Making Science Popular

Figuier in the Brazilian Newspapers and Magazines (1850-1870)

Tornar a ciência popular

Figuier nos jornais e revistas do Brasil (1850-1870)

Kaori KODAMA[1] http://orcid.org/0000-0002-5327-2689
[1] Casa de Oswaldo Cruz
Fundação Oswaldo Cruz
Avenida Brasil, 4365, Manguinhos, Rio de Janeiro, 21.040-360, Brazil
kaori.flexor@gmail.com

Abstract The article intends to analyze the presence of the science popularizer Louis Figuier's texts in the Brazilian press during the 1850s and 1870s. Throughout the two decades studied, in a context particularly conducive to scientific vogue, the author becomes popularized through the press and by the circulation of their books in Portuguese, reaching wider audiences, such as women and children. At the same time, the mediation of science promoted by the author comes to be recognized as a specific genre: the popular science. Both the appropriation of the author's texts in the press and the changes that conform the context of the institutionalization of science in the country provide the keys to understand the hierarchy between popularized science and the science of the scholars at that moment.

Keywords science popularizers, press, mediators

Received: 31 May 2018 | Reviewed by the author: 9 July 2018 | Accepted: 11 July 2018
http://dx.doi.org/10.1590/0104-87752018000300003
Varia Historia, Belo Horizonte, vol. 34, n. 66, p. 601-636, set/dez 2018

Resumo O artigo pretende analisar a presença dos textos do vulgarizador das ciências Louis Figuier na imprensa brasileira durante as décadas de 1850 a 1870. Ao longo das duas décadas estudadas, em um contexto particularmente propício à voga científica, o autor se populariza através da imprensa e a partir da circulação de seus livros em português, atingindo públicos mais amplos, como as mulheres e crianças. Ao mesmo tempo, a mediação das ciências promovida pelo autor passa a ser reconhecida como um gênero específico: a vulgarização científica. Tanto a apropriação dos textos do autor via imprensa quanto as mudanças que se conformam no âmbito das instituições de ciência no país fornecem as chaves para a compreensão da hierarquização entre a ciência popularizada e a ciência dos eruditos naquele momento.
Palavras-chave vulgarizadores das ciências, imprensa, mediadores

> The aim of the poet is to inform or delight, or to combine together, in what he says, both pleasure and applicability to life. In instructing, be brief in what you say in order that your readers may grasp it quickly and retain it faithfully. Superfluous words simply spill out when the mind is already full. Fiction invented in order to please should remain close to reality. Your play must not demand that the audience believe anything you take a whim to portray (…)
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> Horace, The Art of Poetry

Introduction

The evocation of the Horatian maxim with each new practice of communication of scientific knowledge to a non-specialist public also seems to be a characterizing and permanent element of the activity of science mediators, almost as if there were no traces of anchoring in time and space to define a history of this activity. However, if the question is inverted and instead states that this precept — which advises a balance

in the permanent tension between instructing and delighting — is what is mobilized to identify and legitimize those who have dedicated themselves to this activity in different historical periods, one may perhaps understand how the function of scientific mediation acquires particular features and relevance in specific social and historical contexts.

In this article, we will focus on a period in which this Horatian maxim was allied to the motto of "Science for all" in the second half of the 19th century. From then on, the formula "for all" would become a label and model for communicating science to a wider public, used by a considerable number of writers in different countries — including female ones, although fewer in number — who turned their activity into a career and source of income. These mediators, known not only for being knowledgeable about the subject at hand, but also by their capacity to write in a way that would not tire the reader, became known in Brazil as "popularizers of science".[1] By embracing the mission of taking the sciences to the general public, the popularizers followed the Enlightenment's tradition of propagating the light, but at the same time were part of a large, growing mar'ket of readers, books, magazines and newspapers of the period (Mollier, 2008).

This article focuses on the circulation in the Brazilian press of texts and advertisements of books by French journalist and scientist Louis Figuier — one of the most successful popularizers, who sought to follow the Horatian precepts by the letter. In one of his many books on the most varied scientific matters, Figuier even stated that flowers must always be strewn on the arid terrain of science in order for children to learn. At a time when its titles circulated in the press, "popularized" science gained book collections and sections in periodicals, creating a newly-arising genre.

Its great success in Brazil is surely owed to the presence and influence of French-language authors divulged by the country's press, but also

1 The terms for the activity of scientific dissemination at the time varied by country. See VERGARA, 2008 on the term in Brazil.

due to the fact that their topics were conveyed in a new way, treating science as "news", giving the texts the seductive characteristics of novelty and modernity. The mentions made to the author in newspapers and magazines in the 1840s-1870s show how scientific ideas became present in the daily lives of readers of the press and, at the same time, point to certain changes both in the image of the public and in the masses' ways of grasping science throughout those decades.

To deal with this period, considered the golden age of popularizers of several different national contexts (Bensaude-Vincent, 2010; Béguet, 1994; Topham, 2009), is to reflect on a time in which Brazil was going through changes regarding the issue of slave labor and the political regime; the intellectual movements that valued scientific thought and modernity; the social reform proposals; and transformations in the press. If factors such as the growth of the press — enterprise of the late 1800s — as well as the creation of new scientific associations and institutions and the greater importance given to technical education — helped to disseminate the popularizers' texts, we must still understand how the readership was configured. What was the readership of science book and texts in Brazil in the last few decades of the 19th century like? This became a pertinent question as different aspects of the science and culture of the period were investigated, such as the educational reforms, the institutionalization of scientific research, the appearance of new forms of sociability that led to groups with new political and cultural projects being formed (Alonso, 2000), and professionalization and specialization in the field of the natural sciences — to the detriment of a "degree culture" (Sá, 2006) —, along with the structural changes of an imperial society in crisis.

Several pieces of research on the history of science in Brazil have shed light on the role of the imperial institutions — such as the National Museum, the Museum of Pará, the Imperial Academy of Medicine, and the Experimental Physiology Laboratory — in the period's scientific

production.[2] Perhaps getting to know the elements that legitimized science among the types of public considered far removed from this sort of production might be an interesting way in which to understand the greater importance given to science and its uses by its many agents in a context of change (Cooter; Pumfrey, 1994). By reading Figuier's texts in the press, one can reflect on how the relevance of the role of the sciences in society included a hierarchization between specialists and non-specialists, and new shifts in the meaning of the "popular".

Louis figuier and "scientific popularization"

Figuier graduated from the Montpellier College of Medicine, obtained a doctorate in Physics a short while later, and became a Chemistry lecturer at the Paris School of Pharmacy. Starting from the 1840s, he published academic studies in magazines such as *Annales des Sciences* and *Journal de Pharmacie*, having been involved in a heated debate with Claude Bernard, one of the greatest physiologists of the time. In the area of scientific research, Figuier's studies were mentioned in Brazilian medical journals such as *Archivo Medico Brasileiro*, for example.

Outside of academic circles, Figuier started to become better-known as a writer from 1851, when he began to publish the initial volumes of *Exposition et histoire des principales découvertes modernes*, dealing with subjects such as photography; aerial telegraphy and electrical telegraphy; aerostats; gas lighting; and planet Neptune, among other topics.[3] The volumes of *Exposition et histoire...* and *Alchimie et alchimistes* were a great

2 See some analyses of production in this area in the last few decades in the work of KROPF; HOCHMAN, 2011; FIGUEIRÔA, 1997; 2000. Here we cite only a few examples of studies on scientific institutions during the imperial period. On the National Museum, the Museum of Pará, the Imperial Academy of Medicine and the Laboratory of the National Museum, see LOPES, 1997; SANJAD, 2010; EDLER, 2011; GOMES, 2013, respectively.

