for his religious attitudes, there is still much work to do in order to find traces of his scientific activity. Working on this thesis, I contacted some Croatian scholars, both archivists and those familiar with the subject, but did not get any promising information. Apparently, in the Croatian archives in Dalmatia, especially in Split, there is nothing to be found considering Dominis' natural philosophy. English archives examined in detail by Vesna Tudjina Gamulin also did not bring any new clues so far. However, Italian archives are still to be researched. While some results were made in Venice and Rome, again for tracing Dominis' ecclesiological ideas, places where he studied and taught still await deeper investigation. That should be the next step in the further pursuit of this Dalmatian theologian, diplomat and natural philosopher's ideas.

At the very end, it should be clear that my basic intention was not primarily to show what Dominis meant for early modern science, but what early modern scientific movements meant for him and how they formed his ideas. Paying much more attention to Dominis' surroundings and broader context in which he worked than has been done so far in Croatian historiography, this thesis tried to contribute not only to previous notions on Dominis' natural philosophy but to the better understanding of early modern scholars and the scholarly world in general. Hopefully, this approach is successful enough to encourage others to use this model in further research of Domninis' life, as well as the lives of various other personalities and topics that might not have left significant marks at first sight but can possibly encourage historians' curiosity.

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