Nestor Marcoffs Contribution to Bulgarian Physics and Mathematics Education

Ganka Kamisheva

Institute of Solid State Physics, BAS, Sofia, Bulgaria

gkamish@issp.bas.bg

Abstract Physics and mathematics textbooks published before 1878 are studied and analyzed. Earliest Bulgarian primary, secondary and high school textbooks are identified. A new unknown until now physics textbook has been found paper and it is presented in this paper. It is a high school textbook translated from French to Bulgarian and published by Nestor Marcoff in 1871. The exceptional clarity and accuracy of chapters Statics, and Trigonometry show the vast high scientific culture and the vast erudition of Nestor Marcoff. He wrote mathematics textbooks, French and Turkish grammars and also was the author of many dictionaries. Keywords: Nestor Marcoff; Education; Textbooks; Physics; Mathematics.

1 Introduction

Bulgarian history of physics and mathematics education in 19 century is poorly known. Currently only few textbooks [1] and teachers [2]-[3] on physics have been determined [4]. Known Bulgarian physics textbooks are only four [5]. The number of Bulgarian mathematics textbooks in 19 century is much bigger. We found 68 mathematics textbooks published in Bulgarian language up to 1878 [6]. The aim of this work is to examine unknown until now textbook on Statics,
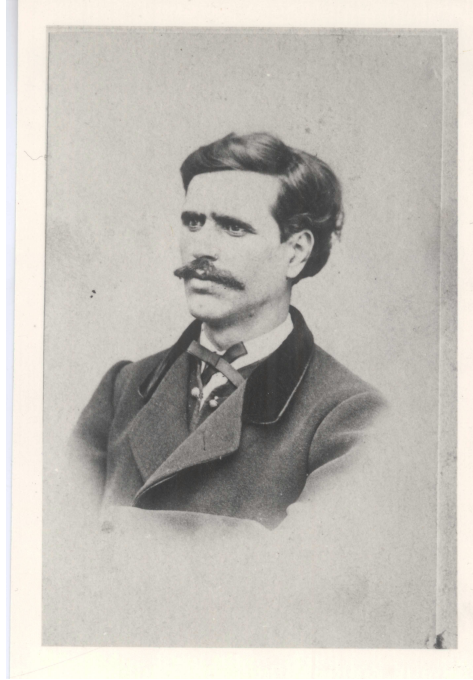
Nestor Markoff 1838–1916

translated by Nestor Marcoff in 1871 [8]. We use the original name of the author since it is the only way his publications to can be found easily.

2 History of education

According to the analysis of textbooks content, Bulgarian secular schools had only primary level up to the 18-th century. Reading, writing and arithmetic have been taught in them. Mathematical operations: addition, subtraction, multiplication and division are included in the Bulgarian elementary textbooks. Marco Teodorovich (1792) [6] and Pierre Beron (1824) [[7], s. 130–164] wrote the earliest Bulgarian primary textbooks. Beron introduced the Arabic numerals. There are nine pages calculation and a paragraph called Physics Story [8]. It examines meteorological phenomena: steam, cloud, fog, rain, hailstorm, snow, dew and frost [[7], s. 137]. Vratsa museum preserved earliest manuscript of a mathematics al textbook written around 1822–

