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**The Early Reception
of Bošković's Natural Philosophy:
the 'Benvenuti Case'**

Abstract

The history of the reception of Bošković's theory of forces in the period 1745–1787, i.e. from the first publication of Bošković's ideas to his death, is yet to be written. This paper is one of the first chapters of that unwritten history. Synopsis Physicae Generalis (1754) by Italian Jesuit Carlo Benvenuti (1716–1797), professor of mathematics, physics, metaphysics and liturgics at the Roman College (1750–1760), is identified as an example of the early reception of Bošković's natural philosophy. This was the first work that offered an exposition of Bošković's theory of forces. According to Bošković's own evaluation, Synopsis helped to advance the application of his theory to general physics, and that on the basis of his earlier treatises (1745–1754) and before the publication of his masterpiece Theoria philosophiae naturalis. Synopsis, therefore, should be considered as a component part of the development which was crowned by Bošković's most renowned work. The author shows that Benvenuti's Synopsis and Bošković's treatise De continuitatis lege (1754) are complementary in content. In the agreed and well conceived distribution of tasks for 1754, Bošković focused on the proofs of the principle of continuity upon which his theory of forces rested, whilst Benvenuti worked out the theory's application to general physics. In addition, Benvenuti recognised and exposed the two most provocative insights of Ruder Bošković regarding the structure of matter and the structure of the universe.

This paper is accompanied by two appendices. Both are documented records of the 'Benvenuti Case': (1) the note of an anonymous journalist from Florentine periodical Giornale de' Letterati, and (2) a fragment extracted from the annals of the Roman College, written by Giulio Cesare Cordara. These two documents are for the first time translated in English and are supplemented with an exhaustive commentary.

»You display far too much respect for the theory of my forces. As far as I am concerned, I am totally convinced that the theory is far from being a purely arbitrary hypothesis like others, which have tried to define the elements of matter and the first principles of bodies, but it has been positively demonstrated, with valid reasons, that with the incomparable simplicity of the law of these forces, in itself a simple and uniform law, it can interpret the immeasurably diverse phenomena that we observe in nature, and that it allows for an endlessly ample field for other innumerable series of other phenomena which constitute thousands of other worlds ... It has these and other advantages that I recognise, but this must certainly be my studious hope, for thirty years have passed since I first published [in *De viribus vivis*, 1745] this my general system which is still little known and accepted in Europe, especially outside the schools of my Order«, wrote Ruder Josip Bošković in a letter to Antonio Vallisnieri on August 4, 1772.¹

¹ Ruder Bošković to Antonio Vallisnieri, *Strasburg*, sulla Brenta, 24 August 1772, in »Risposta del Padre Boscovich, al Signor Vallisnieri«, in *Lettere del P. Boscovich pubblicate per le*

What, therefore, occurred with the reception of Bošković's theory from the moment he called his conception about forces a 'theory' for the first time, in the treatise *De viribus vivis (On Living Forces)*,² to the writing of this letter, in which is expressed the self-consciousness of the scientist faced with the construction of a system and his disappointment on account of the lack of the acceptance of his ideas? In spite of the provocative nature of this issue, the history of the reception of Bošković's theory of forces from 1745 to the time of his death still remains to be written. This is one of the first chapters of that unwritten history.

Ruder Bošković and Carlo Benvenuti

The earliest reception of Bošković's natural philosophy is to be detected in the systematic review *Synopsis Physicae Generalis*, written by Carlo Benvenuti, professor of metaphysics at the Roman (Jesuit) College during the 1753/54 academic year, and prepared for solemn defence at the end of this academic year.³ From this defence evolved the 'Benvenuti case', which undoubtedly became the turning-point in Bošković's life. Observed from the observer's position, the whole scandal can be summarized by the public dispute of two young gentlemen from the Vereterra and Castagnaga families. At the end of their three years study in philosophy they expounded or, better still, represented Bošković's natural philosophy in a form that was especially prepared for them by their professor of metaphysics, Carlo Benvenuti. Shortly after this ceremony, where some worried faces could be seen, Benvenuti was appointed professor of liturgics at the department of theology within the Roman College and never taught philosophy again. This event, of course, conceals a deeper meaning worth highlighting and investigating further.⁴

It would be wrong to think that Benvenuti's review of general physics, written in the spirit of Bošković's understanding of force and matter, is the fruit of some spontaneous decision. Contrary to this, the *Synopsis* signified the peak of many years of mutual assistance and friendship between Bošković and Benvenuti. In keeping with initial teaching obligations at the Roman College,⁵ Benvenuti lectured in mathematics during the 1750/51 academic year, and thus replaced Bošković who during the same year began geodetic measurements along the length of the Rome-Rimini meridian. Benvenuti enthusiastically accepted this new task, for it provided him time to prepare two publications of mathematical textbooks for the alumni of the Roman College for this and the following academic year.⁶ In 1751 he first published Alexis Claude Clairaut's textbook *Elementi di Geometria*, after having translated the French original from 1741 into Italian. Already during the following academic year, for which we have no information regarding the duties he fulfilled, Benvenuti prepared Bošković's mathematical textbook *Elementa universae matheseos* for publication, in two volumes, in spite of the difficult circumstances in which Bošković found himself while completing the final version of his text. For example, in September 1751 Bošković wrote to his brother Baro in Recanati from an inn in Nocera, stating that he had just completed a chapter on the elements of stereometry at Benvenuti's request.⁷ During the 1752/53 academic year

Benvenuti lectured in physics in concordance with Bošković's views on force and matter, confirmed by Bošković's letter to his brother Božo in Dubrovnik. When his older brother Božo wrote him asking whether he intended to propagate his system further, Ruder wrote a reply dated 22 May 1753, in which he testified to Benvenuti's interests: »In the meantime, my system was defended at public disputations at the Roman College during the previous year [1752]. The present lecturer of physics adheres to and teaches it.«⁸ Bošković in this letter did not explicitly refer to his further intentions, but his following step was already outlined when he stated that two years would not pass before he would expound his new contribution to his own system.⁹ Indeed, Bošković in this time period completed his renowned treatise *De continuitatis lege*, whilst Benvenuti published two works, his *Synopsis*; and an optical treatise, *De lumine*.

Bošković's treatise *De continuitatis lege*, as was also the case for Benvenuti's two treatises, was first presented to the public at the solemn defence of the Roman College at the end of the 1753/54 academic year. On the title-

nozze Olivieri-Balbi (Venezia: Co'Tipi di Gio: Pietro Pinelli, 1811), pp. 17-32, on p. 29-31. It is worthwhile noting Bošković's use of the terms *Teoria delle mie forze* and *quel mio generale sistema* in this passage, and not the term usual from 1758 which Vallisnieri used in his letter to Bošković from Padua on 22 August 1772: *celebre Teoria della Filosofia naturale*, in *Lettere del P. Boscovich*, p. 15.

2

See Rogerius Josephus Boscovich, *De viribus vivis* (Romae: Komarek, 1745) n. 55, p. 41: »ex eadem theoria«. For Bošković's unequal evaluation of his own idea on forces during the period 1745-1758 of genesis of his basic idea, see Ivica Martinović, »Bošković on his own theory of forces: from a sentence to the theory of natural philosophy«, *Synthesis Philosophica* 4 (Zagreb, 1989), pp. 533-542, on p. 534; Ivica Martinović, »Theories and Inter-Theory Relations in Bošković«, *International Studies in the Philosophy of Science* 4 (Oxford 1990), pp. 247-262, on p. 248.

3

Synopsis Physicae Generalis quam in Seminario Romano ad disserendum proposuit D. Joseph Joachimus a Vereterra, et Arguto e Marchionibus Castagnagae ejusdem Seminarii convictor, atque academicus redivivus (Romae: Typis Antonii de Rubeis apud Pantheon in Via Seminarii Romani, 1754), pp. 1-81, tab. 1, fig. 1-17.

4

Compare previous synthetic surveys: Željko Marković, *Rude Bošković*, vol. 1 (Zagreb: JAZU, 1968), particularly the chapter »Afera C. Benvenutija (Carlo Benvenuti Affair)«, pp. 290-292; Žarko Dadić, *Ruder Bošković* (Zagreb: Školska knjiga, 1987), pp. 63-64; Germano Paoli, *Ruggiero Giuseppe Boscovich nella scienza e nella storia del '700* (Roma: Accademia dei XL, 1988), pp. 487-488.

5

According to the original catalogues of the Roman College established by Ignazio Ipparraguirre, »Elenco dei Rettori e Professori del Collegio Romano (1551-1773)«, in Riccardo G. Villoslada, *Storia del Collegio Romano dal suo inizio (1551) alla soppressione della Compagnia di Gesù (1773)* (Roma: Typis Pontificae Universitatis Gregorianae, 1954), pp. 321-336, on p. 335; cfr. on Benvenuti as professor of physics on p. 331; on Benvenuti as professor of metaphysics on p. 329; on Benvenuti as professor of liturgics on p. 326.

6

See the bibliographical item »Benvenuti, Charles«, in C. Sommervogel, *Bibliothèque de la Compagnie de Jésus*, t. I (Bruxelles/Paris 1890), cc. 1312-1314 on c. 1312, nn. 3 and 4.

7

Ruder Bošković to Baro Bošković, 14 September 1751, in the Boscovich Archives, Bancroft Library 587/6b-5, f. Iv: »avendo finiti gli elementi de'solidi, che Benvenuti desiderava assai«.

8

Ruder Bošković to Božo Bošković, 22 May 1753, in Branimir Truhelka (transcribed in the 1920's), *Collection of Bošković's Correspondence*, kept in the Institute for the History and Philosophy of Science of the Croatian Academy of the Sciences and Art, T-25, VIII-37: »Intanto esso [il mio sistema] fù difeso in Collegio Romano l'anno scorso alle pubbliche dispute. Il presente Lettor di Fisica lo tiene, e lo detta«.