3 SIRVEN, Alfred. Journaux et journalistes. *La Presse – la Liberté. Portrait des rédateurs*, vol. 3. Paris: Cournol éd., 1866. Retrieved on Jul. 17, 2017. Available at: https://archive.org/stream/journauxetjourn00sirvgoog#page/n8/mode/2up

commercial success.[4] In 1855, he started working for Parisian newspaper *La Presse* in place of another famous popularizer, Victor Meunier.[5] As Fabienne Cardot states, "Figuier's entire body of work is based on the dialectics of a general historical setting and last-minute events" related to the sciences. In a heroic narrative mode in which the main scientific "discoveries" and the novelties of their application to industry were presented, he highlighted the history of a certain area of knowledge, arriving at the present with a new product. In his characteristic style, Figuier captivated an audience interested in learning about the different sciences and, in Cardot's words, expressed a "scientific Romanesque style, a lyrical and epic Romanesque style" (Cardot, 1993, p.17), which although different from Jules Verne's fictional style, also characterized one of the forms of scientific *feuilleton* created in the 19th century.

What is most interesting about his method is what Figuier himself would define as part of his popularization formula: a "science taught by history", where according to the 1800s model based on the idea of progress and positive knowledge it was possible to go from the simple to the complex, at the same time making the subject matter interesting and informative for his readers. It was not his place to view himself as an original thinker and a specialist in the subject, rather, he presented the "inventors", the geniuses, and the many scholars who contributed to a certain fact or scientific process highlighted as a discovery or invention. His role was to gather documents and records, "putting random material in order", as he used to say. In this regard, his function as a "popularizer" was different from that of a specialist and defined a role particular to mediators. This distinction between the functions of an academic scientist and of a mediator, which came to bear on the authority of scientific writings, was noticed by another important popularizer, Camille Flammarion, when he stated that "the great danger for the popularizer

4 *Exposition et histoire des principales découvertes modernes* was published in four volumes and dealt with a variety of themes.

5 SIRVEN, Alfred. Journaux et journalistes. *La Presse – la Liberté. Portrait des rédateurs*, p.307.

is becoming 'vulgar' when the intention is to become 'popular', and this danger, because of which many lost their authority, forewarned a great number of readers about those who accept this role".[6]

As studies on scientific dissemination in the 19th century point out, there is a certain degree of ambivalence surrounding the place occupied by popularizing agents — somewhere between the role of "specialist" or of a scientist who writes for his peers and that of "mediator", in a position considered to be inferior and geared towards non-specialists. For Lightman, for example, the popularizer of the sciences of the 1800s was part of two different worlds — the scientific world and the lay world — and made the most of this ambiguity. A more rigorous differentiation would only happen in the 20th century, and the role of mass communication would play a vital role in this process of differentiation and specialization of the activity of dissemination (Lightman, 2010, p.13).

Having mentioned this double presence of the popularizers, one must point out, however, that it is not a question of reaffirming the narrow split between the "esoteric" and "exoteric" aspects of science — as science historians like to call what is part of scientists' direct production and what is outside it. Neither is it an attempt to establish a rigid frontier between "erudite" and "popular" knowledge". Here is what authors Bensaude-Vincent and Rasmussen have to say about these categorizations:

> The difficulty of establishing a line dividing scientific texts and popular texts is proof of the precarious nature of the postulate, which has always been questioned by several historical or semiotic studies, of the independence from and earlier nature of scientific production in relation to the activity of communication and dissemination. If we presume

6 Free translation of the original in French: "Le grande écueil du vulgarisateur est de devenir "vulgaire" sous l'intention d'être "populaire", et cet écueil, où plus d'un a perdu son autorité, a tenu bon nombre de lecteurs en garde contre ceux qui acceptent ce rôle". FLAMMARION, Camille. Études et lectures sur *l'Astronomie*, T.3. Paris: Gauthier-Villars, 1872. Retrieved on Apr. 26, 2018. Available at: https://archive.org/stream/tudesetlectures04flamgoog#page/n288/mode/2up

> that writing is always adapted to a certain type of public and that the work of reformulation that scientists or science writers engage in are in themselves creative, science will seem like an indissolubly cognitive and communicational activity. It then becomes impossible to decide *a priori* about a continuum of texts in the name of a criterion of purity or scientificity. (Bensaude-Vincent; Rasmussen, 1997, p.15).

Indeed, this idea of "purity" and of a distinction into two spheres — one understood as pertaining to the realm of specialists and the other of the general public —, which arose mainly in the 20th century, was not fully defined in the same terms in the 19th century. On the contrary, it was with the circulation of the popularizers' texts and the institutionalization of the sciences through the creation of scientific societies, scientific journalism, museums and universities, state funding and professionalization that these distinctions became more emphasized and hierarchical. It was through the clash between the interpretations made by readers and by critics that Figuier came to be recognized as an author with an identity as a mediator of the sciences, with his double face of Janus — a sage among his peers and someone who wrote "for all", oscillating between the scientific and the "extra-scientific", between what instructs and what gives enjoyment.

Figuier as an "authority" on behalf of science

The constitution of Louis Figuier's reputation as a messenger of science is not separate from his own trajectory as a scientist trained for an academic career. This would be the very territory that would legitimize him before a readership that went from the "erudite", to the "gens du monde" — the cultured elite, to workers, women and children. In this trajectory, he became professionally active writing scientific articles with a certain degree of repercussion.

There are news of his texts in Brazil in the 1840s, but they remained in the circuit of scientific publications, such as monthly scientific gazette

Archivo Medico Brasileiro. In 1845, in the gazette's ground floor, a text was published and signed by physician Teófilo de Sá that reported on a method proposed by Doctor Louis Figuier, based on the propositions of famous Swedish chemist Jacob Berzélius on how to study the chemical composition of blood cells. The method and its author were mentioned once again the following year in *Diario de Pernambuco*, based on an article originally published in French newspaper *La Presse*.

Louis Figuier's name would only reappear in the Brazilian press in the following decade, in 1852, in an advertisement in *Jornal do Commercio* for recently-arrived titles from publisher Firmin-Didot, where a book with the title "Découvertes scientifiques modernes" was on sale, which was probably *Exposition et histoire des principales découvertes scientifiques modernes* of 1851.[7] News of this book would soon appear in *O Constitucional*, a newspaper from the state of Bahia, in 1854. Thus, much of Figuier's presence in newspapers in the first few years of the 1850s was in advertisements of French books sold in bookshops such as Firmin-Didot and Garnier, which shows that their titles were geared towards a smaller, French-reading public. However, these books, particularly *Exposition et histoire...* and *Alchimie et alchimistes* led him to become a popularizer in the French press,

So much so that a little while later, in 1855, he became responsible for the science section of great French newspaper *La Presse*, led by editor Girardin. In it, Figuier became known for making scientific topics "à la portée de tous", as described by *Courrier du Brésil* in 1856, which informed that the book *Exposition et histoire* had already had four editions in four years. Mentions made of Figuier in *Courrier du Brésil* from 1856-1861 consolidated his reputation as an author of articles of scientific novelties among a certain readership in Brazil. In 1856, a review praised the author for having achieved the objective of taking to the people topics such as the discovery of steam engines, photography,

7 *Jornal do Commercio*, Sep. 20, 1852, p.2. Retrieved on Apr. 26, 2018. Available at: http://memoria.bn.br/DocReader/364568_04/4320

aerial and electrical telegraphy, and electrotyping, among others.[8] Some of Figuier's original texts written for the press were printed in a section of the French-Brazilian newspaper under the heading "Nouvelles de la Science".