1828 [5]. Secondary schools were established in Elena (1810), Svishtov (1815) [9] and Sliven (1828) at first [[7], s. 76]. Since the organization of Bulgarian schools was similar to the Greek schools in the beginning they had one or two levels (now called primary and secondary schools). In 1835, teachers in Gabrovo established a new form of organization with four classes (grades) above elementary level (5, 6, 7 and 8 grades today) [10]-[11]. The Bulgarian schools introduced physics in the beginning of the 19–th century [5]. Situated on the Dunabe River, Svishtov became centre of Bulgarian secondary education. E. Vaskidovich (1795–1875) created the first Bulgarian secondary school in 1815. His school had two levels (primary and secondary). Its curriculum included arithmetic, algebra, physics, history, political economy, geography, anatomy, and Greek language. The chronicle of the school from 1824 was written in Bulgarian language. E. Vaskidovich headed this school 40 years (1815–1846 and 1854–1863). He was a teacher in Pleven (1847–1854) also. In 1817, he acquired a textbook on experimental physics written by E. Vardalachos (1812) [9]. Svishtov schoolmasters created Bulgarian secondary school mathematical literature at first. H. Pavlovich (1804–1848) wrote textbook called Arithmetic or science for calculation in 1833. It contains 118 pages with mathematical operations fraction and ratio. The content of the book corresponds to mathematical syllabus for first and second classes (grades) in 1890 (5 and 6 grades today) [6]. Neophit Hilendarski (1785–1848) and E. Vaskidovich wrote textbook entitled Guidance in Arithmetic (1835). Pythagorass theorem, calculating interest, and terms multiplicand, multiplier, product, dividend, divisor, as well as parametrical equations have been included there. We address mathematical textbooks, mentioned above, as a textbooks for first and second classes (5–6 grades today). Arithmetic (343 pages), written by H. Sichan–Nikolov in 1845 is the earliest textbook that corresponds to mathematical syllabus for third class (1890) (7 grade today). The actions grading and root extraction on of second and third degree are introduced in it together with their symbols for the first time. Geometry was introduced (included) in the syllabus at the same time. D. V. Manchov wrote textbook with chapter Geometry (1862) for the first time. in itOther

chapters there are grammar, geography, natural history, arithmetic, and physics. Textbook with the title Geometry written by V. Gruev (1867) has been intended for to the first, second and third classes (5, 6 and 7 grades today). Terms line, angle, triangle, polygon, circle and perimeter or volume calculation have been clarified in it [6]. Four Bulgarian Colleges existed up to 1878. They were situated in Plovdiv (1846), Bolgrad (1859), Gabrovo (1871) and Lyaskovets (1874). N. Gerov (1823–1900) created the first Bulgarian normal (pedagogical) college in Koprivshtica (1846). He situated this school down in Plovdiv (1850). It became a Central eparchial school since Christians paid taxes for its maintenance [12]. Initially, the school had only upper three classes V, V and V (8, 9 and 10 grade today). It became full six grade high school for teachers and priests training in 1868. High school textbooks on physics and mathematics started to be published in the forties of the 19–th century. All high school textbooks contained proofs. The textbook titled Elemental Arithmetic, written by A. Gerakis and translated by Sava Radulov (1817–1887) in 1843 is the earliest high school mathematics textbook. New mathematical items in it are quadratic parametrical equations, cubic equations and their proofs. Powers, square roots, cube roots, surds, arithmetical and geometrical progressions are included there also. Textbook titled First Algebraic Lessons has 149 pages. It was translated from French to Bulgarian by Ch. Vaklidov (1841–1891) in 1859. The textbook contains description of algebraic expression, algebraic inequality, raised to second power and square root, linear equation with three unknown quantities, and quadratic equation with two unknown quantities. I. Gjuzelev (1844–1916) translated to Bulgarian language Russian textbook entitled by A. Davidov Short Elementary Geometry (1873). There are many proved theorems and 100 solved problems in it. The textbook has two parts. The first part, called plane geometry, comprises lines, angles, geometrical figures, parallel lines, proportional lines, similarity of triangles, similarity of polygons, and surface measurements. The second part, called space geometry, includes lines, planes and angles in space, tetrahedron, hexahedron, octahedron, dodecahedron, icosahedrons, capacities measurement, cylinders, cones, and spheres. Seven

Bulgarian physics textbooks are published up to 1878. Their authors and translators are N. Gerov (1849) [[7], s. 78–176], D. Manchov (1862) [13], and J. Gruev (1869) [[7], s. 264–289], (1872) [14]. Terminology, phenomena, physics laws and apparatuses are described in them. I. Guzelev published in 1874 [[7], s. 293–368] physics formulae for the second time in Bulgarian literature. Recently, we found astronomy textbook, translated by D. Enchev (1873) [15], and textbook on statics translated by N. Markov (1871) [8].

