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SCIENCE AND SOCIETY IN 19<sup>th</sup> CENTURY GREECE:  
THE JOURNALS

During the second half of the 19<sup>th</sup> century, at a time when in Europe the popularization of science had been acknowledged as a serious enterprise by almost everybody, and journals devoted exclusively to that aim, such as *The Popular Science Review*, *The Quarterly Journal of Science*, and naturally, T.H. Huxley's *Nature*, had already appeared with great success, a similar spirit governed those engaged with sciences in late 19<sup>th</sup> century Greece. This spirit was very vividly described by Huxley as a great spiritual stream having railways, telegraphs and printing presses instead of ripples and bubbles.

Compared with European countries we may claim that in Greece we had a reservoir-like science where almost all the new scientific theories were instantaneously received and accepted, but the appearance of original scientific products (ideas, theories, experiments, instruments) was restricted to a minimum. Greeks showed always a preference to be engaged with history and philosophy of science rather than science itself, though for the Greeks, be they from the high or the middle class, science was a respectable practice. A practice closely associated with other social activities and having the following particular characteristic: that science's results could improve, materialistically or spiritually, the life of the new state's citizens, who, in return should recognize publicly the benefits of science. Therefore, it is not a surprise that many relevant articles appeared in several Greek journals during the period under consideration.

As the situation was not yet mature enough, with the exception of medicine and agriculture for which special journals were published, the main effort for the popularization of science in Greece took place through journals of wider interest, that is journals addressed mostly to educated but not specifically knowledgeable readers.

In this brief survey we will concentrate our study on three of the most prestigious journals of that period, namely *Estia*, *Pandora* and *Parnassos*. Other ephemeral series, such as *Eptalophos*, *Athinaion* etc. are omitted in this short analysis, although it may be interesting to compare the contents appeared in journals that failed to have a long-lasting existence with those of the journals that finally succeeded in having a relatively long period of publication.

*Estia* was a weekly magazine published every Sunday from 1876 to 1895. Among editors were several Greek scholars, such as Pavlos Diomidis (1876-82), Georgios Kasdonis (1883-88), N.G. Politis and Georgios Drosinis (1889-90), Georgios Drosinis (1891-94), G. Xenopoulos (1895). After 1895, *Estia* altered to a daily newspaper which is still published.

*Pandora* was a fortnight publication self-characterized as “historical and literary”, published by A.R. Ragavis, Konstantinos Paparigopoulos, N. Dragoumis, from April 1850 to April 1872.

Finally, *Parnassos* was a monthly journal published from 1877-1895 as an organ of the homonymous philological society.

To consider a journal as “organ” was a common practice in 19<sup>th</sup> century Greece, reflecting probably a similar European tendency. It is known for example that in Victorian England and elsewhere in Europe, many popularizing scientific journals were characterized as “organs”.

Though a superficial overview of the three journals does not reveal remarkable differences regarding the criteria and the standards of the articles relating to science, we may proceed to the following remarks.

The first one has to do with the fact that all three journals had a continuous publication for about twenty years, something very unusual given the social and economic circumstances of the 1850s to 1900s, not only in Greece but in Europe as well.

Secondly we would like to deal with the professional identity of the editors. None of them can be considered to be a scientist even in the wider sense of the word. G. Drosinis and Gr. Xenopoulos were well-known men of letters, Al. Ragavis was archaeologist and diplomat, K. Paparigopoulos the most important Greek historian of the 19<sup>th</sup> century, Nik. Dragoumis was historian and journalist, Nik. Politis a famous researcher working on Greek popular songs, Pavlos Diomidis and Georgios Kasdonis were journalists.

This fact shows once again on the one hand that the editors were open-minded, on the other hand that science had become a really important and difficult to ignore factor in Greeks’ intellectual community life.

A third observation is that all these journals emphasized mechanical inventions and industrial processes as science was supposed to be useful to industry and the state.

As during the second half of that century Greek engineers were not enough to fulfill the needs of the country it was not difficult for scientists through their articles to promote a definition of science establishing clear barriers between science and technology while, at the same time, they argued that science was the foundation of technological progress. Through this view, scientists and especially university professors tried to form the public opinion in favor of their efforts for more governmental financial support in order to develop teaching and research facilities. A typical example was the Chemical Laboratory at the University of

Athens, which despite the many difficulties arisen by certain intellectual circles was finally built on plans based on German standards. On the other hand, most of the scientists, having in mind very unfavorable experiences of the recent past, did not want to confront with the official church. Therefore, they tried, using very elegant expressions, to make clear that science was essentially different from religion. As at the time of the *Origin of the Species* the implications of science for religious belief became a main point of public interest, several Greek scientists preached the "incommensurability" thesis, putting science and religion in two entirely distinct realms.