In the 1850s, images of the expansion of railways, steam engines and so many other scientific applications driven by the Second Industrial Revolution caused awe and wonder. Like other popularizers of the time, Figuier took to his public the narrative of the triumph of science in the world. Presenting scientific achievements and applications in accessible language was also a form of persuasion, and, as we will see further ahead, of education (Heizer, 2009). Drawing attention to new inventions in France, Britain, the United States, or other parts of the globe was a way in which to ensure reader loyalty, and examples of this emphasis on the wonder of science abounded in his writings.

However, in spite of the word "all" being used to qualify the readers of his writings, it is interesting to note how from the 1850s-1870s, Figuier was appropriated by Brazilian newspapers and magazines in different ways, as was his readership. News of Figuier's publications in the press demonstrate the construction of this author as a representative of science and a *savant* in constant movement between the "erudite" and the "popular". The "Echos de Paris" section of *Correio Mercantil*, which usually contained a brief summary of several European news items focusing mainly on the French capital, advertised the *Année Scientifique et Industrielle* annual, a collection of articles Figuier had written for his science section. In the foreword, a journalist described who the annual was of interest to: "I recommend this book to men of science and to our farmers, who will discover many good ideas in it and will find both the useful and the enjoyable, which, according to the poet Horace's precept, is the best way to instruct without fantasy".[9] In his words, the

8 *Courrier du Brésil*, Jun. 15, 1856, p.4. Retrieved on May 15, 2018. Available at: http://memoria.bn.br/DocReader/709719/324

9 *Correio Mercantil*, Mar. 12, 1859. Retrieved on Apr. 19, 2018. Available at: http://memoria.

main public that the journalist imagined for Figuier's writings in Brazil appears: men of science and farmers. Not a word, however, on readers from the working classes or who would configure a strand of the popularizers' readership.

The statement by Figuier himself that *Année Scientifique et Industrielle* was aimed at "gens du monde" endorsed a readership that could go from the "erudite" to the "curious", including in this category businessmen, farmers and merchants. Although he did not exclude other groups (which could be contained in the "popular" category), the connotation the author gives to his public in *L'Année* is the following:

> When we favor matters of general interest, we are able to create a collection of interest to the masses, which is aimed at scientists and "popular" readers, industrialists, manufacturers, farmers, as well as to men of the world and lovers of science; a labor, in short, that is at once useful and enjoyable for a considerable number of readers. [10]

In this presentation, it is clear that the annual of scientific novelties did not separate the "erudite" from the amateurs. It was meant for both.

Many of Figuier's texts were used and cited in doctors' speeches in sessions of the Academy of Medicine, or among engineers. Some the scientific periodicals that made mention to Figuier were *Annaes Brasilienses de Medicina*, *Tribuna Pharmaceutica*, *Academico*, and *Gazeta Medica*. In 1856, physician Luiz Vicente De Simoni cited as a reference experiments overseen by Figuier using bromide as an antidote to poisoning by curare.[11] Medical journals also stayed up to date with his scientific studies. *O Academico* disseminated his polemics with Claude

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10 *L'Année Scientifique*, 1857, p. VII. Free translation. Retrieved on May 22, 2018. Available at: http://gallica.bnf.fr/ark:/12148/bpt6k7320p/f8.image

11 *Annaes Brasilienses de Medicina*, April, n. 2, 1857, p.46. Retrieved on Jul. 7, 2016. Available at: http://memoria.bn.br/DocReader/062014/978

Bernard on the liver's capacity to produce glycogen, which was refuted by Figuier.[12] This episode was vital for Figuier's decision to fully dedicate himself to the work of popularization. (Cardot, 1993, p.9).

Some of the topics of medical journals were of general interest, such as "Prolonging Life with Coffee", published initially in the pages of *Annaes Brasilienses de Medicina*, but also in other periodicals.[13] In it, Figuier reported, as he usually did, on the debates or sessions attended by him at institutions such as the Paris Academy of Sciences. The article dealt with the study presented by Dr. Petit de Chateau-Thierry at the Academy on the health benefits of coffee. According to him, the doctor, backed up by observations made by other doctors of miners in Belgium and poor weavers in Bohemia, had stated that its properties enabled greater nutrient absorption when a diet was limited to potatoes. He stated that coffee sustained labor in hot countries. According to the report, soldiers and sailors were given coffee rations during a campaign, and there was evidence for importing the product into the country. In addition, said the text, some doctors attributed to coffee the ability to "delay the process of organ decay" and, for that reason, the product was recommended for the elderly. However, Figuier cautiously warned at the end of the article that he did not guarantee those opinions in any way and was merely reporting on them for considering them original.

However, although Figuier was read by "men of science" and had a role as a reporter and mediator of what happened in academic sessions, he continued to be treated as a "sage" in a way no different from other scholars whose work was purely academic. This perception of Figuier as being on the same levels as scientists of the academic elite appears, for example, in the words of José de Palmella, who registered his impressions of the Mantiqueira region in a book titled *Ascensão ao paraizo*

12 *O Academico*, n. 5, year II, July 1856, p.1. Retrieved on Mar. 28, 2018. Available at: http://memoria.bn.br/DocReader/700878/83

13 *Annaes Brasilienses de Medicina*, 14th year, Feb., vol. 14, 1863, p.198. Retrieved on May 22, 2018. Available at: http://memoria.bn.br/DocReader/062014/2344

da Mantiqueira. Palmella traveled through the Bocaina Sierra in 1875 and spoke of the mineral resources discovered on his descent "to the underground galleries of the globe, arm in arm with Cuvier, Figuier...".[14] Here, the differences between popularizer and naturalist are erased, as both were personalities of scientific knowledge.

It is also a fact that in the 1850s, another readership mentioned in *Correio Mercantil* — farmers — read and commented on Figuier's work published in the press. In 1857, debates regarding the construction of railways to take the coffee produced in the Paraíba Valley were the order of the day, at a time when the Pedro II railway was being built. One of the representatives of the coffee barons of Piraí wrote letters to the newspaper asking the government of the province for its support in building a railway to Belém, in the municipality of Angra dos Reis, to transport 15 million kilos of coffee from the region. In the same issue, in the column published beside it, there was an article by Figuier titled "Railways in Cities" on the construction projects of the underground railways for urban transportation in Paris. In the same year, *Correio Mercantil* published on April 28 and May 6 "The Railways of England" written by Figuier, also published on July 4, 1857 in *A Imprensa*, a newspaper from the state of Maranhão. In the article, *La Presse*'s science writer gave statistics about the extension of English railways, the costs and revenue, the extension of the electrical telegraph system next to them, the number of passengers, and the number of workers on the transport systems that supported an impressive one-fifth of the British population, including the employees' families, totaling 500,000 souls.