9

Ruder Bošković to Božo Bošković, 22 May 1753: »Voi mi dimandate se pensa di far piu alcuna cosa sul mio sistema. Lo farò infallibilmente, e non passeranno due anni«.

page of some rare examples of Bošković's treatise *De continuitatis lege* are recorded the date 7 August 1754.¹⁰ In this treatise, Bošković announced Benvenuti's *Synopsis*:

»In addition to this, during these days a great deal has been published of what Father Carlo Benvenuti, a very learned member of our Society [Society of Jesus] and who in the best manner understands our ideas on these matters, most carefully enriched and polished in his treatise, which should soon be offered to public disputation at the Roman College, precisely so that the theory of forces itself can be interpreted and its use most widely extended to general physics.«¹¹

Bošković's announcement clearly drew attention to the essential relation which Benvenuti considered. This is the relation between the theory of forces (*ipsa theoria virium*) and general physics (*universa Physica*). Benvenuti, for his part, did not conceal the sources which inspired his *Synopsis*. Indeed, in the genesis of Bošković's theory of forces he also inserted the treatise *De continuitatis lege*:

S Y N O P S I S
PHYSICAE GENERALIS

ROMANAE

IN SEMINARIO ROMANO

AD DISSERENDUM PROPOSUIT

D. JOSEPH JOACHIMUS

A VERETERRA, ET AGURTO

E MARCHIONIBUS CASTAGNAGAE

EXORDIUM SEMINARIUM CONVICTORUM, ATQUE
ACADEMICUS MEDICINAE.

Auctore P. Carolo Benvenuti S. J. Soc. Scru



ROMAE M. DCC. LIV.

Typis Antonii de Rubis apud Pantheon in Via Seminarii Romani.

SUPERIORDM PERMISSO.

Fig. 1. The title-page of Benvenuti's work *Synopsis Physicae Generalis*. Courtesy of the Biblioteca Apostolica Vaticana, sign. Misc. C. 22.

»I value as the most convenient argumentation that which Father Ruder Bošković first outlined in the treatise *De viribus vivis* in 1745, and then diffusely exposed in the treatise *De lumine* in 1748, and now expounded for the second time in *De continuitatis lege*. In all of them he had not published the laws themselves as some sort of assumption he made arbitrarily, but rather he demonstrated them with the positive argument inferred from the law of continuity itself. Much of that concerned with this law of forces we shall gather from the aforementioned treatises, but with his permission we shall publish a few things not yet published which, it will be shown, can assist in making the theory we are approaching much clearer, so that it can be expounded.«¹²

In the work that immediately followed, in the first supplement to Stay's poem *Recentioris philosophiae ... versibus traditae libri X (Ten Books on More Recent Philosophy Written in Verse)*, Bošković presented his theory afresh, describing in detail its genesis and Carlo Benvenuti's participation in the working out of the theory:

»I have expounded this theory not as an arbitrary hypothesis, but rather demonstrated it with the most valid positive argument in the treatises *De viribus vivis* in 1745, *De lumine* in 1748 and *De continuitatis lege* in the previous year [in 1754], where I have presented the manifold uses of the theory, which, with the same applications, was also last year very carefully described and extended by Father Carlo Benvenuti in his work *Synopsis Physicae Generalis*.«¹³

This note written by Bošković, published almost a year after the 'Benvenuti case', affirms that he did not succumb to pressures. In discussing the definitions of body and spirit, Bošković did not fail to emphasise how Benvenuti's *Synopsis* expanded the fields of application of his theory of forces. In this gesture of Bošković's, it is worthwhile acknowledging not only his sense of moral indebtedness to his teaching colleague, who had to endure personal sacrifice, but also Bošković's own act of personal courage.

The act of presenting Benvenuti's work *Synopsis Physicae Generalis* must have surely occurred after 7 August 1754, and no later than the beginning of September 1754, for Pope Benedict XIV informed Parisian Cardinal Tencin of a happy conclusion to the 'Benvenuti case' in a letter dated 18 September 1754.¹⁴ The public presentation of the *Synopsis* is exhaustively testified to in Benvenuti's second treatise *De lumine*, which underwent four publications between 1754 and 1766.¹⁵ Here, the reader will come across some confirmations that during the annual solemn exercises at the Roman College the same elected alumni defended Benvenuti's work over two con-

10 Thus Sommervogel noted the title *Dissertatio habita à PP. Societatis Jesu die 7. Augusti 1754* within the bibliographical item »Boscovich, Roger Joseph«, in Sommervogel, *Bibliothèque de la Compagnie de Jésus*, t. I, cc. 1828-1850, on c. 1838, n. 52.

11 Rogerius Josephus Boscovich, *De continuitatis lege et ejus consecrariis pertinentibus ad prima materiae elementa eorumque vires* (Romae: Ex Typographia Generosi Salomoni, 1754), n. 158, p. 73. See also Boscovich, *De continuitatis lege*, n. 170, p. 79: »& multo plura a P. Carolo Benvenuto per hosce ipsos dies, ut innumus, proferuntur«.

12 Benvenuti, *Synopsis*, n. 107, p. 39.

13 Rogerius Josephus Boscovich, »De corporis, et spiritus definitione«, supplementum ad librum primum, in Benedictus Stay, *Recentioris philosophiae...versibus traditae libri X*, vol. 1 (Romae: Pagliarini, 1755), pp. 331-334, on p. 332, n. 10.

14 Benedict XIV to Cardinal Pierre Guerin de Tencin, 18 September 1754, in E. Morelli, *Lettere di Benedetto XIV al Card. de Tencin, 1735-1758*, vol. 2 (Roma, 1965), p. 169. Cfr. Germano Paoli, *Ruggiero Giuseppe Boscovich nella scienza e nella storia del '700*, pp. 488, 496-497.

15 Here are the data on these four editions of Benvenuti's treatise, to which I have added

R. P. CAROLI BENVENUTI
SOCIETATIS JESU
DISSERTATIO
PHYSICA
DE
LUMINE
EX EDITIONE ROMANA ANNI M.DCC.LIV.
RECUSA



VINDOBONÆ,
SEMPITERUS JOANNIS THOMÆ TRATTNER,
CÆS. REG. ET APOST. MAJ. AULÆ, NEC NON INCL. STATUM
IMPERII AUSTRIÆ TYPOG. ET BIBLIOP.
M. DCC. LXI.

Fig. 2. The title-page of the first Viennese edition of Benvenuti's *De lumine*. Courtesy of the Historical Archives (Historijski arhiv), Dubrovnik, sign. HAD R 615.

secutive days, first the *Synopsis* and *De lumine* the following day. For example, when Benvenuti in *De lumine* explains the homogeneity of fluids and crystals, he recalled already stated interpretations: »as we have already shown in yesterday's defended work *Synopsis Physicæ Generalis*«. ¹⁶ Or, when he critically approached Euler's work *Nova lucis et colorum Theoria*, which represented the wave-like nature of light, Benvenuti without hesitation acknowledged his predisposition to Bošković's views and that he openly adhered to them in the *Synopsis*: »But in Bošković's system of the composition of bodies, which we yesterday explained and defended, these difficulties altogether evaporate«. ¹⁷ Nevertheless, Benvenuti stressed most completely the mutual relation between Bošković's *De continuitatis lege*

and his two works at the very end of his treatise *De lumine*. Here, he recalled the interpretation of reflection when light falls upon the border separating two mediums, »as Bošković brilliantly expounded in his most recent treatise *De continuitatis lege*«,¹⁸ and mentioned the principle »which was expounded in yesterday's work *Synopsis Physicae Generalis*«. ¹⁹ Together with this, Benvenuti stresses that during the period while writing the *Synopsis*, Bošković's treatise *De lumine* (1748) had especially inspired him in applying Bošković's law of forces to different physical phenomena: »In the same place [in the *Synopsis*] I have shown, as was demonstrated by Bošković in the second part of his treatise *De lumine*, the manner in which, according to this [Bošković's] law of forces, fermentation is also very strong, without the decay of mass, and that the emission of light occurs with immense velocity, being approximately equal at all points.«²⁰ And this means that Benvenuti's treatise *De lumine*, particularly on account of its first Roman and three Viennese editions, carries echoes of Bošković's theory of forces in those forms which it took in the second part of Bošković's *De lumine* (1748) and, later, in *De continuitatis lege* (1754). And this case reveals the extent to which it is unjustifiable to limit the research of the reception of Bošković's theory of forces to investigations of the reception of his masterpiece *Theoria philosophiae naturalis* (1758). Therefore, there does not exist only one single course of reception of Bošković's theory of forces, but rather there are also complementary courses, together with the main course inspired completely by *Theoria philosophiae naturalis*, that emerge from research interests in Bošković's earlier treatises *De viribus vivis*, *Dissertationis de lumine pars secunda* and *De continuitatis lege*.

the signatures of the examples which are today kept in the Historical Archives of Dubrovnik (abbreviation: HAD), but come down from Milan Rešetar's library *Bibliotheca Rhacusina*: (1) *De lumine dissertatio physica quam in Seminario Romano ad disputandum proposuit D. Joseph Joachimus a Vereterra, et Agurto e Marchionibus Castagnagae ejusdem Seminarii convictor, atque academicus redivivus* (Romae: Typis Antonii de Rubeis apud Pantheon in Via Seminarii Romani, 1754), pp. 1-91, nn. 1-184, fig. 1-19, HAD R 613; (2) Carolus Benvenutus, *Dissertatio Physica de Lumine ex editione Romana anni MDCCCLIV recusa* (Vindobonae: Sumptibus Joannis Thomae Trattner, 1761), pp. 1-92, HAD R 615; (3) Carolus Benvenutus, »Dissertatio de lumine«, in Joseph de Penckler (ed.), *Dissertationes physicae tres Mariae Theresiae Augustae honoribus dicatae* (Vindobonae: Typis Ioannis Thomae de Trattnern, 1766 mense Augusto), the second treatise with its own pagination, pp. 1-152, published together with Bošković's treatises *De lumine* and *De Lunae atmosphaera*, HAD R 624; (4) Carolus Benvenutus, *Dissertatio physica de lumine* (Vindobonae: Typis Ioannis Thomae de Trattnern, 1766), pp. 1-152, an offprint from *Dissertationes physicae tres*, HAD R 614. The citations in this article from Benvenuti's *De lumine* relate to the first edition in which the author's name is printed on the title-page,

that is, to the first Viennese edition from 1761.

¹⁶ Benvenutus, *De lumine*, n. 169, p. 85: »ut in *Synopsi Physicae Generalis* heri propugnata ostendimus«.

¹⁷ Benvenutus, *De lumine*, n. 178, p. 89: »At in *Boscovichiano* systemate de corporum compositione, quod heri protulimus, & propugnativimus, ejusmodi difficultates penitus evanescent«.

¹⁸ Benvenutus, *De lumine*, n. 183, p. 91: »ut in nuperrima *Dissertatione de continuitatis lege Boscovichii* luculenter exposuit«.

¹⁹ Benvenutus, *De lumine*, n. 183, p. 91: »ex eo principio, quod in hesterna etiam *Synopsi Physicae Generalis* protulimus«.

