THE CONTRIBUTION OF GHEORGHE LAZĂR TO THE CREATION OF ROMANIAN MATHEMATICAL TERMINOLOGY

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Abstract. The paper presents historical aspects concerning the Gheorghe Lazăr scientific activity to the creation of Romanian mathematical terminology in: arithmetic, trigonometry and geometry.

1. SHORT BIOGRAPHY

Gheorghe Lazăr (1779–1823) was the founder of the Romanian education and the engineering one in Wallachia (Fig. 1).

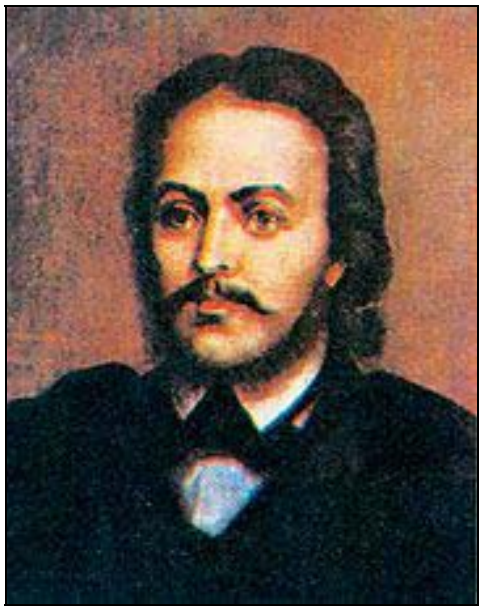

Fig. 1. Gheorghe Lazăr.

Gheorghe Lazăr was born on 5 June 1779, in the Avrig village, near Sibiu, in Transylvania, in a peasants family (G. Andonie, 1965). After graduating from primary school in Avrig, he attended the Piarist Gymnasium studies in Cluj, in particular studying philosophy and law. On 16 May 1806, because of his important

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intellectual qualities he had shown, the Sibiu Consistory granted him a scholarship to study theology in Vienna and become a sermonizer of Catholicism. Gheorghe Lazăr studied, in the period 1806–1809, in Vienna; in addition to theological courses, he studied law, philosophy, history and mathematics, published a series of studies and became an admirer of the democratic concepts from the XVIIth century.

The Sibiu Consistory, in November 1809, sent him to be a priest at Karlowitz, but the Serbian metropolitan Stefan Stratimirovici considered him that is not appropriate for a minister to have the liberal trends for church, too. He returned to Transylvania, in Sibiu, on March 1811, as a teacher in an orthodox theological school. During this time he wrote a version of the *Christian theology*, a *compendium of Transylvanian geography* and a *German-Romanian Dictionary* with a *German-Romanian grammar for Wallachian youth*.

After he delivered a speech in honor of Napoleon I, then he was considered the greatest enemy of the Austrian dynasty, he lost his job on the 22 October 1815, following a disciplinary process. Being subjected to authorities surveillance, persecuted and censored, in the spring of 1816 he was employed as private professor for the children of a Romanian boyar's wife – Catinca Bărcănescu – and he arrived with them in Bucharest. Thanks to his science knowledge, he was allowed to practice the profession of engineer in border field in Wallachia.

Constantin Bălăceanu, who was administrator of schools, agreed with Gheorghe Lazăr, who had the idea of establishing a College with teaching in Romanian language in Bucharest. Supported by Iordache Golescu and Constantin Bălăceanu, he won many adepts from among the Romanian intellectuals.

The country needed engineers in border field and local experts to measure the lands, or for some arrangements or administrative activities required by economic life.

