

Science *and* Literature:
Imagination,
Medicine *and* Space

Edited by
Kostas Tampakis, George N. Vlahakis

Language editing and formatting
Evangelia Chordaki

DIGITAL PUBLICATIONS 07

ΙΝΣΤΙΤΟΥΤΟ ΙΣΤΟΡΙΚΩΝ ΕΡΕΥΝΩΝ | ΕΘΝΙΚΟ ΙΔΡΥΜΑ ΕΡΕΥΝΩΝ
INSTITUTE OF HISTORICAL RESEARCH | NATIONAL HELLENIC RESEARCH FOUNDATION

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ATHENS 2020

SCIENTIFIC INSTRUMENTS AND PUBLIC
LECTURES FROM A PHILOLOGICAL
ASSOCIATION. THE CASE OF GREEK
PHILOLOGICAL ASSOCIATION OF
CONSTANTINOPLE.

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Introduction

The Greek Philological Association of Constantinople (GPAC) has been together with the Patriarchate the leading cultural body of the Greek community in Constantinople for over 60 years (1861-1923) and has supported ethically and economically the establishment and maintenance of many Greek schools in the then Ottoman Empire. The Journal “Σύγγραμμα Περιοδικόν” published by the GPAC is a rich resource for the researcher, both for the interesting studies it contains and for the information about the general structure and organization of the Association, which has been a model for many of the respective associations founded after it¹. The destruction by fire of the archive kept by the GPAC until 1870 and the (temporary?) loss of the subsequent archive, after its seizure by the Turkish state in 1825, make the Journal even more important.

The purpose of the GPAC, as stated in the first article of its regulation, was the cultivation and dissemination of letters and sciences in the East², adopting the lamp of knowledge as the symbol of the Association (Image of the symbol of the Association: <https://imagizer.imageshack.com/img922/4814/mZBDNz.jpg>). One aspect of the relevant action of GPAC, which is little studied, is that of creating a collection of scientific instruments and their use in the public lectures organized by the Association³. This is an initiative that is an innovation for that time in Istanbul.

Another element of particular relevance to the specific action of the GPAC is the fact that many members or speakers were educators in the schools of Constantinople. In fact, among them are teachers and directors from Greek Schools like the Great School

1. There were more than 160 Greek Associations founded between 1861 and 1922. See Mamoni 1975, 106.

2. Among the means that the EFNC was about to use to achieve the goal were to make public lectures and create collections of scientific instruments.

3. For public courses see: Giannakopoulos 1998, 65-69.

of the Nation⁴, the Theological School in Halki Island, the Commercial School in Halki island, the Zappeion Girls' School, the Zografeion School and private schools in Pera (Greek Lyceum and its successor Chatzichristou Greek – French Lyceum). But there are also foreign teachers such as the French professor of physics and chemistry at Galatas-Serai Lyceum, Louis Charrel (*Σύγγραμμα Περιοδικόν* vol. Z, 264, the professor at the Robert College Albert de Long (*Σύγγραμμα Περιοδικόν* vol. IA, 162) and Ch. Bonkowski, professor of chemistry at the Medical School (*Σύγγραμμα Περιοδικόν* vol. IZ, 161)⁵.

The GPAC has undoubtedly been a forum for the exchange of views, knowledge and experience on teaching by contributing to the dissemination of ideas and practices from one school to another. From this point of view, the institution of public lectures on science and the consequent use of scientific instruments in them are of great importance, as it reflects the way in which experimental physics was taught, or should have been taught, at that time.

The first collection

At the meeting on November 12, 1862, the president of the GPAC X. Zografos⁶ proposed that the Association should acquire scientific instruments “from Europe” for the “necessary experiments” for public lectures⁷ on experimental physics⁸. As a result of the proposal a committee was formed by X. Zografos, I. Galatis⁹, A. Kontostavlou and A. Paspatis¹⁰ who undertook to propose, after a relevant research, the place where the lessons would be held and what should be the absolutely necessary instruments. In

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4. Great School of the Nation or Phanar Greek Orthodox College is known as Μεγάλη του Γένους Σχολή in Greek. The percentage of the School's teachers that participate in the GPAC is impressive. Indicatively, we mention Spatharis, Aristoclis, Vilkios, Nonotis, Filalithis and Lianopoulos. More generally, cooperation between the Association and the Great School of the Nation was very close. We note that almost every year the Principal of the Great School of the Nation sends a copy of his Annual Accountability to the library of the GPAC. Also, the large event hall of the GPAC is sometimes provided for anniversaries or musical events (see: vol. IZ', 173) in the “Υπέρ της Μεγάλης του Γένους Σχολής Αδελφότητα Ξηροκρήνη”, a brotherhood which acts for the benefit of the School. Such cooperation exists, of course, with other schools in the Greek community, especially with Zografeio School after its foundation in 1893.
 5. Charles Bonkowski was living in Street Faik Pacha 9. See Cervatti 1891, 238.
 6. Xenofontas Zografos was a physician and one of the founders of the Association.
 7. The decision of the acquisition of the instruments was attributed to the “kindhearted willingness of the audience” of the public lectures, according to a report in “*Ο εν Κωνσταντινούπολει Ελληνικός Φιλολογικός Σύλλογος. Πεντηκονταετηρίς 1861-1911. Παράρτημα του ΛΔ' τόμου*”, [The Greek Philological Association of Constantinople. Fiftieth Year 1861-1911] 1913-1921, 55.
 8. During the first two years of the Association's life the meetings were taking place in a hall at the second floor of the Casino Sala in the Grand Rue in Pera.
 9. I. Galatis was a physician and one of the founders of the Association.
 10. Alexandros Paspatis was a physician and member of the GPAC since 1862.

addition, the Committee was to create a list of subscriptions from GPAC members for the purchase of the necessary equipment (*Σύγγραμμα Περιοδικόν* vol. A, 141).

Indeed, on 26 November 1862 the Committee presented to the bureau of GPAC a list of instruments for experimental physics (*Σύγγραμμα Περιοδικόν* vol. A, 142-143) covering a wide range of disciplines such as electricity, magnetism, special gravity, acoustics and optics¹¹. The cost of purchasing the particular ‘economic’ but ‘representative’ collection amounts to FF 2500, according to Soleil’s invoice¹². X. Zografos suggested that the bureau should be entrusted to a trustworthy and competent member of the GPAC to collect the required amount and to supply the instruments, but no final decision was made.

X. Zografos proposed again in the meeting of 11 March 1863 the creation of a list of subscriptions by the Treasurer of the Association Ch. F. Balakis for the purchase of instruments. The proposal was accepted and the collection of the necessary amount was started (*Σύγγραμμα Περιοδικόν* vol. A, 195). The decision to supply scientific instruments from France and not from another country is expected. In the second half of the 19th century, the French manufacturers of scientific instruments (or philosophical devices as they were usually called at the time) are a step ahead of their English and German competitors in terms of quality and variety. Also, the French books of experimental physics have prevailed in most European countries, spearheaded by Ganot’s famous books¹³. The extraordinary images that adorn the books were the best advertising for French scientist manufacturers. It is no coincidence, therefore, that almost all of Istanbul’s educational institutions had acquired French scientific instruments at this time¹⁴.

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11. Of particular interest is the absence from the proposal of scientific instruments relating to the oldest and most well-known branch of physics, that of mechanics. Preference to more modern (for that time) discoveries and technologies is obvious and reveals the modern spirit of the proposal.
 12. At this point, there is an interesting puzzle and a comprehensive reference should be made to the French instruments’ maker Soleil. The Soleil family has a rich tradition of 3 generations of manufacturers. The most famous manufacturer of the family was undoubtedly the representative of the second generation Jean Baptiste François Soleil (1798-1878). This great manufacturer ceased to work in 1850 and it is therefore unlikely that the committee’s proposal in 1862 would concern instruments of its own construction. His work continued - independently - his son Henri Soleil (? - 1879) and Jules Duboscq (1817-1886). The two makers were housed in the same building but had separate workshops. Henri Soleil produced optical glasses, crystals and optical instruments such as microscopes, polarimeters and prisms. Jules Duboscq had taken over the laboratory for the production of scientific instruments - although he also produced mainly optical instruments. The year that interests us, therefore, scientific instruments coming from Henri Soleil could not be instruments like those proposed by the Committee, except those relating to optics. Instead, Duboscq produced optical instruments as well as those about electricity, magnetism, etc. but these instruments were not under Soleil’s name. We suppose that the committee received a single offer from Soleil and Duboscq, which mentioned the first name because of the special prestige it secured. If that is the case, then the instruments could have been made by either of them, or even by - officially out of work - Jean Soleil. It cannot, however, be ruled out that the instruments were made by other French manufacturers and that they were traded by Soleil’s firm. This practice was particularly common in large and famous manufacturers. See: Brenni 1996, 7-16. Also see: Duboscq 1859; Soleil 1867.
 13. Ganot’s book “*Traité de physique*” was also translated into Turkish. See: Günergun 2016, 11. Also: Akbas 2011.
 14. The situation changed at the beginning of the 20th century when the schools turned to German instrument makers (e.g. Max Kohl or Leybold).

Some examples are the University of Constantinople (Akbas 2011), the Great School of the Nation (Lazos 2013), the Zografeio School (Unpublished recording of the collection by the first author), the Zappeion Girls' School (Unpublished recording of the collection by the first author), the Theological School of Halki Island (Unpublished recording of the collection by the first author) and the Galatasaray High School¹⁵.

In the lecture given by the chairman of the Association S. Mavrogenis on the meeting of 3 May 1864 it was reported that the necessary amount of “subsidized men’s grants” had been collected for the purchase of the necessary instruments of experimental physics for public lectures (*Σύγγραμμα Περιοδικόν* vol. B, 255). It was also noted that the next bureau of the Association would take action on the purchase of the instruments (*Σύγγραμμα Περιοδικόν* vol. B, 256). On June the 13th a letter from Zambakos¹⁶ from Paris was read by the secretary to the members of the bureau (*Σύγγραμμα Περιοδικόν* vol. B, 262). The letter contained the price list of the instruments of physics requested by the Association, but the list itself is not recorded in the Journal.

On 4 July 1864, Andreas Spatharis (1837-1901) was elected as a regular member of the GPAC (*Σύγγραμμα Περιοδικόν* vol. B, 265). For 36 years he had been teaching physics, mathematics, cosmography and chemistry at the Great School of the Nation (1864-1900) and almost in all the Greek secondary schools in Istanbul. A. Spatharis¹⁷ would serve for many years as a curator of the instruments collection of GPAC (1875-1880) and would deliver many public lectures. He also served as a vice-president of the Association for a short period of time during 1887-1888 (*Σύγγραμμα Περιοδικόν* vol. KA, κθ)¹⁸. It would not be an exaggeration to say that A. Spatharis was the authority at this time in experimental physics and chemistry issues in the Greek community of Istanbul¹⁹. Until 1880, when he ceased actively participating in the Association, he was the driving force in physics at the Association.