3   Nestor Marcoff – Biography

Nestor Marcoff (1836 – 11.12.1916) was a teacher and author of high school physics and mathematics textbooks on before 1878 [16]-[17]. He was born in Krivo Pole (Irobas) – a village near Haskovo [18]-[19]. He studied seven years in the three classes school of his native village (1848–1855) – seven grades today; and also one year in the four classes school of Gorski Izvor (Korucheshme) (1855–1856) – eight grades now, one year in the five classes school in Haskovo (1859–1862) – nine grades today, and one year in six classes school in Plovdiv (1865–1866) – ten grades now. Nestor Marcoff taught mathematics [1]-[2], [8], physics [8], chemistry, history, French [13]-[14] and Turkish languages [4] for more than 40 years (1856–1904) in Irobas (1856–1859), Harmanly (1862–1865), Haskovo (1866–1867), Pleven (1867–1870; 1872–1873), Ruse (1870–1872; 1893–1896), Gabrovo (1873–1876), Lyaskovets (1876–1877), and Sofia (1887–1893) [20]-[25]. He was a politician (also) after the Liberation. His career was successful as a governor of Haskovo (1878–1879), Stara Zagora (1979–1982), Tarnovo (1882–1884), Ruse (1884–1886), Varna (1891), and Plovdiv (1891–1893). He was a member of the third (1886–1887), and the twelfth (1902–1903) National Assembly [26]-[28].

4   Textbooks

Nestor Marcoff, Ts. Ginchev (1832–1894), and D. Enchev opened their own bookshop in Ruse (1871) [27, s. 55]. Nestor Marcoff published 38 articles and books. Among them there are 7 textbooks (having 11 editions), 2 dictionaries (having 5 editions) and some articles on geophysics [3], geology, astronomy, and meteorology.

5   Mathematics textbooks

Nestor Marcoff wrote, translated and published 3 mathematics textbooks on arithmetic [[1] (1869), [2] (1869)] and geometry [[8] (1871)] His textbook on geometry was of the highest level because it introduced trigonometry in the Bulgarian literature for the first time. A. Trigonometry Nestor Marcoff translated French textbook, called Geometry Rectilineal, Trigonometry and Statics, written by G. F. Olivier [29]. It is a college textbook on physics and mathematics. Its volume is 216 pages. Physics and mathematics have ratio 1:1. The volume of Geometry and Trigonometry is 162 pages and the volume of Statics is 155 pages [28]. Nestor Marcoff added some arithmetical rules and quite problems there [[27], s. 83]. Newspapers Turkey [30], and Svoboda [31] recommend this textbook for entrance in the military school or the University. Many teachers and students bought this book in advance. There are 213 textbooks sold before its publication. The price was 21 grosha each. According to the list of donors, they came from the Bulgarian high schools in Ruse (III–V classes), the Tsarigrad – Medical school, the Liceum in Galata Saray, and the Roberth College, the High schools in Tabor, in Zheleznik, Gabrovo, Vidin, Haskovo, Razgrad, Sliven (V class), and Kotel. The volume of Geometry is 138 pages. There are theorems and problems about lines, angles triangles, polygon, circle, surface, area, and volume in it. Some elements of geodesy are enlisted in the section Rectilineal (rectilinear) Trigonometry with volume 24 pages. There are theorems and problems by sine; tangent, measurement inaccessible distance, level and alignment location [8]. First order equations with one unknown

