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## Building a Bibliographical Data-Base on Old Science, Medicine and Technique in Portugal and Brazil

ROBERTO DE ANDRADE MARTINS\*

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### Summary

This article presents a bibliographical project on sources for the study of Portuguese and Brazilian science, medicine and technique, from the 15th Century to 1822. The project led to the development of a set of computerized data-bases that contains 20,000 entries on primary and secondary sources (including printed works, manuscripts, and maps). The article describes the method of bibliographical research employed in the project.

### Introduction

How is it possible to find out relevant sources for the history of science, medicine and technique that have been completely ignored or seldom used by historians? This question occurred to me a few years ago, after noticing that most of old Portuguese and Brazilian science was still waiting for a first description. Of course, there are a few very well known episodes and authors (Garcia de Orta, Pedro Nunes, Emmanuel Alvares, etc.); but what about other authors and episodes? What about the context around those best known authors?

From this kind of concern, a project was started in 1989 at UNICAMP to map the old science, medicine and technique of Portugal and Brazil, through a systematic search of published and unpublished source materials. This project is now fairly advanced. This article describes the method used in the search and the present state of the work.

\* Universidade Estadual de Campinas (UNICAMP), Brasil.

The older part of the project studied the period from the 15th Century to 1822 (the year when Brazil became independent from Portugal). Afterwards, the project was broadened so as to include the period from 1823 to 1900. However, as our work on this new period has just began, only the early project (up to 1822) will be described here.

### Aim of the project: subjects and kinds of documents

The project intends to provide information on both primary and secondary sources for the history of science, medicine and technique<sup>1</sup> in Portugal and Brazil, up to 1822. It is necessary, however, to delimit as exactly as possible the subjects and kind of documents to be included in the search.

A very broad delimitation of "science, medicine and technique" was used. The following subjects were included: astronomy (including nautical astronomy), mathematics, physics (or natural philosophy), geography, geology, chemistry, metallurgy, natural history (including what nowadays would be called biology, zoology, botany, mineralogy), farming (including husbandry and agriculture), medicine, pharmacy, veterinary sciences, engineering, architecture, mechanics, naval techniques, military techniques, education, philosophy (including logic, cosmology, ethics, metaphysics, psychology, etc.), philology, social studies,<sup>2</sup> statistics, and (partially) history. Studies and manuals on arts (music, drawing, handicrafts, cooking, etc.) were included. The so-called "pseudo-sciences" (astrology, alchemy, magic, etc.) were also included.

It was necessary to include works that were not properly scientific studies, such as travel descriptions and historical descriptions of the period, as they are essential for the study of the development of scientific, medical and technical knowledge. The following subjects were *excluded*: religion, law, fiction literature (romance, poetry, drama, etc.), politics. However, some religious works were included for their linguistic relevance (for instance: religious texts written in indigenous or Asiatic languages). A few fiction works and laws directly related to science and technique were also included (for instance: Gil Vicente's "Auto dos físicos", that depicts the author's view on Portuguese Renaissance medicine).

History was *partially* included in the search.<sup>3</sup> It was not desirable to include

1. In this period, *technology*, in the sense of practical use of scientific knowledge, hardly existed. It is better to use the word "technique" for practical knowledge of that time. Throughout this article, instead of repeating the phrase "science, medicine and technique", the words "science" and "knowledge" will usually be used for short.

2. Anthropology and sociology did not exist in this period as disciplines, but many works of the period contained what nowadays would be called anthropological and sociological knowledge.

3. This selection should not be interpreted as a denial of the scientific *status* of history. History of science is only *part* of history. Anyone trying to build a bibliography for the study of history of poetry or history of art would also include only a small part of the available historical works.

all works that might interest a historian working on the history of Portugal or Brazil (in that case, *nothing* could be excluded). The selection was made from the assumption that this data-base was to be used by historians of science, medicine and technique. For this reason, the search included historical works that presented an account of the general historical context of Portugal and Brazil during the period, but excluded specialized works of political import, diplomatic correspondence, discourses, laudatory biographies of kings, queens and princes, etc.

Even with those restrictions, the task is, of course, a big one. At first, for practical reasons, it was necessary to limit the work to the search of *published* works (books, articles, pamphlets, theses) of the period (from the 15th Century to 1822) related to the above described subjects. As the project advanced, it also became possible to include: post-1822 editions of pre-1822 works (either new editions and translations of works published before 1822, or first editions of unpublished works); secondary literature (bibliographical and historical books and articles on this period, produced afterwards); maps and manuscripts.

In the case of manuscripts, it was very difficult to draw a clear distinction between relevant and irrelevant material. All manuscripts that corresponded to scientific, medical and technical monographs were included, of course. Individual letters were included only when they were written by important authors, or when their content was clearly relevant. Institutional papers (those, for instance, of Coimbra University) were included as large units, without detailed description.

It was also necessary to decide what should be understood as "Portuguese and Brazilian". A very broad delimitation was chosen. The search included any works published in Portugal, Brazil and other Portuguese colonies, as also works written by authors that lived in those countries, but were published elsewhere. Portuguese translations of works published elsewhere were also included. Works *about* Portugal and Brazil published in other countries were not included. For instance: some foreign travelers have described the geography, flora and fauna of Brazil, but their works cannot be considered as part of the Brazilian scientific production.

### Methods of information search

Given the objective of the project, how could it be fulfilled? How was it possible, in the first place, to find out information about Portuguese and Brazilian scientific books of the colonial period? Of course, historians of science have described some of these works. It was necessary to use this kind of available information. However, the main quest was for unknown or little known works. They had to be tracked by a different technique: consulting *general* bibliographical works (not restricted to any particular subject), and catalogues, and selecting relevant information.

From the very beginning of the project I was aware, of course, of some historical and bibliographical works that should be used in the search. However, how was it possible to find out information about bibliographies and catalogues?

Of course, any library's card catalogue will provide this kind of information for available *books*. However, in order to find out about other works that are not in nearby libraries and about bibliographical *articles*, it is necessary to use *bibliographies of bibliographies*.

### *Bibliographies of bibliographies*

Four important Brazilian and Portuguese bibliographies of bibliographies were used to find reference works: those of António Anselmo, Antonio Simões dos Reis, Bruno Basseches and Jorge Peixoto.<sup>4</sup> Of course, from a systematic point of view, this is the logical beginning - but as a matter of fact, it only gradually became clear to me that these were the most important bibliographies of bibliographies available.<sup>5</sup> They provide information on a few thousand secondary works. A selection of those works was made, to be gradually obtained and used in the project.<sup>6</sup>

What is presented below is a *systematic reconstruction* of the search of the present project, but not a description of the steps in their actual historical order. The exact order of the search depended on many contingent aspects— specially availability of a copy of the relevant reference work, and awareness of its importance.

### *General bibliographies*

There are several Brazilian and Portuguese general bibliographies (not restricted to any specific subject) that were used in the present project. The oldest one is the monumental work of Abbot Diogo Barbosa Machado (1682-1772).<sup>7</sup>

4. Antonio Joaquim Anselmo, *Bibliografia das bibliografias portuguesas*, Lisboa, Biblioteca Nacional, 1923; Antonio Simões dos Reis, *Bibliografia das bibliografias brasileiras*, Rio de Janeiro, Instituto Nacional do Livro, 1942; Bruno Basseches, *A bibliography of brazilian bibliographies - Uma bibliografia das bibliografias brasileiras*, Detroit, Blaine Ethridge Books, 1978; Jorge Peixoto, *Bibliografia analítica das bibliografias portuguesas*, Coimbra, Universidade de Coimbra, 1987.

5. I only became aware of Peixoto's work (note 4) when I met its title in a catalogue of publications of the University of Coimbra. It could not be found in any of the Brazilian libraries that I was able to consult, and was obtained directly from Coimbra.

6. Of course, I have also found and used other relevant secondary works that are not cited in any of those reference works.

7. Diogo Barbosa Machado, *Bibliotheca lusitana histórica, critica e chronologica. Na qual se comprehende a noticia dos authores portuguezes, e das obras, que compuserão desde o tempo da promulgação da ley da graça até o tempo prezente*, Lisboa, Officina de Antonio Isidoro da Fonseca, 1741-1759, 4 vols; this work was republished twice: Lisboa, Of. Gráfica de Bertrand, 1930-1935; and Coimbra, Atlântida, 1965-1967.

*Bibliotheca lusitana* was intended to contain biographical and bibliographical information on any work on any subject (whether published or manuscript) written by Portuguese authors (including, of course, authors of Portuguese colonies), up to the time of its composition. It contains about 5,000 references. Of course, it contains many errors and omissions, but is still a fundamental work for the study of old Portuguese works.