15. As mentioned on the school's website: <http://www.gsl.gsu.edu.tr/en/tarihce/1868-1923>.

16. The sender of the letter was Demetrius Alexandre Zambako(s) – Pacha (1831-1913), a Greek leprologist and dermatologist from Neochori (Yeniköy), a village near Istanbul. He studied medicine in Paris and he was living there in 1864, when the mentioned letter had been sent. He returned to Istanbul in 1872 although he spent much of his time in Cairo, where he died. He was an honored member of the GPAC since 1904 (See: *Σύγγραμμα Περιοδικόν* vol. ΚΘ, 93). The strong relationships of him with the Association leded Zambakos in 1910 to propose and sponsor a competition about Byzantine studies organized by GPAC. See: *Σύγγραμμα Περιοδικόν* vol. ΛΓ, 19-20.

17. Spatharis finished the Commercial School in Halki Island and then moved to Berlin to study Architecture at the Architecture Academy. and then attended general lessons, with emphasis on physics, at the University of Berlin.

18. He resigned at 19/4/1887.

19. Spatharis was the author of the following textbooks: *Γεωμετρία* [Geometry], Πατριαρχικό Τυπογραφείο, Constantinople (Istanbul), 1887. *Άλγεβρα* [Algebra], Πατριαρχικό Τυπογραφείο, Constantinople (Istanbul), 1887. *Στοιχεία Φυσικής Πειραματικής*, [Elements of Experimental Physics], Κωνσταντινίδης, Athens, 1886. *Στοιχειώδη Γεωγραφία, τεύχη Α' και Β'* (Elements of Geography, Vol.1 & 2), Πατριαρχικόν Τυπογραφείον, Constantinopl (Istanbul), 1888. This book was written in co-operation with his colleague, teacher of geography and history K. Zachariadis. *Στοιχεία Τριγωνομετρίας* [Elements of Trigonometry], Κορομηλάς, Athens, 1892.

At the meeting on October 3, 1864, the secretary read, among others, a letter from Zambakos about the purchase of the scientific instruments (*Σύγγραμμα Περιοδικόν* vol. B, 267). The exact contents of the letter were not mentioned, but a few weeks later (November 2, 1864) a new letter from the same sender is about the completion of the shipment of the instruments to the GPAC (*Σύγγραμμα Περιοδικόν* vol. B, 268). Consequently, the first letter concerned the latest details of the market and the shipment of the instruments. There is no mention of the number and type of the instruments neither about the instrument maker – except what has been mentioned in the committee’s proposal in 1862. The amount raised amounted to 2000 francs (8800 grosis) and was collected between May 1863 and April 1864 (*Σύγγραμμα Περιοδικόν* vol. E, 137)²⁰. The amount allocated was, however, 13200 grosis (*Σύγγραμμα Περιοδικόν* vol. E, 137) (3000 francs), but it is not clear how the additional amount of 4400 grosis was collected. It is recalled that the original proposal of the committee concerned an order worth 2500 francs.

Three lectures (1, 8 and 18 November) by K. Caratheodory²¹ on electricity are listed in the public lectures program for the period November-December 1864 (*Σύγγραμμα Περιοδικόν* vol. B, 276).

In the annual report of the GPAC Secretary given at the meeting on May 14, 1865, there is a very detailed - and therefore extremely interesting - description of K. Caratheodory’ lectures on electricity and A. Spatharis’s “About the air” (*Σύγγραμμα Περιοδικόν* vol. Γ, 46-47). It seems that the lectures of A. Spatharis took place after December 1864 and therefore do not appear in the aforementioned program of public lectures.

There were many experiments in K. Caratheodory’s lectures, but it is not entirely clear whether the experiments were carried out or were simply described to the audience. However, at one point it is reported that “... Mr Caratheodory has been involved in the demonstration of the induction in static electricity by using the electroscope of Coulomb and the electrophorus of Volta”. Based on this passage we assume that much - if not all - of the experiments were carried out with the newly acquired instruments, and if this the case among the instruments acquired should be a Coulomb electroscope and a Volta electrophorus²². It is also reminded that the second letter of Zambakos, which refers to the shipment of the instruments, was read in the GPAC on 2 November 1864, one day after K. Caratheodory’ first lecture. It is therefore possible for the instruments to have already been received and used in these lectures.

20. In particular, it is mentioned: «Διάφοροι φιλόμουσοι και φιλοπάτριδες ομογενείς (τον κατάλογον των ονομάτων τούτων μετά λύπης ημών δεν ανεύρομεν, ίνα ο Σύλλογος και τα γράμματα γινώσκωσι τους ευεργέτας τους) δι’εράνων φράγκων 2000 προς σχηματισμόν της οργανοθήκης του Συλλόγου». The list of names was apparently destroyed along with the Association’s record in the great fire of 1870.

21. Konstantinos Caratheodory was a professor in the Medical School of Istanbul. He was a regular member of the Association since 1867.

22. For details see: http://physics.kenyon.edu/EarlyApparatus/Static_Electricity/Electrophorus/Electrophorus.html

The lectures presented and analyzed the speed of “electric fluids”²³, static and dynamic electricity, the charging of bodies by friction, the electric pendulum, conductors, non-conductors and the theories of the time about the nature of electricity. Subjects such as the measurement of the electrical power, the accumulation of “electric fluid” on the surface of a conductor, the effect of the shape of the bodies on this accumulation and the leakage of “electrical fluid” in the vacuum and air were presented. The operation of the electric machine, of the Leyden jar (Lazos, Paparou 2015) and of the discharger was explained. The theory of electric hail²⁴, lightning and lightning rod was also presented. Then, Caratheodory presented elements from the “dynamic electricity” such as the Galvani’s experiment on frog legs. Finally, he focused on the operation of the Volta pile, the Daniel cell and the Bunsen cell, (types of electrical sources) and he explained electromagnetism and the function of the telegraph “in a very precise way”.

Regarding whether experiments were carried out in Spatharis lectures, the text is very clear: “... Mr. Spatharis performed the admiration of this great audience through the excellent selection of experiments and his very flexible word.” Unfortunately, no other information is available about the type of experiments performed, and this is because Spatharis has neglected, rather on a permanent basis, to deliver a detailed written report on his lectures. Also, Spatharis, who also taught mathematics, delivered a number of lectures on “Geometry Applied in Art”.

Based on the rich information on the public lectures of 1864-1865 - information that are not found in any other volume of the Journal – we can reasonably suppose that among the instruments acquired in 1864 were included: an electrostatic machine, a Volta electrophorus, a Coulomb electroscope, an electric pendulum, a cylindrical and a spherical conductor on insulated bases, at least one Leyden jar, an electric hail, a Volta pile, some Bunsen and Daniell cells, a telegraph and some devices to demonstrate electromagnetic phenomena such as coils and a galvanometer. Moreover, instruments which were necessary in the experiments presented by Spatharis, such an air pump with some accessories and a barometer, should be added to those.

Spatharis gave in 1868 a lecture on chemistry, presumably with experiments (*Σύγγραμμα Περιοδικόν* vol. Δ, 244) but no lecture related with experiments was given next year (*Σύγγραμμα Περιοδικόν* vol. Δ, 256). During 1868-1869 the maintenance and safe keeping of this collection, as well as the library, were entrusted to Ioannis D. Aristoklis (*Σύγγραμμα Περιοδικόν* vol. Δ, 201), who was a teacher of history and philosophy in the Great School of the Nation and one of the founders of the GPAC in 1861.

23. The terminology of this period is kept in this paper. The theory that some kind of electrical fluids are responsible for the electrical phenomena enjoyed almost universal acceptance during that period. Its gradual abandonment occurred slowly only after the discovery of the electron by J. J. Thomson in 1897.

24. For details see: http://physics.kenyon.edu/EarlyApparatus/Static_Electricity/Electric_Hail/Electric_Hail.html

The second collection

Ambrosios Mavrogordatos²⁵ donated to the GPAC an astronomical instrument (*Σύγγραμμα Περιοδικόν* vol. Δ, 252, 257), as announced at the meeting on 3 March 1870 and in the presidential lecture given on May 3, 1870. Unfortunately, this instrument, as well as any mobile and immovable property of the GPAC, was lost shortly after a major fire that broke out on May 24, 1870. The fire completely destroyed the building²⁶ of the Association in Pera (today is called Beyoglou). The archive²⁷, the library and the instruments collection of the GPAC were also destroyed and this temporarily stopped a 9-year rally (*Σύγγραμμα Περιοδικόν* vol. Ε, 181)²⁸. As a result, in 1870 the GPAC was again at the starting point for scientific instruments (and not just them) having permanently lost the whole of its equipment.

The fire marked the history of the GPAC deeply, initially as a wound. At the meeting, which was convened for the destruction on July 3, 1870, the president, S. Aristarchis, wonders (*Σύγγραμμα Περιοδικόν* vol. Ε, 132-133): “Where is the collection with the numerous instruments of physics which so many times in the public lectures have pleased both us and the public of this great city?”

Nevertheless, this catastrophe awakened the Greek community and eventually led to the beginning of a new course so impressive as to be the cause for the frequent comparisons of the GPAC with the mythological Phoenix. The Association was trying to acquire an owned building since 1867 and after the fire the required amount was collected through subscriptions²⁹. The architects Cleanthis and Parigoris designed a two storey building (*Σύγγραμμα Περιοδικόν* vol. Ζ, 340) that was inaugurated in 1873. Nevertheless, the final transportation of the GPAC happened in 1875³⁰. A third storey was added in 1917 to house the reading room³¹.

25. At his own expense, the surgery in the Valouclis hospitals was constructed. For details see: <http://www.chios-medical.gr/constantinoupolis.htm>

26. This building was rented by the Association.

27. The archive could provide valuable information about the type and number of the available instruments. Its loss means the definitive absence of relevant information.

28. “Μετά την πυρκαϊάν της 24^{ης} Μαΐου, ήτις εν ακαρεί κατέστρεψε παν ό,τι ο Σύλλογος εις το διάστημα του 9ετούς βίου του είχε δυναθή να αποκτήσει...”.

29. For lists of the subscribers see: *Σύγγραμμα Περιοδικόν* vol. Ε, 181; *Σύγγραμμα Περιοδικόν* vol. Στ, 300-301; *Σύγγραμμα Περιοδικόν* vol. Ζ, 329-331.

30. The banker Ch. Zografos donated an extra amount of 2000 Ottoman liras in order for the building to be completed. (*Σύγγραμμα Περιοδικόν* vol. Η, 286).