quantity and second order equations are solved in it too [8]. B. Aritmethics Small Arithmetic is the textbook for the secondary school written by Nestor Marcoff. It has two editions (1869 and 1872). The book has small volume and shape. There are 11 chapters, 104 pages and three parts. They are called: count, calculation and commerce. The first part examines: count, decimal number, abstract fractional number, fraction [1]. Numbers are written by letters and ciphers. The second part calculation contained operations: collection, subtraction, multiplication and division with integer, and complex quantities [P1]. The third part embraces: triple rule, rule of interest, rule of discount, rule of partners [1]. C. Mathematical problems Collection of arithmetical problems [2] is the textbook used in the Bulgarian schools of Pleven, Svishtov, Lovech and Ruse for the first six years of study. It contains 1060 problems. Actions: collection, subtraction, multiplication, division, triple rule and second and third grades are used in it. The volume of textbook is 192 pages. In advance, 406 books were sold. The price was 10 grosha each. Dunabe newspaper announced this book [20]. Nestor Marcoff took some problems from the collection of J. J. Gremilet. Answers have been given at the end of the book [[2], s. 4]. This collection book has five sections. The first one covers problems with integers [[2], s. 5]. There are 240 problems in it. Actions addition, subtraction, multiplication, and division are used there. The integers are without dimensional units. The second section covers problems with dimensional units [[2], s. 25]. There are 150 problems about on conversion of units solved there. The third section includes problems about fractions [[2], s. 39]. There are 215 problems with simple, decimal, and infinite fractions. The fourth section has been called Attitude and consistency [[2], s. 60]. There are 93 problems divided into four paragraphs titled arithmetical attitude, geometrical attitude, arithmetical proportionality, and geometrical proportionality. The last fifth section entitled triple rules has 362 problems [[2], s. 68]. They concern common triple rule, complex triple rule, rule of partners, rule of mixture, and square and cubic roots finding. Today, common triple rule is in six grade programs, and quadrate and cubic roots are in 7 and 8 grades programs.

6   Physics

D. Statics Chapter Statics has two parts and 13 sections. The first part has 6 sections called definition, collection of forces, collection of parallel forces, momentum of couple forces, velocity and gravity, and centre of gravity. The second part called Machinery has 7 sections entitled: driving belt, lever, pulley, gears, inclined plane, propeller, and wedge. There are 26 solved statics problems on the end of the chapter. Terms mechanics, statics and dynamics have been examined. Solid state motion and rest have been determined. Two tipes of motion – displacement and rotation have been formulated [[8], s. 175]. Nestor Marcoff presented forces by tense and direction. He examined resistence forces too. The theorem for collection of forces acts on one point have been proved. Some consequences have been considered. The concepts of a pair of forces and momentum of forces have been introduced. The formula about constant velocity of rectilinear motion has been proved. Nestor Marcoff presented formula V = : where V is velocity, E – distance and T is time [[8], s. 176] and formula V=F:M where M is a mass, F is a force and V is a velocity [[8], s. 177]. The term energy has been introduced and the law of living force has been deduced. (M.V2) [[8], s. 181]. Nestor Marcoff wrote: there are two formulas about all uniformly accelerated motion lows V=g.T, E=1/2gT2, where is a time, g is a velocity after one unit time, V is a velocity acquire after the time and is the distance traveled on the same time [[8], s. 181–182]. The terms weight, centrifugal and centripetal forces have been introduced there. The second part of the statics entitled about machines includes 7 paragraphs with rope machine, leverage, pulley, the spindle of gravity, leaning area, propeller (vice or press) and wedge [8]. Nestor Marcoff gives comprehensive, complete and accurate descriptions: The lever is in equilibrium when the moment of force is equal to the moment of resistance [[28], s. 192]. Pulley serves only to change the direction of power [[8], s. 193]. Statics ended with 26 solved problems. E. Physics problems Nestor Marcoff published physical problems in two of his textbooks [P2, P8]. His book entitled Collected arithmetical problems contained many problems of

physics content [2]: 356 and 368 from graduses [[2], s. 35–36]; and 489 [[2], s. 49]; 490 [[2], . 49], 604 [[2], s. 60] from fractions. F. Geophysics Article entitled About centralized ground heat has been written by Nestor Marcoff in January 1870 [3]. Terms Earth crust, inner mass of the globe and flattened form of the Earth have been scrutinized. Rotation has been pointed out as a reason for it. Another statement is the Earth has its own warmth inside. The temperature of the Earth crust increases in depth every 30 metrs by 1 degree. Nestor Marcoff wrote that, the Earth has more dense in its interior and substances are in a molten state there. Gas, liquid and solids substances have been produced and accumulated below the hard shell of the Earth accompanying volcanic phenomena and geysers [3].

