Pioneers in the anti-malaria battle in Greece (1900–1930)

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Summary

The aim of the study is to present the efforts of the Greek physicians to introduce a malaria control and eradication program in Greece. It is based on the proceedings of the Greek Anti-Malaria League and on medico-historical studies. Due to political, economic and military reasons the Greek State seemed weak to develop a dedicated plan to eradicate malaria. Hence, the Greek Anti-Malaria League in 1905 was founded by a group of eminent citizens who took the initiative to organize a campaign against the disease. Constantinos Savvas, Professor of Hygiene and Microbiology and President of the League, as well as the pediatrician Dr. Ioannis Kardamatis were among the most influential personalities in the Greek society at that time. Due to the massive use of quinine the burden of the disease decreased significantly. But, the national disaster of 1922, however, during the Greek-Turkish War and the wave of one million Greek refugees from Asia Minor to Greece modified the epidemiological map of malaria. The heritage of the epidemiological studies undertaken by the League was the basis for the new campaign undertaken during the 1930s by the Greek State and the Rockefeller Foundation. The new structure of the Sanitary Services, the legacy of the League's experience and the knowledge of the Greek trainees of the Rockefeller Foundation, served as the starting-point for the final eradication of malaria after World War II.

Keywords: Constantinos Savvas, Ioannis Kardamatis, Greek Anti-Malaria League, Malaria, Public health, Ronald Ross

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Introduction

Malaria was endemic in Greece from 400 BC and was a major public health problem all over the country until the mid-20th century¹. Epidemiological data for Greece are practically missing until 18th century. It was only during the 19th century that the British sanitary officers of the Ionian Islands (1814–1864), which were then under British Protection, started to study the morbidity under the prism of environmental, climatic and social parameters. According to these data the most frequent endemic infectious disease in the Ionian Island region was malaria. Different names, such as *tertian fever*, *quartian fever*, *benign or malignant fever*, *therma continua*, *amphimerina paludoza* were given by the local physicians for the “fevers”, which were actually a main sign of malaria². In addition, the British data, for military use or the development of public health policies by the British High Commissioner, give us a proportional picture of the disease in the Greek territories under Ottoman rule.

The sanitary campaigns and public health efforts against malaria started in Greece at the beginning of the 20th century and were developed in two periods. The first, so called “heroic” period from 1900 to 1930 pertains to the efforts of the pioneers of the Greek Anti-Malaria League. The second part of the effort covers the years 1930–1960 and was organized by the Malaria Department of the Athens School of Hygiene and the Rockefeller Foundation. From the liberation of Greece from the Ottoman Empire in 1832 until the end of the 19th century, a series of lectures offered at the Medical Society of Athens by eminent Greek physicians and the reports of the Medical Newspaper of the Greek Army (1894–1896) describe the dramatic situation of a small new country under siege by malaria³.

During the Greek Medical Congress of 1887, Theodoros Afentoulis, Professor of Pharmacology in the Athens Medical School, stated that “the fevers are the enemies of the Greek population. In every corner of Greece you can see the graves. The fevers are the enemies of the bodies and the souls of our young generation and our soldiers. We lost half our days of life as a nation...”⁴ Afentoulis’ statement about the Army was another critical point regarding the disease. The small Greek state was fragile and at risk of a new war with Ottoman Empire. The sufferings of the Greek Army during the period

1 Sallares/Bouwman/Anderung 2004; Linton 2007; Grmek 1994.

2 Hennen 1830, 190–228; Statistical Report 1839, 210–215; Goodison 1822, 230.

3 Roezer 1849; Prententeris 1868; Sakorafos 1895; Papavasiliou 1896.

4 Afentoulis 1888.

1882–1887 were enormous; approximately 42 000 soldiers were treated in the Military Hospital of Athens⁵.

At the population level, high sufferings from the disease were observed. According the archives of the General Hospital *Astikliniki* of Athens, the number of the malaria entries during 1865 was 56,3%⁶. From 1899 until 1906, 2147 individuals died from various types of malaria⁷, with the capital of Athens being also the capital of malaria and the disease primarily affecting the most vulnerable part of the population, namely neonates and young children. Calculations made from the archives of the Athenian hospitals (1896–1905) show that the various kinds of malaria occur in Athens in the following proportions: intermittent fevers 91,5%, remittent fevers 3,4%, pernicious fevers 30%, and malaria cachexia 4,6%. For Greece generally the proportions were: intermittent fevers 91,6%, remittent fevers 6%, pernicious fevers 27%, and malaria cachexia 1,9%. Indeed, malaria in Greece was out of control and the time had come for concrete decisions and efforts.