Thus, after a century of education in Greek language, prince George Caragea, decreed on 10 December 1817, the establishing of the first Romanian College, which became functional on 6 March 1818, in an inadequate building in the capital center, at the Saint Sava's. The College was opened in August 1818. Until that time, Gheorghe Lazăr prepared his translations and teaching courses. He taught arithmetic, geometry and trigonometry, but also other disciplines such as ethics, philosophy, geography and history. Among his students there were small boys of craftsmen, teachers and townsmen because the children of richest families were attending the Greek school. The new institution soon became the main center of consolidation and dissemination of Romanian culture. From the first generation of pupils we mention: Petrache Poenaru, Daniel Tomescu, Simon Marcovici and others.

He was professor at the school founded by him since 1818 until July 1822. In 1821 he was an active participant in Tudor Vladimirescu Revolution.

After establishment of the College, teaching in the Romanian language was widespread and education in the Greek language decayed.

In the College of St. Sava were formed the first Romanian engineers in the border field, for this reason he is considered the founder of engineering education in Wallachia and the College of St. Sava – the first school of higher technical education. The engineering work of Gheorghe Lazăr was materialized by some of his works in Bucharest, such as lifting of topographic lands – Obislavu (Dâmbovița) or Fântânele (Prahova). Both documentations are still in the State Archives in Bucharest.

He died on 17 September 1823 and was buried in the courtyard of the Orthodox church from Avrig, near the native home, at only 44 years.

2. SCIENTIFIC ACTIVITY IN MATHEMATICS

Gheorghe Lazăr as mathematics teacher taught arithmetic, trigonometry and geometry. He was the author of textbooks of arithmetic, trigonometry and geometry, contributing to the creation of Romanian mathematical terminology. These contributions, however inappropriate it may seem today, demanded a considerable intellectual effort, which can never be measured at their fair value.

It should be emphasized, first the manner to appreciate these manuscripts, which are not simple notes taken in classes or courses or translations made in some quiet office; but are laced with an active and eventful life in whose center he is situated (A. Creangă, 1967). There are two manuscripts with mathematical writings of Gheorghe Lazăr:

1) *The mathematical arithmetic* (manuscript no. 2787 of the Romanian Academy Library). The arithmetic is preceded by a table of contents, with titles: *Implementation of arithmetic*, *Implementation of geometry* and *About trigonometry*.

2) *The right trigonometry* (manuscript no. 2788 of the Romanian Academy Library).

The exact titles of these manuscripts are: *The mathematical arithmetic made now in Romanian language by Giorgie Lazăr for full benefit of his schoolchildren from College of St. Sava*, and *The right trigonometry made now in Romanian language by Giorgie Lazăr for full benefit of his schoolchildren from College of St. Sava Bucharest 1821 – February 26th Lazăr. The mathematical arithmetic* was the most complete arithmetic textbook written in Romanian language at that time and also this was the first textbook that described the decimal fractions (A. Creangă, 1967). *The right trigonometry* was the first textbook of this type written in Romanian language, which contained the first attempt to use the Romanian terminology specific to trigonometry (A. Creangă, 1967).

Further details on writing these manuscripts present:

a) The manuscript of the arithmetic no. 2787 by Gheorghe Lazăr was translated, according to studies from 1936 of Prof. Dr. Victor Marian from Cluj University, using three different authors (G. Andonie, 1965):

- the paragraphs 1 to 86 of the manuscript were translated after *Compendium elementorum matheseos universae in usum studiosae iuventutis adornatum* (The abbreviation of general mathematical elements, ready to benefit of Youth studies) by Christian Wolff, published at Halle, in Germany, in 1731, after which *a Compendium* was printed in Cluj, in 1773. Gheorghe Lazar adapted it to the economical situation in Wallachia;
- the paragraph 87 of the manuscript was translated after *Anleitung zum Rechnen zum Gebrauche der Nazionalschulen in den Königreiche den Ungarn und den damit verbundenen Staaten* (Guides for thought for the benefit of national schools of the Hungarian kingdom and the countries united with it), published in Budapest in 1780 and translated into Romanian in 1805–1806. In paragraph 87 is explained the three simple rules.
- the paragraphs 88 to 95, including decimal fractions, were translated after G.I. Metzburg textbook entitled *Institutiones mathematicae* (Teaching math), I, chap. VII. Gheorghe Lazăr limited the material about fractions of G.I. Metzburg. Gheorghe Lazăr studied from this textbook when he was in Vienna, where G.I. Metzburg was professor in 1775.