²⁰ Benvenutus, *De lumine*, n. 179, pp. 89-90: »Ibidem autem ostendimus, quod in secunda parte suae *Dissertationis de lumine* ostenderat *Boscovichius*, quo pacto per ejusmodi virium legem & fermentatio habeatur validissima, sine dissolutione massae, & emissio luminis cum immani velocitate, in omnibus punctis fere aequali«.

Bošković attentively followed Benvenuti's scientific work, and in the passage on light in his synthesis *Theoria philosophiae naturalis* he carefully chose his words in commenting on Benvenuti's treatise *De lumine*. In discussing the alternation of reflection and the transmission of light rays as they fall upon the border separating two mediums, Bošković called Benvenuti's work *De lumine* a glorious treatise and Benvenuti himself a very cautious writer.²¹ He was especially impressed by Benvenuti's use of the continuous curve in describing the alternating behaviour of light rays, for this sort of approach he evidently experienced as a supplement to his own theory.²² Should it be mentioned that this mutual relation between Benvenuti's *De lumine* and Bošković's *Theoria philosophiae naturalis* has never been noticed until now? In documentary accounts concerning of reception of Bošković's theory in the second half of the 18th century, there was always a place for Benvenuti's *Synopsis*, but not for Benvenuti's *De lumine* which also influenced the acceptance of Bošković's theory and, moreover, caused Bošković's return.

Statements in which Bošković and Benvenuti spoke of the many years construction of an original theory of forces clearly affirm that this relates to a mutual project between the professor of mathematics and the professor of metaphysics at the Roman College during the 1753/54 academic year. Indeed, their joint project in physics. These claims entail much more than simply bibliographical information. They indicate that there exist several levels or layers upon which the development of Bošković's theory of forces, after its first systematic exposition in *Dissertationis de lumine pars secunda* (*The Second Part of the Treatise on Light*, 1748), can be judged as a joint project between Ruder Bošković and his collaborator Carlo Benvenuti.

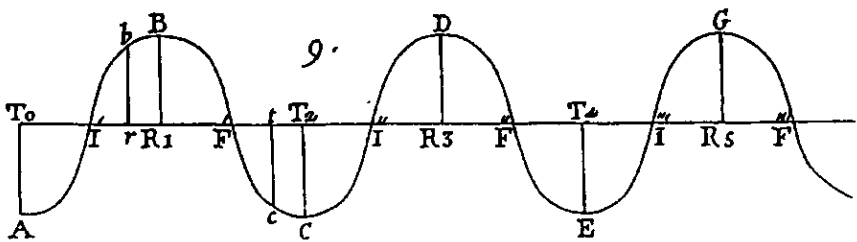


Fig. 3. Benvenuti's interpretation of the reflection of light with the help of a segment of Bošković's curve of forces. Benvenuti, *Dissertatio physica de lumine* (Vindobonae: Trattner, 1761), fig. 9. Courtesy of the Historical Archives of Dubrovnik

»The Author of Our Theory«

Benvenuti's treatise *Synopsis Physicae Generalis* is an evident example of the agreed elaboration of a theory which was jointly executed by the author and his closest adherent. Other valuable confirmations of the joint presentation of Ruder Bošković and Carlo Benvenuti can be found in those passages of Benvenuti's treatise in which he speaks of »the author of our theory«. All these passages belong to the fourth, last chapter entitled »De Corporum Principiis« (»On the Principles of Bodies«), in which Benvenuti also expounds Bošković's theory of forces, and this chapter will be discussed here.

The author of the theory, *Rogierius Boscovich*, is explicitly mentioned only once, at the very beginning of Benvenuti's exposition concerning the principles of bodies, in accordance with Benvenuti's judgement that for the *Synopsis* he chose a most suitable doctrine for the foundation of the already discovered laws of forces, a doctrine already expounded in three of Bošković's treatises: *De viribus vivis*, *De lumine* and *De continuitatis lege*.²³ Later, while discussing the centre of gravity, Benvenuti claimed that the position of the centre of gravity can be easily inferred, »which the author of the theory [*Auctor Theoriae*] amply emphasized in the aforementioned treatises and in his treatise *De centro gravitatis* (*On the Centre of Gravity*) published two years earlier.«²⁴ Given that Ruder Bošković published both editions of his treatise *De centro gravitatis* in 1751, Benvenuti indirectly discovered this when he began writing his *Synopsis* in 1753. And in the section where he inferred the properties of the centre of gravity of physical bodies, Benvenuti employed the same words for Bošković: »These same properties [of the centre of gravity] the author of our theory [*nostrae Theoriae Auctor*] most happily published by means of direct demonstrations from his own theory.«²⁵ And in the approach to the resolution of forces in nature, Benvenuti found it convenient to call upon the theory's original author himself and his position in 1745: »From this it becomes quite clear what the author of the theory [*ipse Theoriae Auctor*] himself already claimed when, for the first time, he outlined the same theory in the treatise *De viribus vivis*, that according to him there is no true resolution of forces in nature ...«²⁶ In keeping with this, when Benvenuti discussed particular cases, such as the classic example of the resolution of the weight of a ball found on a slope, he refers to Bošković's original solution derived from his basic tenet that there is no physical contact in nature, but rather that an infinitely great repulsive force acts between particles at infinitely small distances. Benvenuti can thus conclude regarding Bošković's attitude towards the classical solution: »But the author of our theory [*nostrae Theoriae Auctor*] does not need this means of escape.«²⁷

21 Rogerius Josephus Boscovich, *Theoria philosophiae naturalis* (Venetiis: Ex Typographia Remondiniana, 1763; reprint Zagreb: Liber, 1974), n. 472, p. 218: »quae omnia satis luculenter exposuit in celebri dissertatione *De Lumine* P. Carolus Benvenuti e Soc. nostra Scriptor accuratissimus«.

22 Boscovich, *Theoria*, n. 497, p. 231.

23 Benvenutus, *Synopsis*, n. 107, p. 39: »abunde constat ex superioribus, ut jam not aliud faciendum supersit, quam earum leges apta quadam ratione constituere. Illam autem maximè censemus idoneam, quam P. Rogierius Boscovich adumbravit primum in dissertatione *De Viribus vivis* anno 1745., & uberius deinceps exposuit in dissertatione *De Lumine* anno 1748. ac nuper etiam in *Dissertatione de Continuitatis lege* iterum pro-posuit,....«.

24 Benvenutus, *Synopsis*, n. 139, p. 54: »quod Auctor Theoriae abunde praestitit, & in

supra nominatis Dissertationibus, & in Dissertatione *De Centro gravitatis* duobus abhinc annis edita«.

25 Benvenutus, *Synopsis*, n. 145, p. 56: »Easdem [proprietas] tamen nostrae Theoriae Auctor felicissime sane directa demonstratione eruit ex ipsa sua Theoria,....«.

26 Benvenutus, *Synopsis*, n. 162, p. 61: »unde etiam admodum perspicuum fiet illud, quod ipse Theoriae Auctor affirmavit jam tum, cum in *Dissertatione De Viribus Vivis* Theoriam eandem primum adumbravit, nullam sibi esse veram virium resolutionem in Natura,....«.

27 Benvenutus, *Synopsis*, n. 166, p. 63; see also n. 165, p. 62: »Sic in alio exemplo, quod quidem adhibitum est contra Auctorem ipsum,....«; n. 167, p. 63: »ut hic ope suae virium Theoriae evadit ejusdem Auctor,....«.

Benvenuti's *Synopsis* was not concerned solely with a recapitulation of Bošković's ideas and proofs, but was also the first publication of new results from Bošković's scientific workshop. This appearance, altogether out of the ordinary in the scientific community, best confirms the extent to which Bošković and Benvenuti co-operated with each other in working out the theory of forces. At the beginning of the chapter on the principles of bodies, Benvenuti explicitly announced: »and with his [Bošković's] permission we shall expound that which is not yet published ...«. ²⁸ Consequently, Bošković, in the first catalogue of his works published in 1761, was able to write:

»Much of that which belongs to Father Bošković himself can be found in two treatises entitled *Synopsis Physicae Generalis* and *De lumine*, both of which were published in quarters in Rome in 1754 at the Antonio de Rubeis printing house. This is also testified by the author of these works (that is, Father Carlo Benvenuti of the same Society) who claims there that what he accepted was expounded in the same words by Father Bošković.« ²⁹

In Benvenuti's *Synopsis* a certain passage was guaranteed by Bošković's pen, the one in which he first formulates and solves the problem of the equilibrium of four points, of which the two extremes A and D have whatever masses proportional to external forces, and the force in one of the intermediate points B originates from the fulcrum (fig. 4). ³⁰ This passage, together with an illustration, was inserted by Bošković in his masterpiece *Theoria philosophiae naturalis* as the fifth appendix, ³¹ and Bošković's note to the title of the fifth appendix expressly states: »Taken from *Synopsis Physicae Generalis* by Father Carlo Benvenuti of the Society of Jesus from number 146, to whom I submitted this solution to be printed there.« ³²

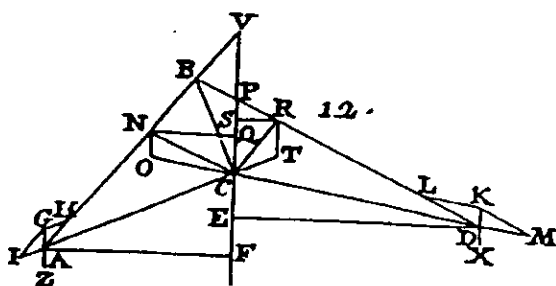


Fig. 4. Bošković's solution for the problem of the equilibrium of four points A, B, C and D: the diagram was first published in Benvenuti's *Synopsis* and later inserted in Bošković's *Theoria philosophiae naturalis*. Benvenuti, *Synopsis Physicae Generalis*, fig. 12.

Benvenuti's explicit references to the author of the theory of forces and Bošković's statements regarding his active co-operation in working out Benvenuti's *Synopsis* directly confirms Bošković's influence, but this does not speak adequately of the nature of this influence. Bošković's influence on Benvenuti's exposition of general physics can be seen fully in the structure of the fourth chapter, »De Principiis Corporum«, of Benvenuti's work:

(1) The curve which illustrates Bošković's law of forces (nn. 108–116, pp. 39–44): the flow of the curve, the limits of cohesion and non-cohesion, the finite arcs and the areas which belong to them, the types of asymptotic arcs and the magnitude of the areas which they encompass (fig. 5).