7 Conclusion

Nestor Marcoff is a remarkable teacher and mathematician. He has an enviable scientific culture and broad erudition. His textbooks had exceptional mathematical clarity and accuracy. He translated and published first college textbooks on physics and trigonometry in Bulgarian language (1871) using contemporary physics terminology. Interesting conclusions have been derived (made). Statics translated by Nestor Marcoff has been compared with mechanics in the Bulgarian physics textbooks, published up to 1878 [32]. Statics is the first Bulgarian textbook with mathematical proofs on physics laws. Mathematical method with vectors have been used in it. It is the reason to believe that this is the textbook of the highest scientific level until 1878. Statics is the earliest published Bulgarian physics textbook with formulae and problems. In contrast to the other Bulgarian physics textbooks (of experimental nature), Nestor Markov's Statics contains at least seven physical devices.
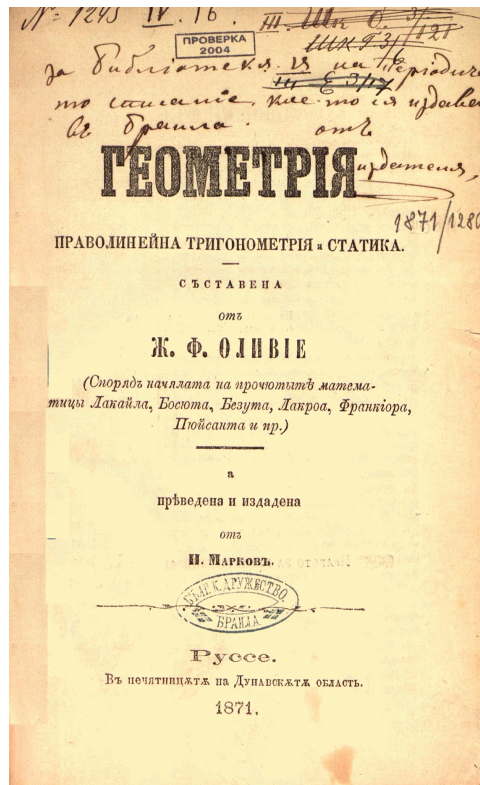
G. F. Olivie, Geometriya, pravolinejna trigonometriya i statika,
Ruse, 1871

8 Nestor Marcoffs Publications

[1] N. Markov, Malka aritmetika za parvonachalnite uchenici , Ruse,
1 izd. 1869; novo izdanie 1872.

[2] N. Markov, Sabrane aritmeticheskie zadataci, Hr. G. Danov,
Ruschuk, Pechatnica na Dunavskata oblast, 1869.

[3] N. Markov, Za sredotochnata zemna toplina, v. TurciJa, br. 48–
49, Januari 1870.

[4] N. Markov, Gramatika za turskij yazik, Carigrad, 1870; ch. 1 i 2, 1871; 2 izd. 1874; Plovdiv, 1884.

[5] N. Markov, Kam predstavitelite (carkovno–narodniya sabor), v Makedoniya, br. 10, 5 maj 1871 g.

[6] N. Markov, Razsazhdenie po reshenieto na vaprosa, v. Dunav, br. 555, 1871; Turciya, 22 maj 1871.

[7] N. Markov, Predmet na chitalishtata, v. Turciya, br. 7 (1871).

[8] G. F. Olivie (prev. N. Markov), Geometriya, pravolinejna trigonometriya i statika, 1871.

[9] N. Markov, Chisti lazhi i mjuzevirlici na garcite, Pravo, br. 12, 8 maj 1871; Otechestvo, br. 90, 21 maj 1871.

[10] N. Markov, sp. Uchilishte, g. 2(kn. 10) 29 maj 1872, s. 79; g. 2(kn. 11) 18 juni 1872, s. 88.