Another particular characteristic of the Greek journals was that with few exceptions, they were not used by the members of the scientific community as means of their communication. The Greek journals were used by the scientists mainly as a tool to achieve social distinction.

We should note also another difference from the situation that was prevailing in Europe. There flourished the amateurs' contributions in writing interesting articles on several subjects, especially on Botany and Astronomy. That did not happen in Greece, probably because the University professors created a climate of scientific orthodoxy, a climate that considered science a too serious matter to be undertaken by amateurs.

The majority of the contributions were signed, even when they were translations of foreign-language articles or reports on new inventions. Usually the only unsigned pieces were the short news that were appearing in the regular columns.

This situation proves once again that contributors used their publications in these journals not only to popularize science but to make themselves popular too.

### *Pandora*

In *Pandora*, the earliest of the three journals, we mostly find articles related to education, natural history and medicine.

Articles regarding natural history could be divided into those referred to Botany and those dealing with Geology. In the first group belong the articles, which described several plants, used for gardening, in the second one articles on earthquakes, volcanoes and mineral waters' springs.

Of particular interest is a series of articles written by Joseph de Kigallas (1812-1886), a medically trained contributor to natural history topics (Kigallas was also a regular correspondent of French and Italian journals on natural history topics), particularly articles about children who were born with serious defects. We keep in mind the following titles:

- On Monsters, vol. 5, 1854, p. 269.  
 About a twin monster, vol. 5, 1854, p. 355  
 On a mishapenned baby, vol. 5, 1854, p. 490.  
 Giants and dwarfs, 1858, p. 474.  
 On Siamaean children, p. 185.  
 The Wolfman, 1866, p. 115.



There were also some articles concerning astronomy written mostly by the Director of Athens Observatory, the German astronomer Julius Smith, or his assistant Dimitrios Kokkidis.

Very few were the articles concerning Physics and Chemistry, as they demanded both more serious contributors and more advanced readers. That happened only during the last quarter of the century, since the teaching of physics and chemistry entered seriously the secondary education not earlier than the 1860s.

One of the articles about Physics described the principles and the significance of spectral analysis. The author referred to the efforts of Norrman Lockyer and Janssen to find the spectrum of the solar corona, as well as to the spectroscopes constructed by Huggins and Secchi (Pandora, 1871, p. 470-475).

From the first period of the journal, in 1854, we read a short notice on a new microscope constructed by a German professor at the University of Koeln, Assert, which could magnify an object up to 4000 times.

We conclude this short survey on the articles of Pandora, which had a scientific attitude by mentioning an article having the peculiar title: "Chemistry heals arrogance". This is actually a description of an event concerning a baron in Germany who sent his blood and the blood of one of his servants to Klaproth to analyze them and find out if the first one was of better quality. As Klaproth answered that there was no difference in both samples, the baron was convinced that there is not any natural superiority of the nobles compared to the working class people. Though from a scientific point of view the article could not be considered significant, its publication in a journal of that kind proves that according to the Greeks science could not be used for claiming social hierarchy. It proved that science should belong to everybody and not just to few people having the power of money or the nobility.

### *Parnassos*

We will start the short presentation of *Parnassos'* scientific articles by presenting a piece of similar attitude, entitled "Morality is improved by physical sciences". Through the historical account of facts, such as the prohibition of teaching Aristotelian natural philosophy at the University of Paris by Pope Innocent the third in 1215, the author condemns Church's practice to intervene in science. He concludes that:

"In the study of physical sciences there is the basic principle that the progress in Nature is governed by a universal law", or "Nothing ever moralized humanity so much as the study of the physical sciences".

Comparing with *Pandora*, we met in *Parnassos* significantly more articles concerning sciences. Though natural history and astronomy articles continued to appear, they were no longer the majority. This detectable shift to physical sciences reflected also a similar trend in the academic community and the public interest. In *Parnassos* there were standard columns where interesting news were published concerning Geography and Travels, Technology and Science, Meteorological observations.

In the columns of Geography information was given about the expedition of the famous travelers of the 19<sup>th</sup> centuries towards the North Pole or the African interior, information that naturally provoked the imagination of the readers.

In the column "Technology and Science" the emphasis was put on the new inventions which had practical usefulness such as the telephone, as well as on publications of Greeks in foreign scientific journals.