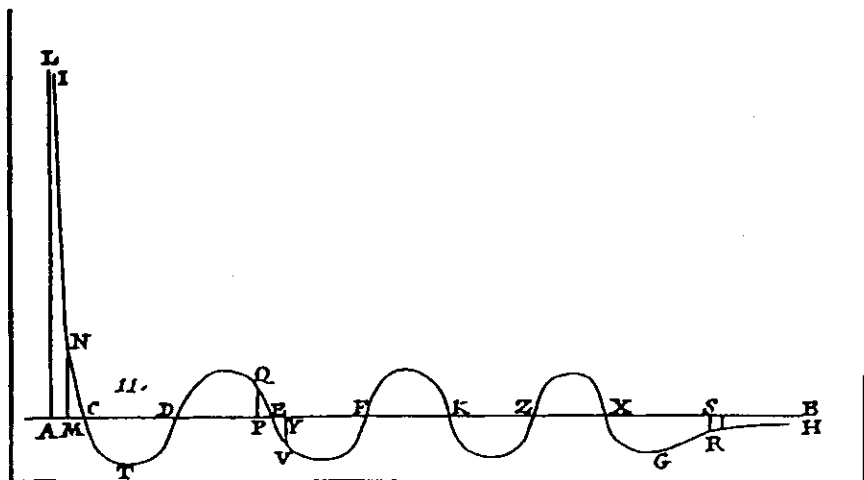


Fig. 5. The final shape of Bošković's curve of forces in Benvenuti's survey of general physics. Benvenuti, *Synopsis Physicae Generalis*, fig. 11.

(2) Reasons which demonstrate Bošković's law of forces (nn. 117-124, pp. 44-47; n.126, pp. 47-48; n. 128, pp. 48-49): the law of continuity, analogy, the critical approach towards the evidence of the senses.

(3) The general and particular properties of bodies which were successfully interpreted by Bošković's law of forces (nn. 125-195, pp. 47-81): extension, impenetrability, density and rarity, excluding leap, mobility, the existence of the centre of gravity, cohesion, difference between solid bodies and fluids, fluidity, viscosity, the equilibrium of the system of three points, difference between elastic and soft bodies, difference between extendable and soft bodies, difference between stable and unstable bodies, boiling and evaporation, rarefaction and concentration, homogeneity and heterogeneity, dissolution, sedimentation, crystalization.

On the basis of comparing Benvenuti's writings with Bošković's earlier treatises, it is easy to conclude that Benvenuti's order of the exposition of the principles of bodies is in fact the deductive form of exposition for the theory of forces which Bošković applied in his treatise *Dissertationis de lumine pars secunda*, and used again later in a condensed version at

28
Benvenuti, *Synopsis*, n. 107, p. 39: »& aliqua etiam nondum vulgata ejusdem permissu proferemus,...«.

30
Benvenuti, *Synopsis*, nn. 146-152, pp. 56-59, fig. 12.

31
»De aequilibrio binarum massarum con- nexarum invicem per bina alia puncta«, supplementum V., in Boscovich, *Theoria*, nn. 86-92 for supplements, pp. 293-296, fig. 75.

32
Boscovich, *Theoria*, p. 293, note f): »Excerpta haec sunt ex *Synopsi Physicae Generalis* P. Caroli Benvenuti Soc. Jesu num. 146, cui hanc solutionem ibi imprimendam tradideram.«.

29
»Catalogus operum P. Rogerii Josephi Bos- covich S. J. impressorum usque ad initium anni 1761.«, in Rogerius Josephus Boscovich, *De Solis ac Lunae defectibus libri V.* (Venetiis: Typis Antonii Zatta, 1761), p. XIX; here Bošković explicitly guarantees that Carlo Ben- venuti is the author of two Roman treatises, *Synopsis Physicae Generalis* and *De Lumine* published in 1754.

the end of his treatise *De continuitatis lege*.³³ In this instance, we can even probably speak of a distribution of tasks within a joint project. In the second part of his treatise *De lumine* (1748) Bošković formulated his law of forces depending on distance, describing it with a curve which from then has maintained a constant shape, called *curva Boscovichiana*. This final shape of the curve of forces Benvenuti adopted in the first section of his own exposition (fig. 5). Benvenuti's approach in the *Synopsis* is complementary to Bošković's procedure in *De continuitatis lege*. The treatise *De continuitatis lege* Bošković in fact devoted to the reasons that demonstrate his law of forces, mainly the law of continuity, and only in one paragraph did he cite a list of general and particular properties which are successfully explained by a unique law of forces: impenetrability, gravitation, different types of cohesion, the difference between elastic and soft bodies, the difference between solid bodies and liquids, boiling, flammability, evaporation, the emission of light, whatever form of rays from solid continuous mass upon which chemical operations depend, nourishment and natural processes.³⁴ Benvenuti in his own account of general physics summarized Bošković's reasons for the general validity of his law of forces in a few pages, so that he could devote the bulk of his work to elaborating the general and particular properties of bodies. Although he followed Bošković's list of properties for physical bodies in *De continuitatis lege*, Benvenuti's and Bošković's lists of properties nevertheless do not totally correspond.

Even though Benvenuti publicly announced that his *Synopsis* is an elaboration of Bošković's theory of forces, both written echoes of the 'Benvenuti case', which have been preserved to this day, have assigned the main role to the professor of metaphysics, Carlo Benvenuti. An unknown journalist wrote in his note in the Florentine journal *Giornale de' Letterati* that Benvenuti, following the clear outline of philosopher and geometrician Bošković, had established a whole new system of physics, and Giulio Cesare Cordara, an annalist at the Roman College, testified to how Benvenuti in his treatise *Synopsis Physicae Generalis* exerted so much effort only so that *Benvenuti's philosophy*, interestingly not physics (!), would become the model for every other Italian university administered by the Jesuits.³⁵ How do we explain these records in which Benvenuti plays the main role and Bošković is present only in the background? Here is one answer! Those well informed and powerful Fathers, that decided to attack and thwart Bošković's philosophy within the Jesuit Order, decided to denounce this philosophy as Benvenuti's philosophy. It was much easier to eliminate Bošković's adherent, Benvenuti, as a young unknown scientist and thereby achieve their desired goal. Furthermore, according to the annalist Cordara, this *argumentum ad hominem* of the insignificant scientist was also utilized before Pope Benedict XIV, but the Pope disentangled the 'Benvenuti case' by publicly humiliating Benvenuti's superiors.³⁶ The Pope decided that Benvenuti, who in his exposition of metaphysics did not, according to his superiors, in prescribed measures sufficiently lean towards the tested and proven ways of Aristotle's doctrine, should write a book against the perilous teachings with which the philosophers of the time were denying supernatural faith! But Benvenuti, a skilled writer who, after the Pope's judgement, lectured in liturgics at the department of theology within the Roman College, never wrote such a work. That is why those who decided to defend Bošković's philosophy had to defend it also as Benvenuti's, that is in accordance with the tactics imposed by stronger attackers.

In its social dimension, the 'Benvenuti case' was used within the community of Roman Jesuits, and especially among professors of the Roman College, to affirm the balance of power between those who were for and against the new natural philosophy. It is not possible to imagine a clearer and more vocal message given to Bošković concerning their position on his theory of forces. Even though during the following academic year he lectured in mathematics at the Roman College, the 'Benvenuti case' signaled Bošković's departure from Rome, but with this also a reprieve from the many duties he was burdened with as a public professor of mathematics. Even so, we cannot neglect two of his unrealized ambitions: the writing of the fourth volume for his mathematical textbook *Elementa universae matheseos* (*The Elements of Universal Mathematics*), in which he hoped to elaborate the infinitesimal calculus (which would have had a far reaching impact on his work in mathematics and theoretical astronomy), and the building of an astronomical observatory at the Roman College. However, this second proposed project he took up later with the founding of the Brera Observatory in Milan.

The Intelligent Reception of Bošković's Most Provocative Ideas: The Structure of Matter and the Structure of the Universe

Benvenuti in the fourth chapter, »De Corporum Principiis«, of his *Synopsis* worked out the application of Bošković's theory of forces to the general and particular properties of physical bodies. Within natural scientific knowledge of the mid 18th century, this entailed the application of the new theory to general physics, as claimed by Ruder Bošković in his synthesis: »Here, I shall more orderly follow that which is concerned with physics itself, and I shall first deal with the general properties of bodies, ...«³⁷ Therefore, the third part of Bošković's renowned work *Theoria philosophiae naturalis* is titled »Applicatio Theoriae ad Physicam« (»The

33

Rogierus Josephus Boscovich, *Dissertationis de lumine pars secunda* (Romae: Typis Antonii de Rubeis, 1748), deduction of the theory of forces in nn. 2-9, pp. 2-4; cfr. Ivica Martinović, »The fundamental deductive chain of Bošković's natural philosophy«, in Valentin Požaić (ed.), *The philosophy of science of Ruder Bošković: Proceedings of the symposium of the Institute of Philosophy and Theology S.J.* (Zagreb: Institute of Philosophy and Theology, 1987), pp. 65-99, on pp. 84-93; Boscovich, *De continuitatis lege*, deduction of the theory of forces in nn. 159-170, pp. 73-79.

34

Boscovich, *De continuitatis lege*, n. 170, p. 79.

35

Anonimo, »Novella da Roma«, *Giornale de' Letterati* (Firenze, 1754), in Agostino Faggiotto, »Benedetto XIV e il 'caso Benvenuti', *Atti del I Congresso di Studi Romani* (Roma, 1928), p. 485: »...P. Benvenuti, che seguitando le tracce luminose del P. Boscovich, Filosofo e Geometra di primo ordine

nelle sue dissertazioni *De viribus vivis*, *De aestu maris*, etc. stabilisce un sistema affatto nuovo di fisica...«; Julius Cordara, *De suis ac suorum rebus aliisque suorum temporum usque ad occasum Societatis Jesu commentarii*, a cura di Giuseppe Albertotti e di Agostino Faggiotto (Turin: Fratelli Bocca, 1932), p. 181: »... Benvenutus, excellentis ingenii vir, patria Liburnensis,..., meditans singula, excerpens optima, potiora recentium philosophorum theorematum ita pertractavit, explicuitque, ut ejus philosophia caeteris deinde Italicis Jesuitarum scholis exemplo fuerit«. See appendix-1 and 2 in this article, with complete translation of these two sources and accompanied comments.

36

Cordara, *De suis ac suorum rebus...commentarii*, p. 183.

37

Boscovich, *Theoria*, n. 358, p. 164: »at hic, quae pertinent ad ipsam Physicam, ordinatius persequar; & primo quidem de generalibus agam proprietatibus corporum...«.