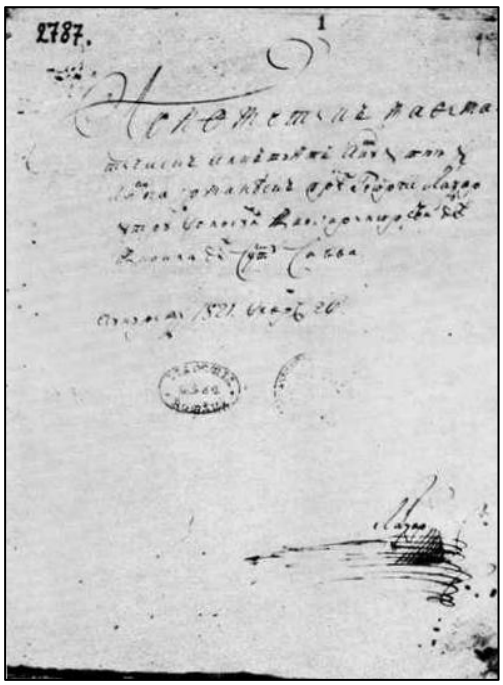

Fig. 2. The mathematical arithmetic. The cover manuscript with Gheorghe Lazăr signature.

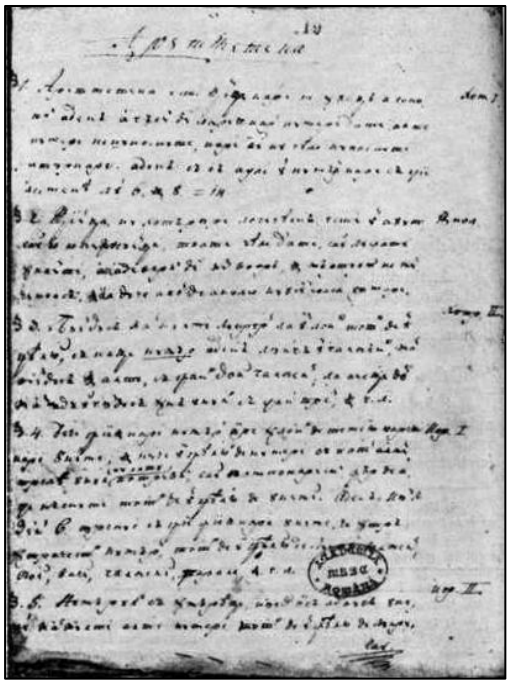

Fig. 3. The mathematical arithmetic, pg. 19.

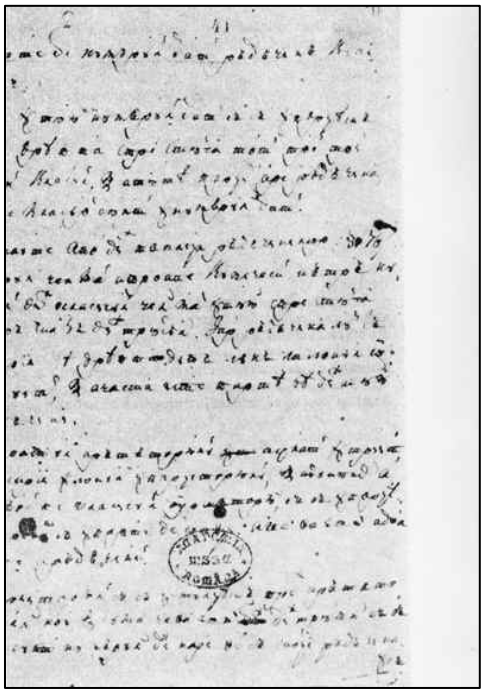

Fig. 4. The mathematical arithmetic, p. 41.