In the next century, Innocencio Francisco da Silva (1810-1876) - and, after his death, Pedro Venceslau de Brito Aranha - complemented the work of Diogo Barbosa Machado.<sup>8</sup> The aim of the *Diccionario bibliographico portuguez* was to provide biographical and bibliographical information on "relevant works" by Portuguese (and Brazilian) authors, published in Portuguese (excluding, therefore, manuscripts and foreign editions). For the period covered by Diogo Barbosa Machado, Innocencio's work does not add many new references, but it is invaluable for the later period.

In Brazil, the physician Augusto Victorino Alves do Sacramento Blake (1827-1903) followed Innocencio's example and produced the *Diccionario Bibliographico brasileiro*.<sup>9</sup> It only included authors who were born or lived in Brazil. It corrected and complemented many of Innocencio's references.

After those breathtaking works, no other person was able to produce similar general Portuguese or Brazilian bibliographies.<sup>10</sup>

Very well, given those three first bibliographies: how can we find relevant scientific, medical and technical works there?

At first sight, it is very easy to search the work of Diogo Barbosa Machado: it contains a subject index. However one should not trust this index. In the case of all those works, it was necessary to examine all volumes, page by page, in search for relevant information.

8. Innocencio Francisco Silva & Pedro Venceslau de Brito Aranha, *Diccionario bibliographico portuguez. Estudos de Innocencio Francisco da Silva applicaveis a Portugal e ao Brasil. Continuados e ampliados por Brito Aranha*, Lisboa, Imprensa Nacional, 1858-1923, 23 vols. This work was later complemented by: Martinho Augusto Ferreira da Fonseca, *Aditamentos ao Diccionario Bibliographico Portuguez de Innocencio Francisco da Silva*, Coimbra, Imprensa da Universidade, 1927; Martinho Augusto Ferreira da Fonseca, *Subsidios para um diccionario de pseudonymos, iniciaes e obras anonymas de escriptores portuguezes. Contribuição para o estudo da litteratura portugueza*, Lisboa, Typ. da Academia Real das Sciencias, 1896. Both works were reprinted: Lisboa, Imprensa Nacional, 1972.

9. Augusto Victorino Alves do Sacramento Blake, *Diccionario bibliographico brasileiro*, Rio de Janeiro, Typographia Nacional, 1883-1902, 7 vols. Reprinted: Rio de Janeiro, Conselho Federal de Cultura, 1970.

10. There were some limited attempts. João Francisco Velho Sobrinho tried to replace Blakes's work by a more complete and updated bibliographical dictionary, but was unable to push his work beyond the first letters of the alphabet: João Francisco Velho Sobrinho, *Diccionario bio-bibliográfico brasileiro*, Rio de Janeiro, Oficinas Gráficas Irmãos Pongetti, 1937-1940, 2 vols. Carlos Coimbra tried to produce a complement to Innocencio's work, but was also unable to complete it: Carlos Coimbra, *Diccionario de bibliografia portuguesa*, Lisboa, A. de Gusmão Navarro, 1932-1935. Some recent works do not attempt to be as complete as any of the "classical" bibliographies. See, for instance: Eugénio Lisboa (Coord.), *Dicionário cronológico de autores portugueses*, Lisboa, Instituto Português do Livro Publicações Europa-América, 1985-1990, 2 vols.

After this job had been done, could we assume that most relevant publications have already been found? How far did those bibliographies fulfill their aim? It was impossible to answer that question. Nowadays, after several years of work, it is possible to know that Diogo Barbosa Machado lists little more than 1/3 of the relevant books published before 1740. It is also possible to know that only 60% of the relevant works published up to 1822 are described in any of those general bibliographies.

Several other relevant general bibliographies were also used: Martinho da Fonseca's complements to Innocencio's work<sup>11</sup>; the available volumes of the work of João Francisco Velho Sobrinho and Carlos Coimbra; Eugénio Lisboa's *Dicionário cronológico*;<sup>12</sup> Ricardo Pinto de Mattos' *Manual*,<sup>13</sup> etc.

Most of those general bibliographies *excluded* works published in other countries, in other languages, and translations of foreign works published in Portugal and Brazil. The most important bibliography intended to fill those gaps, in what concerns Portugal, is Manoel Bernardes Branco's work.<sup>14</sup>

#### *Bibliographies restricted to a time period*

There are also some important general bibliographies restricted to a specific time period. A project sponsored by the Lisbon Academy of Sciences produced first a very nice bibliography of Portuguese publications of the 15th Century —and, more recently, of the 16th Century.<sup>15</sup> Before that work, António Anselmo had produced a bibliography that remained for several decades the standard reference for the 16th Century.<sup>16</sup> None of those works is complete, of course, and they can be complemented by several other specific studies for the same period.<sup>17</sup> Unfortunately, Portuguese publications of the 17th and 18th Centuries have not hitherto deserved the same bibliographical interest.

11. See note 8.

12. See note 10.

13. Ricardo Pinto de Mattos, *Manual bibliographico portuguez de livros raros, classicos e curiosos*, Porto, Livraria Portuense, 1878. Reprinted: Porto, Manuel Barreira, 1970.

14. Manoel Bernardes Branco, *Portugal e os estrangeiros*, Lisboa, Livraria de A.M. Pereira - Imprensa Nacional, 1879-1895, 5 vols. Alfredo de Carvalho tried to do a similar job for Brazil, but his work is, unfortunately, very incomplete: Alfredo de Carvalho & Eduardo Tavares, *Bibliotheca exotico-brasileira*, Rio de Janeiro, Empreza Graphica Editora Paulo Pongetti & Co., 1929-1930, 3 vols.; Alfredo de Carvalho, "Bibliotheca exotico-brasileira (N a Z)", *Anais da Biblioteca Nacional* 77, 1957, pp. 59-87.

15. Academia das Ciências de Lisboa, *Bibliografia geral portuguesa*, Lisboa, Imprensa Nacional, 1941-1983, 3 vols. Volumes 1 and 2 describe works published in the 15th Century, and the third volume describes 16th Century books.

16. Antonio Joaquim Anselmo, *Bibliografia das obras impressas em Portugal no século XVI*, Lisboa, Biblioteca Nacional, 1926. Reprinted: Lisboa, Biblioteca Nacional, 1977.

17. Venâncio Augusto Deslandes, *Documentos para a história da typographia portugueza nos séculos XVI e XVII*, Lisboa, Imprensa Nacional, 1881-1882, 2 vols.; Marlene Monteiro de Castro Martins, *Quinhentistas portugueses da Biblioteca Nacional*, Rio de Janeiro, Biblioteca Nacional, 1989; D. Manuel II, Rei de Portugal, *Livros antigos portugueses (1489-1600). Da bibliotheca de sua Magestade Fidelissima*.

In the case of Brazil, several important studies were published by Rubens Borba de Moraes concerning the whole colonial period.<sup>18</sup> For the same period, it is important to refer to José Carlos Rodrigues' book.<sup>19</sup> It is a nice bibliographical work, and describes a private collection that was later incorporated to the National Library of Rio de Janeiro.

During the largest part of the colonial period, Portugal prohibited the printing of books in Brazil. Only in 1808 an official typography was established in Rio de Janeiro. For this reason, the period between 1808 and 1822 has deserved special attention. Alfredo do Valle Cabral produced the first bibliography on this period. It became a standard reference for a whole century, but was recently superseded by Ana Maria Camargo and Rubens Borba de Moraes' work.<sup>20</sup>

### *Printed catalogues of libraries and book-sellers*

For the search of books, it was useful to use published catalogues of important libraries. It is, of course, easier (and cheaper) to consult those printed catalogues than to peruse card catalogues in the libraries. In the case of card catalogues, there is in general no easy way to find old books. On the contrary, if those

*Descritos por S.M. el rei, D. Manuel*, Londres, Universidade de Cambridge - Maggs Bros, 1929-1935; Luis Silveira, *Livros impressos no século XVI, existentes na Bibliotheca Pública e Arquivo Distrital de Évora*, Évora, Biblioteca Pública e Arquivo Distrital, 1941-1954; Maria Emília Lavoura, "Obras de tipografia quinhentista portuguesa na Biblioteca Nacional de Madrid", *Revista da Biblioteca Nacional de Lisboa* 6, 1991, pp. 107-148; Maria Alzira Proença Simões, *Catálogo dos impressos de tipografia portuguesa do século XVI - a colecção da Biblioteca Nacional*, Lisboa, Biblioteca Nacional, 1990; Maria Emília Lavoura, *Obras de tipografia quinhentista portuguesa na Biblioteca Nacional de Paris*, Lisboa, Biblioteca Nacional, 1993. Since the publication of Anselmo's work, many articles were published on specific findings not referred by Anselmo. See, for instance: Jorge Peixoto, "Relectio de Manuel Tavares, de 1598. Outras edições de António Mariz não citadas por Anselmo", *Arquivo de Bibliografia Portuguesa* 6, 1960, pp. 175-194; José V. de Pina Martins, "Um livro de medicina desconhecido pelos bibliófilos impresso em Lisboa por Germão Galharde", *Arquivos do Centro Cultural Português* 7, 1973, pp. 411-420; Francisco Leite de Faria, "Desconhecidos impressos quinhentistas portugueses existentes na Biblioteca da Casa de Cadaval", *Revista da Universidade de Coimbra* 30, 1984, pp. 319-345. Several other studies are also cited in: Jorge Borges de Macedo, "Livros impressos em Portugal no século XVI - interesses e formas de mentalidade", *Arquivos do Centro Cultural Português* 9, 1975, pp. 183-221.