Application of the Theory to Physics»). From here it is possible to evaluate the position of Benvenuti's *Synopsis* in the application of Bošković's theory of forces to mechanics and physics. The *Synopsis* finds itself half-way on the path, which begins as the first systematic attempt at interpreting the general properties of bodies by means of Bošković's curve of forces in the second part of Bošković's *De lumine* (1748), and is crowned by the third part of Bošković's masterpiece *Theoria* (1758).

Benvenuti's manuscript is distinguished, in its selection of themes, by its intelligent recognition of Bošković's most provocative ideas. Benvenuti, namely, in his own exposition of the principles of bodies inserted two of Bošković's problems, which even today, after two and a half centuries, we experience as imaginative thought experiments: the structure of matter and the structure of the universe.

When Bošković in the second part of his treatise *De lumine* explained the cohesion of matter, followed by an account of the solidity and fluidity of bodies, he approached the most simple case which excited him with its elegant consequences.³⁸ In investigating the equilibrium state of a system made by three points which do not lie on the same straight-line, such as points A, B and I in his diagram (fig. 6), and since the two points A and B have a position given in advance, he sought after the equilibrium state of the third point I of the system. By means of his curve of forces, Bošković discovered the equilibrium states of the third point in the vertices of the ellipse where the first two points of the system are placed at the foci of the same ellipse. He did not stop here, but rather generalized his conclusion to his planimetric and spatial idea. Questioning the power of analogical thinking, Bošković stated that the equilibrium states of the third point of a system can be considered as the entire perimeters in the system of confocal ellipses and, more generally, whole surfaces in the system of confocal spheroids. This spatial idea, which Bošković surprisingly afterwards never elaborated or mentioned (not even in his synthesis of natural philosophy *Theoria philosophiae naturalis*), is very similar to Bohr's model of the hydrogen atom from 1913. As I have already stated, it deserves to be called Bošković's 'model of an atom' from 1748.³⁹

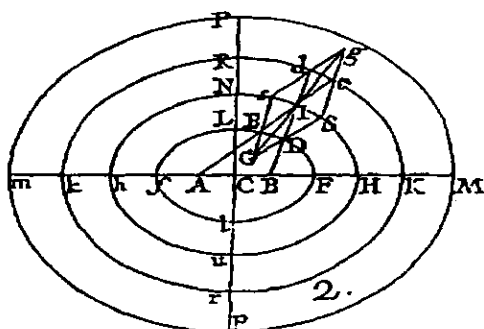


Fig. 6. Bošković's 'model of an atom' from 1748: surfaces of confocal ellipsoids as the equilibrium states of the third point of the system. Boscovich, *Dissertationis de lumine pars secunda* (Romae: Typis Antonii de Rubeis, 1748), fig. 2. Courtesy of the Historical Archives (Historijski arhiv), Dubrovnik, sig. HAD R 547/4.

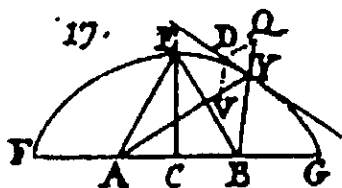


Fig. 7. Benvenuti's detail to be illustrated Bošković's first analogy: the vertices of an ellipse as the equilibrium states of the third point of the system. Benvenuti, *Synopsis Physicae Generalis*, fig. 17.

The earliest reception of this valuable insight by Bošković's is found precisely in Benvenuti's *Synopsis*.⁴⁰ When inserting Bošković's solution to the problem of three points, Benvenuti's effort to comprehensively explain the general properties of physical bodies was decisive. Similar to Bošković in *De lumine*, Benvenuti in the *Synopsis* was prompted by the explanation of cohesion and the differentiation of solid bodies and fluids, that is, was inspired by the opposition of the properties *soliditas* – *fluiditas*. Benvenuti fully carried out Bošković's first analogy between the null-points of the curve of forces (fig. 5) and the equilibrium states of the third point of the system. Two points A and B of the system are placed in the foci of the ellipse, but the third point Y is placed in any point on the perimeter of the ellipse outside its vertices (fig. 7). The third point Y, »placed in any other point on the perimeter of an ellipse, will endeavour to move along the tangent towards the most approximate vertex of the conjugate axis.«⁴¹ And this is, in fact, the statement which Bošković in *De lumine* called a 'theorem'.

Two paths follow from this basic claim. The first, with which Benvenuti is expressly concerned, opens up the possibility of understanding how the particles of a solid body, set in motion by a large external force, could leave their position of equilibrium and become particles of fluid. The second path, together with the application of manifold analogies, leads to the spatial idea of Bošković's 'model of an atom', and Benvenuti is content with this in that he draws the attention of the reader of the *Synopsis* to the the source:

»Furthermore, in the aforementioned treatise *De lumine* [by Ruđer Bošković, from 1748] from which we have selected all this for a more generous display of the subject, it will be possible so far as the combinations of three points are concerned to see the consequences of the most elegant case, and particular manifold analogy which take place between the limits of *cohesion* and *non-cohesion* which [the limits] exist also at the axis AB in figure 11 [fig. 5 of this article] in relation to only two points, and at the vertices of the ellipse on both axes in figure 17 [fig. 7 of this article].«⁴²

³⁸ Boscovich, *Dissertationis de lumine pars secunda*, nn. 25–32, pp. 12–15.

³⁹ See the historical context and methodological explanation of Bošković's »model of an atom« in Ivica Martinović, »Boscovich's 'model of atom' from 1748«, in Michele Bossi and Pasquale Tucci (eds), *Bicentennial commemoration of R. G. Boscovich*, Milano, September 15–18, 1987: *Proceedings* (Milano: Unicopli, 1988), pp. 203–214.

⁴⁰ Benvenuti, *Synopsis*, nn. 177–178, pp. 69–71.

⁴¹ Benvenuti, *Synopsis*, n. 177, p. 70: »ac in quovis alio perimetri puncto constitutum regredi conabitur per tangentem versus proximum verticem axis conjugati«.

⁴² Benvenuti, *Synopsis*, n. 178, pp. 70–71.

Benvenuti, evidently, was not fascinated by what Bošković termed, already in 1748, the »most elegant consequences of the most simple case« (*simplicissimi casus elegantissima consecraria*),⁴³ and this means that he did not note the beauty of Bošković's spatial idea for the equilibrium states of a system formed by three points. Even so, Benvenuti showed himself to be a very attentive reader of Bošković's early treatises. Bošković's listing of properties for physical bodies in *De continuitatis lege* does not contain the problem of three points, thus Benvenuti encroached on this problem for a more complete understanding of the difference between solid bodies and fluids in the light of Bošković's theory. Together with this, it appears that Benvenuti's illustration pleased Bošković. The basic claim of the first analogy, which Bošković called a 'theorem', Benvenuti showed in a separate illustration, which displayed greater detail than Bošković's diagram in *De lumine*. Bošković saw the advantages of this detail and elaborated it further in his own synthesis. Instead of showing just half the ellipse, he outlined the whole ellipse and presented two possibilities of the moving away of the third point of the system, moving along the tangent towards the vertex of the major or minor axis. In this way, Bošković's *Theoria* contains two illustrations, and Benvenuti's detail and Bošković's whole, both in their refined forms (fig. 8).

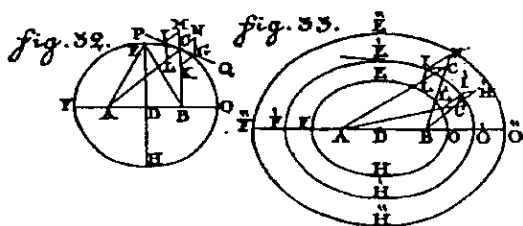


Fig. 8. Benvenuti's detail (1754) and Bošković's whole (1748) on the third graphic plate of Bošković's philosophical synthesis. Boscovich, *Theoria philosophiae naturalis* (Venetils: Remondini, 1763), fig. 32 and fig. 33.

The question of the structure of the universe Bošković first made in his treatise *De viribus vivis* when explaining his continuous curve of forces. Faithful to his earlier adopted epistemological principle of analogy and the simplicity of nature, he took this opportunity to ask the same questions regarding the structure of both the micro and macro worlds, that is, the structure of matter and the structure of the universe. Bošković's answers to these questions were not of equal demonstrative strength. In investigating the structure of matter as the classical question *compositio particularum majorum ex minoribus*, Bošković came to his key conclusion of his natural philosophy on the indivisible points of matter endowed with forces, located at the limits of attraction and repulsion, so that three years later in his treatise *De lumine* he outlined his 'model of an atom'. His opinion, however, of the structure of the universe Bošković articulated as a series of questions, leaving them unanswered in *De viribus vivis*:

»Given that fixed stars are placed in some limits of attraction and repulsion in the same way [just as larger particles are composed of smaller ones], what if the curve, that is KIH [arc GRH in fig. 5], both at the smallest and at the largest distances beyond all planets, recedes essentially from this hyperbola which expresses gravitation decreasing in inverse proportion to the square of the distance and again intersects the axis, maybe even at many other points? Would they not be ordered approximately at the same distance, and would they not mutually act upon one another so that the entire world would be so composed as one of these larger particles? Why would not that be the reason why they are so immensely distant from us and alternately placed? Why would not comets, which recede entirely when they are near us when entering the planetary system due to forces which are in inverse proportion to the square of the distance, describe curves that completely approach parabolas or ellipses? ...«⁴⁴

Two years later, in the treatise *De maris aestu*, Bošković was more definite in answering only one of these questions, namely that of fixed stars. He described, but did not then or later illustrate, a new version of his curve of forces according to which fixed stars took their equilibrium positions at the intersections of the curve beyond the gravitational arc GRH (fig. 5):

»It is also possible to conceive one single force between individual particles of matter which at greater distances would decrease in inverse proportion to the square of the distance and express gravitation. But at smaller and also at very large distances, it would change in the mode of ordinates for any curves which we dealt with in the treatise *De viribus vivis* two years ago [1745], where we also demonstrated how it could happen that all fixed stars would be stable in equilibrium.«⁴⁵

Regarding forces at large distances which separate us from fixed stars, Bošković leans only on the power of analogy in both cases. The action of force at the 'smallest' and 'largest' distances, hence the action of force in both areas, for which, according to Bošković's conviction, Newton's law of general gravity does not hold, would be described by means of the arcs of Bošković's curve having the same shape. Here, Bošković is very cautious. Questions like »Why should not?«, as found in a passage of Bošković's treatise *De viribus vivis*, have no place in the scientist's manuscript, but they opened the door for Benvenuti into Bošković's scientific workshop. On account of his careful study of Bošković's earlier works, Benvenuti was able to ask Bošković directly what he thought of his own ideas at that moment, after which he decided to insert this detail in his description of Bošković's curve of forces:

»It can also happen that the arc [GRH in fig. 5], just as it recedes at the smallest intervals from the hyperbolic shape of this arc, it will diverge from this shape at the largest distances, like those between us and fixed stars, given that it will move away from the axis, or intersect the axis again and bend around it toward a new route, so that attractive forces, which at smallest distances infinitely recede from the inverse proportion to the square of the distance, grow not only into infinity, but reach zero and then transform into repulsive forces, namely the attractive forces over those greatest of intervals, which must decrease over any limit but never disappear, would grow or disappear or transform into negative.«⁴⁶

⁴³ Boscovich, *Dissertationis de lumine pars secunda*, n. 26, p. 12.