31. The relevant expenses were borne by Alexandros Mavrogenis. In his honor the reading room was named Mavrogenio. “*Λογοδοσίαί Μηνιά Αυθεντόπουλου, προέδρου του εν Κωνσταντινουπόλει Ελληνικού Φιλολογικού Συλλόγου*”, [Reports of Mina Afthentopoulou, president of GPAC] 1972, 16, 88. The building was in Topçilar 18, in Pera. Two photographs of the building can be viewed at: <https://imagizer.imageshack.com/img923/9269/xQ4VJO.jpg>. The first image is from around 1886 and the second has been taken a few years before its demolition in 1965.

The intention for recovery of the equipment for the public lectures is reflected in the provision of 50 Ottoman liras “for the gradual re-establishment of the library and the collection of scientific instruments” (*Σύγγραμμα Περιοδικόν* vol. Z, 340). Members of the relevant committee were I. Gion³², Z. Alexandridis³³ and M. Tsigaras. However, the purchase of any new instruments would be delayed enough.

The destruction of the archives is the reason why there is little available data on the Association’s action during the period 1865-1870. GPAC had not printed the Journal for those years until the day of the fire. A great effort was made to re-compile the necessary information for the lost five years, and the volume Δ was printed in 1871. It is the only volume of the Journal that covers such a long period (5 years) and obviously the description of the action of GPAC is quite succinct. The only recorded public lecture that could be related to scientific instruments is a lecture by A. Spatharis about chemistry in 1868 (*Σύγγραμμα Περιοδικόν* vol. Z, 340) but no further details are given. Probably, some instruments of chemistry existed in the instruments collection. The hypothesis of the existence of chemical utensils in the collections is reinforced by the fact that for the period May 1864 - April 1865, an expense of 720 grosis is reported for public lectures about, among other reasons, “chemical materials” (*Σύγγραμμα Περιοδικόν* vol. E, 137).

In any case, it is unlikely that lectures on experimental physics were not held within 5 years (when only the lecture year 1864-1865 was held at least 5 lectures) but given the circumstances, it is not strange that they were not mentioned in the Journal.

In the first year after the fire (1870-1871) the GPAC organized an impressively large number of public lectures. The destruction of the GPAC building makes it necessary to make lectures somewhere else. The School of Panagia in Pera offered the necessary space to the GPAC and twenty five lectures were given, two of which by A. Spatharis on the “Alterations of the Earth’s crust” and another two by A. Tagis on earthquakes (*Σύγγραμμα Περιοδικόν* vol. E, 88, 101-103, 188). There are enough detailed descriptions of these lectures, but no experiments were included (*Σύγγραμμα Περιοδικόν* vol. E, 101-103).

Fifty-three more lectures were given at the headquarters of other cultural clubs, which was facilitated by the cooperation of seven cultural clubs, which started that year (*Σύγγραμμα Περιοδικόν* vol. E, 87, 176-177).

Spatharis presented nine lectures (*Σύγγραμμα Περιοδικόν* vol. E, 90) on the following subjects (into parenthesis there is the name of the club and the place where the lecture was given “A map of Istanbul with the mentioned places can be viewed at <https://img922/3412/rUh8rP.jpg>”, written both in Greek and English):

32. Ioannis Gion was manager of insurance companies and member of the GPAC since 1864.

33. Zacharias Alexandridis was a merchant and member of the GPAC since 1869.

- About barometer (Omonia Club in Diplokiono - Besiktas)
- About chemical attraction (Omonia Club)
- About the eye as a visual instrument (Omonia Club)
- About acoustics (Mnimosyni Club in Fanari - Fener)
- About Meteors (Mnimosyni Club)
- About Aurora Borealis (Mnimosyni Club)
- On the Solar Eclipse of 22 December 1870³⁴ (Mnimosyni Club)
- About Elevation of Moon (Mnimosyni Club)
- About the prehistoric state of man (Mnimosyni Club)

The only issues that could be supported by demonstration of experiments are the first, second and fourth but the GPAC instruments collection was destroyed. We either have to accept that those were purely theoretical lectures or suppose that Spatharis borrowed instruments from somewhere (perhaps from the laboratory of the Great School of the Nation, in which he was teaching?). Especially for the barometer it is difficult to imagine how a speaker could convey the relevant information (or even choose the subject) without having the instrument available at the lecture.

Other given lectures on science were (*Σύγγραμμα Περιδικόν* vol. E, 90):

from A. Konstantinidis: “On Physics” (Chalkidona’s Club in Chalkidona – Kadikoy),
from A. Tagis³⁵: “On Heavenness”, “On earthquakes’ and two lectures “On Volcanoes’ (Mnimosyni Club),

from I. M. Raptarchis³⁶: “About multiple worlds” (Club of Ipsomathia in Ipsomathia – Koca Mustafa Paşa and Omonia Club),

and from G. Georgiadis: “On the Sun” (Association of Vlaga in Vlaga – Yeniciapi and Club of Ipsomathia).

It is worth noting that there is no information about the content of the above lectures, as opposed to lectures on other topics (e.g., literature or history). The reason is probably the negligence of the lecturers in the delivery of a relevant text, not the indifference of the GPAC.

In the years 1871-1872, there is no development in the supply of scientific instruments, as it appears in the GPAC’s list of expenses (*Σύγγραμμα Περιδικόν* vol. Στ, 229).

34. This eclipse was visible from Istanbul. It is characteristic of Spatharis’s pedagogical attitude and experience that he realizes that after the eclipse there will be a quite big audience who will want to understand the causes behind the phenomenon. In a following lecture he extended the subject by presenting lunar eclipses.

35. Anastasios Tagis was born in Monodendri in Epirus. He studied in the Rizario School and in the Faculty of Philosophy of the University of Athens. He taught in many schools in Istanbul for almost 40 years. He was a co-founder of the private Greek Lyceum and a member of the GPAC since 1869. He was living in Street Fakir 10. See: Cervatti 1891, 439.

36. Ioannis M. Raptarchis was a scholar, a poet, a translator and a journalist.

The six lectures by A. Spatharis were about cosmography (*Σύγγραμμα Περιοδικόν* vol. Στ, 279-284) [a lesson that he was teaching in the Great School of the Nation (Αρχιμανδρίτης Φιλόθεος Βρυέννιος 1871, 24)] and were probably chosen because no experiments were necessary. There were nine other scientific lectures (*Σύγγραμμα Περιοδικόν* vol. Στ, 305) by K. Karatheodoris and D. Maliadis³⁷ without any further information on their content.

The situation remains unchanged for the following year (1872-1873) (*Σύγγραμμα Περιοδικόν* vol. Ζ, 284). Quite typically, the report of the Scientific Committee of the Association stated that in order to be able to carry out its mission, it needed first of all access to scientific journals for information on new developments and to scientific instruments in order to be able to control and verify their own data.

The librarian of the Association, in his report, stressed, perhaps with an irresistible irony, that although according to the regulation he was responsible for the scientific instruments collection such a collection did not exist for well-known reasons (*Σύγγραμμα Περιοδικόν* vol. Ζ, 301).

There were seventeen scientific lectures (*Σύγγραμμα Περιοδικόν* vol. Ζ, 306) that year, where the term “scientific” covers almost everything except literary lectures. The speakers were A. Spatharis, K. Karatheodoris, G. Dimitriadis (“geometer”), X. Zografos, D. Maliadis (lawyer), A. Vernardakis (economist) and P. Kalivoursis (physician).

In the financial report of the year (*Σύγγραμμα Περιοδικόν* vol. Ζ, 324-333) there is no mention of income or expense for scientific instruments or public lectures. The same picture is repeated in the following year’s account (1873-1874 account (*Σύγγραμμα Περιοδικόν* vol. Η, 331-336). Again, the report of the Scientific Committee (*Σύγγραμμα Περιοδικόν* vol. Η, 326-329) highlighted the lack of “collections and utensils of physics and chemistry”.

However, something seems to change by the appointment of a five-member committee, chaired by the librarian, to enrich the library, the reading room and the scientific instruments collection. Schroeder, Zoiros, Perdikidis, Vasiadis and Spatharis were elected as members of the committee (*Σύγγραμμα Περιοδικόν* vol. Η, 340).

In his lecture, the president Ir. Vasiadis (*Σύγγραμμα Περιοδικόν* vol. Η, 349-350) quoted his goals when he took the presidency one year earlier. Among them was the purchase of instruments of experimental physics and chemistry. He then explained why the objectives could not be achieved, with the sole exception of the continuation of work on the new GPAC building.

The situation was finally reversed in 1874. In a letter written on July 15, 1874 and being read at the meeting of 19 August 1874, the banker G. Zarifis informed the Association that he offered 200 Ottoman liras to the GPAC for the purchase of instruments of experimental physics and natural history tables (*Σύγγραμμα Περιοδικόν* vol. Θ, 208). Zarifis (1807-1884) is a well-known benefactor and supporter of education and science.

37. Dimitrios Maliadis was a lawyer and member of the GPAC since 1865.

His contribution to the construction of the building of the Great School of the Nation was very important, while at his own expense the beautiful wooden displays were made, which still protect the scientific instruments of the School.

The fulfillment of the desire of Zarifis took place very quickly as is revealed from a letter (*Σύγγραμμα Περιοδικόν* vol. Θ, 211) sent to GPAC from Paris³⁸ by Stefanos Stamatiadis³⁹. The letter stated that the sender, following the instructions of Spatharis had ordered the instruments and would send them within a month or so. Once again, the prestige enjoyed by Spatharis in the field of experimental physics appears. At the meeting on August 28, 1874 Spatharis took over the position of the curator⁴⁰ of the instruments collection (*Σύγγραμμα Περιοδικόν* vol. Θ, 215). It was the first of 5 consecutive years he took this position⁴¹.