However, it must be said that some of the novelties presented by the popularizer, which attempted to push for modernization in agriculture, could be very different from the reality of slavery. In 1855, the magazine *O Auxiliador da Indústria Nacional* translated an article by Figuier on the steam engines of the World Exhibition in Paris, debating the

14 *A Familia Maçonica*, Apr. 25, 1875, p.2. Retrieved on Nov. 28, 2017. Available at: http://memoria.bn.br/DocReader/247782/90

mechanization of agriculture.[15] Because they could be transported by an animal, the machines, called *locomobiles*, had 3-12 horsepower and were used in some fields of the United States to plow, sow and thresh produce. The different models were exhibited at the large international fair of the World Exhibition to those who were interested and possessed the capital for them, as the inventions were sold at high prices.

Other indications about Figuier's readership in this period can be gleaned from *Revista Popular*, published in 1859 by Maison Garnier. As Giselle Venancio explains, one of the main aims of the publication according to its editors was "to establish a direct communication channel with its readers and increase its readership" (Venancio, 2013, p.1154). Figuier was certainly in tune with the magazine's interests and with the articles it published with the aim of popularizing science, "writing about everything and for all". In this magazine, from 1859-1861 there are seven articles directly citing him, although one can infer from several other texts that the French author's influence was wider still. One of the articles, for example, on chemistry applied to industry, deals with aluminum. In a note, the author of the text, chemist Pedro d'Alcantara Lisboa, warned: "Almost everything we mention about aluminum is owed to the interesting work of Mr. Figuier, which we recommend for its elegant style, the wonder of its novelty, and stringent criteria to the lovers of the sciences and their applications".[16]

However, the interesting thing is that in spite of the broader scope of the scientific topics for the general public by the Garnier publishing house, and of the word "Popular" in its title, the readers it targeted were more defined by the fact that they were laypeople, outside of intellectual and academic activities, than because they were from the lower classes. The "Introduction" gave some clues as to these readers when he wrote:

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15 *O Auxiliador da Industria Nacional*, 1855, p.17. Retrieved on Jul. 13, 2016. Available at: http://memoria.bn.br/DocReader/302295/10113

16 *Revista Popular*, 1859, p.172. Retrieved on May 22, 2018. Available at: http://memoria.bn.br/DocReader/181773/1357

> When one deals with a scientific or artistic subject and enters into the domain of a particular science, one must do so using terms all will understand. No mysteries shall be reserved for the initiated. When we speak to the farmer, we want the financier to understand us, when we speak to the engineer, the philosopher shall not be left fasting.[17]

Thus, there was no connotation that "popularizing" meant lowering the level. The same meaning that *Correio Mercantil* gave to the "useful" nature of Figuier's texts was as true for "men of science" as it was for the "farmers". One subtlety may indicate a different meaning given to the public when, in 1876, American Telegraphic Agency newspaper *O Globo* presented Camille Flammarion and other popularizers as writers who endeavored to "write books at everyone's reach and understandable by less intelligent people",[18] but this connotation would only appear in the Brazilian press in the next few decades.

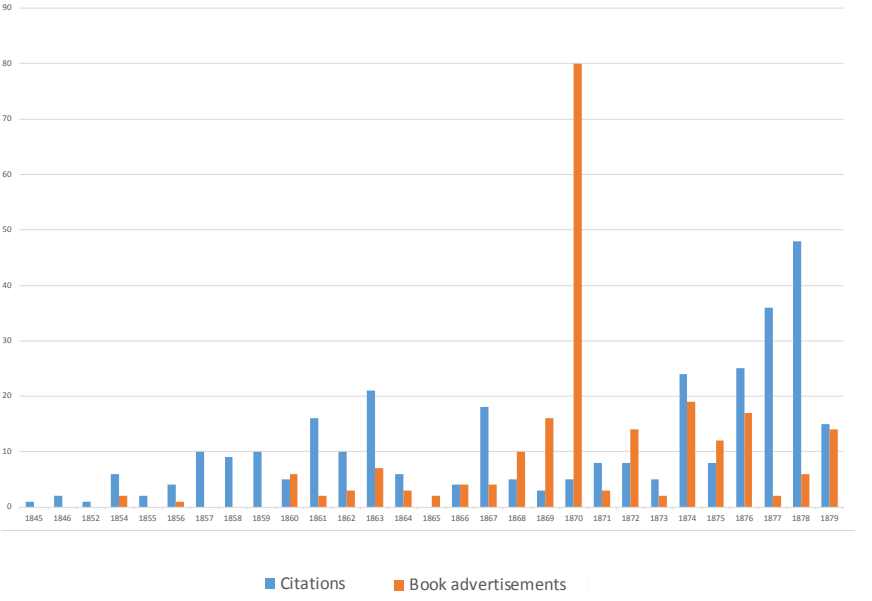
Science as news

In the 1860s and 1870s, Figuier continued to be credited as an important source in science application and *L'Année Scientifique* and the science section of *La Presse* became references for scientific news in Brazil. Many newspapers contained translations of excerpts of the annual in their science sections, and the number of quotes by the author and mentions made to him over the years grew, as seen in Graph 1.

17 *Revista Popular*, 1859, p.3. Retrieved on May 22, 2018. Available at: http://memoria.bn.br/DocReader/181773/5

18 *O Globo*: *A body of the American Telegraphic Agency dedicated to the interests of commerce, farming and industry.* Nov. 15, 1876, p.1. Retrieved on Aug. 29, 2017. Available at: http://memoria.bn.br/DocReader/369381/3228

Graph 1: Citations of Louis Figuier's work and advertisements of his books in newspapers and magazines – 1845-1879.



Source: BNdigital
Graph by author

The most varied topics were dealt with, such as the invention of toughened glass, the discovery of a f rozen mammoth in Siberia, underground telegraphy, the typewriter, studies on the speed of sound, the discovery of an electric plant in the United States, the freezing method used by industry, and meat extract, among many other topics. In these cases, either quotes from the French press made up half the article or it was fully translated into Portuguese.

The number of news items repeated by several different newspapers is also considerable, which shows some of the most popular themes — or at least the most recurrent — such as considerations on coffee, the quality of water, or the bite of an animal with rabies. Some polemical topics, such as plumbing with lead pipes, also had their place in

newspapers, with credit given to Figuier. *Jornal do Commercio* reproduced excerpts of his article endorsing what the engineer and director of the Paris water and sanitation board, Dr Belgrand, had said about the innocuous nature of plumbing with a heavy metal. "A chemical analysis of all the waters distributed in Paris has proven the complete absence of lead in the water. The risk of poisoning from the city's water, channeled by lead plumbing is therefore null".[19] The intention of disseminating information notwithstanding, the fact was that the popularizers' texts also served as deciding factors — as their authority was recognized because of their activity — for matters involving diverse interests, and could be appropriated in many different ways.