⁴⁴ Boscovich, *De viribus vivis*, n. 59, p. 44.

⁴⁵ Rogerius Josephus Boscovich, *De maris aestu* (Romae: Ex Typographia Komarek in Via Cursus, 1747), n. 35, p. 15.

⁴⁶ Benvenuti, *Synopsis*, n. 114, p. 42.

Benvenuti also introduced the action of forces at the greatest of distances by way of analogy. This means that he appropriated the methodological background of Bošković's ideas. Further on in *Synopsis*, when analysing the difficulties involved with understanding Newton's gravitation, Benvenuti does not conceal his fundamental methodological question which imposes Bošković's conception regarding the distribution of fixed stars at the null-points of the curve of forces:

»Whether the last, almost hyperbolic branch [of Bošković's curve] at very large distances intersects the axis again, we cannot define directly from the phenomena. Within our solar system it is certainly preserved in this state so that it does not differ from the hyperbolic state and, therefore, does not intersect the axis. Nevertheless, perhaps the curve and axis will meet at those immense distances where fixed stars recede mutually, and, therefore, the difficulty that is customarily brought up against the theory of general gravitation will be removed.«⁴⁷

In general physics, Benvenuti followed the modern scientific ideal of »define immediately from phenomena« (*immediate ex phaenomenis definire*). Benvenuti's position reechoes Bošković's statement made at the time his curve of forces first took shape: »In truth, the nature of these curves, as well as the points through which they pass [the intersections with the axis] should be researched from phenomena.«⁴⁸ Under those circumstances where this demand could not be met, Benvenuti decided to cautiously present Bošković's ingenuity.

Conclusion

Carlo Benvenuti's work *Synopsis Physicae Generalis* (1754), and particularly its fourth chapter »De Corporum Principiis«, which comprises half of this edition, is the first work that exposed Bošković's theory of forces. According to Bošković's own evaluation, it furthered the application of Bošković's theory to general physics, and that on the basis of the study of Bošković's early treatises from the period 1745–1754 and before the publication of Bošković's masterpiece *Theoria philosophiae naturalis* (1758). Benvenuti's *Synopsis*, therefore, should be considered a component part of the development of Bošković's theory of forces, crowned by Bošković's famous *Theoria*. Bošković's treatise *De continuitatis lege* and Benvenuti's *Synopsis*, both published in 1754, are complementary in content and represent the result of an agreed and conceived distribution of tasks within the common project of two scholars. Bošković focused on proofs of the principle of continuity as the foundational principle of his theory of forces, and Benvenuti intended to elaborate the application of Bošković's theory to the general and special properties of physical bodies.

In *Synopsis*, Benvenuti, on only one occasion, explicitly named Bošković as the true originator of the theory. In later works, Bošković himself gave testimony to his active co-operation in the creation of Benvenuti's text. Indeed, Benvenuti for the first time published, in *Synopsis*, certain new results which emerged out of Bošković's scientific workshop. Bošković's influence on Benvenuti's exposition of general physics is best reflected in the structure of the chapter entitled »De Corporum Principiis«:

- (1) a curve describing Bošković's law of forces;
- (2) argumentation in support of Bošković's law of forces;

(3) general and special properties of physical bodies successfully explained by Bošković's law of forces.

Benvenuti, in displaying great sensitivity, recognised and exposed the two most provocative insights of Ruder Bošković as the *nostrae Theoriae Auctor*:

(1) the idea about the placing of fixed stars at the null-points of Bošković's curve of forces, formulated by Bošković as an open problem;

(2) the 'model of an atom' from 1748, developed with the help of mathematical means and formulated in the basic theorem that was later analogously generalised to the spatial conception of the equilibrium states of the third point of a system.

In addition, Benvenuti's treatise *De lumine* (1754), thanks to the first Roman and three Viennese editions, contributed to the reception of Bošković's theory of forces in the form of earlier accounts published in *Dissertationis de lumine pars secunda* (1748) and *De continuitatis lege* (1754). In other words, there is not only one single flow of reception of Bošković's theory. Parallel to the main stream, inspired by Bošković's *Theoria philosophiae naturalis* (1758), there were also complementary flows arising from Bošković's early treatises.

Looked at from a social dimension, the attacks of the religious superiors on Benvenuti's *Synopsis*, causing the removal of Benvenuti from the chair of metaphysics at the Roman College, was in reality a veiled attack on Bošković's natural philosophy. Having revealed the pros and cons of the philosophical novelties among the Jesuits of the Roman community at the end of the academic year 1753/1754, these attacks finally influenced Bošković's later retirement from the Roman chair of mathematics.

Translated by
Marko Ivković

47
Benvenutus, *Synopsis*, n. 170, p. 65.

48
Boscovich, *De viribus vivis*, n. 56, p. 42. Cfr.
Martinović, »The fundamental deductive chain

of Bošković's natural philosophy«, especially
the chapter »The continuous curve of forces«, pp. 71-79.

Appendix 1

An Anonymous Correspondent

Novelty from Rome:

A New System of Physics

Following the Clear Outlines of Father Bošković

Fr. Benvenuti¹ of the Society of Jesus, a lecturer in philosophy at the Roman Seminary,² in order to complete his philosophical course in August of this same 1754, prepared for defence certain public theses gathered together in a comprehensive booklet in quarters with the title *Synopsis Physicae Generalis*.³ This entire review is divided into 195 paragraphs in which are extensively discussed: I. on the principal properties of bodies; II. on their weight; III. on the various differences between bodies, their changes and transformations; IV. on their principles.⁴

The correspondent with particular satisfaction read these theses, from which everyone will be able to draw a conclusion about the special skill of Fr. Benvenuti in matters pertaining to physics and geometry. He has, following the clear outlines of Fr. Bošković, a first class philosopher and geometrician in the treatises *De viribus vivis*, *De maris aestu* etc.,⁵ established a completely new system of physics⁶ in which he proposed new laws maintaining this system. Praises of approval from Rome were great, and Fr. Benvenuti was assigned to take on another duty elsewhere.⁷ His manner of philosophizing was not approved of by some of those to whom it did not appeal: *quae juvenes didicere, senes perdenda fateri*.⁸

In order that Fr. Benvenuti should not leave Rome, the High Priest⁹ has assigned him to the chair of liturgics, recently left vacant due to the departure of the Portugese Fr. Azevedo from Rome.¹⁰ We therefore hope that he will be given another duty more adequate to the knowledge of physics and geometry which Fr. Benvenuti possesses, and in exercises which would highlight the sublime talent with which he is gifted.

Anonimo, »Novella da Roma«, *Giornale de'Letterati* (Firenze, 1754); again published in: Agostino Faggiotto, »Benedetto XIV e il 'caso Benvenuti'«, *Atti del I Congresso di Studi Romani* (Roma, 1928), pp. 485-495, on p. 485.

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¹ Carlo Benvenuti (Livorno, 1716 – Warsaw, 1797), Jesuit (1732–1773), professor of mathematics at the Roman College during the time when Bošković was absent from Rome while taking geodetic measurements along the Rome–Rimini meridian (1750/51), professor of physics and metaphysics at the Roman College (1752–54), professor of liturgics at the Roman College (1754–60), *scriptor de rebus Sacrae Congregationis*, master of liturgical questions (1761–1773), and guest of the Potocki family in Warsaw after the suppression of the Society of Jesus.

² It would be correct to say: the professor of metaphysics at the Roman College. This same institution, if thought of as a teaching institution, is called a college, but if thought of as an educational institution and religious community is denoted as a seminary. The correspondent could also have been deceived by the title-page of the edition, on which, quite out of the ordinary, is stated that the two alumni exposed an outline of general physics at the Roman Seminary, instead of the Roman College.

³ *Synopsis Physicae Generalis quam in Seminario Romano ad disserendum proposuit D. Joseph Joachimus a Vereterra, et Agurto e Marchionibus Castagnagae ejusdem Seminarii convictor, atque academicus redivivus* (Romae: Typis Antonii de Rubeis apud Pantheon in Via Seminarii Romani, 1754), pp. 1–81, tab. 1, fig. 1–17. As usual, the title-page of the edition prepared for the solemn defence at the end of the academic year, it does not contain any information on the actual author, professor Carlo Benvenuti, and his main collaborator in its preparation, professor Ruder Bošković.

⁴ The correspondent evidently translates the chapter titles of Benvenuti's work into Italian: »De Primariis Corporum Proprietatibus«, pp. 1–6; »De Corporum Gravitate«, pp. 6–25; »De Diversis Corporum Differentiis,

eorumque Alterationibus, & Transformationibus«, pp. 25–38; »De Corporum Principiis«, pp. 38–81.

⁵ The correspondent explicitly mentions two of Bošković's treatises which Benvenuti quotes in *Synopsis: De viribus vivis* (1745) and *De maris aestu* (1747). If the correspondent had attended to Benvenuti's statements, then the sequence of treatises, in which Bošković exposed the framework of his theory of forces, would read: *De viribus vivis* (1745), *Dissertationis de lumine pars secunda* (1748), *De continuitatis lege* (1754). Cfr. Benvenuti, *Synopsis Physicae Generalis*, p. 39, n. 107.

⁶ The anonymous correspondent ascribes to Benvenuti a new system of physics, to be sure unjustifiably, but congruently with his plea for Fr. Benvenuti to be assigned a position suitable to his knowledge of physics and geometry, seen in the last sentence of this report from Rome.

⁷ On the proposal of Fr. Centurione and according to the decision of Fr. Ignazio Visconti, the superior general of the Society, Benvenuti should have been removed from the chair of metaphysics at the Roman College and exiled from Rome.

⁸ *What the young have learnt, that is what the old recognise as that which must fall.* A proverb aimed at the influential conservative faction of the Roman Jesuit community, which had the main bastion in the general administration of the Society of Jesus.