The instruments were finally sent on December 2, 1874, together with a relevant list and an invoice, as Stefanos Stamatiadis informed the GPAC with a new letter (*Σύγγραμμα Περιοδικόν* vol. Θ, 220). The list was not published, but the librarian of the Association G. Hassiotis⁴² mentioned in his lecture that those were instruments mainly about electricity and magnetism, which were unfortunately so few that it could not be supported that the GPAC has an adequate equipment to teach even the simplest physics (*Σύγγραμμα Περιοδικόν* vol. Θ, 251). He added that 16 more Ottoman liras had been collected from donators (namely: A. Vlastos⁴³, D. Tamvakos⁴⁴, N. Verisis, Th. Mavrogordatos⁴⁵, St. Rallis⁴⁶, M. Negrepontis, A. Rossolimos⁴⁷, K. Vlastaris⁴⁸ and M. Kamaras⁴⁹) to buy some more “absolutely necessary” instruments about electricity⁵⁰, specifically:

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38. Once more there is a preference for instruments from French makers.
 39. No information about Stefanos Stamatiadis has been found.
 40. The position of the keeper was empty at least since 1870 because there was no collection after the fire. Before 1870, there are available data only for 1868-1869 (see: *Σύγγραμμα Περιοδικόν* vol. Ε, 137), because of the destruction of the archives in the fire.
 41. On 25/5/1875 Georgios Dimitriadis was elected to the position of the keeper of the instruments collection (*Σύγγραμμα Περιοδικόν* vol. Θ, 264), but he resigned on 24/11/1875 and Andreas Spatharis took his place for the year 1875-1876 (*Σύγγραμμα Περιοδικόν* vol. Ι, 150).
 42. Georgios Hassiotis was a teacher, a co-founder of the private Greek Lyceum and member of the GPAC since 1869.
 43. Antonis Vlastos was a banker and one of the founders of the GPAC in 1861.
 44. D. N. Tamvakos was a merchant and member of the GPAC since 1863.
 45. Theodoros Mavrogordatos was a banker and member of the GPAC since 1873.
 46. Stefanos Rallis was a banker and member of the GPAC since 1863.
 47. Athanasios Rossolimos was a merchant and member of the GPAC since 1871.
 48. Constantinos Vlastaris was a merchant and member of the GPAC since 1874.
 49. Manouil Kamaras was a merchant and member of the GPAC since 1874.
 50. Instruments are described in this text with the French terms used in the Journal and in the brackets with the terms used in the list of 1880-1881

1. Moteur électrique⁵¹ (electric motor).
2. Rumkof (sic) bobine⁵² (Ruhmkorff coil).
3. Voiture électrique avec pile⁵³ (electromagnetic locomotive with a voltaic pile).
4. Lampe de mineur¹ (probably a Geissler's lamp for mines⁵⁴).
5. Piles a bicrowates⁵⁵ (The term is wrong, the right one is "pile à bichromate⁵⁶"). This is a type of battery, also known as Grenet cell⁵⁷.
6. Barometè Breguet (Breguet barometer).

The Breguet barometer, also known as an aneroid barometer, is a handy and portable instrument, as it does not use mercury like the other barometers of the time. In the 1880-1881 list the instrument is not mentioned, but there is a Breguet thermometer⁵⁸. It is obvious that the one of the two entries is wrong. Given that the Breguet thermometer is a rather unusual instrument and not very precise⁵⁹, we can reasonably assume that it is a mistake of the inventor of the catalog and in fact the instrument was an aneroid barometer⁶⁰.

The final cost was 209.21 Ottoman liras (*Σύγγραμμα Περιοδικόν*vol. Θ, 256). There is no reference to the supplier or the manufacturer of these instruments, but it appears from another letter by S. Stamatiadis, which was sent seven years later (*Σύγγραμμα Περιοδικόν*

51. No 26 in the list of the instruments of the Association

52. No 23 and No 24 in the list of the instruments of the Association

53. No 25 in the list of the instruments of the Association

54. First: "No 34 in the list of the instruments of the Association. A Geissler's lamp can be viewed at <https://imgazer.imageshack.com/img924/4026/BMwg9r.jpg>"

Second: "The possible existence of flammable gases in the mines was a permanent danger to workers who were obliged to have a source of lighting. Davy's lamp had provided a safe solution to the issue already in the early 19th century, but new ideas were constantly showing up. One of these is this particular bulb, which is essentially a Geissler cathode tube, containing carbon dioxide or, in the second phase, nitrogen and fed by a small Ruhmkorff coil. The latter is in turn fed by an electric element (e.g. Bunsen, Grenet or Daniell). The small Ruhmkorff coil, listed in the 1880-1881 catalog, probably collaborated with this lamp. The coil and the electric element were contained in a leather case carried by the worker while holding the Geissler tube. A related video is available at <https://vimeo.com/21551806> (Accessed on 15/6/2018).

This particular invention, made by the French Alphonse Dumas and Camille Benoît, was used by Julius Vern in several of his books under the rather deceptive name of "Ruhmkorff's Lamp". It is a matter of wonder if and to what extent the presence of the lamp in the works of the famous French writer played a role in its acquisition by the GPAC. See: Lazos Panagiotis, Scientific Instruments and Jules Vernes, 2nd International Conference on Science & Literature, European Physical Society, Pöllau, Austria, September 2016."

55. No 36 in the list of the instruments of the Association . There were having been bought two of them.

56. The formula of Potassium Bichromate (Διχρωμική ποτάσα) is $K_2Cr_2O_7$.

57. See: <http://leradiofil.com/pileGrenet2V.htm>

58. No 32 in the list of the instruments of the Association

59. See: <http://physics.kenyon.edu/EarlyApparatus/Thermodynamics/Thermometer/Thermometer.html>

60. See: <http://www.bom.gov.au/info/aneroid/aneroid.shtml>

vol. Ιστ, 338)⁶¹, that the instruments were bought by Hachette. Hachette was, and still is, a publishing house⁶², which was also active in the sale of materials for schools, including scientific instruments. Hachette collaborated with various instrument manufacturers. For this reason, the origin of the GPAC instruments cannot be identified with certainty⁶³. The relationship between the two parties seems to have lasted, as in 1879 Hachette donated 80 volumes of various books to the GPAC library (*Σύγγραμμα Περιοδικόν* vol. ΙΓ, 148). It is also worth mentioning that the great order of instruments, made by the Great School of the Nation in the school year 1879-1880, after donations by Th. Mavrokordatos and G. Koronios⁶⁴, was made again by Hachette⁶⁵. It is no coincidence that both orders were made at the suggestion of A. Spatharis.

The purchase also included a total of ninety geological, zoological and botanical tables of Comte worth 650 francs⁶⁶. The tables were intended to be used in public lectures on natural history.

For the public lectures of the year many interesting information is given to the speech of S. Mavrogenis (*Σύγγραμμα Περιοδικόν* vol. Θ, 253). A total of ninety-five lectures⁶⁷ were scheduled from November to April; about 4 each week. K. Karatheodoris held four lectures on electricity experiments, which probably had a similar structure to those of 1864 but using the new instruments. Also, Karatheodoris completed a series of three lectures on botany. A. Spatharis gave 6 lectures on “Physical Geography” and, while he had promised eleven lectures on experimental physics, he failed to do so because of personal problems.

On October 28, 1874, Joseph Oikiadis, a government official, became a full member (*Σύγγραμμα Περιοδικόν* vol. Θ, 214). Oikiadis would donate a few years later to the Great School of the Nation the refractor telescope that adorns the dome of the imposing build-

61. The sender sent the GPAC a list of the instruments purchased in 1874 (does that mean that the original list was lost?) plus a list of the instruments asked by Stamatiadis to Hachette to be given free of charge to the Association to complete the collection. No other report was found about the progress of this case.

62. It was founded in 1826.

63. Accordingly, the commission of the Great School of the Nation (Phanar Greek Orthodox College) in the school year 1880-1881 from Hachette (see: *Σύγγραμμα Περιοδικόν* vol. Ε, 101-103) includes instruments from various manufacturers such as Breton Frères (Paris), Rohrbeck, W.J. (Wien) etc.

64. G. Koronios was a banker in Paris and a member of the GPAC also since 1872.

65. Παλαμάς Γρηγόριος [Palamas Grigorios], “*Ἐκθεσις τῆς πνευματικῆς καὶ υλικῆς καταστάσεως τῆς Πατριαρχικῆς Μεγάλῃς τοῦ Γένους Σχολῆς κατὰ τὸ σχολικὸν ἔτος 1879-1880*”, [Report of the spiritual and physical condition of the Patriarchal Great School of the Nation during the school year 1879-1880], 1880.

66. The set consisted of 90 tables that could be hung on a wall. A detailed description of the content of each table, but not its image can be found in the book: Comte 1869. See: <http://gallica.bnf.fr/ark:/12148/bpt6k6581267s/fl.image>

67. The Mavrogenis’ statistics on the professional status of speakers are of interest. The group of 16 speakers consisted of five physicians, three lawyers, two teachers of Greek literature, one teacher of physics and mathematics (A. Spatharis), two journalists, one “scholar merchant”, one teacher of history and philosophy and one female teacher of French language who is also a director of a school for girls.

ing and an impressive celestial sphere made by the English manufacturer Malby. Once more a devotee of scientific instruments became a member of GPAC.

During the next year, five lectures on physics were delivered by A. Spatharis (*Σύγγραμμα Περιοδικόν* vol. I, 172, 182), other five on cosmography by G. Lianopoulos⁶⁸ and two on geology by A. Tagis. There are not any further details about the lessons, but it's probable that Spatharis used the new instruments in his lectures. Besides, it is not a coincidence that after many years there are a large number of lectures exclusively on physics.

In addition, it is characteristic of what is said in the presidential lecture of A. Paspatis about the lectures (*Σύγγραμμα Περιοδικόν* vol. I, 182): "... the fruits of these lectures are the most beneficial; we need most instruments, minerals and great geographical tables". It's obvious that some kind of relevant material had been used in the public lectures. Also, the existence of a mineral collection appears to be evident for the lectures on geology.

During the collegiate year 1876-1877 there was no change in the collection. One interesting piece of information is the application for the borrowing of three optical instruments, which will be used by G. Dimitriadis in lectures given in the "εν Μεγάλω Ρεύματι Αδελφότητα", a cultural club in the village Μεγάλο Ρεύμα (today is called Arnavutköy) near Istanbul (*Σύγγραμμα Περιοδικόν* vol. IA, 155). Those instruments, for which no other information is given, should belong to the collection of scientific instruments of the GPAC. The application was accepted. A. Spatharis gave four lectures on physics (*Σύγγραμμα Περιοδικόν* vol. IA, 177-178), while from the total of thirty-eight planned lectures there were given only twenty (*Σύγγραμμα Περιοδικόν* vol. IA, 177).

The situation is not better next year (1877-1878), but rather the opposite: Of the forty planned lectures, only fifteen were held (*Σύγγραμμα Περιοδικόν* vol. IB, 125-126). No lectures by A. Spatharis were given, without giving any indication as to whether he had planned some lectures or not. In any case the absolute absence of the curator of the collection from the public lectures is surprising. Among the lectures there were two about the physiological study of milk and especially that of women. The lectures were given by the physician K. Makris and included the performance of experiments, but no more details are given (*Σύγγραμμα Περιοδικόν* vol. IB, 125-126).

The GPAC launched that year a series of lessons aimed at craftsmen which took place at the "εν Σταυροδρομίω ενοριακή σχολή της Παναγίας" every Sunday. Lessons were delivered free of charge by teachers. Among the lessons is the experimental physics, which is taught by D. Livadeas (*Σύγγραμμα Περιοδικόν* vol. IB, 134). It is unknown what kind of equipment the teacher used and to whom it belonged. It seems totally unlikely that scientific instruments were moved from the GPAC building to that school.

68. G. Lianopoulos was a teacher of physics and mathematics. He served as principal at the Commercial School of Halki Island. He also taught at the Theological School of Halki Island and in the Great School of the Nation.