18. Rubens Borba de Moraes, *Bibliografia brasileira do período colonial*, São Paulo, Instituto de Estudos Brasileiros, 1969; Rubens Borba de Moraes, *Bibliographia brasiliana. Rare books about Brazil published from 1504 to 1900 and works by Brazilian authors of the Colonial period*, Rio de Janeiro, Colibri, 1958, 2 vols. Revised and enlarged edition: Los Angeles, CA/Rio de Janeiro, University of California/Kosmos, 1983, 2 vols.

19. José Carlos Rodrigues, *Bibliotheca brasiliense. Catalogo anotado dos livros sobre o Brasil e de alguns autographos e manuscriptos pertencentes a J. C. Rodrigues. Parte I - Descobrimento da America, Brasil colonial 1429-1822*, Rio de Janeiro, Typ. do "Jornal do Comercio" de Rodrigues e Cia., 1907.

20. Alfredo do Valle Cabral, *Annaes da Imprensa Nacional do Rio de Janeiro de 1808 a 1822*, Rio de Janeiro, Typographia Nacional, 1881; Ana Maria de Almeida Camargo & Rubens Borba de Moraes, *Bibliografia da Imprensa Régia do Rio de Janeiro (1808-1822)*, São Paulo, EDUSP - Livraria Kosmos, 1993, 2 vols.

printed catalogues were written a long time ago, or if they describe special collections, they will provide the easiest way to find out the old books that interest us.

In the 19th and early 20th centuries, several Portuguese and Brazilian libraries published their catalogues.<sup>21</sup> More recently, some libraries have published catalogues of special collections.<sup>22</sup>

Unfortunately, there are no general printed catalogues from the two largest libraries: *Biblioteca Nacional de Lisboa*, and *Biblioteca Nacional do Rio de Janeiro*.

A few special libraries and collections in other countries have also been useful for this project.<sup>23</sup> In general, however, the probability of finding relevant Portuguese and Brazilian books in foreign catalogues is very small (usually about 1/1,000).

21. In Brazil, one of the most important of those catalogues is: Benjamin Franklin Ramiz Galvão, *Catálogo do Gabinete Portuguez de Leitura no Rio de Janeiro, segundo o systema decimal de Mevil Dewey*, Rio de Janeiro, Typ. do "Jornal do Commercio" de Rodrigues & C., 1906-1907, 2 vols. Brazilian production of library catalogues was considerably larger than that of Portugal - probably because, at that time, Portuguese libraries were much larger and consequently more difficult to describe in a published catalogue. There are several other useful catalogues - specially those of specialized libraries: A. Lima, *Catálogo da Bibliotheca Municipal (Publicação Oficial - Municipalidade do Rio de Janeiro)*, Rio de Janeiro, Typ. Central de Brown & Evaristo, 1878; João Augusto dos Santos Porto, *Catálogo da bibliotheca da Marinha segundo o systema decimal Dewey*, Rio de Janeiro, Imprensa Nacional, 1904, 2 vols.; Carlos Costa, *Catálogo systemático da Bibliotheca da Faculdade de Medicina do Rio de Janeiro*, Rio de Janeiro, Imprensa Nacional, 1892; *Catálogo da Bibliotheca da Escola Polytechnica organizado em 1878 e acompanhado do respectivo regulamento*, Rio de Janeiro, Typographia Nacional, 1878; *Catálogo dos livros da Bibliotheca Fluminense*, Rio de Janeiro, Typographia Thevenet, 1866; *Catálogo dos livros da Bibliotheca do Instituto Histórico e Geographico Brasileiro*, Rio de Janeiro, Companhia Typ. do Brazil, 1893; Luciano Cordero, *Sociedade de Geographia de Lisboa. Catalogos e Indices. As Publicações*, Lisboa, Imprensa Nacional, 1889; Pedro Rodrigues Guimarães, *Catálogo dos livros da Bibliotheca da Faculdade de Medicina da Bahia*, Bahia, Livraria Catilina, 1910, 2 vols.; *Catálogo geral da Bibliotheca Publica da Bahia*, Bahia, Typographia de Antonio Olavo da França Guerra, 1898.

22. Maria Teresa Pinto Mendes, Jorge Peixoto & José Barbosa, *Catálogo dos reservados da Biblioteca Geral da Universidade de Coimbra*, Coimbra, Biblioteca Geral da Universidade, 1970; Maria da Graça Peixoto, *Catálogo dos reservados da Biblioteca Geral da Universidade de Coimbra. Suplemento*, Coimbra, Coimbra Editora Ltda., 1981; Noah Moura, *Catálogo de obras raras ou valiosas da Biblioteca Pública do Estado [do Rio Grande do Sul]. Edição comemorativa do centenário de fundação, 1871-1971*, Porto Alegre, Globo, 1972; Rosemarie Erika Horch, *Bibliotheca selecta catalogus librorum*, São Paulo, Instituto de Estudos Brasileiros, 1971; Brasil, Arquivo Nacional, *Catálogo de obras raras*, Rio de Janeiro, Arquivo Nacional - Biblioteca, 1972; Biblioteca Municipal Mário de Andrade, *Catálogo de obras raras da Biblioteca Municipal Mário de Andrade*, São Paulo, Secretaria da Educação e Cultura, 1969; Biblioteca Municipal Mário de Andrade, *Catálogo de obras raras (suplemento) da Biblioteca Municipal Mário de Andrade*, São Paulo, Secretaria da Educação e Cultura, 1980; Angela Braga, *Catálogo das obras raras e valiosas da Biblioteca Frederico Edelweiss*, Salvador, Universidade Federal da Bahia - Centro de Estudos Baianos, Gráfica Universitária, 1981; Antonio Joaquim Lopes da Silva Junior, *Os reservados da Bibliotheca Publica de Evora, catalogo methodico pelo director da mesma Bibliotheca*, Coimbra, Imprensa da Universidade, 1905; Angela Maria Barcelos da Gama, *Catálogo da Biblioteca do "Real Colégio de São Pedro" de Coimbra*, Biblioteca Geral da Universidade, 1977-1978, 2 vols.; Salvador de Mendonça, "Catálogo da collecção Salvador de Mendonça", *Annaes da Bibliotheca Nacional do Rio de Janeiro*, 27, 1905, pp. 1-126; Leila da Conceição Vellozo Prestes Ferreira, *Catálogo seletivo de obras raras da Universidade Federal do Rio de Janeiro*, Rio de Janeiro, Universidade Federal do Rio de Janeiro, 1987.

23. Susanne Koppel, *Brasilien-Bibliothek der Robert Bosch GMBH*, Stuttgart, Deutsche Verlags-Austalt, 1986; Ruth E. V. Holmes, *Bibliographical and historical description of the rarest books in the Oliveira Lima collection at the Catholic University of America*, Washington, Catholic University of America, 1926.

Another excellent kind of information source is provided by printed catalogues of book-sellers.<sup>24</sup> Some of them are auction catalogues of rich private libraries.<sup>25</sup> Many works of this kind were published in the 19th Century and beginning of the 20th Century in Portugal; nowadays they are not so common. Several of them contain very careful bibliographical descriptions of the books, and sometimes facsimile reproductions of title pages.

There are hundreds of catalogues of book-sellers. In one respect, they are as useful as library catalogues: both provide equally good bibliographical descriptions. There is, however, an important difference: if one finds a reference of a very rare book in a book-seller catalogue, it will be impossible (in general) to find out where that book is now. On the contrary, if a reference is found in a library catalogue, there is a high probability that the book can still be found in that library.<sup>26</sup>

24. José dos Santos, *Arquivo bibliográfico de livros raros e curiosos impressos e manuscritos em diversas linguas à venda na Livraria Lusitana*, Lisboa, 1915; Manuel dos Santos, *Bibliografia. Alguns livros raros e curiosos à venda na livraria de Manuel dos Santos*, Lisboa, Tipografia de Adolpho de Mendonça, 1914-1919, 13 vols.; *Catálogo de livros raros e curiosos dos séculos XV, XVI, XVII, XVIII e XIX. Esta colecção de obras antigas e modernas será vendida no Porto, em leilão, promovido pelas Livrarias Moraes, de Lisboa, e Fernando Machado & Cia Ltda, do Porto*, Lisboa, Typ. Torres, 1926; J. A. Telles da Sylva, *Manuscritos & livros valiosos*, Lisboa, J. A. Telles da Sylva, 1972.