⁹ Pope Benedict XIV.

¹⁰ Emmanuel de Azevedo, a Portuguese Jesuit, the founder of the chair of liturgics within the theological department of the Roman College (1748–1754).

Appendix 2

Giulio Cesare Cordara

The Veiled Attack on Bošković's Philosophy:

A Passage From the Annals of the Roman College

To return to that from which I have drifted a little, I shall report on what is a new, or certainly a rare, example among the Jesuits. And this affair, if the superiors¹ had listened to me, could have and perhaps would have been avoided. But prior to this, we should recall the new decree that I mentioned above, which the General Congregation issued concerning the transformation of studies.² And this decree commanded the professors of the Society to lecture all that is new and certain, while still preserving the primary chapters to Aristotelian philosophy from which it was not permitted to retreat or completely abstain.

Following this decree, Benvenuti,³ a man of exceptional ability, originally from Livorno, was the first to lecture in philosophy at the Roman College. Given that he had at his disposal within the inner domestic library⁴ all the selected works of renowned European academies, he reflected, being interested day and night, on single theorems and, selecting the best, investigated and explained the preferable theorems of recent philosophers so that his philosophy⁵ could be a model for other Italian Jesuit schools.⁶ When at the end of his three years course one of his students⁷ held a public discussion, as is the custom,⁸ the booklet⁹ was distributed amongst all the gathered members of the entire Order. No one had ever seen it before,¹⁰ and in it are, evidently, very scientifically expounded almost everything new and until then inconceivable.¹¹

It also contained something Aristotelian and ancient, but Benvenuti very rarely touched on this and very prudely inserted it so that one can hardly distinguish it in the abundance of other things.

At this meeting were present major superiors of the Society, all very respected Fathers, above all others Luigi Centurione, who at the time was the assessor to the superior general of the Order for the Italian provinces, and later himself became the supreme head of the Order.¹² And he, leafing through the book, as it happened, sporadically reading about light, sound, the motion of bodies, mutual attraction, the force of inertia, centrifugal and centripetal force, electrical forces and other exact matters of this type up to Newton's interpretations,¹³ marvelling at the abundance and variety of unusual things, he nevertheless sought out whether there is anything on first matter, substantial forms, accidents and absolutes.¹⁴ When he attentively studied, he did not deliberate on any of this (namely, as I have mentioned, there was little of this, and so much was mixed up with other things that they could hardly be distinguished), and he rightly held that the decree [of the transformation of studies] was violated. He thus testified against Benvenuti as a scorner of the law and his defiance towards senior powers. He stated that the imprudent man should be punished, who dared to publicly, indeed before the very eyes of the superior general, and so unashamedly violate the newest and holiest law. I shall not say too much. The superior general was so angered with the aforementioned that he, punishing him for stubbornness, commanded that Benvenuti be exiled from

1
Firstly the powerful Fr. Luigi Centurione, who the well informed Cordara tried to influence, as is seen in Cordara's records in the annals.

2
The 17th General Congregation, held 1751, brought about the decree on the education of young students. With this ruling, a medium path between the traditional and modern was confirmed, that is, between the speculative philosophies of Aristotle and Thomas Aquinas, and the theoretical and experimental physics developed in the 17th and 18th centuries. Ignazio Visconti, chosen as the superior general at the 17th General Congregation, directed a letter to the superiors on August 14, 1752, concerning the new organisation of philosophical studies, with detailed instructions for the implementation of the new decree. See Enrico Rosa, *I Gesuiti dalle origini ai nostri giorni*, 3a edizione riveduta ed aggiornata da Angelo Martini (Roma: La Civiltà Cattolica, 1957), pp. 247-248.

3
During the 1752/53 academic year, at the start of which General Visconti directed his letter, Benvenuti for the first time lectured in physics, according to Bošković's theory, and in metaphysics during the following year. Both subjects were conducted within the framework of philosophical studies, and in view of this Cordara's statements were correct. For the remaining biographical data on Benvenuti, see note 1 in Appendix 1.

4
The professors of the Roman College had at their disposal three libraries: *Bibliotheca maior*, *Bibliotheca Secreta* and *Bibliotheca PP. Coll. Rom. Societ. Jesu*, as I had already established when I researched the *ex libris* in the philosophical and scientific works within the library holdings of the Roman College, which are today kept in the Biblioteca Nazionale Centrale Vittorio Emanuele II in Rome.

5
In fact Bošković's theory. Cordara, to whom the relationships and influences in the common room of the Roman College were well known, avoided mentioning Bošković's name. In his booklet, Benvenuti behaved differently, explicitly stating in several places how he followed that which »the author of our theory«, i.e. Bošković, formulated. Cfr. Benvenutus, *Synopsis Physicae Generalis*, n. 139, p. 54: »Auctor Theoriae«; n. 145, p. 56: »nostrae Theoriae Auctor«; n. 162, p. 61: »ipse Theoriae Auctor«; n. 165, p. 62.

6
The Roman College had a reputation of the central university of the Society of Jesus. Therefore, works affirmed by the professors of the Roman College were sure to have ex-

traordinarily quick reception. In this way, the immediate impact of Bošković's ideas throughout Jesuit colleges across Europe can be well understood.

7
Joseph Joachimus a Vereterra, as his name is cited on the title-page of Benvenuti's treatise *Synopsis Physicae Generalis*.

8
In agreement with the rulings of the Jesuit pedagogical statutes *Ratio Studiorum*.

9
This was Benvenuti's treatise *Synopsis Physicae Generalis*, of which the complete bibliographical information can be found under the note 3 of Appendix 1.

10
This information is not credible, for the edition of Benvenuti's booklet was accompanied by two *imprimatur* at the end of the edition.

11
Cordara exaggerates here, for Benvenuti in his own publication explicitly calls on Bošković's earlier treatises, which were also presented for solemn defence at the end of the academic year at the Roman College: *De viribus vivis* (1745), *De maris aestu* (1747), *Dissertationis de lumine pars secunda* (1748), *De centro gravitatis* (1751), *De continuitatis lege* (1754). Emphasizing Benvenuti's originality, Cordara was convinced that he deserved punishment, even though, as will be seen in the subsequent records in his annals of the Roman College, he intervened in order to lessen the penalty or even abolish it so as to avoid a division among professors of the Roman College.

12
Luigi Centurione (1686-1757), the assistant of the superior general of the Order (*Assessor Vicecomitis Generalis Praepositi*) for the Italian provinces from 1751, but in 1755, a year after the 'Benvenuti case', elected the superior general.

13
Cordara lists many physical phenomena and concepts which Centurione could find in Benvenuti's text, including also Newtonian interpretations of phenomena, but he shrewdly hushed up the fact that Benvenuti's *Synopsis* elaborated Bošković's theory of forces.

14
The philosophical terms belonging to Aristotle's doctrine on matter and form, exactly hylomorphism, which during the centuries were unavoidable in the scholastic discipline of *philosophia naturalis*.

the City [Rome] and sent into the province, and with that he revoked Benvenuti's task of teaching (*munus docendi*).¹⁵

This matter was not exactly unanimously accepted in the Roman College. Many of them, compelled to respect the commands of the superior general, nevertheless questioned in wonder, and in silence concealed their feelings in their souls. And Benvenuti's friends and protectors, of which there were only a few, but mainly among the most learned, spoke out openly. Such a member and so merited for the Society, they claimed, should not be punished, but rather distinguished, promoted and rewarded. What is more unworthy than to prohibit the teaching of one who is very well suited to administer the duty of teaching?

In all, it seemed that the matter was heading towards a revolt. The factious party was led by Ruder Bošković, that most capable mathematician, but also a man of unrestrained nature and excessive in all matters embedded in his soul.¹⁶ He threatened that he, if Benvenuti were removed from the Roman College, would also leave voluntarily, and with him perhaps other excellent [professors]. He maintained that with this the superior general¹⁷ should be frightened, and thus make him withdraw his decision. Having been informed of this by Bošković himself, I intended to try, if I only could, to calm these waves already set into motion, and avert the causes of an even greater storm. That is why I, given that Centurione has pledged to rule towards me with friendship and confidence, exerted myself, having found the right moment and slowly imposed a conversation concerning Benvenuti, in convincing him that the Roman College would suffer greatly should he deprive it of such a learned member, and far greater damage would occur should Bošković and other learned members depart. To this he said: »Let them all freely go, as far as I am concerned. Jesuits, regardless of how learned, if they are not obedient are detrimental to the Society and should not be endured«. »But«, I answered, »I do not see what was done disobediently by Benvenuti who sufficiently expounded Aristotle's doctrine«. »It was, thus«, he replied, »sufficient to fool the authorities and conduct himself hypocritically. Indeed, there is almost very little, and he only mentioned in passing that which must be essential to the schools of the Society«. That is how, namely, he thought of these matters, or perhaps after the long quarrels during council consultations. Given that the reasons had not changed anything, I warned: »But at least reflect upon that what you are doing! I am afraid your accomplishment may succeed too well. What, namely, if the factions call upon the Pope? What if the Pope took Benvenuti under his protection? Would it in fact be easier if some of Benvenuti's protectors¹⁸ visited the papal court and confidentially made an agreement with Cardinal Valenti?«¹⁹

As I said this, Centurione stopped me short not so much with words as with laughter, and thus focused the conversation on something else. Nevertheless, the warning was not neglected. That day, when the superior general first intended to visit the Pope,²⁰ he was warned beforehand not to despair should the Pope suddenly engage in the discussion and praise Benvenuti. He should resist, albeit moderately, but firmly and steadily, as one who is not self-willed, not from his own soul, but rather inspired by others state that he is not a Pope who would constrain the unwilling man and completely compel the supreme head of the Society in order to please some Benvenuti, a man of no repute and to him altogether unknown.