The "scientific facts" of Figuier's annual often served as markers for debates, both by specialists and by laypersons. Members of the Imperial Academy of Medicine used Figuier's information to oppose the alleged benefits of planting *eucalyptus globulus* in Brazil. Physician Nicolau Moreira refuted the defense of the eucalyptus plant made by José Pereira Guimarães, going against the idea that planting eucalyptus was a form of precaution against "swamp fevers" because it cleansed the air of miasma. His medical opinion was backed up by his colleagues, who signed the document at the end of the Academy session.[20] In *Jornal do Commercio*, a study by the Academy to assess the water quality in Gamboa, a Rio de Janeiro neighborhood, began with an epigraph from a passage of *Les merveilles de l'industrie* by Figuier. The popularizer's quote appeared next to another one taken from a more academic title, the *Traité de Chimie Hydrologique* by chemist Jules Lefort.[21]

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19 *Jornal do Commercio*, May 7, 1877, p.2. Retrieved on Mar. 27, 2018. Available at: http://memoria.bn.br/DocReader/364568_06/15812

20 *Jornal do Commercio*, Jun. 19, 1874 p.2. Retrieved on Jul. 13, 2017. Available at: http://memoria.bn.br/DocReader/364568_06/8828

21 *Jornal do Commercio*, Apr. 30, 1877, p.3. Retrieved on Mar. 27, 2018. Available at: http://memoria.bn.br/DocReader/364568_06/15759

Changes: circulation of texts and translations

Jornal do Commercio gives an idea of the changes regarding the way in which Figuier was presented to the public. If during the 1850s newspapers that referred to Figuier treated him mainly as a "sage", two decades later he was more clearly associated with "popular science" and called a popularizer. One of the reasons for this may be the fact that his books were translated, which made him better-known by the public. In 1869, Augusto Emilio Zaluar translated into Portuguese one of Figuier's biographies, contained in his Christopher Columbus issue of the collection *Vie des Savants Illustrés*. The original French collection consisted of five volumes on the life of the "masters of science", covering the period from Antiquity to the 19th century, and including figures from the classical philosophers to contemporary scientists. The book *Os sabios illustres: Cristóvão Colombo* was edited in Rio de Janeiro by Oliveira & Co. and printed at the Americana typography. Advertisements for the book and short reviews could be seen in many periodicals of several capitals of the Empire, including *Jornal da Tarde*, *Jornal do Commercio*, *Diario de Belem*, and *Jornal de Recife,* among others. *Vida Fluminense* recommended the book, emphasizing that Zaluar had rendered a good service by translating the "news about the great navigator" into Portuguese, "registered in documents that few people knew about, a beautiful style, method, and clear presentation".[22] *Opinião Liberal* also called the biography by Zaluar "a small book of not many pages that invites people to read it", which "is not undeserving of the original".[23] São Paulo's *O Ypiranga* stated that the translation was good and the edition clear.[24]

22 *Vida Fluminense*, Feb. 13, 1869, p.3. Retrieved on Jul. 9, 2017. Available at: http://memoria.bn.br/DocReader/364568_06/15759

23 *Opinião Liberal*, Feb. 22, 1869, p.2. Retrieved on Jun. 2, 2017. Available at: http://memoria.bn.br/DocReader/359696/685

24 *O Ypiranga*, Feb. 18, 1869, p.2. Retrieved on Jun. 2, 2017. Available at: http://memoria.bn.br/DocReader/375420/1778

Graph 1 shows that a good part of the advertisements of 1870 were for Zaluar's publication.

The availability of translated books meant that scientific popularization made it into a list of areas read by a wider audience and can be considered an important factor for a clearer demarcation of the authors as producers of specific genres. *Jornal do Commercio* announced Garnier's translation of the work of Jules Verne. A comparison between the science fiction writer and Figuier gives a clear image of the latter as a popularizer. In the advertisement for two of Jules Verne's books, the newspaper compared them as authors who had taken on the task of popularizing science:

> Figuier analyzes the more run-of-the-mill objects, the more mundane facts of life, and little by little explains their formation, the elements that compose them, the causes that determine them, and gradually rises to the general scientific principles. Jules Verne invents a fable, goes on a journey, and, captivating the reader's attention with the interest aroused by the characters he brings to life, presents a theory, science or art, which, if not complete, is at least very developed.[25]

Both differed from the style of Camille Flammarion, whose title *Les Mondes imaginaires et les mondes réels*, also translated by Garnier in 1876, was reported on in a bibliographical note in *O Globo.* For the author of the review, Verne wrote "novels", whereas Flammarion's books were "more scientific than those of his colleagues dedicated to the same activity". The article highlighted that Flammarion had been employed by the Paris Observatory for a few years and that because he wrote well, he was now writing for famous French magazine *Cosmos*, edited by Abbott Moigno, responsible for "instructing the masses with light and amenable work, in which theory does not occupy most of the space." In addition, he compared him to Figuier, who according to the article

25 *Jornal do Commercio*, Aug. 3, 1874, p.1. Retrieved on Mar. 27, 2018. Available at: http://memoria.bn.br/DocReader/364568_06/9137

wrote more than Flammarion but was more superficial than him and had a "certain industrial spirit", making the commercial aspects of the novelties of applied science more visible.[26] These reviews were published in different newspapers, such as *Diário de Pernambuco* in December that year and *Jornal da Tarde* in Rio de Janeiro in 1877.

However, it was also these "industrial characteristics" that made Figuier's writings, especially his scientific annual, appealing for many readers in Brazil, as we saw earlier on. *Monitor Campista,* of the province of Rio de Janeiro, recalled in 1879 the "curious" nature of Figuier's publications. His *Année Scientifique*, he said, was "sought after by people curious for scientific knowledge" and contained news about "mice that sang".[27] *Correio da Bahia*, managed by Augusto de Oliveira Mendes, reported on the invention of the Remington typewriter, originally contained in Figuier's *Année Scientifique* and translated by *Diario de Pernambuco*. The newspaper transcribed Figuier's translation: "An interesting invention has arrived from America. It is a machine that writes, that is, it produces writing mechanically on paper. For this, all you need to do is to run your fingers over the keys".[28]

As well as *L'Année Scientifique*, sold in French, but whose texts were widely translated in the newspapers, Figuier's books, whether or not in the original language, presented his readers with the latest novelties in natural sciences approaches. In the 1870s, *Lux* magazine, written by F. G. Castello-Branco, J. B. de Lacerda Filho and J. A. Teixeira de Mello, opined on Figuier's book, *As grandes invenções antigas e modernas*, highlighting its luxuriant cover. It also presented the writer as a "true sage", who has

26 *O Globo: orgão da Agencia...*, Nov. 15, 1876, pp.1-2. Retrieved on Aug. 29, 2017. Available at: http://memoria.bn.br/DocReader/369381/3228

27 *Monitor Campista*, Aug. 30, 1879, p.2. Retrieved on Mar. 28, 2018. Available at: http://memoria.bn.br/DocReader/030740/4440

28 *Correio da Bahia*, Jun. 8, 1878, p.1. Retrieved on Sep. 28, 2017. Available at: http://memoria.bn.br/DocReader/303488/1812

made every effort to place the natural sciences "at the reach of common intelligence" and recommended his books to the "curious reader".