25. *Catalogo dos livros raros manuscritos e impressos que compunham a biblioteca de Sir G\*\*\* [Gubian] e que hão de ser vendidos em leilão no domingo 10 de novembro de 1867, e 10 dias seguintes das 12 ás 4 horas da tarde, rua da Conceição, 27 (á praça das Flores). Livros, raros e curiosos, classicos portugueses, hespanhoes e latinos; edições originaes raras, e algumas desconhecidas; poetas, historiadores, philologos, etc.*, Lisboa, Impr. de Joaquim Germano de Sousa Neves, 1867; Casimiro da Cunha, *Catálogo da preciosa livraria antiga e moderna que pertenceu ao distincto bibliophilo e bibliographo Annibal Fernandes Thomaz*, Lisboa, Centro Typographico Colonial, 1912; Arnaldo Henriques de Oliveira, *Catálogo da importantissima e valiosa biblioteca da família Sousa da Câmara*, Porto, Tip. Sociedade de Papelaria, 1966; Arnaldo Henriques de Oliveira, *Catálogo da riquíssima biblioteca Victor M. d'Avila Perez organizado por Arnaldo Henriques de Oliveira para venda em leilão que terá início em 30 de outubro de 1939 no Salão de Antiguidades da Casa Liquidadora, Rua do Alecrim 70, Lisboa, Of. Gráficas da Sociedade de Papelaria Ltda.*, 1939-1940; José dos Santos, *Catálogo da importante e preciosíssima livraria que pertenceu aos notáveis escritores e bibliófilos Condes de Azevedo e de Samodães*, Porto, Tip. da Empresa Literaria e Tipografica, 1921-1922, 2 vols.; José dos Santos, *Catálogo da magnífica e curiosa livraria que pertenceu ao muito ilustrado director do Arquivo Nacional da Torre do Tombo e da Biblioteca Nacional de Lisboa, Pedro de Azevedo*, Porto, Tipografia da Sociedade de Papelaria, 1929; José dos Santos, *Catalogo da preciosa e riquissima livraria que foi do distincto bibliophilo Dr. Luiz Monteverde da Cunha Lobo de Vianna do Castello*, Porto, Typ. da Empesa Litteraria e Typographica, 1912; José dos Santos, *Catalogo da notavel e preciosa livraria que foi do illustre bibliophilo conimbricense Conde do Ameal [João Correia Aires de Campos]*, Porto, Sociedade de Papelaria, 1924; Francisco Arthur da Silva, *Catalogo da importante livraria dos exmos. srs. Condes de Linhares, que será vendida em leilão no dia 1 de dezembro e seguintes no seu palacio da Calçada de Arroyos*, 38, Lisboa, Empreza Editora de Francisco Arthur da Silva, 1895.

26. That depends, of course, on the history and vicissitudes of the specific library. For instance: the Public Library of Bahia got fire twice. Most of the books described in its 19th Century catalogue have unfortunately been destroyed. Even in a more favorable case - that of the *Gabinete Português de Leitura do Rio de Janeiro* - about 1/3 of the old relevant books could not be found in a recent search.

### *Thematic bibliographies, catalogues and historical studies*

Bibliographies and historical studies on specific scientific subjects provide important information. Of course, if there did exist excellent bibliographies on all subjects, the project described in this article would not be necessary. This is not the case, however.

There are a few good works on nautical studies,<sup>27</sup> medicine,<sup>28</sup> botany,<sup>29</sup> history and geography,<sup>30</sup> mathematical sciences,<sup>31</sup> ethnology and indian linguistics,<sup>32</sup> works published in specific languages or places,<sup>33</sup> etc. Of course, they are far from complete, but provide a lot of useful information.

27. Francisco Marques de Souza Viterbo, *Trabalhos náuticos dos portugueses nos séculos XVI e XVII*, Lisboa, Typographia da Academia Real das Sciencias, 1898-1900, 2 vols.; Abel Fontoura de Costa, *Bibliografia náutica portuguesa até 1700*, Lisboa, Agência Geral das Colónias, 1940.

28. Maximiano Lemos, *História da medicina em Portugal*, Lisboa, Publicações Dom Quixote, 1991, 2 vols.; Matias Ferreira Mira, *História da medicina portuguesa*, Lisboa, Empresa Nacional de Publicidade, 1947; Lycurgo de Castro Santos Filho, *História geral da medicina brasileira*, São Paulo, HUCITEC, 1977; Carlos Antonio de Paula Costa, *Catálogo da exposição medica brasileira realizada pela Bibliotheca da Faculdade de Medicina do Rio de Janeiro a 2 de dezembro de 1884*, Rio de Janeiro, Typographia Nacional, 1884; Francisco Guerra, *Bibliografia médica brasileira. Período colonial 1808-1921*, New Haven, Yale University School of Medicine, 1985.

29. Miguel Colmeiro, *La botánica y los botánicos de la península hispano-lusitana. Estudios bibliográficos y biográficos*, Madrid, Imprenta y Estereotipia de M. Rivadeneyra, 1858; David Corazzi, *História da botânica em Portugal*, Lisboa, Typ. das Horas Românticas, 1883.

30. Benjamin Franklin Ramiz Galvão, *Catálogo da Exposição de Historia do Brazil realizada pela Bibliotheca Nacional do Rio de Janeiro a 2 de dezembro de 1881*, Rio de Janeiro, Bibliotheca Nacional do Rio de Janeiro, Typ. de G. Leuzinger & Filhos, 1881, 3 vols. Reprinted: Brasília, Editora da Universidade de Brasília, 1981; Jorge César de Fignière, *Bibliographia histórica portuguesa*, Lisboa, Typographia do Panorama, 1850. Reprinted: Naarden, Anton W. Van Bekhoven, 1970; Rodolpho Augusto de Amorim Garcia, "Bibliographia geographica brasileira", *Revista do Instituto Historico e Geographico Brasileiro*, 85, 1919, pp. 5-105; Z. Consiglieri Pedroso, *Catálogo bibliographico das publicações relativas aos descobrimentos portugueses*, Lisboa, Imprensa Nacional, 1912; Barão Homen de Mello, *Catálogo da exposição de geographia sul-americana realizada pela Sociedade de Geographia do Rio de Janeiro e inaugurada a 23 de fevereiro de 1889*, Rio de Janeiro, Imprensa Nacional, Sociedade de Geographia do Rio de Janeiro, 1891.

31. Francisco de Borja Garção Stockler, *Ensaio histórico sobre a origem e progressos das mathemáticas em Portugal*, Paris, P. N. Rougeron, 1819; Rodolpho Guimarães, *Les mathématiques en Portugal au XIX siècle. Aperçu historique et bibliographique*, Coimbra, O Instituto, 1909.

32. Alfredo do Valle Cabral, "Bibliographia das obras tanto impressas como manuscriptas relativas á Lingua Tupi ou Guarani também chamada Lingua Geral do Brazil", *Annaes da Bibliotheca Nacional*, 8, 1880-81, pp. 143-214; Eugenio de Castro, *Relação bibliográfica de linguística americana*, Rio de Janeiro, Instituto Cairu, 1937; Tancredo Duque Estrada de Barros Paiva, "Bibliographia ethnica-linguística brasiliana", *Annaes do XX Congresso Internacional de Americanistas*, 3, 1932, pp. 331-400; Plínio Marques da Silva Airosa, *Apontamentos para a bibliografia da lingua tupi-guarani*, São Paulo, Cruzeiro do Sul, 1943; Hebert Baldus, *Bibliografia crítica da etnologia brasileira*, São Paulo, Comissão do IV Centenário da Cidade de São Paulo, 1954, 2 vols; José Leite de Vasconcellos, *Etnografia portuguesa-tentame de sistematização*, Lisboa, Imprensa Nacional, 1933-1939, 5 vols.

33. Bernardo Xavier de Coutinho, *Bibliographie franco-portugaise -essai d'une bibliographie chronologique de livres français sur le Portugal*, Porto, Librairie Lopes da Silva, 1939; Anatole Louis Garraux & Francisco de Assis Barbosa, *Bibliographie Brésilienne, catalogue des ouvrages français et latins relatifs au Brésil (1500-1898)*, Rio de Janeiro, José Olimpio, 1962; Vitor Ramos, *A edição de lingua portu-*

Some highly specific studies (on a single author, for instance) were also consulted.<sup>34</sup> They usually provide complete information on a very limited topic.

A few international catalogues and bibliographies were also searched for relevant information. In general, the probability of finding information about Portuguese or Brazilian works in international bibliographies is, of course, small. However, it was useful, for instance, to consult Sommervogel's bibliography,<sup>35</sup> because up to 1770, the teaching in Portugal and its colonies was directed by Jesuit priests.