[11] N. Markov, Garcite i balgarete, v. Turciya, br. 3, 3 mart 1873.

[12] N. Markov, v. Pravo, br. 33, 26 oktomvri 1873.

[13] N. Markov, Bukvar za francuzkij yazik, Hr. G. Danov, 1874; 1881; 1885.

[14] N. Markov, Leksikologicheska gramatika za izuchavane na francuzkij yazik i stil, 1875.

[15] N. Markov, Slovoto, v koeto Starozagorskiya prefekt e otvoril parvata sesiya na Starozagorskiya glaven savet, Marica, br. 221, 26.09.1880.

[16] N. Markov, Doklad na Starozagorskiya prefekt varhu sastoyanieto na povereniya mu departamen, Marica, br. 223, 03.10.1880; br. 224, 07.10.1880.

[17] N. Markov, Rechnik na chuzhdite dumi, rakopis, ch. –V, 1894.

[18] N. Markov, Palen frensko–balgarski rechnik, Plovdiv, 1894, 1107 str.; 2 izd. 1896; Globus, 1906.

[19] N. Markov, Balgaro–frenski rechnik, Plovdiv, 1898, s 43 000 dumi.

[20] N. Markov, Spomeni ot Gabrovo prez 1876, Jubileen sbornik po sluchaj 25 g. ot I vipusk na Gabrovskata Aprilovska gimnaziya, Plovdiv, Hr. G. Danov, 1900.

[21] N. Markov, Narodno sabuzhdane v edin kat na nasheto otechestvo, sp. Uchilishten pregled, tom 6, kn. 3, 1901, s. 201–208.

[22] N. Markov, Izlozhenie za sastoyanieto na Plovdivskoto okrazhie prez 1901–1902, Plovdiv, D. V. Manchov, 1902.

[23] N. Markov, Balgaro–frenski i frensko balgarski dzhoben rechnik, tom, Lajpcig, 1912; tom, 1915.

[24] N. Markov, Spomeni, sp. Saglasie, Pleven kn. 2, 1927.

[25] N. Markov, Belezhki po narodoobrazovatelnoto delo v grada Pleven i okoliyata mu prez 1867–1873, Saglasie, Pleven, br. 2, 1927.

References

[1] V. Vranski, Parviyat balgarski uchebnik po fizika. – Spisanie na FMD (5–6) (1943).

[2] V. Metev, Najden Gerov i obuchenieto po fizika predi Osvobozhdenieto. – Fiziko–matematichesko spisanie, t. 6(1) (1963)

[3] S. Armenski, Ivan Gjuzelev. – Matematika i fizika (2) (1972)

[4] M. Borisov, A. Vavrek, G. Kamisheva, Osnovopolozhnici na obuchenieto po fizika v Bulgaria, Narodna prosveta, Sofia, 1988.

[5] G. Kamisheva, Bulgarian physical and mathematical culture in 19 century. – Proceedings of Sixth International Conference of the Balkan Physical Union, Istanbul, AIP Conference Proceedings, No 899 (2006) 521–522.

[6] G. Kamisheva, Bulgarian Mathematical Culture in XIX century. – History and Pedagogy of Mathematics Newsletter (61) 16–20 (2006).

[7] M. Borisov, A. Vavrek, G. Kamisheva, Predshestvenici na razprostranenieto i razvitieto na fizicheskite nauki, 1985.

[8] P. Beron, Riben bukvar, Jubilejno izdanie, Narodna prosveta, Sofia, 1964.

[9] G. Kamisheva, Fizikata v svishtovskoto uchilishte na Emanuil Vaskidovich. – Svetat na fizikata, kn. 3, 1993, s. 169–172.

[10] N. Vankov, Istoriya na uchebnoto delo v Bulgaria ot kraj vreme do osvobozhdenieto, Lovech, 1903.

[11] L. Dorosiev, Nashite klasni, sredni i specialni uchilishta predi osvobozhdenieto, Materiali za izuchavane na uchebnoto delo v Bulgaria, kn. 1, MNM, Sofia, 1925.