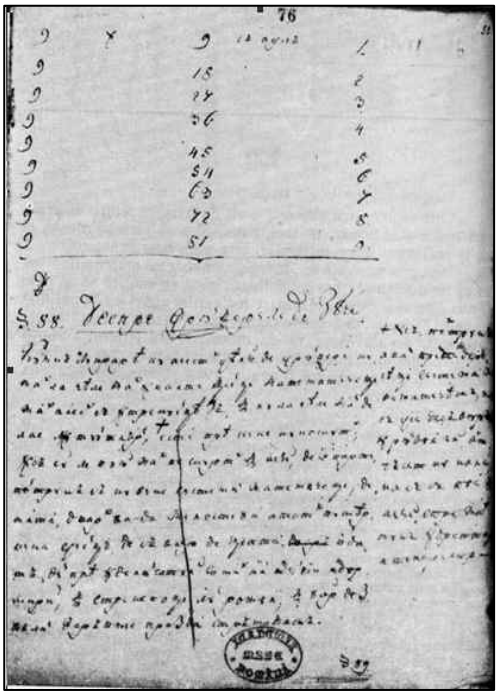

Fig. 5. The mathematical arithmetic, p. 76.

The mathematical arithmetic of Gheorghe Lazăr began with „Implementation of arithmetic", that means the table of contents for arithmetic. Some of the terms used in translation as: addition, subtraction, multiplication, division etc., have been preserved until today, but other terms such as sales for solving, decision for definition, breaks for fractions, were not adopted. The arithmetic was transcribed and published for the first time, by de Gh. Bogdan-Duică and Gh. Popa-Lisseanu in 1924, in the volume *Life and scientific activity of Gheorghe Lazăr* containing all the writings left of him. This volume contains the transcription of trigonometry after Traian Lalescu, but without preface and without his notes.

b) The manuscript of trigonometry no. 2788 by Gheorghe Lazăr was translated, according to studies from 1936 of Prof. Dr. Victor Marian from Cluj University, using the trigonometry of G.I. Metzburg, included in the textbook *Institutiones Mathematicae*, t. III, entitled *Elementa trigonometriae planae* (Elements of plane trigonometry) (G. Andonie, 1965). In the manuscript there are words like: side, triangle, sin, cosinus, cathetus, hypotenuse, parallel, logarithm, which were completely preserved or modified just a little. Also there are words that were later modified in mathematical procedures, as the words concerning the isosceles triangle, some triangle (scalene), oblique angle, tangent, cotangent, secant, cosecant, look for theorem etc. The concepts taught by Gheorghe Lazăr for trigonometry were sufficient for practical work in topography.

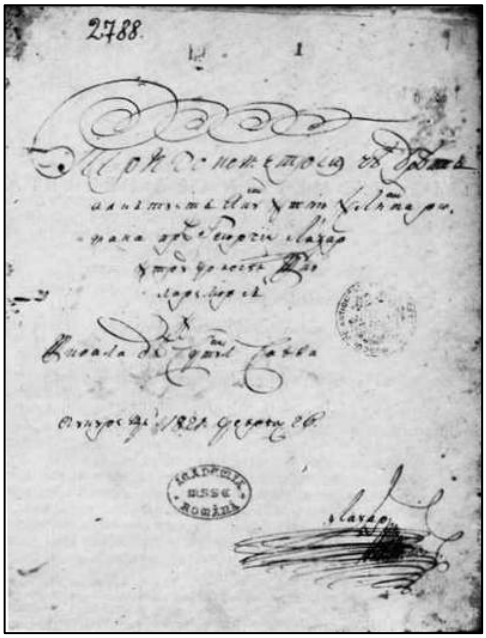

Fig. 6. The trigonometry. The cover manuscript with Gheorghe Lazăr signature.