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guesa em França (1800-1850). *Repertório geral dos títulos publicados e ensaio crítico*, Paris, Fundação Calouste Gulbenkian, 1972; Charles R. Boxer, "A tentative check-list of indo-portuguese imprints", *Arquivos do Centro Cultural Português*, 9, 1975, pp. 567-600; Jack M. Braga, "The beginnings of printing at Macao", *Studia*, 12, 1963, pp. 29-137; Domingo García Pérez, *Catálogo razonado biográfico y bibliográfico de los autores portugueses que escribieron en castellano*, Madrid, Impr. del Colegio Nacional de Sordomudos y de Ciegos, 1890.

34. A few instances on specific topics of the history of medicine: Maximiano Lemos, *Amato Lusitano - a sua vida e a sua obra*, Porto, Eduardo Tavares Martins, 1907; Maximiano Lemos, *Zacuto Lusitano - a sua vida e a sua obra*, Porto, Eduardo Tavares Martins, 1909; Máximo Lemos, *Ribeiro Sanches - a sua vida e a sua obra*, Porto, Eduardo Tavares Martins, 1909; José Veríssimo Serrão, "Manuel Álvares (1545-1612). Um desconhecido português, professor de medicina na Universidade de Toulouse", *Boletim da Biblioteca da Universidade de Coimbra*, 21, 1953, pp. 345-393; Jaime Walter, "Garcia de Orta - bibliografia principal", *Garcia de Orta*, 11, 1963, pp. 857-875; Luís de Pina, "Medicina e médicos na história da Filosofia em Portugal", *Studium Generale*, 2, 1955, pp. 5-52; also published in: *Revista Portuguesa de Filosofia*, 11, 1955, pp. 416-454; Yara Frateschi Vieira, "O médico e o monstro: sobre a evolução do discurso teratológico em Portugal, do século XVI ao XVIII", *Arquivos do Centro Cultural Português*, 25, 1988, pp. 461-482.

Many other specific studies on several subjects could be cited. In order to show the variety of works that were used, a few instances are provided below: Luís Graça, *A visão do oriente na literatura portuguesa de viagens, os viajantes portugueses e os itinerários terrestres (1560-1670)*, Lisboa, Imprensa Nacional - Casa da Moeda, 1983; Luís de Albuquerque, "A 'Aula de esfera' no Colégio de Santo Antão no século XVII", *Anais - Academia Portuguesa da História*, 21, 1972, pp. 335-391; António Alberto de Andrade, "Edições do Verdadeiro método de estudar", *Boletim Internacional de Bibliografia Luso-Brasileira*, 3, 1962, pp. 474-482; António Alberto de Andrade, *Vernei e a cultura do seu tempo*, Coimbra, Universidade de Coimbra, 1965; João de Barros, Maria Leonor Carvalhão Buescu, "Os Gramatices rudimenta de João de Barros", *Arquivos do Centro Cultural Português*, 4, 1972, pp. 93-140; Joaquim Barradas de Carvalho, "A literatura portuguesa de viagens (séculos XV, XVI e XVII)", *Revista de História*, 40, 1970, pp. 51-73; Joaquim Barradas de Carvalho, "As edições e as traduções da Crônica dos feitos da Guiné", *Revista de História*, 30, 1965, pp. 181-190; Fernando Castelo-Branco, "Portugal quinhentista visto através das cartilhas para ensinar a ler", *Anais - Academia Portuguesa da História*, 21, 1972, pp. 291-305; Maria Adelaide Valle Cintra, *Bibliografia de textos medievais portugueses*, Lisboa, Instituto de Alta Cultura, 1960; Maria Helena de Torres Costa, "Livros escolares de latim e grego adoptados pela reforma pombalina dos estudos menores", *Arquivos do Centro Cultural Português*, 14, 1979, pp. 287-329; Francisco Contento Domingues, "Experiência e conhecimento na construção naval portuguesa do século XVI, os tratados de Fernando Oliveira", *Revista da Universidade de Coimbra*, 32, 1986, pp. 339-364; Fidelino de Figueiredo, "Para a história da filosofia em Portugal (subsídio bibliográfico)", *Revista de História*, 11, 1922, pp. 5-33; Jordão de Freitas, "Subsídios para a bibliografia portuguesa, relativa ao estudo da língua do Japão", *O Instituto*, 51, 1904, pp. 762-768; 52, 1905, pp. 115-128, 310-320, 349-356, 437-448, 499-512; Armando Carneiro da Silva, "Almanaques e folhinhas conimbricenses", *Arquivo de Bibliografia Portuguesa*, 1, 1955, pp. 13-23, 136-145, 239-252, 273-276; José da Silva Terra, "De João de Barros a Jerônimo Cardoso - o terramoto de Lisboa de 1531", *Arquivos do Centro Cultural Português*, 23, 1987, pp. 373-416.

35. Carlos Sommervogel, *Bibliothèque de la Compagnie de Jesus*, Bruxelles, Oscar Schepens, 1890-1932, 11 vols.

### *Library card and computer catalogues*

Direct search for information in libraries is another way of discovering relevant works. This method has hitherto been sparsely employed, because it is too expensive and provides a relatively small amount of information. It is useful, however, in order to find secondary works, to complement the search based on published catalogues, to check bibliographical data, etc. Some very rare works have also been found by direct card catalogue search in some libraries.<sup>36</sup>

A few computerized catalogues were also used. There is a Portuguese national data-base net of libraries, directed by *Biblioteca Nacional de Lisboa*. Unfortunately, however, only a small proportion of old books have been entered in this database. The CD-ROM versions of the *British Library* and of the *Bodleian Library* catalogues have been consulted, as they provide the possibility of search by place and year of publication. Several important on-line databases (such as the *Library of Congress* catalogue) could not be efficiently used, since they do not allow primary search by place of publication or language.<sup>37</sup>

### *Printed books: special problems*

Using all the above described means, one may expect to gradually find information about most published books, and to select those that correspond to the aims of the project. There are, however, a few problems.

It is specially difficult to find information about foreign translations of Portuguese and Brazilian books, or works published by Brazilian and Portuguese authors in other countries. A systematic search in the printed catalogue of the National Library of Paris, or in the American *National Union Catalogue*, for

36. A few instances: André Marie Legendre, *Elementos de geometria*, translated by B. Alves Carneiro, Rio de Janeiro, B. L. Garnier, 1822; Francisco Nepomuceno Ferreria, *Arte de fiar, em que se explicão as partes da machina, os preceitos para bem fiar, e os successos, e perigos que podem acontecer á machina, e fiado, como também seus remedios, e precauções*, Lisboa, Officina de Simão Thaddeo Ferreira, 1807; José Francisco Borralho, *Direcções e advertencias para o uso da agoa febrifuga*, Lisboa, Impressão Regia, 1812. Two curious anonymous works: *Verdade de Feijo propugnada e falsidade convencida de hum novo systema de marés*, Coimbra, Officina de Francisco de Oliveyra, 1745; *Lunario, e prognostico diario... seu author hum astrónomo lusitano, da Borda d'Água*, Lisboa, Impressão Regia, 1812.

37. In the Library of Congress data-base, it is possible to limit a former search by language, year of publication and place. However, this can only be made *after* another search (by author, subject or title) has been made. Unfortunately, when one uses broad subject specifications (for instance: "medicine"), this data-base only finds medical works that were not classified under more specific subjects. For this reason, it is very difficult to use this kind of data-base for the search required in the present project. I think that other historians have also found this sad limitation of many computer catalogues. It is frustrating to know that there is a lot of information there, that the computer *could* find the information you need, but the search methods of the data-base forbid it.

instance, could help fill many gaps—but this would be a formidable task, with a relatively small outcome.<sup>38</sup>

Printed pamphlets and theses constitute another special problem. They were usually printed in small number and had a very small circulation. The probability of finding pamphlets and theses in libraries is much smaller than for books. Even when they were conserved in libraries, they were usually bound in “miscellaneous” volumes and were seldom described individually in catalogues.<sup>39</sup>

Anonymous works are *excluded* from many bibliographical works and catalogues, because their entries are organized by *author's name*. It is very difficult to find references to these works.

Recent new editions of old works and first editions of unpublished manuscripts are also difficult to find. The older bibliographies, and old catalogues of libraries and book-sellers, of course will never contain these works. Only recent bibliographies or catalogues will contain references to those books.

It is also difficult to find out recent relevant secondary publications (specially historical studies). They are seldom cited in international reference periodicals (*Historical Abstracts*, *Isis Critical Bibliography*, etc.) and can only be found by consulting many Portuguese and Brazilian periodical collections.

In all those cases, therefore, one must assume that a smaller proportion of existing works has been found. For books published in Portugal and Brazil up to 1822, however, the use of the above described methods of search will gradually lead to a very complete bibliography.

#### *Method of information search-maps and manuscripts*

Many of the above mentioned secondary works contain information about maps and manuscripts. Besides those sources, other specific works were used.