In the established presidential lecture by I. Aristoklis (*Σύγγραμμα Περιοδικόν* vol. IB, 131-142), there is no mention of the scientific instruments collection, a possible result of the very difficult economic situation that the GPAC had come to and which is dealt with repeatedly in this volume of the Journal.

In the collective year 1878-1879 there is a significant improvement in the subject of lectures with A. Spatharis coming back to the forefront with seven lectures (*Σύγγραμμα Περιοδικόν* vol. IG, 163). The president of the GPAC wrote a text full of admiration for Spatharis's ability to handle the elements of nature in his lectures⁶⁹. Altogether, seventy-two public lectures were planned of which thirty-six were held. Among those canceled included two of G. Lianopoulos (*Σύγγραμμα Περιοδικόν* vol. IG, 165).

Unfortunately, the improvement was to prove temporary and only four lectures were held next year (*Σύγγραμμα Περιοδικόν* vol. ID, 202)⁷⁰, none of which was related to physics or chemistry. A. Spatharis was missing again, and the instruments remained idle. A question should be posed if the collection is adequately maintained.

The unpleasant answer is given immediately at the first meeting of next collegiate year, on 19/5/1880. when one of the subjects is that of the «grim situation” of the physics instruments (*Σύγγραμμα Περιοδικόν* vol. IE, 29-30). The conversation initially revolved around a typical subject – if the responsibility of the collection of the scientific instruments lies with the librarian or the curator of the collection. The former⁷¹ argued that, although according to the regulation he is formally responsible, the Association had overcome it by placing a curator (A. Spatharis), who had not visited the collection for the last two years⁷². In addition, he argued that, having found that the instruments had become almost useless, he had asked the president to press Spatharis to visit the collection and to make the necessary repairs or at least to give up and replace it by someone with the necessary time and willingness to offer.

69. “[...] ο κύριος Ανδρέας Σπαθάρης καταβάλλει υπό το κράτος των χειρών αυτού τα ακατάβλητα στοιχεία της φύσεως, δίδωσι τοις ανέμοις τας διευθύνσεις αυτών και τω Ηλίω τας κλίσεις των ακτίνων αυτού, ελέγχει την αστασίαν της θερμοκρασίας των εν τη αυτή γραμμή της παρατάξεως διατελούντων κλιμάτων και εν γένει άγει ημάς μετά πνοής ανέμου ανά πάσαν την υφήλιον επιδεικνύς ημίν ψύχη και δρόσους και καύσωνας, νυν δε αναβιβάζων μέχρι των άκρων κορυμβων των Άλπεων και των Κορδιλλιερών”.

70. The causes of this inactivity were “the severe winter and many serious illnesses”.

71. The position of the librarian was held by Themistokles Saltelis, who was a teacher in the Great School of the Nation and colleague of Spatharis.

72. Even if it is not true what Spatharis is attributed to, it is obvious that he gradually moved away from his rich action at GPAC. Perhaps this was due to lack of time because of his intense activity at the Great School of the Nation. It is reminded that in 1880 the School purchased a very large number of instruments. Spatharis was responsible for the order and its reception. The next year began the construction of the impressive new building, which houses the School till today, in which the entire collection of scientific instruments was transported, organized and installed. It seems reasonable that this was a huge burden on Spatharis' shoulders.

T. Karatheodoris⁷³, acting diplomatically, proposed the election of a new curator in the position of Spatharis, who "... with all his good will and his love for the Association, because of his many occupations, he does not have time to come often to the Association and to maintain the instruments". Finally, the Association decided to ask Spatharis, either by himself or by a three-member committee, to visit the collection and after checking it to propose the necessary measures for its maintenance.

In the meantime, for one more year, there is no provision in the budget for expenses related to the collection of instruments or public lectures (*Σύγγραμμα Περιδικόν* vol. IE, 35). Six months later, the committee⁷⁴, consisting of T. Karatheodoris and G. Dimitriadis, after inspecting the scientific instruments collection, reported to the Association that its situation was not good and asked for a credit of 10 Ottoman liras to make the necessary repairs (*Σύγγραμμα Περιδικόν* vol. IE, 40). The application was approved (*Σύγγραμμα Περιδικόν* vol. IE, 41) and a few days later 7 Ottoman liras⁷⁵ were given for the first actions. The presidential lecture of this year informs that the committee had successfully completed its work by cleaning and repairing the instruments (*Σύγγραμμα Περιδικόν* vol. IE, 98). Moreover, the discontinuation of public physics and chemistry lectures was attributable to the poor situation of the instruments⁷⁶.

T. Karatheodoris⁷⁷ and G. Dimitriadis replaced (*Σύγγραμμα Περιδικόν* vol. IE, κδ) A. Spatharis and an important evolution resulting from this change was the publication of a complete and accurate list of the scientific instruments and devices possessed by the GPAC at that time (*Σύγγραμμα Περιδικόν* vol. IE, 142). The list was published in the Journal and it is of unique value for the study of the collection and it is presented in the appendix placed in the end of this paper⁷⁸. All the instruments mentioned in the list must originate from the purchase of 1874, since there is no mention of any addition to the collection since then. It is possible, though, that some of the instruments acquired were no longer in the collection because of destruction or heavy wear.

The collection consisted of forty-three instruments and ninety natural history tables⁷⁹. The majority of the instruments were associated with electricity and electromagnetism (33 out of 43 or 77%). This indicates the direction of the GPAC towards the

73. Tilemachos Karatheodoris was engineer and regular member of the Association since 1874. He was corresponding member since 1870, when he was studying in Zurich.

74. It is unclear whether, eventually, Spatharis participated in this inspection.

75. The amount, which of course did not exist in the budget of the year, should be part of the not scheduled expenses listed in this year's report. GPAC vol. IE, 81-82.

76. The collection was described as totally neglected and almost destroyed "[...] παρηγκωνισμένη [...] και καταστρεφόμενη".

77. T. Karatheodoris was the curator of the collection until the year 1885-1886. *Σύγγραμμα Περιδικόν* vol. Κ, λ.

78. The original published list can be viewed at <https://imgizer.imageshack.com/img923/1885/kmp6je.jpg>

79. These are the Comte tables. By comparing the number of tables with that in Comte's catalog at <http://gallica.bnf.fr/ark:/12148/bpt6k6581267s/fl.image>, it is clear that GPAC had purchased the entire series (26 botanical tables, 54 zoology tables and 10 geology tables). Fortunately, the entire series is posted on the following web addresses:

modern applications of physics. Of course, the absence of instruments for the study of heat, optics and acoustics seems rather unexplained, since they would be very useful in public lectures.

The barometer (No 40) and the air pump (No 37) were absolutely necessary devices for a typical collection of this period. The magic lantern (No 41) is a very interesting addition to the collection, since it illustrates the focus of the GPAC to the public lectures. Perhaps the light source of the magic lantern was a carbon arc lamp (No 29). However, the GPAC building had a natural gas supply, which could be an alternative light source.

The bookseller Ernest Eilemann shipped from Leipzig to GPAC a series of 7 zoological tables for public lectures, as a sample offering a significant discount to the Association if there is interest in buying the whole series (*Σύγγραμμα Περιοδικόν* vol. ΙΕ, 40). The tables made an extraordinary impression on Ir. Vasiadis, who proposed their purchase, but no final decision was made.

T. Karatheodoris presented a series of lectures (*Σύγγραμμα Περιοδικόν* vol. ΙΕ, 64-65) on modern physics issues, such as spectroscopic analysis and about the technology behind the streets lights in big cities, at GPAC meetings (not public courses), but there is no mention of performing experiments⁸⁰. Also, D. Mavrogenis presented Bell's photophone (*Σύγγραμμα Περιοδικόν* vol. ΙΕ, 94)⁸¹.

Nineteen public lectures were delivered during the year 1881-1882, of which two by A. Spatharis with issues related to the planetary system and one lecture by A. Tagis on volcanoes (*Σύγγραμμα Περιοδικόν* vol. ΙΣτ, 382). The instruments seem to have not been used, and for one more year no resources are available for instruments or lessons (*Σύγγραμμα Περιοδικόν* vol. ΙΣτ, 342-343). S. Aristarchis, chairman of the Scientific Committee, considers it necessary to buy a microscope and suggests the Harnack in Paris⁸². Interesting information is that the Association's building faced moisture problems and,

Zoology: http://www.iessagasta.edurioja.org/elsagasta/museos/laminas-historia-natural/1869_zoologia/galeria.htm

Botany: http://www.iessagasta.edurioja.org/elsagasta/museos/laminas-historia-natural/1869_botanica/galeria.htm

Geology: http://www.iessagasta.edurioja.org/elsagasta/museos/laminas-historia-natural/1869_geologia/galeria.htm

80. It is noted that the collection of scientific instruments of GPAC had equipment suitable for supporting the second lecture.

81. About the photophone see: <https://www.princeton.edu/ssp/joseph-henry-project/photophone/>

82. Edmund Harnack (1826-1891) was born in Germany and he went to work to Paris in 1847. He initially worked under the famous Heinrich Daniel Ruhmkorff, later he moved to the workshop of the optician Georg Oberhauser and in 1854 the two men began a co-operation. After the death of Oberhauser in 1860, Harnack took over the company. In 1864 he started a co-operation with the mathematician and astronomer Adam Prazmowski (1821-1885). Harnack had to leave Paris because of the war between France and Prussia and he moved to Postdam. Until 1879, when Prazmowski bought the company in Paris, the Harnack's microscopes were labeled with both locations (Paris and Postdam) and the name Harnack & Co. After that year, there was only the city of Postdam and the name Harnack in the label. It's obvious that Aristarchis didn't know in 1881 this change in the status of Harnack's company, believing that its base is still in Paris. The microscopes made by Harnack were of high quality and they enjoyed a great

after a study, 40 Ottoman liras had been credited for the necessary repairs (*Σύγγραμμα Περιοδικόν* vol. ΙΣτ, 387)⁸³.

In the collective year 1882-1883, there are again no expenses reported about the collection (*Σύγγραμμα Περιοδικόν* vol. ΙΖ, 200). However, for the first time, a report on the state of the collection was reported to the GPAC (*Σύγγραμμα Περιοδικόν* vol. ΙΖ, 202) by the curator T. Karatheodoris. Its content was not been printed in the Journal, but it was broadly mentioned in the presidential lecture of the year.

In particular, it was stated that after the Committee's efforts, the instruments are intact and without any deficiencies but require some serious repairs (*Σύγγραμμα Περιοδικόν* vol. ΙΖ, 211). In addition, T. Karatheodoris believed that it was absolutely necessary to purchase immediately additional instruments, so that GPAC could follow the recent scientific discoveries. The president expressed his hopes that there would be some financial donation in the near future for this purpose.