[12] G. Kamisheva, M. Borisov, Obuchenieto po fizika v balgarskoto klasno uchilishte Sv. Kiril i Metodij v Plovdiv do Osvobozhdenieto. – Svetla letopis (120 godini ot sazdavaneto na parvata gimnaziya v Bulgaria – ESPU aDimitar Blagoeva), Hr. G. Danov, Plovdiv (1988) 38–52

[13] D. Manchov, Uchebnik, kojto sadarzha gramatika, geografiya, vseobshta istoriya, aritmetika, geometriya i fizika, Plovdiv, 1862.

[14] D. Shubert, Fizika za glavni narodni uchilishta, Prevedena ot J. Gruev, H. G. Danov, 1872.

[15] A. Malinin, K. Burenin (prev. D. Enchev), Kosmografiya, Tarnovo, 1873.

[16] Enciklopediya balgarska vazrozhdenska inteligenciya, Sofia, Izd. P. Beron, 1988, s. 404–405.

[17] S. Spirov, Radeteli za kulturen vazhod, 100 godini narodno chitalishte G. Dimitrov Pleven. – Jubileen sbornik, OF, Sofia, 1969, s. 194–205.

[18] M. Mladenova, Uchitelyat Nestor Markov i dejnostta mu v Harmanli, Haskovo i Pleven. – Nestor Markov i negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 25–31.

[19] V. Kjuvlieva, Prinosat na Nestor Markov za frenskoto kulturno vliyanie u nas. – Nestor Markov i negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 11–13.

[20] C. Pancheva, Imalo e i takiva balgari ili edna bibliografiya za uchitelya, prosvetitelya i darzhavnika Nestor Markov. – Nestor Markov i negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 33–39.

[21] M. Lazarova, Proektat vazrozhdenecat Nestor Markov i plevenskite buditeli – sazdavane, realizaciya i rezultati. – Nestor Markov i negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 41–43.

[22] V. Stojkova, Nestor Markov i mnogostrannite aspekti na negovata knizhovna dejnost v konteksta na balgarskoto obrazovanie prez Vazrazhdaneto, Nestor Markov i negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 45–51.

[23] M. Lovdzhieva, Balgarski uchiteli okolo Osvobozhdenieto. – Nestor Markov i negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 53–61.

[24] N. Kjurkchiev, S. Markov, Matematicheski analiz na danni za obrazovanieto ot epohata na Vazrazhdaneto. – Nestor Markov i

negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 77–84.

[25] S. Markov, Bulgarian teachers and scholars around Liberation. – 3rd National Congress on Physical Sciences, Sofia (2016) s. 27–31

[26] R. Stoyanova, Nestor Markov Demirev, 100 godini narodno chitalishte Georgi Dimitrov Pleven, Jubileen sbornik, Sofia, 1969, s. 219–241.

[27] N. Dimov, T. Valchinov, Nestor Markov ot Krivo pole do Paris, Grafoprint, 1 izd. 2006; 2 izd. Haskovo, 2013;

[28] N. Dimov, Nestor Markov – naroden buditel, darzhavnik, obshtestvenik. – Nestor Markov i negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 17–24.

[29] G. F. Olivier, Geometrie Ussuele et Trigonometrie Rectiligne Precedees des premiers principes de lAlgebre, de la Theorie des Equations des Puissances et Racines des Proportions et Progressions des Logarithmes et suivies delements de Statique, avec application usuelle nux diverses machines le tout accompagne de problemes, Cinquieme edition, Paris, 1843.

[30] Turciya, g. 6, br. 48, 16 Januari 1871 g.

[31] Svoboda, g. 2, kn. 27, 17 Fevruari 1871, s. 215.

[32] G. Kamisheva, Rolyata na Nestor Markov za sazdavaneto na balgarska fizicheska terminologiya. – Nestor Markov i negoviyat prinos v leksikografiyata i obrazovanieto, Sast. D. Blagoeva (2017) s. 63–76.