That is how he [Centurione], as it appeared to him, wonderfully prepared the matter, and he shielded himself from blows beforehand. But, it happened differently. Bošković had, as is held, in detail instructed Cardinal

Valenti on the whole matter. Valenti in turn had won over the Pope, indeed so thoroughly that the Pope was prepared to command that within the City [Rome] Benvenuti should be retained as a man of distinguished learning, who is an embellishment to the Roman Athenaeum²¹ and who could be of great use in writing. Therefore, seeing that the superior general had arrived, the Pope accepted him as a much desired and awaited guest, fixing a joyful expression on his face. He said he was pleased that he had come to ask him about somebody. The Pope was aware of what and with which reason he decided against Benvenuti. He expected that, according to the will of the superior general, the decision would be established, perhaps being too harsh. Overall, he would be pleased to hear that such a talented member of the Order with his extraordinary learning would be able to stay in the City. With this the superior general, having arrived prepared, appealed ardently to the Pope not to go too far. That he would submit in any other matter whatsoever, but in no case could he refuse the treacherous and obstinate man [Benvenuti] of his just punishment. This would be a very bad example among Jesuits, it would disgrace him, and will especially eventuate in the weakening of the authority of the superiors. The Pope was opposed to him. With such members, who are eminent for their talent and learning, it appears that one should not act with the most harsh of laws, and equally not exercise oneself in exaggerating punishments and enforcing authority.²² Finally, it would

15

For the high superior, responsible for Italian Provinces and also Roman province, ended Benvenuti's *munus docendi* (task of teaching), he deprived Benvenuti the position of professor in the provinces. Of the three types of penalties delivered to Benvenuti, this form of punishment showed most strongly distrust towards the inferior.

16

Cordara resorted to a psychological description of Bošković's nature, but again avoided to formulate the real argument for Bošković's defence of Benvenuti. Bošković was indirectly convicted by punishing Benvenuti due to his teaching of Bošković's philosophy. That is why Bošković threatened to leave the Roman College. Thereby he decided on this brave gesture, unheard of in the 18th century, which could have resulted in his dismissal from the Order. According to the outcome of events, it seems that Bošković assessed the situation well, that is, he was able to foresee the final position Pope Benedict XIV would take.

17

Ignazio Visconti (1682–1755) was elected the superior general in 1751. In the annals of the Roman College, Cordara employed two titles for the superior general: *Generalis Praepositus Societatis Jesu* and *Summus Societatis Praeses*.

18

Cordara first thinks of Ruder Bošković, which he plainly states in the following sentences.

19

Silvio Valenti Gonzaga (Mantova, 1690 – Rome, 1756), the papal nuncio in Brussels and

Madrid (1731–1739), became a Cardinal in 1738, and served as Secretary of State for the Holy See in 1740–1756. While serving as Secretary of State, he occupied himself with geodetic measurements along the Rome–Rimini meridian and the drawing up of the first exact map of the Papal state. This project he entrusted to Ruder Bošković and Christopher Maire in 1750–1752. It was during this period that the Bošković–Valenti correspondence is derived. Cfr. Claudio Todeschi, »Elogio del Cardinale Silvio Valenti Gonzaga«, in Todeschi, *Opere*, Tomo II (Roma: Per il Casaletti, 1779), pp. 1–74.

20

Benedict XIV, born Prospero Lambertini (Bologna, 1675 – Rome, 1758), elected Pope in 1740. Due to the vow of obedience to the Pope, which particularly obligated select members of the Society of Jesus, the Pope's judgement was final. We should consider the visit of the superior general Ignazio Visconti to the Pope and the course of their discussion in this light. In his annals, Cordara usually refers to the Pope simply as *Pontifex*, but he also uses the full two titles *Pontifex Maximus* (High Priest) and *Sancitatis Sua* (His Holiness).

21

Here, the honourable epithet is used for philosophical studies at the Roman College.

22

Benedict XIV was the enlightened promoter of science and the arts. He founded four academies in Rome and launched out the publication of catalogues of manuscripts from the Vatican Library. An example of Lam-

result in an appeal to the High Priest for pardon, being neither a disgrace to the superiors, nor an example to the inferiors, much less an inticement to increased arrogance.

This in truth, however stated in the most kind and friendly of tones, did nothing to help. The superior general persisted in the proposal and denied that he was able to retreat from it, unless of course perhaps His Holiness ordered him, what he added on account of obedience. With that the High Priest, raising his eyebrows, took him by his word: »If that is your assessment«, he said, »I order beforehand and completely forbid Benvenuti's removal from the City, and you will not in any way be inconvenient towards him. As for his duty, it will be our concern to ensure that Benvenuti is not idle within the Roman College«. And with these words, the Pope dismissed him, together with an appropriate blessing, letting him depart confused with this unexpected ruling, sad and ashamed. After that, the Pope decreed Benvenuti to utilize his time in writing and undertake a defence of the Christian faith against the perilous philosophers of the time, who completely did not permit any faith or permitted only natural faith. This will be his duty. It is said that he fulfilled his duty with excellent work, even though the work, for what reason I do not know, has never been published.²³

These domestic difficulties, if it can be rightly said, perhaps do not want to be emphasised by the Jesuits who survived the suppression of the Society.²⁴ But I judge the matter in this way. These little blemishes do not in any way darken the splendour of the very distinct Order of which other many works speak praiseworthily. Even if this were overlooked, I think that no one would be convinced that Jesuits were more than men who would not permit anything human.

Julius Cordara, *De suis ac suorum rebus aliisque suorum temporum usque ad occasum Societatis Jesu commentarii*, a cura di Giuseppe Albertotti e di Agostino Faggiotto, *Miscellanea di storia Italiana* tomo LIII (Torino: Fratelli Bocca, 1932), pp. 181-184.

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Die Frührezeption
von Boškovićs Naturphilosophie:
»Der Fall Benvenuti«

Eine Geschichte der Rezeption von Boškovićs Kräftelehre von 1745 bis 1787, d.h. von der ersten Publikation seiner Ideen bis zu seinem Tod, ist noch nicht geschrieben worden. Vorliegender Aufsatz ist eines der ersten Kapitel dieser noch nicht niedergeschriebenen Geschichte. Das Werk Synopsis Physicae Generalis (1754) des italienischen Jesuiten Carlo Benvenuti (1716-1797), Professor für Mathematik, Physik, Metaphysik und Liturgik am Römischen Kollegium von 1750 bis 1760, wurde als Beispiel für die Frührezeption der Naturphilosophie Boškovićs identifiziert. Es ist dies das erste Werk, das die Kräftelehre bei Bošković darlegte. Gemäß der Einschätzung von Bošković selbst wurde durch das Synopsis die Anwendung seiner Theorie auf die allgemeine Physik erweitert, und zwar aufgrund einer Untersuchung der frühen Schriften Boškovićs (herausgegeben 1745-54), während sein Hauptwerk Theoria philosophiae naturalis 1758 erschien. Das Synopsis muß daher als Komponente einer Entwicklung betrachtet werden, deren Krönung das bekannteste Werk Boškovićs darstellt. Der Verfasser weist nach, daß Benvenutis Schrift Synopsis

und Bošković's Abhandlung De continuitatis lege ihrem Inhalt nach komplementär sind. Auf eine vereinbarte und gut durchdachte Arbeitsteilung im Jahre 1754 hin konzentrierte Bošković sich auf den Nachweis des Kontinuitätsprinzips, auf dem sich seine Kräfte-theorie gründet, und Benvenuti entschloß sich, die Anwendung dieser Theorie auf die allgemeine Physik zu erarbeiten. Hierbei erkannte Benvenuti die herausforderndsten Einsichten Bošković's zu Materien- und Weltallstruktur und stellte sie vor.

Dieser Aufsatz hat zwei Beilagen. Es handelt sich um dokumentierte Zeugnisse des »Falls Benvenuti«: (1) den Aufschrieb eines anonymen Journalisten des Florentiner Blattes *Giornale de' Letterati* und (2) ein Fragment aus den *Annalen des Collegium Romanum*, verfaßt von Giulio Cesare Cordara. Diese zwei Dokumente wurden hier zum ersten Mal ins Englische übersetzt und sind dem vorliegenden Text mit erschöpfenden Kommentaren beigelegt.

Ivica Martinović

L'acceptation précoce
de la philosophie naturelle de Bošković:
»cas Benvenuti«

On n'a pas encore écrit l'histoire de l'acceptation de la théorie des puissances de Bošković, notamment celle de la période 1745-1787, allant de la première publication des idées philosophiques de Bošković jusqu' à sa mort. Cet article est un des premiers chapitres de cette histoire. L'oeuvre *Synopsis Physicae Generalis* (1754), écrite par le jésuite Carlo Benvenuti (1716-1797), professeur de mathématiques, de physique, de métaphysique et de liturgique au Collège de Rome (1750-1760), est identifiée comme un des premiers écrits inspirés par la philosophie naturelle de Bošković. C'est dans cette oeuvre que la théorie des puissances de Bošković a été exposée pour la première fois. Selon l'estimation de Bošković lui-même, le *Synopsis* a eu le mérite d'introduire sa théorie dans la physique générale, et cela en partant de l'étude de ses premiers traités (1745-1754), et avant la publication de sa principale oeuvre *Theoria philosophiae naturalis* (1758). C'est pourquoi le *Synopsis* devrait être considéré comme un important apport à l'évolution qui devait atteindre son sommet par l'oeuvre capitale de Bošković. L'auteur du présent article prouve que le *Synopsis* de Benvenuti et le traité *De continuitatis lege* (1754) sont complémentaires quant à leur contenu. Après une répartition de travail concertée et mûrement réfléchie (1754), Bošković s'est concentré sur l'étude des preuves corroborant le principe de continuité, qui est la base de sa théorie des puissances, et Benvenuti, de son côté, s'est consacré à l'élaboration de l'application de cette théorie à la physique générale. Ce faisant, Benvenuti a reconnu et présenté les idées les plus audacieuses de Bošković sur la structure de la matière et de l'univers.

Ici sont ajoutés deux suppléments qui apparaissent comme documents pour le »cas Benvenuti«: (1) la note d'un journaliste anonyme du *Giornale de' Letterati* et (2) un fragment des *annales du Collegium Romanum* écrit par Giulio Cesare Cordara. Ces deux documents ont été traduits en anglais pour la première fois et sont accompagnés des commentaires exhaustifs.

bertini's ideas is recorded in Cordara's testimony concerning the Pope's support for the freedom of scientific activities of the most talented of scientists amongst the Jesuits, Benvenuti being on his mind, but also Bošković. In fact, the Pope was well informed of the essence of the controversy at the Roman College.

23

Such a work, either in print or manuscript form, does not exist amongst the other works in Benvenuti's bibliography, written by the very thorough Sommervogel. It seems that with the death of the superior general Vis-

conti in 1755 and his successor Centurione in 1757, the reason behind the Pope's decree ceased to exist, that is, the reason for Benvenuti, whose superiors aimed to remove him from teaching duties, to write a philosophical work in defence of the Christian faith.

24

Here, Cordara reveals that the final version of this passage in his annals of the Roman College was written after the Jesuit Order was suppressed in 1773. His open and direct approach is due mainly to the fact that the protagonists in the 'Benvenuti case', Centurione and Visconti, had already passed away.