A. Spatharis returned with four public lectures on physics, mainly about optics (*Σύγγραμμα Περιοδικόν* vol. ΙΖ, 206). There were almost no optical instruments in the 1881 list and this raises questions about whether experiments were included in Spatharis's lectures. However, the magic lantern combined with some simple materials, could be an excellent tool in the hands of an experienced experimental physics teacher such as Spatharis.

In 1883-1884 references to the instruments collection are virtually eliminated⁸⁴. In addition, Spatharis's three scheduled lectures on physics were canceled because of the speaker's illness (*Σύγγραμμα Περιοδικόν* vol. ΙΗ, 99)⁸⁵. The situation did not change during 1884-1885 since it was not even mentioned any lecture by Spatharis or some other speaker about physics (*Σύγγραμμα Περιοδικόν* vol. ΙΘ, 126-127).

During 1886-1887⁸⁶ A. Spatharis gave two lectures on "physics" (*Σύγγραμμα Περιοδικόν* vol. Κ, 93), while it is particularly interesting to refer to two lectures by Il. Valsamakis⁸⁷ with title "About the air" and "About the solar system" with experiments in one of these, apparently the first one. Two more interesting facts are the absence of the name of Spatharis from the list of members of the Association for the year 1885-1886, and

reputation. A price catalogue of the firm can be found in: http://obsolete.musoptin.com/Hartnack_Courant_1872.html?fbclid=IwAR3ufxu2hqSgfGYWdRou6a94_mk-ptU2fqy1LcRM-tBs4geNsCbIxz8X8Fo

83. To what extent the presence of moisture is responsible for the poor state of the scientific instruments the preceding years?

84. The absence of expenses for the collection of scientific instruments is permanent in the coming years and will not be reported again in this paper.

85. A total of 21 lectures were held.

86. It was not possible to locate a report on the public lectures of 1885-1886.

87. Ilias Valsamakis was a teacher of mathematics and chemistry. He was teaching in Zografeio School since 1893. He was also a member of the GPAC since 1883 and the collection keeper for the collective year 1887-1888. He was the author of the textbook "Chemistry", printed in 1894 and used in Greek Schools in Istanbul. The reference to the experiments he used in his lecture is the first clear relevant reference after several years.

that nobody was appointed as a curator of the collection during 1886-1887 (*Σύγγραμμα Περιοδικόν*, vol. Κ, λα’).

The presence of Valsamakis and A. Spatharis in public lectures continued next year⁸⁸. Spatharis gave four lectures titled “on cosmography, about the shape of the Earth”. Valsamakis gave three lectures entitled “from physics, about weather or temperature” (*Σύγγραμμα Περιοδικόν* vol. ΚΑ, 217)⁸⁹, in which he could have used some of the instruments of the Association. He also served as the curator of the collection for that year (*Σύγγραμμα Περιοδικόν* vol. Κ, λ).

In 1887-1888 two lectures were given (*Σύγγραμμα Περιοδικόν* vol. ΚΑ, 280) by Th. Akestoridis⁹⁰ with the help of Ch. Bonkowski, professor of chemistry in the Medical School. The lectures included “chemical experiments” and they were on “Analysis from experimental chemistry”.

Vasilios Ritsos, a physician and member of the GPAC since 1887 held the position of the collection’s curator in 1888-1889 (*Σύγγραμμα Περιοδικόν* vol. ΚΑ, λβ), 1889-1890 (*Σύγγραμμα Περιοδικόν* vol. ΚΒ, κθ), 1891-1892 (*Σύγγραμμα Περιοδικόν* vol. ΚΓ, κθ), 1908-1909 (*Σύγγραμμα Περιοδικόν* vol. ΚΓ, κγ) and 1910-1911 (*Σύγγραμμα Περιοδικόν* vol. ΔΓ, κβ). No curator is mentioned for 1890-1891 (*Σύγγραμμα Περιοδικόν* vol. ΚΒ, λα) and no public lecture included physics or chemistry was given at this time (*Σύγγραμμα Περιοδικόν* vol. ΚΒ, 65-66, 137-138). There were, however, two lectures by the physician P. Makris (*Σύγγραμμα Περιοδικόν* vol. ΚΒ, 137-138) with the title “On microbes after microscopic observations”. The way in which the microbes were observed was not mentioned. Possibly the magic lantern of the GPAC’s collection may have been used with ready-made samples on slides. The Association did not have a microscope. After all, observation with a microscope would not be a convenient solution for a wide audience.

A new member of the Association, the architect Fragkiskos Mavrogordatos, gave an interesting lecture in 1892 about the history of artificial lighting. During the lecture various old and new sources of artificial light were presented (*Σύγγραμμα Περιοδικόν* vol. ΚΓ, 59) and some experiments were made but no further information is given. Perhaps some of the equipment of the collection was used, such as the Geissler’s lamp.

In the year 1892-1893 Stavros Vrahamis⁹¹ was the curator of the collection. He served in this position for the longer time than anyone else, since he served in 1892-1893 (*Σύγγραμμα Περιοδικόν* vol. ΚΔ, κη), in 1893-1895 (*Σύγγραμμα Περιοδικόν* vol. ΚΕ, κη; *Σύγγραμμα Περιοδικόν* vol. ΚΣτ, κη) and in 1896-1900 (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, λ, λβ;

88. Spatharis and Valsamakis were colleagues in the private school of Chatzichristou, at least in the school year 1890-1891. See: Cervatti 1891, 567-568.

89. There were 42 lectures (39 planned and 3 out of schedule).

90. Theagenis Akestoridis was a pharmacist and was elected a member in GPAC in 1888. He graduated the Great School of the Nation in 1870 with excellent grade.

91. Stavros Vrahamis studied chemistry in the National University of Athens. He was teaching chemistry and natural history in Zografeio School since 1893. He was a member of the GPAC since 1892. See: Vetsopoulos 1969, 218-220.

Σύγγραμμα Περιοδικόν vol. ΚΗ, κζ), whereas no data are given for the period 1900-1902. It is worthy of reference that since 1892-1893 the curator was no longer responsible only about the scientific instruments but also about specimens of zoology and phytology⁹². Vrahamis gave only one lecture that year about earthquakes, while no lectures with probable relevance to the collections were given by other speakers.

Vrahamis also gave one lecture the next year about “The Universe” (*Σύγγραμμα Περιοδικόν* vol. ΚΕ, 123). Thirty-one lectures were scheduled but only twenty were finally given. Among them, there was a series of four lectures of Il. Valsamankis about “Heat” but no experiments are mentioned (*Σύγγραμμα Περιοδικόν* vol. ΚΕ, 123).

The year 1894-1895 was a richer period with quite many lectures about science (*Σύγγραμμα Περιοδικόν* vol. ΚΣτ, 124). Athanasios Ioannou⁹³ gave two lectures; one about the “Causes of the earthquakes” and one “About the atmosphere and the living nature” in which some experiments were included. Il. Valsamakis also gave two lectures “About hail”. Another scheduled lecture by S. Vrahamis about “Physics” was canceled. After quite many years a new instrument was added in the collection. It was a barometer donated to the Association (*Σύγγραμμα Περιοδικόν* vol. ΚΣτ, 126) by Themistoklis Kosoudis⁹⁴.

Twenty public lectures were given in 1895-1896. The lecture “About electricity”, given by the engineer I. B. Fachris⁹⁵, could have included experiments but no such information is given (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 87). Nevertheless, in the presidential speech about the course of the GPAC during that year, the president referred that the collection was well maintained “for the shake of teaching”, even if there was no addition for quite many years (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 88).

In 1896-1897 there were sixteen lectures (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 165). G. Akestoridis⁹⁶ spoke “About the anesthesia with chloroform with some experiments”. The “Rontgen Rays” were presented by Kl. Kokkolatos⁹⁷. According to a later reference the lecture was accompanied by experiments⁹⁸, although the Association had not the appropriate equipment according to the available information. During next year there was

92. This change may indicate a change in the priorities of the Association.

93. Athanasios Ioannou was a mathematician. He was teaching mathematics, physics and chemistry in Zografeio School where he also served as the principal in 1913-1914 and 1916-1922. He was a member of the GPAC since 1894. He wrote one textbook about organic and inorganic chemistry and two books about elemental arithmetic. See: Vetsopoulos 1969, 200-202.

94. Themistoklis Kosoudis was a merchant and one of the founders of the Association in 1861.

95. Fachris was the author of the book *Ηλεκτρομηχανική* [Electromechanics], Valentin Hilbert, Constantinople (Istanbul), 1914.

96. Giorgos Akestoridis was a physician and a member of the GPAC since 1888.

97. Kleovoulos Kokkolatos was a physician and member of the GPAC since 1891.

98. “*Ο εν Κωνσταντινούπολει Ελληνικός Φιλολογικός Σύλλογος. Πεντηκονταετηρίς 1861-1911. Παράρτημα του ΛΔ' τόμου*” [The Greek Philological Association of Constantinople. Fiftieth Year 1861-1911], 1913-1921, 479.

no lecture that could include experiments among the twelve given lectures (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 165).

In 1898-1899 fourteen lectures were given and the one that stood out was about the Rontgen rays given by the physician Ch. Christidis. The introduction of this lecture included elements of electricity, electric light and photography combined with experiments presented by “S. Vrahamis and Isoard” (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 210-211). Leon Isoard was teacher of physics and mathematics at Galatasaray High School and he was quite experienced in X-rays as he had taken images of his son’s hand in 1896 (Yıldırım, Ulman, Tunacı 2018, 75-91).

K. Kalkovoresis, an engineer and president of the committee about physics and mathematics, stated that the committee could not work properly without scientific instruments and a chemistry laboratory in good working order. Therefore, he asked from the curator Vrahamis a catalog of the instruments with comments about their condition. He also asked for proposals about new instruments, how they could be acquired, how a chemistry lab could be set up and how the committee could have access to them (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 204). This is the first mention about recording of the instruments after the catalogue of 1880, eighteen years earlier. Nevertheless, there is no information about Vrahamis’s response to this request.

During 1899-1900 thirty-eight public lectures were given. A. Spatharis reappeared and gave two of them, entitled “About the Calendar” and “Easter and seasons in Byzantine times” (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 26)⁹⁹. Those were his last lectures in GPAC. The president of the GPAC noted that the Association had missed Spatharis’s lectures for quite many years. The bureau decided to make him an honorary member in 6/11/1900 on the occasion of completion of 40 years of teaching (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 34). Few months later Spatharis died (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 38).

Next year only ten lectures were given but no one was relevant to physics or chemistry (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 49). This is exactly what also happened in 1901-1902 (twenty eight lectures) (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 80-82), in 1902-1903 (seventeen lectures) (*Σύγγραμμα Περιοδικόν* vol. ΚΘ, 29), in 1903-1904 (thirteen lectures) (*Σύγγραμμα Περιοδικόν* vol. ΚΘ, 59), in 1904-1905 (twenty six lectures) (*Σύγγραμμα Περιοδικόν* vol. ΚΘ, 91-92) and in 1905-1906 (fourteen lectures) (*Σύγγραμμα Περιοδικόν* vol. Λ, 38-39). It is not a surprise that the president Christos Chadzichristou did not mention the collection at all in his annual lecture for 1905-1906 (*Σύγγραμμα Περιοδικόν* vol. Λ, 35-45).

