

Mathematics in the *Memoirs* of the Lisbon Academy of Sciences in the 19th century

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Abstract

From the end of the 18th century until the appearance of the first issue of the *Jornal de Sciencias Mathematicas e Astronomicas* in 1877, the Lisbon Royal Academy of Sciences, founded in 1779, was the main publisher in Portugal of periodicals that included mathematical papers. In this article I will give an overview of the mathematical papers which appeared in the Academy's *Memoirs* during the 19th century, in the context of the scientific output published in its pages. We will characterize the community of mathematicians around the Academy's journal and the changes in background and in themes researched throughout the century.
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Sumário

Do fim do século XVIII ao início do *Jornal de Sciencias Mathematicas e Astronomicas* em 1877, a Academia Real das Sciencias de Lisboa, fundada em 1779, é a principal entidade em Portugal que publica jornais periódicos com artigos de matemática. Neste artigo daremos um panorama do que de matemática foi incluído nas Memórias da Academia durante o século XIX, no contexto da produção científica publicada nessa época nas suas páginas. Caracterizaremos a comunidade matemática que publica neste jornal, e daremos indicações sobre as mudanças operadas quer na sua composição quer nos temas matemáticos por ela abordados ao longo do século XIX.

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1. Introduction

The aim of this paper is to give a general overview of the mathematical papers published in the 19th century in the *Memoirs* of the Lisbon Academy of Sciences, presenting this in the general context of the scientific publications in the *Memoirs*. We will give a report on the quantitative output of the *Memoirs*, emphasizing the main subjects covered by the published papers, concentrating particularly on mathematics papers and authors.

It should be noted that there is a major restriction to our work: the Archives of the Lisbon Academy of Sciences are not cataloged and are not open to researchers. Apart from the *Memoirs* themselves, there is very little available to researchers. In particular, sometimes the only information in the individual files on the academicians is the dates when they became Academy members, and frequently there are no individual letters or any written correspondence in these files. Consequently for the time being many questions must remain unanswered, and even data such as the number of

copies printed of each issue of the *Memoirs*, or financial questions related to the journal, cannot be answered. It may be hoped that this situation will change in the future, and it will then be possible to present an analysis of these issues and others.

We should also bear in mind not only that the subject of this paper covers a long time period but also that there is very little published on this subject, so it is inevitable that many interesting subjects related to 100 years of publication of the *Memoirs* of the Lisbon Academy of Sciences are not analyzed in depth, or even mentioned here.

In a future publication I intend to analyze the other main 19th-century Portuguese journals that included mathematics papers, particularly two further journals that the Academy of Sciences published during the 19th century, the *Annaes de Sciencias e Lettras* (1857–1858) and the *Jornal de Sciencias Mathematicas, Physicas e Naturaes* (1866–1923), and furthermore *O Instituto*, published by the academy of that name in Coimbra, and the groundbreaking *Jornal de Sciencias Mathematicas e Astronomicas*, masterminded by Francisco Gomes Teixeira (1851–1933), which radically changed the panorama of scientific journals in Portugal and initiated a new era for mathematics in this country.

2. Mathematics in Portugal in the 19th century

In 1900, the Portuguese mathematician and historian of mathematics Rodolfo Guimarães (1866–1918) published his *Les Mathématiques en Portugal au XIXe siècle* [Guimarães, 1900] as a contribution to the Portuguese section of the Paris Universal Exhibition. The main feature of this book was a 122-page catalog of 19th-century Portuguese mathematical works, compiled according to the norms of the 1889 *Congrès International de Bibliographie des Sciences Mathématiques*. This was greatly expanded, nine years later, when a second edition [Guimarães, 1909] was published under the title *Les Mathématiques en Portugal*, reflecting the change in scope of the book, which now aimed to include a comprehensive bibliography of all Portuguese mathematical works.¹ Guimarães considered three groups of mathematical works: mathematical analysis, which included algebra, analysis, probability theory, and number theory; geometry (including trigonometry); and applied mathematics, an extremely heterogeneous group that included everything that was not covered by the other two groups, namely mechanics, ballistics, astronomy, geodesy, hydrodynamics, textbooks, philosophy and history of mathematics, graphic calculus, descriptions of instruments, etc. Guimarães' information must be approached with care, due to the extreme heterogeneity of the material compiled, from research papers to textbooks. Nonetheless, from the data in this catalog, we can see that Portuguese mathematics in the 19th century can be divided into three different periods according to the average number of publications produced per year.² In the first half of the century very little was published on mathematics: for this period Guimarães only lists 66 works, 36 of which are in his group of applied mathematics, 18 in mathematical analysis, and 12 in geometry. In contrast to this, the second half of the century saw a blossoming of mathematics, with a rapid further increase in the last quarter of the century. There are 147 publications listed in Guimarães' compilation for the period 1851–1875, while there are 520 in the period 1876–1900. Applied mathematics is in each case the group with the largest number of publications: 83 in the former period and 221 in the latter, as opposed to 34 and 158 for mathematical analysis and 30 and 141 for geometry, respectively. The distribution over the three groups and their percentages are as listed in Table 1.

If we combine mathematical analysis and geometry, a more coherent theme-orientated group than applied mathematics, we can see that it started to dominate in the last quarter of the century, with over 57% of the total number of publications. If we only consider papers published in journals, we have a similar, although not identical, situation.

Table 1
Mathematics publications in Portugal during the 19th century, according to Guimarães

	Math. analysis		Geometry		Applied math.	
1801–1850	18	27.27%	12	18.19%	36	54.54%
1851–1875	34	23.13%	30	20.41%	83	56.46%
1876–1900	158	30.38%	141	27.11%	221	42.50%

¹ For more information on Rodolfo Guimarães and his work, see Saraiva [1993b].

² For a more detailed analysis of Portuguese mathematics in the 19th century, see Saraiva [2000].

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