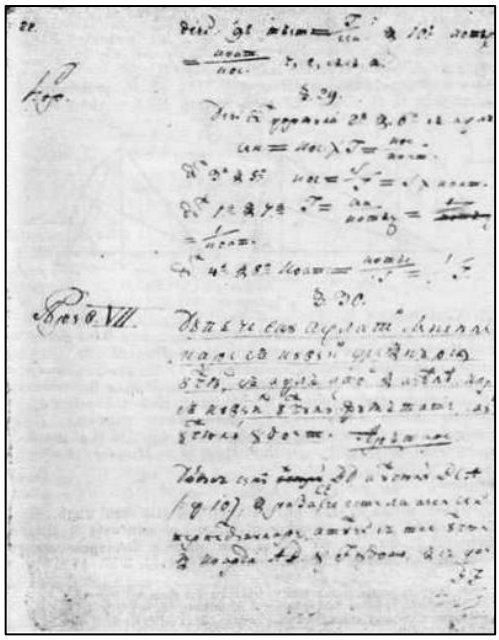

Fig. 7. The trigonometry, p. 28.

Fig. 8. – The trigonometry, p. 44.

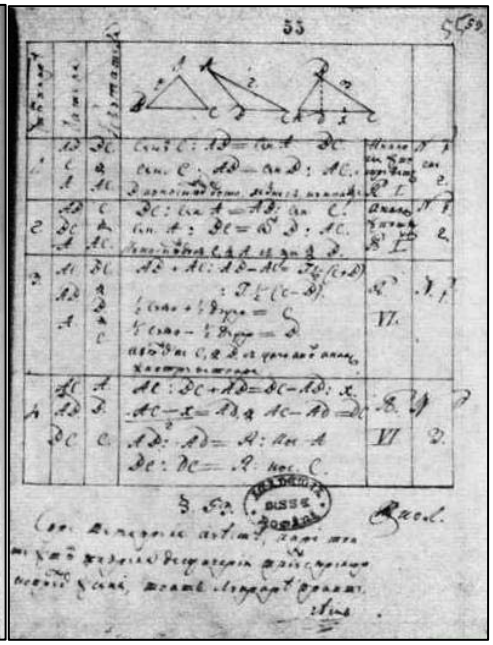

Fig. 9. – The trigonometry, p. 55.

The trigonometry was transcribed in Latin letters and published for the first time in vol. VII, „Gazeta Matematică" Collection in 1919 by Traian Lalescu, that is accompanied by a preface, a study on the life and work of Gheorghe Lazăr, and a series of notes (G. Andonie, 1965).

c) Gheorghe Lazăr also taught a geometry course, and had a manuscript of geometry, translated and adapted from similar foreign works. This manuscript was translated after *Compendium elementorum matheseos universae in usum studiosae iuventutis adornatum* by Christian Wolff, published at Halle, in Germany, in 1731, after which a *Compendium* was published in Cluj, in 1773. The manuscript was kept in Romanian Academy Library, but subsequently was lost (G. Andonie, 1965).

The geometry of Gheorghe Lazăr began with "Implementation of the geometry" (table of contents), continue with "areas and measuring the heights" and ends with "Solid measure". Gheorghe Lazăr adopted many words in geometry that are also preserved today as point, line, straight, figure, angle, square, polygon, trapezoid, circle, radius, diameter, degree, chord, area, measure, plane, cube, prism etc. The manuscript of Gheorghe Lazăr was lost, but „Implementation of the geometry" which was found, showed that his geometry manuscript was translated after Chr. Wolff's compendium, according to table of contents.

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1. Andonie Şt. George, *Istoria matematicii în România*, vol. I, II, III, Editura Ştiinţifică, Bucureşti, 1965.
2. Creangă Axente, *Scrierile matematice ale lui Gheorghe Lazăr*, EDP, Bucureşti, 1967.