The president L. Limarakis informed the Association in his annual speech that during 1906-1907 a committee was formed in order to decide which instruments are broken or are out of order (*Σύγγραμμα Περιοδικόν* vol. Λ, 87). He also noticed that the repair seemed impossible for quite many of them. The results and the members of the committee were not published somewhere though. Nineteen lectures were given, again with

99. It is obvious that no experiments could have been included.

no experiments (*Σύγγραμμα Περιοδικόν* vol. Λ, 84). The committee for physics and mathematics was not formed because there were no members at all (*Σύγγραμμα Περιοδικόν* vol. Λ, 49).

In 1907-1908 no one of the twenty-one lectures could have included experiments (*Σύγγραμμα Περιοδικόν* vol. ΛΑ, 80-81). The president gave some interesting pieces of information in his annual speech (*Σύγγραμμα Περιοδικόν* vol. ΛΑ, 79), namely that the committee for physics and mathematics didn't work at all ("it gave no signs of life"), the curator of the collection hadn't delivered his annual report and finally that the Association had planned to repair the magic lantern ("electrical projector") but they hadn't found the necessary amount of money. The president stressed that this device was too useful for the lectures, so it is obvious it was used quite often, in fact it should have been the most frequently used device of the collection.

Fourteen lectures were given in 1908-1909, all dedicated to medicine, literary and history (*Σύγγραμμα Περιοδικόν* vol. ΛΒ, 38-39). A. Ioannou taught "Physics and Chemistry in the industry and the arts" in a series of nine public lessons.¹⁰⁰

The absence of experiments continued in the twenty six public lectures given in 1909-1910 (*Σύγγραμμα Περιοδικόν* vol. ΛΒ,75) but it must be stressed the one entitled "About comets in general and Halley's comet in particular" given by S. Stamatiadis¹⁰¹. Obviously, the pass of the famous comet near Earth in 1910 was the cause of that lecture. A. Ioannou taught an unknown number of public lessons about chemistry and physics, again without any mention to experiments. There were twelve lectures in 1910-1911, all irrelevant with the collection (*Σύγγραμμα Περιοδικόν* vol. ΛΓ, 21-22).

After volume ΛΓ the publication of the Journal was banned. Nevertheless, an appendix of the volume ΛΔ of the journal was printed for the 50 years of the GPAC (1861-1911) but the rest of the volume was never printed. Thanks to this appendix, it is known that there were nine lectures in 1911-1912, three lectures in 1912-1913 and nine lectures in 1913-1914¹⁰². Among those lectures was one given by N. Kalamartzis¹⁰³ entitled "About wireless telegraphy with experiments". There is no information about the existence of such telegraphy in the collection of the GPAC. Perhaps the necessary equipment was

100. The public lessons must not be confused with public lectures. The former were a series of lessons on a specific theme and they were introduced in order to ensure a solid and useful body of knowledge for the participants.

101. Stamatis Stamatiadis studied agriculture, chemistry and mathematics in France. He was also known by the nickname Eliseos Gianidis and was one of the pioneers for the introduction of the vernacular language in the education.

102. "Ο εν Κωνσταντινούπολει Ελληνικός Φιλολογικός Σύλλογος. Πεντηκονταετηρίς 1861-1911. Παράρτημα του ΛΔ 'τόμου", [The Greek Philological Association of Constantinople. Fiftieth Year 1861-1911], 1913-1921, 486.

103. Nikolaos Kalamartzis was a mathematician. He was born in Siatista and he studied math in the National University of Athens. After teaching some years in schools in Siatista and Kozani he moved in Istanbul in 1911. He taught math and physics in Zografeion School, in Great School of Nation, in the National Lyceum, in the Ioakeimio School for girls, in the Zappeio School for girls and in the Kentriko School for girls. He served, also, as the principal of Zografeion School and of the National School of Languages and Commerce.

part of the physics laboratory of Zografeion School or the Great School of the Nation where he was teaching since 1911.

There is no available information about the lectures or the collection after 1914. However, the First World War brought many difficulties to the everyday life in Istanbul, particularly for the Greek community. In such an environment it seems improbable that there would be any notable usage and maintenance of the collection.

Conclusions

The Greek Philological Association of Constantinople has, since its foundation, set out as one of its main objectives to promote and disseminate scientific knowledge. Public lectures were one of the most important tools in this effort. For lectures on physics and chemistry, it was considered absolutely essential to present experiments, and thus to create a well-equipped scientific instruments collection¹⁰⁴. Indeed, with the help of donations, there were 2 large purchases of instruments from French manufacturers. The first was completed in 1864 and was used quite often in the lectures of the following years, until it was totally destroyed by the fire of 1870. The second one took place in 1874, and it was used in several public lectures, but rather fragmentary, until the middle of the decade 1880-1890. After that the collection was gradually abandoned and finally almost fallen into disuse.

It is not easy to value both the effectiveness of using the instruments in public lectures and their contribution to the diffusion of scientific knowledge to the audience. Surely, the average number of public lectures per year almost never reached the level that the founders of GPAC would like. On the other hand, it seems that the audience was more than satisfied from the content and the scientists who devoted time and effort to those lectures, such as A. Spatharis, K. Caratheodory, T. Karatheodoris etc.

It was not, however, an easy task. The persistent economic tightness and the direction of the minimal available resources to the most important and urgent objectives (mainly to the support of schools in the Greek communities) was a permanent obstacle for the enrichment and operation of the collection of scientific instruments. We must not forget that both the purchase and the maintenance in an operational situation of such a collection have an increased cost, while the total destruction of 1870 increased the problem to the utmost. As a result, there are numerous references in the Journal in which many of the instruments are described as damaged and broken but no action is taken. It is also common that an amount of money for the collection can be found in the budget of the Association but not in the final balance (*Σύγγραμμα Περιοδικόν*, vol. Λ, p. 47; *Σύγγραμμα Περιοδικόν*, vol. ΛΒ, p. 9).

104. The significance given by the Association to the scientific instruments is also apparent from the references made to them in the review of the history of the GPAC published in Vol. ΙΒ, 8, 18.

The lack of a permanent and salaried curator was a second important reason for the under-operation of the collection. The almost permanent absence of written reports by the curators is indicative of the problem. Only one paid employee would be a safe solution for the permanent maintenance of the collection at a high operational level. Of course, when it was not always possible for the Association to ensure the financial resources for a salaried librarian, it is clear that a salaried curator would be a luxury for the less important and less frequently used collection of scientific instruments.

Moreover, the absence of numerous GPAC members with the necessary experience with the laboratory and teaching experimental physics and chemistry -like physics and chemistry teachers¹⁰⁵- is another cause for the not satisfying use of the collection. The GPAC had a scientific committee that later changed its name to committee about physics and mathematics. As long as this committee had enough active members there were enough lectures with experiments too. But after 1895 the committee practically paused to work (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 29; *Σύγγραμμα Περιοδικόν* vol. Λ, 58; *Σύγγραμμα Περιοδικόν* vol. ΛΑ, 79¹⁰⁶; *Σύγγραμμα Περιοδικόν* vol. ΛΒ, 38)-even if it theoretically continued to exist- and this caused problems to the use of the collection as well. Especially after 1900 almost all the curators were physicians (Table 1), whereas some years there was no curator at all. The lack of lectures devoted to experimental physics and chemistry during the same period empowers this argument. It must be also noted that, as it results from the various presidential speeches, the references to the necessity and significance of the collection of the scientific instruments gradually diminished and finally disappeared as the GPAC turned its attention to other fields, like biology and medicine while its basic field remained history, literary and geography.

Table 1:

The curators of the collection of scientific instruments of the GPAC.

Year	Curator	Profession	Member since
1868-1869 ¹⁰⁷	Ioannis Aristoklis	History and Philosophy Teacher	1861
1869-1870	Not mentioned	-	-
1870-1871	Not mentioned	-	-
1871-1872	Not mentioned	-	-
1872-1873	Not mentioned	-	-
1873-1874	Not mentioned	-	-

105. A. Spatharis was not only a teacher of physics and mathematics at the Great School of the Nation. He had undertaken the responsibility of maintaining, adjusting and keeping in working order the instruments of the School's laboratory. After some years of teaching in the School, he was receiving an extra amount of money for this duty. See: Palamas 1880, p. 157.

106. The committee "showed no signs of life".

107. *Σύγγραμμα Περιοδικόν* vol. Δ, 201.

Table 1: (continued):

The curators of the collection of scientific instruments of the GPAC.

Year	Curator	Profession	Member since
1874-1875	Not mentioned	–	–
1875-1876 ^{108,109}	Georgios Dimitriadis (March-November 1875) Andreas Spatharis (November 1875–1876)	Geometer - Math and Physics Teacher	1866 - 1864
1876-1877 ¹¹⁰	Andreas Spatharis	Math, Physics and Chemistry Teacher	1864
1877-1878 ¹¹¹	Andreas Spatharis	Math, Physics and Chemistry Teacher	1864
1878-1879 ¹¹²	Andreas Spatharis	Math, Physics and Chemistry Teacher	1864
1879-1880 ¹¹³	Andreas Spatharis	Math, Physics and Chemistry Teacher	1864
1880-1881 ¹¹⁴	Tilemachos Karatheodoris & Georgios Dimitriadis	Engineer & Geometer	1874 & 1866
1881-1882 ¹¹⁵	Tilemachos Karatheodoris	Engineer	1874
1882-1883 ¹¹⁶	Tilemachos Karatheodoris	Engineer	1874
1883-1884 ¹¹⁷	Tilemachos Karatheodoris	Engineer	1874
1884-1885 ¹¹⁸	Tilemachos Karatheodoris	Engineer	1874
1885-1886 ¹¹⁹	Tilemachos Karatheodoris	Engineer	1874
1886-1887	Not mentioned	-	-
1887-1888 ¹²⁰	Ilias Valsamakis	Math and Chemistry Teacher	1883
1888-1889 ¹²¹	Vasilios Ritsos	Physician	1887
1889-1890 ¹²²	Vasilios Ritsos	Physician	1887
1890-1891	Not mentioned	–	–
1891-1892 ¹²³	Vasilios Ritsos	Physician	1887

108. *Σύγγραμμα Περιοδικόν* vol. Θ, 264.109. *Σύγγραμμα Περιοδικόν* vol. Ι, κδ.110. *Σύγγραμμα Περιοδικόν* vol. ΙΑ, κδ.111. *Σύγγραμμα Περιοδικόν* vol. ΙΒ, κγ.112. *Σύγγραμμα Περιοδικόν* vol. ΙΓ, κγ.113. *Σύγγραμμα Περιοδικόν* vol. ΙΔ, κδ.114. *Σύγγραμμα Περιοδικόν* vol. ΙΕ, κδ.115. *Σύγγραμμα Περιοδικόν* vol. ΙΣτ, κδ.116. *Σύγγραμμα Περιοδικόν* vol. ΙΖ, κδ.117. *Σύγγραμμα Περιοδικόν*, vol. ΙΗ, ρ. κδ.118. *Σύγγραμμα Περιοδικόν*, vol. ΙΘ, ρ. κδ.119. *Σύγγραμμα Περιοδικόν*, vol. Κ, ρ. λ.120. *Ibid.*, λ'.121. *Σύγγραμμα Περιοδικόν*, vol. ΚΑ, ρ. λβ.122. *Σύγγραμμα Περιοδικόν*, vol. ΚΒ, ρ. κθ.123. *Σύγγραμμα Περιοδικόν*, vol. ΚΓ, ρ. κθ.