Who it was aimed at: the readership

However, it was not just the general "curious reader" that remained as the definition of the readership of the works of popularization. Other better outlined categories started to incorporate readers in view of the many processes of change in society at that time. In the 1870s, advertisements appeared, pointing to new readers resulting from the diversification of printed sections during those years. In *O Globo* in 1876, newspaper *Illustração da Moda* was advertised to "Brazilian ladies". It was written in Portuguese but had Parisian fashion in its pages. The advertisement said that the editor had the honor of announcing to the "illustrious ladies that issues n. 1, 2, 3, and 4 are at their disposal, with beautiful colored outfits, lots of illustrations, patterns for clothes and embroidery, and varied literature by the most celebrated authors: Littré, L. Figuier, and others".[29] It was no longer only men of science and farmers but also women who were cited as potential readers of the popularizer's work.

Another important change includes the debates on public education and proposed methods of schooling. From the last quarter of the 19th century onwards, as Faria Filho and Vidal have pointed out, discourse in favor of a specific space for developing school culture was actualized in the materiality of school buildings and the arsenal of school objects (such as maps, posters, books, and tablets). As they stated, "pedagogical discussions, especially those on methodological proposals, demonstrated the need for there to be specific spaces for schools as a condition for them to perform their specific social function" (Faria Filho; Vidal, 2000, p.24). In this process, primary school started to grow in importance, supported

29 *O Globo: orgão da Agencia...*, May 21, 1876, p.4. Retrieved on Aug. 29, 2017. Available at: http://memoria.bn.br/DocReader/369381/2554

by a number of auxiliary items — school material and institutions such as libraries and museums — alongside other social structures active in an individual's education such as the Church and home.

Newspapers of the time discuss these new pedagogical premises, particularly the intuitive method, or "object lesson", in which the popularizers' books had great importance. In this debate, which happened in many countries, the promotion of scientific teachings in schools also involved the popularizers' work, with Figuier, among other authors, one of the leaders in sales of books at low prices (Béguet, 1994, p.13). The popular libraries, promoted by republicans of different States such as Domingos Sarmiento, included the popularizers' books, particularly Flammarion's and Figuier's. In fact, some of Figuier's books were precisely aimed at the teaching of natural sciences as the best model for children's and young people's intellectual and moral education. In the foreword to his book *La terre avant le déluge*, said to be for young people, Figuier stated that fantasy was a natural gift of humanity, so that knowledge through reason had to be strengthened through the lessons taken from science and nature, not from fables. What was underlying his discourse was a position assumed — that of scientific teaching — in the long debate in which the preponderance of either letters or science was up for dispute in the French post-revolutionary context (Feuerhahn, 2015, p.99), in what came to be known as a split or battle between two cultures. In a critique of 1863 book *La terre avant le déluge*, Figuier's substitute at *La Presse* André Sanson wrote the following about the author's position:

> ... here we touch on the question of the relative importance of the sciences and letters in education, a question so widely debated for a few years now. Only letters make the man, they say. That is why they are called *humanities*. They complete him and perfect him, we say, in turn. Only science can create a righteous spirit, because it is only science with its rigorous and logical methods that can train him to discern the

> truth. In a good education system, the sciences are the base and letters are the capital.[30]

The Municipal Library's Librarian's Report" published in *Revista do Rio de Janeiro* considers the role of the popularizer's production as being of assistance to formal education and to the diffusion of public teaching. The author, who does not sign the report, speaks of the inauguration of Rio de Janeiro's municipal library and of the hiring of an employee to run it, praising the actions by the president of the City Council, *Comendador* Barroso Pereira. He argued that books needed to be made cheaper in order to develop an education for the people, because as long as books remained a luxury item it would be impossible to make schooling compulsory. In order to make books affordable, incentives would need to be created such as abolishing tax on paper and ink, as well as on print shops that imported materials or employed a certain number of workers. The freedom to teach and the ease with which compendia could be produced also helped to reduce prices, he said. Thus, the author of the report exhorted:

> ...disseminate the people's libraries, facilitate people's access to recreational books, give them novels, which are their favorite genre, and from novels they will progress to serious and useful books without difficulty. Jules Verne, Figuier, Aristide Roger, Flammarion and others were the gentle bridges that led readers from the banks of fiction to the banks of reality, from the ideal to the positive, from fantasy to science.[31]

The use of the word "bridge" as a metaphor was emblematic of the popularizers' texts, as it alludes precisely to the image of an gap between

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30 *A Actualidade*: *jornal politico, litterario e noticioso*. Apr. 18, 1863, p.2. Retrieved on Jul. 27, 2017. Available at: http://memoria.bn.br/DocReader/235296/1558

31 *Revista do Rio de Janeiro*, 1876, p.123. Retrieved on Sep. 21, 2017. Available at: http://memoria.bn.br/DocReader/342920/124

science practitioners and the lay public, and to a difference in "language" (Bensaude-Vincent, 2009). This difference was bridgeable through the translations made by those mediators.

However, one must consider that these were not movements in "stages", as there was much variation in the appropriation of Figuier's work. An example concomitant to the reviews of the then recently published translations of Jules Verne, in which Figuier was characterized as an author whose mission was to popularize the sciences, certain writers, like Mello Morais, referenced Figuier in topics such as the Earth's geological age, thus treating him as a specialist.[32] The popularizer was therefore considered a "sage" and used as a reference by many specialists.

In newspaper *A Instrucção Publica*, a discussion on a schoolbook written by Abílio Cezar Borges, owner of well-known elite school Colégio Abílio, used facts taken from Figuier. The review of *Terceiro Livro de Leitura* by Counselor Magalhães Taques, pointed out an error in Borges's book, in which the author spoke about the vegetable kingdom, stating that scientists had counted the existence of 160,000 plant families. According to Taques, botanists and physicians Antoine Laurent Jussieu and Adrien Jussieu had pointed to the existence of 100-284 plant families, respectively, and that Figuier had estimated the number at 300.[33]

In the space of a little more than three decades and with an increase in the number of translations, Figuier's books started being offered to the best students of public and private schools. By 1886, in and end-of year celebration at the American School of Belém, with a chorus singing Verdi's *Un ballo in maschera*, principal José Veríssimo distributed luxury editions of Camille Flammarion's books and *As grandes invenções* by

32 O *Globo: orgão da Agencia...*, Mar. 31, 1876, p.4. Retrieved on Aug. 29, 2017. Available at: http://memoria.bn.br/DocReader/369381/2358

33 *A Instrucção Publica*, n. 6, 1872, p.46. Retrieved on Apr. 19, 2018. Available at: http://memoria.bn.br/DocReader/233048/48

Louis Figuier as awards for students.[34] The event must have definitely brought together the high society of the state of Pará and included food and drink, local lyrical singers and French poetry recitals by the students. If mention of the elite school led by Veríssimo leaves doubt as to the dissemination of the popularizers among the masses, one may recall the case of Lima Barreto, who was awarded by his teacher, Thereza Pimentel do Amaral, a beautifully bound volume with illustrations from *As grandes invenç*ões as a prize. The writer, then still a boy, would keep the book with a dedication from his teacher using his first name, Afonso, dated 1890.[35]

The "Popular" And Hierarchizations

When we observe the themes dealt with by Figuier in the press, we can see that some of them would actually become more "popular" and, coincidentally, came to be known as "extra-scientific". This is the case of books such as *La terre avant le déluge*, a book that deals with the Earth's geological history and attempts to uphold scientific approaches without breaking with the biblical dogma about the origin of the world and man. André Sanson would point out that although Figuier expressed his faith in scientific education, considering myth and fable to be farcical, in his book there were still "extra-scientific" aspects, as his vision of geological history still reconciled biblical beliefs with science-based information. Sanson denounced the religious vision underlying the way in which Figuier narrated the Earth's geological past, which presupposed the idea of creation and a divine intervention that would have been responsible for the planet's formation. "...one would think that the author had