The older Portuguese and Brazilian cartography has deserved several good studies.<sup>40</sup>

38. Paris, Bibliothèque Nationale, *Catalogue général des livres imprimés de la Bibliothèque Nationale*, Paris, Imprimerie Nationale, 1897-1981, 231 vols.; American Library Association, *The National Union Catalog, Pre-1956 Imprints*, London, Mansell, 1968-1981, 754 vols.

39. Fortunately, there have been a few bibliographers who collected this kind of publication. See, for instance: Rosemarie E. Horch, “Catálogo dos folhetos da Coleção Barbosa Machado”, *Anais da Biblioteca Nacional do Rio de Janeiro*, 92 (1), 1974, pp. 63-251; 92 (2), 1974, pp. 5-248.

40. Manoel Francisco de Barros Carvalhosa & Sousa de Mesquita de Macedo Leitão, *Estudos de cartographia antiga*, Lisboa, Imp. Portugal-Brasil, 1931; Armando Cortesão, *Cartografia e cartógrafos portugueses dos séculos XV e XVI (Contribuição para um estudo completo)*, Lisboa, Seara Nova, 1935; Ernesto de Vasconcelos, “Subsídios para a história da cartografia portuguesa nos séculos XVI, XVII e XVIII”, *Boletim da Sociedade de Geografia de Lisboa*, 34, 1916, pp. 88-116; Armando Cortesão & Avelino Teixeira da Mota, *Portugalia e monumenta cartographica*, Lisboa, Casa da Moeda, 1960, 6 vols.

Catalogues of map collections,<sup>41</sup> exposition<sup>42</sup> and specific studies<sup>43</sup> were also used.

In the case of manuscripts, printed catalogues of several important archives are available<sup>44</sup> and were used. There are also some useful thematic manuscript catalogues and studies.<sup>45</sup>

41. Isa Adonias, *Mapas e planos manuscritos relativos ao Brasil Colonial conservados no Ministério das Relações Exteriores e descritos por Isa Adonias para as comemorações do Quinto Centenário da morte do Infante Dom Henrique*, Rio de Janeiro, Ministério de Relações Exteriores, 1960; Brasil, Arquivo Nacional, *Catálogo dos mapas existentes na Biblioteca do Arquivo Nacional. Notícia apresentada à 2a. Reunião Pan-Americana de Consultas sobre Geografia e Cartografia, realizada no Rio de Janeiro*, Rio de Janeiro, Arquivo Nacional, 1944; Brasil, Ministério da Guerra, *Catálogo das cartas históricas da mapoteca da Diretoria do Serviço Geográfico do Exército*, Rio de Janeiro, Imprensa Militar, 1953; Alfredo do Valle Cabral, "Relação dos mappas, chartas, planos, plantas e perspectivas geographicas, relativas à America meridional, que se conservam na secção de mss. da Bibliotheca Nacional do Rio de Janeiro", *Annaes da Bibliotheca Nacional do Rio de Janeiro*, 1, 1876-1877; Duarte da Ponte Ribeiro (Barão da Ponte Ribeiro), *Catálogo dos mappas que possui a Secretaria de Estado dos Negocios Estrangeiros, organizado com a respectiva classificação e anotações*, Rio de Janeiro, Laemmert, 1876.

42. Brasil, Biblioteca Nacional, *Ensaio de cartographia nacional extrahido do Catálogo da Exposição de História do Brazil*, Rio de Janeiro, Typographia de G. Leuzinger, 1883; Maria Natália Ramalho Pais Carqueijeiro, *Catálogo da exposição cartográfica e iconográfica comemorativa do V Centenário da morte do Infante D. Henrique*, Lisboa, Arquivo Histórico Ultramarino, 1960; A. Fonseca da Costa, "Catálogo da exposição de cartografia", *Congresso do Mundo português, VI vol. Memórias e comunicações apresentadas ao Congresso de História dos Descobrimentos e Colonização (III Congresso)*, Tomo 2º, II Secção, Imperio do Oriente VI, 1940, pp. 287-459; Lygia Fonseca Fernandes da Cunha & Marlene Monteiro de Castro Martins, *Mapas antigos, séculos XVI a XVII. Catálogo da exposição organizada pela seção de Iconografia*, Rio de Janeiro, Biblioteca Nacional, 1978; Duarte da Ponte Ribeiro (Barão da Ponte Ribeiro), *Exposição dos trabalhos historicos geographicos e hydrographicos que serviram de base á Carta Geral do Imperio exhibida na Exposição Nacional de 1875*, Rio de Janeiro, Typographia Nacional, 1876; Ernesto de Vasconcellos, *Catálogo de exposição de cartographia nacional realizada na Sociedade de Geographia de Lisboa (1903-1904)*, Lisboa, Sociedade de Geographia de Lisboa, 1904; *Catálogo da exposição bibliográfica e cartográfica comemorativa do V Centenário da morte do Infante D. Henrique*, Angra do Heroísmo, Ed. da Biblioteca Pública e Arquivo Distrital de Angra do Heroísmo, 1960.

43. Isa Adonias, *A cartografia da região amazônica, catálogo descritivo, 1500-1961*, Rio de Janeiro, Conselho Nacional de Pesquisas, 1963; Isa Adonias, Marta Maria Gonçalves & Yolette Soares de Miranda, *Catálogo das plantas e mapas da cidade do Rio de Janeiro*, Rio de Janeiro, 1966; Brasil, Arquivo Nacional, *Catálogo de plantas e mapas da cidade do Rio de Janeiro, 1750-1962*, Rio de Janeiro, Arquivo Nacional, 1962; Alberto Iria, "Inventário geral da cartografia brasileira existente no Arquivo Histórico Ultramarino (elementos para a publicação da *Brasiliae Monumenta Cartographica*)", *Studia*, 17, 1966, pp. 35-116; Albert Kammerer, "La découverte de Madagascar par les portugais et la cartographie de l'île (1500-1667)", *Boletim da Sociedade de Geografia de Lisboa*, 64, 1949, pp. 521-632.

44. Tristão de Alencar Araripe, *Catálogo dos manuscritos do Instituto Histórico e Geographico Brasileiro existentes em 31 de Dezembro de 1883*, Rio de Janeiro, Typographia Perseverança, 1884; Brasil, Biblioteca Nacional, *Catálogo dos manuscritos da Bibliotheca Nacional do Rio de Janeiro*, Rio de Janeiro, Typ. de G. Leuzinger & Filho, 1878; Coimbra, Biblioteca Geral da Universidade, *Catálogo de manuscritos*, Coimbra, Biblioteca Geral da Universidade, 1935-1972, 22 vols.; Lisboa, Biblioteca Nacional, *Inventario - Secção XIII. Manuscritos*, Lisboa, Biblioteca Nacional, 1896; Joaquim H. da Cunha Rivara & Joaquim A. S. Telles de Matos, *Catálogo dos manuscritos da Bibliotheca Publica Eborense*, Lisboa, Imprensa Nacional, 1850, 2 vols.; Conde de Tovar, *Catálogo dos manuscritos portugueses ou relativos a Portugal existentes no Museu Britânico*, Lisboa, Academia das Ciências de Lisboa, 1933.

45. Lino de Assunção, "Exploração à África nos inéditos da Bibliotheca de Évora", *Boletim da Sociedade de Geografia de Lisboa*, 5, 1885, pp. 350-376; António Barbosa, "Dois inéditos de João Baptista Lavanha", *Boletim da Biblioteca da Universidade de Coimbra*, 9, 1928, pp. 88-93; Arthur de Magalhães Basto, *Catálogo dos manuscritos ultramarinos da Bibliotheca Municipal do Porto*, Lisboa, 1938; Brasil, Biblioteca

There are special difficulties in the search for manuscripts and non-printed maps, because they are *unique* items. Different copies of the same printed book can find their way into several libraries and this increases the probability of their being conserved, catalogued and cited. A map or manuscript can obviously be copied, and this also increases the probability of its conservation and description. However, each copy is a new individual item, and if it is destroyed its individual content is lost forever.