Table 1: (continued):

The curators of the collection of scientific instruments of the GPAC.

Year	Curator	Profession	Member since
1892-1893 ¹²⁴	Stavros Vrahamis	Chemist	1892
1893-1894 ¹²⁵	Stavros Vrahamis	Chemist	1892
1894-1895 ¹²⁶	Stavros Vrahamis	Chemist	1892
1895-1896 ¹²⁷	Alexandros Efstathianos ¹²⁸	Math Teacher	1893
1896-1897 ¹²⁹	Stavros Vrahamis	Chemist	1892
1897-1898 ¹³⁰	Stavros Vrahamis	Chemist	1892
1898-1899 ¹³¹	Stavros Vrahamis	Chemist	1892
1899-1900 ¹³²	Stavros Vrahamis	Chemist	1892
1900-1901	Not mentioned	–	–
1901-1902	Not mentioned	–	–
1902-1903 ¹³³	Athanasios Ioannou	Math, Physics and Chemistry Teacher	1894
1903-1904 ¹³⁴	Periklis Tiverios ¹³⁵	Physician	1903
1904-1905 ¹³⁶	Periklis Tiverios	Physician	1903
1905-1906 ¹³⁷	Periklis Tiverios	Physician	1903
1906-1907 ¹³⁸	Dimitrios Varsamis ¹³⁹	Physician	1904
1907-1908 ¹⁴⁰	Vallianos Kombothekras ¹⁴¹	Physician	1905
1908-1909 ¹⁴²	Vasilios Ritsos	Physician	1887

124. *Σύγγραμμα Περιοδικόν*, vol. ΚΔ, p. κη.

125. *Σύγγραμμα Περιοδικόν*, vol. ΚΕ, p. κη.

126. *Σύγγραμμα Περιοδικόν*, vol. ΚΣΤ, p. κη.

127. *Σύγγραμμα Περιοδικόν*, vol. ΚΖ, p. κθ.

128. Alexandros Efstathianos was a mathematician and he was teaching in Zografeion School since 1901-1902. He was a member of the GPAC since 1893. Efstathianos wrote the textbook: *Στοιχειώδης αριθμητική* [Elemental Arithmetic], Τυπογραφείο Παλλαμάρη, Constantinople (Istanbul), 1899.

129. *Σύγγραμμα Περιοδικόν*, vol. ΚΖ, p. λ.

130. Ibid.

131. *Σύγγραμμα Περιοδικόν*, vol. ΚΖ, p. λβ.

132. *Σύγγραμμα Περιοδικόν*, vol. ΚΗ, p. κζ.

133. *Σύγγραμμα Περιοδικόν*, vol. Α, p. κβ.

134. *Σύγγραμμα Περιοδικόν*, vol. ΚΘ, p. κγ.

135. Periklis Tiverios was a physician and member of the GPAC since 1903.

136. *Σύγγραμμα Περιοδικόν*, vol. Α, p. κβ.

137. Ibid.

138. *Σύγγραμμα Περιοδικόν*, vol. Α, p. κγ.

139. Dimitrios Varsamis was a physician and member of the GPAC since 1904.

140. *Σύγγραμμα Περιοδικόν*, vol. ΑΑ, p. κγ.

141. B. Kombothekras was a physician and member of the GPAC since 1905.

142. *Σύγγραμμα Περιοδικόν*, vol. ΑΑ, p. κγ.

Year	Curator	Profession	Member since
1909-1910 ¹⁴³	Dimitrios Varsamis	Physician	1904
1910-1911 ¹⁴⁴	Vasilios Ritsos	Physician	1887
1911-1912 ¹⁴⁵	Kleovoulos Kokkolatos	Physician	1891

Besides, the incomplete and fragmented use of collections of scientific instruments was probably the norm in most of Europe's educational institutions, even in those that did not lack financial resources (Brenni 2012, 191–226). It is not possible, therefore, to judge strictly an Association which, even if it did not have inexhaustible resources, acquired a collection of scientific instruments earlier than the University of Constantinople and almost all the schools in Istanbul¹⁴⁶.

This was, in fact, the most important contribution of GPAC: It presented a solid model for the experimental teaching of physics and chemistry; a model that faithfully followed all the Greek schools in Istanbul in the years to come. The Great School of the Nation (1866-1867, 1878-1879 and 1880-1881), the Zappeion Girls' School (1875), the Zografeio School (1893) and the Theological School of Halki Island (some when after 1870) were equipped with more or less rich collections of scientific instruments, thus providing an adequate infrastructure for the teaching of science to the pupils and students of the Greek community.

It should be noted that nowadays the collection is ignored. The decision of the GPAC to donate the whole collection to the Central Girls School of Stavrodromiou (Κεντρικό Παρθεναγωγείο Σταυροδρομίου) is mentioned,¹⁴⁷ but doubts are expressed (Giannakopoulos 1998, 380), as to whether the donation had been completed. Moreover, no other evidence has been found that the Central Girls School ever received those instruments. Most probably, the collection had the same fate as all GPAC's movable and immovable property, which were seized in 1925 by the Turkish state and their present condition and location are unknown. Finding them would give the researchers a great opportunity to understand better the action of the GPAC.

143. Ibid., κδ.

144. *Σύγγραμμα Περιοδικόν*, vol. ΑΓ, p. κβ.

145. Ibid., 12.

146. Only the Commercial School in Halki Island should have earlier purchased instruments about Experimental Physics, since this lesson was taught as soon as 1841. "Πρόγραμμα ιστορικών της ανέκαθεν οικοδομής του κατά την Χάλκινη Ελληνικού Φροντιστηρίου και της ενεστώσεως αυτού καταστάσεως εκθετικών", [Historical Programme of the Greek Tutorial in Halki Island and report of its current situation] 1841, 12. We also have some reservations about the Robert College and some French private schools.

147. "Λογοδοσία Μηνά Αυθεντόπουλου, προέδρου του εν Κωνσταντινουπόλει Ελληνικού Φιλολογικού Συλλόγου", [Reports of Mina Afthentopoulou, president of GPAC] 1972, 94.

Appendix

Κατάλογος των εν τη οργανοθήκη του ΕΝ ΚΠ. Ελληνικού Φιλολογικού Συλλογού Οργάνων

1. Ηλεκτρική μηχανή Van Marum
2. Ηλεκτρικόν ωόν
3. Βολτάμετρον του Faraday ήτοι όργανον προς αποσύνθεσιν του ύδατος
4. α' Ράβδος εκ ξύλου μελανού
β' Ράβδος εκ ερυθρού ισπανικού κηρού
γ' Ράβδος εκ ρητίνης
δ' Ράβδος εκ υέλου
5. α' και β' Ηλεκτροφόρον
6. α' Εκκενωτής
β' και γ' Λαβαί εκκενωτού
δ' Σφαίρα μεταλλική
ε' Δίσκος μεταλλικός
7. Ηλεκτρική συστοιχία λαγήνων εξ
8. Τράπεζα μονωτήρ
9. Λάγηνος μετά κινητού οπλισμού (Ελλειπής)
10. α' Λουγδουνική λάγηνος
β' Λουγδουνική λάγηνος
γ' Λουγδουνική λάγηνος
δ' Λουγδουνική λάγηνος σπινθηροβολούσα
11. Μαγική πλαξ
12. Ηλεκτρική χάλαζα
13. Συμπυκνωτικόν ηλεκτροσκόπιον του Βόλτα μετά του δίσκου αυτού
14. Ηλεκτρικόν τύμπανον
15. Υελοτρυπητήρ
16. Αλύσεις δύο
17. Ηλεκτρικός όλμος
18. Ηλεκτρική λυχνία οιοσπνεύματος
19. Γενικός εκκενωτής του Henley
20. Στατήρ μεμονωμένος φέρων δίσκον
21. Βάσις οργάνου κυλινδρική
22. Στατήρ μετά δρομέων
23. Ηλεκτρομαγνητική μηχανή του Ruhmkorf
24. Ηλεκτρομαγνητική μηχανή του Ruhmkorf μικρά
25. Ηλεκτρομαγνητική άμαξα
26. Ηλεκτρομαγνητική κινητήριος μηχανή

27. Ηλεκτρομαγνήτης πεταλοειδής μετά σπλισμού
 28. α', β' Σύστημα διά τον άνω ηλεκτρομαγνήτη
 29. Λύχνος ηλεκτρικός εξ ανθράκων
 30. Τηλεγραφικός χειριστής Breguet
 31. Τηλεγραφικός δέκτης Breguet
 32. Θερμόμετρον του Breguet
 33. Επτά σωλήνες του Geissler
 34. Λύχνος του Geissler διά μεταλλουργεία
 35. Τεσσαράκοντα στοιχεία του Bunsen, το εν ελλειπές
 36. Δύο στοιχεία διχρωμικής ποτάσσης μετά 26 τεμαχίων ψευδαργύρου
 37. Αεραντλία επί τραπέζης
 38. Συσκευή προς παρασκευήν αερίου
 39. Σωλήν διά το αέριον της άνω συσκευής
 40. Βαρόμετρον του Fortin
 41. Φανός δι'οπτικής προβολάς
 42. Πλεγμάτιον εκ πλατίνης
 43. Σωλήν μετ' ερυθρού οينوπνεύματος
- Έτι υπάρχουν σύρματα χάλκινα μεμονωμένα και μη, 3 χοάνοι υέλινιοι, αγγεία, φιάλαι κτλ.

Πίνακες φνοικής ιστορίας

Βοτανικής 1-26

Γεωλογίας 1-10

Ζωολογίας 1-54

Εν Κων/πόλει τη 10/22 Νοεμβρίου 1880

Τ. ΚΑΡΑΘΕΟΔΩΡΗΣ

Γ.Α.ΔΗΜΗΤΡΙΑΔΗΣ “

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