34 *Diario de Belem*, Nov. 20, 1886, p.3. Retrieved on Mar. 21, 2018. Available at: http://memoria.bn.br/DocReader/222402/11853

35 Figuier's book with the dedication to Lima Barretto by his schoolteacher can be found in the collection of the National Library Foundation of Rio de Janeiro. The teacher's influence and the memory of the book would mark the writer, who would mention Figuier's book in his novel *Clara dos Anjos*. BARBOSA, 2017; SCHWARCZ, 2017.

conversed with God. He attributes to God an active role in geological phenomena; states His intention and His aim in everything." He also criticized the way in which he affirmed the superiority of man over nature, and of intelligence as being a gift exclusively of man:

> If he [the man] is the most intelligent, he is surely not the least fierce. The history of his wars proves this, as well as the gratuitous crudeness rife in the annals of the human species (...) Therefore, this idea, with no basis, of a special place for the human kingdom above the animal kingdom is a conception that must be excluded from science, that is, from the truth.[36]

In the process of disseminating the sciences in general culture, the newspapers naturally reflected the debates on the relationship between science and religion. Catholic newspaper *O Apóstolo*, for example, contested the "heterodox declarations" of the 19th century "dusk" of Catholicism and the idea that priests had made no contribution to the "scientific feast" As proof of this, it took from Figuier's *Merveilles de la Science* the name of numerous priests that had contributed since the 13th century to physics experiments on vapor, pressure, motion, electrical machines, chemical experiments, electrotyping, telegraphy, and astronomy. He also recalled the greatest "scientific geniuses" from Bacon and Newton to Linnaeus, Humboldt and Morse, all "manifestly theistic".[37]

For *O Apostolo*, an author such as Figuier, who endorsed the Church's position on issues such as the origin of man, was an ally in the attacks suffered from critics of the Catholic Church and the materialists of the time. That is how the newspaper positioned itself against Miranda de Azevedo and his conference on Darwinism. Ridiculing the topic, dubbed "the question of the apes", *O Apostolo*'s editors undertook a

36 *A Actualidade*, Apr. 18, 1863, p. 2. Retrieved on May 22, 2018. Available at: http://memoria.bn.br/DocReader/235296/1558

37 *O Apostolo*, Jan. 2, 1870, p.8. Retrieved on May 28, 2018. Available at: http://memoria.bn.br/DocReader/343951/1508

war of dogma against the positivists. The newspaper asserted that the French popularizer had demonstrated "that all the vice of those who find similarities between man and ape is derived from the fact that these individuals are guided by purely anatomical data", when this was supposedly casuistic. The opinions of the Frenchman, who presented scientific thought without clashing with religious dogma — such as the deluge — seemed to be preferable for the newspaper.[38]

However, as we would like to state here, the dichotomies and classification of both the writer and Figuier's readership were not reduced to simple oppositions. The book *Depois da morte*, an 1876 Garnier translation of *Le lendemain de la mort*, aroused the interest of both the "erudite" from the academies and of lay readers. The book, which deals with hypotheses about life after death, had great repercussion "among men of science and cultivators of the letters", according to newspaper *A Reforma* in its April 7, 1877 edition.[39] The review, published in *Correio Paulistano*, said that the book brought "if not scientific hypotheses, ingenious combinations of the most intricate philosophical and positive problems, and yet, as the book is read, it becomes increasingly interesting and, once finished, the reader acquires a valuable volume of useful knowledge". However, those who considered Figuier's work a doctrine, "a book of propaganda, would surely find fault in it; but the French sage's intention is manifest, and no-one is seeking mathematical theses in it", wrote the reviewer.[40]

In the *A Reforma* article of December 29, 1875, there is a passage from Figuier's book in French, written after the loss of his son, in which he reflects on the soul. The newspaper's text highlights the author as

38 *O Apostolo*, Dec. 28, 1881. Retrieved on Sep. 12, 2017. Available at: http://memoria.bn.br/DocReader/343951/7586

39 *A Reforma*, Apr. 7, 1877, p.2. Retrieved on Jul. 28, 2016. Available at: http://memoria.bn.br/DocReader/226440/9203

40 *Correio Paulistano*, May 2, 1877, p.2. Retrieved on Sep. 15, 2017. Available at: http://memoria.bn.br/DocReader/226440/9203

"one of the most notorious men of modern science, who has illustrated it, at times by diving deep into the bottom of the ocean to bring to light the huge wealth contained in it, at others by searching the skies and seeking to show us the aerial regions and all of their worlds".[41] According to the newspaper, Figuier rejected materialism, which for him was the cause of Communism and "petrolism"[42], defending a "spiritualism" compatible with science. It read:

> The death of man is nothing but one of the moving scenes of the metamorphoses which the soul must go through. (...) However, not every human goes over to the supernatural and inhabits the ether; for this he must have been ennobled by deserving actions, his conscience must be pure and immaculate, and that man must have been deserving of the esteem of other men; only thus will his soul, untouched by vices that weigh heavily, ascend to the upper realms, where his attributes will increase. The perverse man, he who had been a deceiver of humanity, who has been the nest of all vices, will incarnate in another earthly body, and here he shall remain until he is ennobled by exemplary living worthy of praise. The same shall happen to children, whose very short lives were insufficient for intelligence to develop. Needless to say, memory has disappeared in these incarnations, so there is no memory of what one has been.

It ends with an objection to his hypothesis: "It is an ingenious hypothesis, in which its author's bravery of imagination is patent, and which can maybe satisfy those who need to resign themselves to the laws that govern us; but it has nothing of positive about it, neither could it withstand much objection." The text was almost identical, with only

41 *A Reforma*, Dec. 29, 1875, p.2. Retrieved on Jul. 28, 2016. Available at: http://memoria.bn.br/DocReader/226440/7859

42 "Petrolism" was a reference to the "pétroleuses", or women accused of having set fire to buildings in the Paris Commune of 1871.

a few differences from the one that had appeared in *Diario de S. Paulo* only six days prior to the one published in *A Reforma*.

In *Anais Brasilienses de Medicina*, mention is made to Figuier's reflections in *A vida depois da morte* in a speech delivered at the Imperial Academy of Medicine by physician and tenured member Luiz Correia de Azevedo at one of the Academy's anniversaries. Agreeing with the French author, the orator declared:

> Matter and force, which pertain to the realm of physiology, physics and chemistry, and find in medical experimentation their analysis and solution, do not and will never explain to us what we would like to know about the immaterial realm. If they do not explain it, it is because our comprehension does not go as far as to discover truth in the simplicity of its essence.[43]

The speech was a homage to the Academy's deceased doctors, Luiz Bompani and Antonio Martins Pinheiro; but as well as am allusion to the spiritual dimension of obituaries, it was also evidence that Figuier was read by academics in areas considered to be less "scientific".