In the column of the "Meteorological observations" appeared regularly statistical data for parameters like atmospheric pressure, temperature, rain and wind, given by the National Observatory of Athens which had already established a network of meteorological stations. The Director of the Observatory seized the opportunity to prove that at his institution not only pure astronomical research was taking place but also a number of activities with direct usefulness to the public were engaged.

Let us now look at two of the articles in detail. These articles presented in extensive important scientific discoveries of the 19<sup>th</sup> century.

The first one deals with the liquefaction of the gases, which constitute the atmospheric air, by Cailletet in Paris and Pictet in Geneva. The relevant experiments were described by the most prominent physicist of the 19<sup>th</sup> century in Greece, Timoleon Argyropoulos. The epilogue of the article reflects perfectly the ideological framework concerning the scientific development in the new Greek state, a framework which was undoubtedly Baconian. We read:

"These marvelous discoveries should be considered for the moment of exceptional significance from purely scientific view and not from practical or industrial consideration. It is probable that in the future they will have their applications".

The second article is about the kinetic theory of gases. In the first paragraph, is given in a very definitive way the general spirit of physics and chemistry in the 19<sup>th</sup> century, a spirit formed by the German naturphilosophie and the mechanistic "image" of the world:

"According to all recent research it seems that not only chemistry but all the sciences are governed by a simple mechanical law".

In this article one can read the contributions of Vant Hoff and Van der Waals to the final form of the theory. The conclusion confirms the prologue:

“From the above research, and the discoveries of the French physicist Rohault, it seems that chemistry and physics constitute a single science”.

Other articles of particular importance were those concerning the formation of the earth and the Darwinian theory of evolution. Darwin’s theory became a subject of deep interest not only within the small Greek scientific community but also within the society as a whole, as the critical question was: is theory compatible with the Christian dogmas?

In *Parnassos* we find also extensive descriptions of the scientific inventions (or were they technological innovations?) of the era: the Bell’s telephone, the Edison’s phonograph, the Hughes microphone for which it was noted that it will be used in acoustics as the microscope was used in optics, and the electric lamp.

### *Estia*

*Estia* had a parallel evolution with *Parnassos*. Therefore, it is natural that the articles about science are on similar topics.

The telephone, the phonograph, telegraphy, electrical applications on the one side, earthquakes and volcanoes on the other are the “classic” contents of *Estia*.

Charles Darwin is also present through the articles of one of his supporters in Greece, the professor of Botany in the University of Athens, Spyros Miliarakis.

One of the novelties that introduced *Estia* was a series of biographical sketches of famous scientists under the title “the Martyrs of Sciences”, written originally by the famous French popularizer of science Gaston Tissandier and translated by one of the most brilliant Greek women in the late 19<sup>th</sup> century Greece, Eliza Soutzou (We jump at the chance to open a parenthesis containing a short comment on the place of women in 19<sup>th</sup> Greek University. Let us note that just before the end of the century, the first female students entered the University, one of them in the Physics Department. Most of them after their graduation worked as teachers in high schools). Is it a coincidence that during that time the national Greek poet Kostis Palamas published under the same title “Martyrs of science” -in *Parnassos*- a poem praising the role of scientists to the social development ?

### *Conclusion*

We have avoided giving quantitative data, which sometimes create distorted pictures, if they are not analyzed properly.

We considered convenient to restrict ourselves to a brief sketch of the scientific subjects, which were published in the three most influential Greek journals of the 19<sup>th</sup> century in order to form an opinion of the way

popularization of science was made.

Knowing the general role of these journals in the intellectual life of that period we may argue that finally their influence in the acceptance of science as a considerable social component was not negligible.

As there were not specialized scientific journals in Greece, sometimes the publications we have referred to were the only channels of dialogue on subjects which even in Europe were at that time at the peak of the scientific interest, such as the theory of evolution.

A common characteristic of all the publications was that they referred to recent facts. Despite their low "productivity" once they came back to Greece after having studied abroad, Greek scientists were knowledgeable, in a good extent, of the topics of their field of interest.

The absence of mathematical analysis, which could be expected from articles aiming at the popularization of science, does not reduce the scientific accuracy of the writings. But in connection with a relevant persistence to the "qualitative" (non mathematical) approach of science which was also to be found in more serious essays or books in Greece during 19<sup>th</sup> century, Greek scientists gave credits to those scientists in Europe who, influenced by the Romantic movement, continued being committed themselves to a non "mathematized" science. In opposition with the prevailed current in Europe, that of full mathematization, the Greek conception of science was that of a science of the philosophical argument.

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