Nacional, *Catálogo de manuscritos sobre São Paulo existentes na Biblioteca Nacional*, Rio de Janeiro, Biblioteca Nacional, 1954; Alfredo do Valle Cabral, "Alexandre Rodrigues Ferreira. Notícia das obras manuscritas e inéditas relativas à viagem philosophica do Dr. Alexandre Rodrigues Ferreira pelas Capitanias do Grão Pará, Rio Negro, Matto-Grosso e Cuyabá, 1783-1792", *Annaes da Bibliotheca Nacional do Rio de Janeiro* 1, 1876-1877, pp. 103-129, 222-247; 2, 1877, pp. 192-198; 3, 1877-1878, pp. 54-67, 324-354; Manuel Gonçalves da Costa, "Inéditos de Filosofia em Portugal", *Revista Portuguesa de Filosofia*, 5, 1494, pp. 37-77, 145-82; Manuel Gonçalves da Costa, "Um inédito judaico-português de Amsterdam", *Revista Portuguesa de Filosofia*, 5, 1949, pp. 201-220; Manuel Gonçalves da Costa, *Inéditos de Filosofia em Portugal*, Braga, Livraria Cruz, 1949; Manuel Gonçalves da Costa, "Inéditos de Filosofia da Biblioteca de Évora", *A Cidade de Évora*, 8, 1951, pp. 7-48, 299-398; Manuel Gonçalves da Costa, "Inéditos de Filosofia da Biblioteca do Porto", *Revista Portuguesa de filosofia*, 12, 1956, pp. 55-94; Rosalina da Silva Cunha, "Manuscriptos sobre o Ultramar Português, Sociedade de Geografia de Lisboa", *Boletim Internacional de Bibliografia Luso-Brasileira*, 3, 1962, pp. 119-170; Luis Fernando de Carvalho Dias, "O ultramar português e a expansão na África e no Oriente. Breve notícia dos documentos manuscritos do Fundo Geral da Biblioteca Nacional de Lisboa. Extracto do ficheiro geral", *Garcia de Orta*, 3, 1953, pp. 245-260; Carlos Alberto Ferreira, *Inventário dos manuscritos da Biblioteca da Ajuda referentes à América do Sul*, Coimbra, Faculdade de Letras da Universidade de Coimbra - Instituto de Estudos Brasileiros, 1946; Frederico Francisco de la Figanière, *Catálogo dos manuscriptos portuguezes existentes no Museu Britannico; em que também se dá notícia dos manuscriptos estrangeiros relativos á historica civil, politica e litteraria de Portugal e seus dominios, e se transcrevem na integra alguns documentos importantes e curiosos*, Lisboa, Imprensa Nacional, 1853; Fidelino de Figueiredo, "Manuscriptos de philosophia", *Revista de História*, 12, 1923, pp. 224-228; Maximiano de Lemos, "Notícia de algunos manuscritos de Ribeiro Sanches existentes na Biblioteca Nacional de Madrid", *Anais Scientificos da Faculdade de Medicina do Porto*, 1, 1913, pp. 143-171; Henrique de Campos Ferreira Lima, "Documentos manuscritos e cartográficos relativos ao Brasil que existem no Arquivo Histórico Militar", *Congresso do Mundo Português*, XI vol. Memórias e comunicações apresentadas ao Congresso Luso-Brasileiro de História (CII Congresso), tomo 3º, II Secção, 2ª parte. O Imperio e a República, 11, 1940, pp. 219-241; Oliveira Lima, *Relação dos manuscriptos portuguezes e estrangeiros de interesse para o Brasil, existentes no Museu Britannico de Londres*, Rio de Janeiro, Companhia Typographica do Brasil, 1903; Francisco Moraes, *Catálogo dos manuscriptos da Biblioteca Geral da Universidade de Coimbra relativos ao Brasil*, Coimbra, Instituto de Estudos Brasileiros da Faculdade de Letras de Coimbra, 1941; José Honório Rodrigues, "Alexandre Rodrigues Ferreira - Catálogo de manuscritos e bibliografia", *Anais da Biblioteca Nacional*, 72, 1952, pp. 11-151; Vitor de Sá, "Notícia de manuscritos setecentistas existentes no Archivo da Biblioteca Pública de Braga", *Bracara Augusta*, 28, 1974, pp. 337-366; Mariana Amélia Machado Santos, "Manuscriptos de filosofia do século XVI existentes em Lisboa", *Boletim da Biblioteca da Universidade de Coimbra*, 19, 1950, pp. 241-382; 20, 1951, pp. 295-525; Luis Silveira, "Indículo dos manuscritos de filologia portuguesa da Biblioteca Pública de Évora", *Revista de Portugal - Série A. Língua Portuguesa*, 9, 1946, pp. 94-100, 172-176, 213-216; Luis Silveira, "Pelos bibliotecas e arquivos. Manuscriptos de filologia. Biblioteca de Ajuda", *Revista de Portugal. Série A. Língua Portuguesa*, 4, 1944, pp. 78-80, 232-327; 5, 1944, pp. 66-70, 204-209, 338-343; 6, 1945, pp. 118-122, 201-204, 275-278; Pedro Souto Maior, "Nos archivos de Hespanha. Relação dos manuscriptos que interessam ao Brasil", *Revista do Instituto Histórico e Geográfico Brasileiro*, 81, 1918, pp. 7-208; E. A. Voretzsc, "Manuscriptos das bibliotecas de Portugal relativos ao Extremo Oriente", *O Instituto*, 72, 1925, pp. 266-286; Ana Maria Ribeiro de Andrade, Adriana Xavier Gouveia Oliveira & Marco André Ballousier Ancora da Luz, *Guia de instituições e arquivos privados para a história da ciência e da técnica no Rio de Janeiro*, Rio de Janeiro, Museu de Astronomia e Ciências Afins, 1991.

Many manuscripts described by Diogo Barbosa Machado in his *Bibliotheca lusitana*<sup>46</sup> have never been found by later scholars. It is impossible to evaluate how many relevant documents have been lost.

Many manuscripts were privately produced and conserved for some time among family papers, and then lost. Many archives were destroyed or scattered. Individual manuscripts have been lost or stolen. In general, the probability of conservation of manuscripts and maps increases if they are produced and conserved from the very beginning within institutional bodies. Manuscripts written by non-secular religious teachers have a better chance of preservation than those written by lay teachers. Institutional documents produced by the clerical staff of a university have a better chance of preservation than scientific manuscripts written by its teaching staff. Manuscripts written by physicians who were also university teachers have a better chance of preservation than those written by physicians with no such status.

Similar rules apply to maps. However, as maps are usually produced by people related to government bodies, for practical ends, they have a much higher probability of conservation than, for instance, a philological manuscript. Besides, it is usually easier to find maps than to find relevant manuscripts: maps are usually kept apart from other documents,<sup>47</sup> and are less numerous than manuscripts. Someone interested in XVIIth Century Portuguese maps conserved in any library will, in general, find out every thing that interests him in a short time. On the other side, someone interested in XVIIth Century Portuguese botanical manuscripts conserved in any library will, in general, have enormous difficulty in finding the relevant items. For these reasons, one may assume that secondary works on cartography will, in general, be much more representative of the actual historical production and existing collections, than secondary works on manuscripts about any other subject.

Many important manuscript collections have never been described. Many collections have been described, but their catalogues have never been published. This project cannot, of course, fill those gaps. Only in special cases it will be possible to complement published information by direct search in archives, because this kind of research consumes enormous time and resources.

For all these reasons, the project cannot be expected to be as complete for unpublished sources as for printed sources.

46. See note 7.

47. Sometimes, maps are part of manuscript treatises or letters. In most cases, however, they are conserved apart from other documents, in archives and libraries.

### *Method of information search: periodicals and articles*

The search for information on articles and periodicals used a twofold technique: direct search of important periodicals, and the use of secondary literature. In the case of known scientific, medical and technical periodicals, the best approach is, of course, to consult the periodicals themselves and list their contents. This direct approach was used, for instance, in the case of the periodicals published by the Lisbon Academy of Sciences.<sup>48</sup> However, during the period studied in this project, many relevant articles were published in general (cultural) periodicals—and even in newspapers. It is impossible to check all general periodicals in search for those articles. Besides several Portuguese and Brazilian authors published articles in foreign periodicals—and it is very difficult to trace them. Fortunately, many articles of this kind are referred to in the bibliographical dictionaries of Innocencio Francisco da Silva, Velho Sobrinho, Sacramento Blake, etc.<sup>49</sup>

There is, of course, another practical problem: Sometimes it is difficult to find complete collections of some old periodicals. Secondary literature also can help to fill those gaps.

### **Evolution of the work**

Using all the above mentioned kinds of information sources, the project attempts to obtain the largest possible amount of references to primary and secondary sources on old Portuguese and Brazilian science, medicine and technique.

About 300 secondary works (bibliographies, historical studies, catalogues) have been used (up to 1995) for the search of relevant information.<sup>50</sup> The sources presented in the footnotes of this article represent only a sample of those effectively used. Several hundred additional secondary works have been listed as likely useful for the project, but have not yet been used.

All selected information is incorporated into a set of computer data-bases.<sup>51</sup>

48. *Memorias de Agricultura* (which began in 1787), *Memorias Económicas* (which began 1789), *Memorias de Litteratura Portugueza* (which began in 1792), and *Memorias [de Mathematica e Physical] da Academia das Sciencias de Lisboa* (which began in 1789). All those publications were, after 1812, unified in a single periodical with the title: *História e Memorias da Academia das Sciencias de Lisboa*.