Others would disagree with the book's "scientific" character, separating what belonged to the domain of science from what was fantasy. The review published in *O Mosquito* of April 7, 1877 considers the book to be outside the scientific realm and, if it defended the author as a popularizer, it was because it indulged him following the loss of his only child, thus justifying his speculations:

> It is a book of fantasy and is not as worthy as other works of scientific popularization by the same author. More or less intertwined with metaphysics and the problems of origin and finality, on which the human mind has exhausted itself in sterile considerations, this book does not

43 *Annaes Brazilienses de Medicina*, Jul. 1877, p.63. Retrieved on May 24, 2018. Available at: http://memoria.bn.br/DocReader/062014/8968

> further the solution desired by man by even one line. According to positive philosophy, the subject that the author deals with is postponed to a far-off time, by which the sciences will be largely developed. It is therefore an untimely book, and with the elements that exist today, Louis Figuier could only have written a fantastical book. His spirit, troubled by the death of a child, has sought consolation by writing these 300 more or less mystical pages.[44]

Whether or not it was scientific, the fact is that the book was already becoming a great success and soon after its initial French edition, in the space of four months, it had sold out. At the time of its publication in France, the "commercial and news" periodical *O Movimento* announced that it would be translated into Portuguese with the title *Sciencia*.[45]

However, over the years, concomitantly with the "popularization" of certain titles and subjects — as well as the dynamics of Figuier's readership —, processes of change in Brazil included specific periods of institutionalization of the scientific fields. Through the actions of scientists in Brazil, another channel for disseminating news arose in the midst of Figuier's publications and Brazilian newspapers. News of the geodesic commission organized by the Rio de Janeiro Observatory were published in *Année Scientifique*, which, in turn, were highlighted by *Gazeta de Noticias* in 1877. According to the reproduction by the Rio newspaper, at that moment a number of geodesic operations led by the observatory directed by Emmanuel Liais took place, which would contribute to "knowledge of the real shape of the Earth's globe". [46] The aim of this commission, known as the Astronomical Commission, was

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44 *O Mosquito*, Apr. 7, 1877, p.5. Retrieved on Oct. 17, 2017. Available at: http://memoria.bn.br/DocReader/709654/1824

45 *O Movimento*, Mar. 15, 1872, p.1. Retrieved on Oct. 17, 2017. Available at: http://memoria.bn.br/DocReader/709654/1081

46 *Gazeta de Noticias*, May 31, 1877, p.1. Retrieved on Mar. 23, 2018. Available at: http://memoria.bn.br/DocReader/103730_01/2652

to determine the geographical positions of points of the Pedro II railway all the way to São Paulo, from which a parallel arc could be perfectly measured, providing data and coordinates that helped to produce the General Charter of the Empire (Vergara; Capilé, 2012, p.41).

However, it was also in this process of institutionalization, which took place in the country's laboratories and scientific institutions, that a possible demarcation of the role of "popularization" began to appear, one in which the agents of this activity of mediation were categorized in relation to the practice of science. Perhaps the best example of this period is the article by Louis Couty, "Estudos experimentaes no Brasil", published for the first time in *Revista Brasileira* in 1879.[47] More than a defense of experimental science and laboratory research, Couty advocated the importance of developing "a taste for science" that would create "innumerable means of scientific propaganda, no longer destined directly to the sages but mainly to the illustrious and cultured public".[48] In this regard, he used Figuier's texts as an example of support material that helped to "instill in the youngest minds the pleasure of knowledge and inquiry", in other words, to provide means for new candidates to enter into a scientific profession.

In 1882, *Correio Paulistano* praised the directors of the Rio de Janeiro Astronomy Observatory, which was by then issuing weather and astronomy bulletins "along with important graphic work, distinguished by the copious amount of data provided for the general progress of meteorology and astronomy and by the manifest and beneficial impulse it has given, among us, to the study and application of these sciences, so intimately linked to the development of humanity's wellbeing".[49] The

47 The article was also published in *Diario de Pernambuco* on December 21, 1879. On *Revista Brasileira* and Couty's text, see VERGARA, 2003. French scientist Louis Couty was then hired by the Experimental Physiology Laboratory of the National Museum. Regarding the Laboratory and Couty's activity, see GOMES, 2013.

48 *Revista Brasileira*, n. 2, 1879, p.236. Retrieved on Sep. 19, 2017. Available at: http://memoria.bn.br/DocReader/139955/2670

49 *Correio Paulistano*, Feb. 5, 1882, n.7544, p.1. Retrieved on Mar. 21, 2018. Available at: http://memoria.bn.br/DocReader/090972_04/2381

unsigned article gave equal value to those who disseminated the sciences outside the inner circle of scientists, or the "scholarly science. The citation is a little long, but worth the read:

> The services rendered to the Observatory are not restricted, however, to exclusive use by the erudite and by scientific associations: along with this science of sages, which Aristotle said must be shrouded in an obscurity that the profane could not penetrate, there is another undoubtedly less solid one, in which reason is not the sole instrument, but which, acting by principle over sentiment, often ends up producing the salutary effect of guiding the attention of the profane to the study of the sciences, whose secrets seemed to them inscrutable. This mission has been entrusted to the useful popularizers of the mathematical and natural sciences. The amount of work produced annually in Europe and the United States to disseminate among the most diverse social strata, from the highest to the lowliest, the long series of practical pieces of knowledge of great usefulness to ordinary life, which comes from profound study, perceptive observation and repeated experiences of sages and professionals, is incalculable. The names Figuier, Flammarion, Massé, Taylor, E. Gray, Jules Verne etc. etc. will occupy a special place in the popularization of the sciences, whose fundamental laws and principles were discovered and determined by the Newtons, Laplaces, Lavoisiers etc. In the scientific order, they represent, before these great figures, the same role that is occupied in the economic order by tradesmen as opposed to the great men of industry. They accumulate in their vast workshops the products they take upon themselves to distribute and circulate. In the same way the sage condenses scientific laws into great treaties, the popularizer busies himself with disseminating them amongst the people.

Final considerations

The hierarchies were recomposed in the newspaper's words, indicating the popularizers' function, presenting them as tradesmen in comparison to the "great men of industry" represented by scientists dedicated exclusively to activities among peers. From then on, we can see that the institutionalized sciences more emphatically defined the difference between the forms of scientific communication for peers and non-specialists.

It can also be said that in the pages of the press, through its "popularizers", science as a consumer item began to arise in the form of daily news and a source of wealth for industry and commerce, attracting new audiences. Figuier's ambiguity as a figure who occupied a dual position as popularizer and a "scholar" calls attention to the manner in which questions regarding the legitimacy and authority of scientific texts were configured. In this period in particular, the press made visible the engendering of a new "scientific culture" — and why not call it a new scientific policy too?

Acknowledgments

This article is part of the research funded by PROEP-CNPq/FIOCRUZ (Program of Excellence in Research-National-Council for Scientific and Technological Development-CNPq/Fiocruz Foundation). It was based on sources collected using keywords entered into the Digital Newspaper Library of Rio de Janeiro's National Library. 83 periodicals from the 1840s to the 1870s were analyzed, with a total of 290 articles and 280 advertisements. I thank Marília Trajtenberg for her assistance and Professor Angela de Castro Gomes and Maria Rachel Froes da Fonseca for reading and giving their opinion on the first version of this text.

Translation from Portuguese into English by:
Priscila Moura
priscilamoura@hotmail.co.uk

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