49. See notes 8, 9, 10. Manoel Bernardes Branco's, *Portugal e os estrangeiros* (see note 14) has also provided many references to articles published in foreign periodicals.

50. Some of those reference works are short articles, other works are multi-volume catalogues and bibliographies. Over 30,000 pages have certainly been searched in this work.

51. When the project began, in 1989, all information was registered in manuscript cards. After about 2,000 cards were filled, it was possible to obtain a grant to transfer the information to a computer data-base. From 1991 onwards, all information has been loaded directly in the several data-bases. The project uses the CDS-ISIS software, developed by UNESCO.

The data-bases can only be consulted on site. As soon as possible, the project data-bases will be open to external Internet users.<sup>52</sup>

Nowadays, the size of each data-base is the following:

Table 1

Current number of entries in the data-bases

<i>Data-base</i>	<i>Description</i>	<i>Number of entries</i>	<i>Planned size</i>
HTC	Primary and secondary printed works	9,400	11,000
MAP	Maps	3,100	4,000
MAN	Manuscripts	5,700	7,000
PES	Biographical data on authors	1,900	3,000
	Total	20,100	25,000

The HTC data-base contains entries on about 5,900 books printed and up to 1,822,400 articles published in the same period, 1,200 post-1822 editions and works written before 1822 but published after this date, and 1,900 secondary works (bibliographies and historical studies). This part of the project is fairly complete. Most of the further development will correspond to secondary works and post-1822 publication of Colonial works.

Data-base PES is an auxiliary data-base that contains biographical information on the authors of the works described in the main data-base.

The above numbers might give the false impression that this project is close to its completion. However, it is far from its end, for several reasons. First of all, the project has been recently enlarged to include the period from 1823 to 1900. Due to the general trend of growth of scientific literature, it is possible to estimate that about 40,000 scientific books and 20,000 scientific articles were published in this period, in Portugal and Brazil. Only one third of this number has been obtained, hitherto.

Even without taking into account this new period, however, there are other reasons to describe it as far from its end. In the case of pre-1822 printed works, it is likely that more than 90% - perhaps 95% - of the relevant books, theses,

52. Meanwhile, any researcher interested in the use of these data-bases should send inquiries to prof. Roberto Martins, UNICAMP, Caixa Postal 6059, 13081-970 Campinas, SP, Brazil, or by electronic mail: rmartins@ifi.unicamp.br.

pamphlets and articles have already been found.<sup>53</sup> However, this does not mean that the work can be completed in a time corresponding to 10% or 5% of that hitherto employed. When the work reaches this point, about 90-95% of the relevant references contained in each new reference work will already be known, and it will be increasingly difficult to find references to unknown works.

When should the search for new information be interrupted? There is no simple answer to this question. In the case of published documents, it seems worthless to sustain a systematic search after it is noticed that new secondary sources adds less than 1 or 2% of new items.

Even when this goal is attained, however, the work is not finished. It is desirable to check available information, either by comparison of several descriptions of the same work, or - better - by direct examination of the work. It is desirable to find the libraries where each work can be found, examine it, and obtain a copy of its title page (and, eventually, of the colophon). This will require a lot of additional effort.

In the case of maps and manuscripts, it is impossible to obtain a good evaluation of existing items from available information. However, there are still many reference works that have not yet been used in the project, and it is desirable to use a very large number of secondary works, because —differently from what happens with books— each new catalogue will probably add many new relevant items. In this case, therefore, an attempt should be made to analyze as many catalogues as possible of relevant libraries and archives.

An effort must also be dedicated to the improvement of technical aspects of the data-bases (specially to make it as useful and easy to use as possible). Additional data-bases are being created to improve the project.<sup>54</sup> Images of title-pages have been scanned and will be incorporated to the data-bases. A lot of work must also be done before the data-bases can be opened to remote users.

### Uses of the project

What exactly is the usefulness of this kind of project?

The first obvious usefulness is to find out information about sources for the history of science, medicine and technique - bibliographic information, local-

53. The completeness of the search can be evaluated taking into account the repetition of references in independent reference sources. As a matter of fact, it was noticed that the available data do not fit in any simple statistical model. However, the completeness of the search can be assumed to be roughly equivalent to the ratio of already known to total relevant references in any new reference source.

54. One auxiliary data-base contains a dictionary of equivalences between old and new forms of words that appear in the names of authors, of cities, of titles of the works, etc. It is now operational and allows the program to find all old forms when the new form is used in any search. Another data-base contains a thesaurus to help structured search (it is not operational, yet). A general historical chronological auxiliary data-base is also under development, now.

ization of the documents, and information about reference works that describe each item. In this sense, the data-bases can provide in a few minutes information that would take months to find out in secondary literature. The project is not complete, but even with all its present limitations, it now provides an easy way to find information on sources for the study of old Portuguese and Brazilian science, medicine and technique. Its data-bases can spare any researcher the job of consulting about 300 reference works that have already been used in the project.

There are, however, other uses for this kind of data-base. It can provide a different kind of information. Only when one can use data that has been systematically collected, representing the whole technical and scientific development of a period, does it become possible to analyze the global evolution of the scientific development of a country.

Let us show some kinds of questions that can be answered with the help of this kind of data-base and that cannot be answered without the help of a similar research tool:

—When did Portugal suffer a significant decrease or increase of its science?

—Were there periods when the relative weight of medicine, or agriculture, suffered a significant increase or decrease?

—Which were the most productive fields of knowledge in Portugal, in a given period?

—How did any specific historical (political, economical, etc.) episode affect scientific production?

—Was there any correlation between the development of science A and science B, in Portugal, in some given period?

—What was the scientific context in which research X worked? Which other people were working on similar subjects at the same time? Which other related fields deserved attention at that time?

—Was researcher X very productive, for its time (as compared with other authors of the same period)?

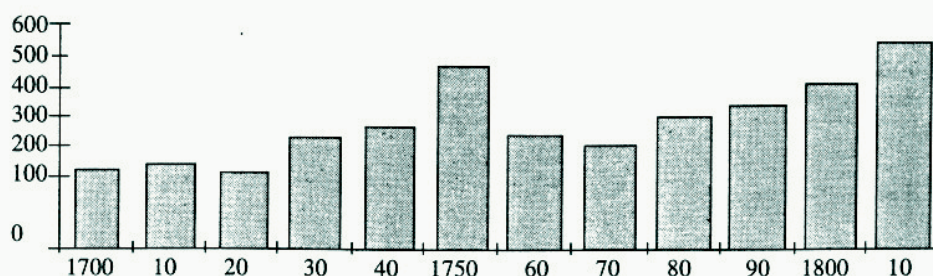
Any historical research of this kind will need *comparative, quantitative or statistical* data that can be provided by the data-bases built in this project. Even without the detailed study of the *contents* of the sources detected by this project, those data-bases allow the development of relevant statistical and bibliometric studies.

Let us look at one simple example. From the main data-base (HTC) it is very easy to find out the number of published books<sup>55</sup> for each decade. What happened between 1700 and 1820?

55. The data used in this graph includes theses and pamphlets but excludes articles.

Chart 1

Number of scientific Portuguese books published in each decade



There was a remarkable *decrease* in the number of published works in the decades of 1760 and 1770. From 1770 onwards, the rate of publication increases again. What happened in this period?

The year of 1759 marks the beginning of the so-called “*reformas pombalinas*”—a deep reform of Portuguese educational and scientific institutions, lead by Sebastião José de Carvalho e Melo, Marquis of Pombal (1699-1782), minister of king D. José I. Up to 1759, Jesuit priests had enormous influence in Portuguese education. Pombal’s reform prohibited Jesuit priests to teach and, soon afterwards, ordained all of them to leave Portugal and its colonies. Of course, this reform was not purely destructive: in 1772, there was a deep reform of the University of Coimbra, with a new emphasis on scientific studies; in the same year, the *Imprensa Régia* was created; and in 1779, the Lisbon Academy of Sciences was founded. According to the data shown above, the immediate impact of Pombal’s reform was negative and lead to a drastic reduction of the number of published scientific works, in most fields. Only for comparison, the invasion of Portugal by Napoleon in the beginning of the XIX Century, did not produce such a noticeable effect.

This instance shows how useful this project can be for the analysis of interactions between political (or other) factors and scientific production. Without a nearly complete knowledge of the number of publications of this period, nothing could be stated about the quantitative impact of Pombal’s reform upon scientific production.

### Final comments

The aim of this paper was to describe the method and resources employed in a project on sources for the study of Portuguese and Brazilian science, medicine and technique, from the 15th Century to 1822. Although a lot of work

has been done, the project is not complete. Criticism and suggestions are welcome and, after the data-bases are made public, we shall be very grateful for specific additions and corrections.

We hope that this project will be useful to as many researchers as possible. Although the method used in this particular work cannot be considered a canonical recipe, we hope that our experience may help the development of other similar projects.

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