During the Greek Medical Congresses of 1901 and 1902 the physicians contributed to the development of a comprehensive proposal to the Government for the organization of the malaria control plan. Political instability during that period and the defeat in the Greek-Turkish War of 1897 casted a shadow on the Greek governments during the years that followed. The scientific pressure by physicians was steady, but the Greek State, confronted to a destroyed postwar economy and unsettled foreign affairs, was unable to organize an anti-malaria project on a national scale, or even in the area of the capital. Indeed, during the years 1860–1905, Athens suffered 14 major malaria epidemics⁸.

The area surrounding the Panathenean Stadium, where the first modern Olympic Games were held in 1896, was full of swamps created by the Ilissos River. The morbidity rate was 95% and this area, located in the heart of Athens, was better known to the inhabitants by the nickname “Vatrahonisi” (Frogs’ Island).

According the epidemiologic data of that era, malaria affects all the ages, mainly the groups of 7–15 years (21,63%), 20–30 years (21,02%), followed by the ages 1–7 (15,87%), 15–20 (13,09%) and 30–40 (10,71%)⁹.

5 Savvas 1907.

6 Jones 1909, 9–21; Stéphanos 1884, 497.

7 Savvas 1907.

8 Vladimirov 2006, 46, 93–110.

9 Kardamatis 1909, 134.

The foundation of the Greek Anti-Malaria League

Following refusal of the Greek Government to organize an anti-malarial plan, two dedicated physicians with public health vision decided to take action for the nation's health. After the Greek Medical Congress of 1905, they decided to found an institution aiming to organize the anti-malarial fight,

Fig.1: The swamps of river Ilissos around the Panathenean Stadium of Athens, 1869.

Ages	(%) of the cases
0–1	1,27%
1–7	15,87%
7–15	21,63%
15–20	13,09%
20–30	21,02%
30–40	10,71%
40–50	7,94%
50–60	4,58%
60–70	2,12%
70–80	0,56%
80–90	0,08%
90–100	0,03%

Table 1: Groups of age and malaria in Greece around 1900 (Source: Kardamatis 1907).

Fig. 2: Constantinos Savvas (1861–1929). Signature with his motto “Malaria is the greatest enemy of our country” (Source: Savvas/Kardamatis 1928).

Fig. 3: Ioannis Kardamatis (1857–1942). Signature with his motto “The fight against malaria is as important as the other national fights” (Source: Savvas/Kardamatis 1928).

announced as the “Greek Anti-Malaria League” by Professor Savvas and Ioannis. Kardamatis on February 18, 1905. Constantinos Savvas was Professor of Hygiene and Microbiology in the Athens Medical School of Athens University and Ioannis Kardamatis a pediatrician and epidemiologist who served from 1909–1915 as Professor of Parasitology and Tropical Diseases in Athens Medical School¹⁰.

Founding members included Professors of medicine and pharmaceuticals, physicians, deputies, journalists, clergymen and other eminent personalities of the Greek society such as the Vice President of the National Bank of Greece, Ioannis Valaoritis. The movement was not only a scientific collaboration but an example of socially motivated network to account for the indifference of the State. The insignia of the League was inspired by the ancient Greek mythology: the contest of Hercules against ‘Lernea Hydra’,

¹⁰ Vladimirov 2006, 93–110; Marketos 1998.

namely the successful struggle with a terrible monster with multiple regenerating heads living in the swamps of Lake Lerna. It has been claimed that the ancient myth was itself a depiction of the Ancient Greeks' fight against the "miasmatic air" of the swamps¹¹. The League was a twin of the similar Italian League founded by Angelo Celli, Professor of Hygiene in Rome¹².

A few days after the founding and publication of the news in the press, Savvas and Kardamatis were invited by the King of Greece, George I. The King declared that the League would be under the patronage of His Majesty. According to the estimates of Savvas and Cardamatis during 1905, there were 250 000 new cases of malaria and 960 000 cases of fevers in swampy areas¹³. However, despite the high magnitude of the problem and the royal patronage, the Greek Government remained unable to adopt a plan for a national plan in order to fight a preventable disease, such as malaria.

The general principles of the Greek Anti-Malaria League may be seen from the second article of its constitution:

"The League shall strive to attain its object:

- By popularizing what is known of the origin, transmission, prevention and treatment of malaria diseases;
- By the study of these diseases and of the conditions under which they spread;
- By the preparation of suitable legislative or other measures pertinent to the object of the League, to be submitted to the Government;
- By the application of the means pointed out by science of suppressing malaria;
- By enquiry into the various means that further the object of the League;
- By the distribution of rewards to those who carry out studies relating to the mission of the League, and to those who discover means or successfully apply measures furthering the prosperity thereof."

The plan of the League was two-pronged, aiming to increase awareness of the population on the preventability of the disease and to drain the swamps. Lack of administrative structure as well as insufficient accurate epidemiological data were the two main issues the League had to face. To this end, the League requested and was accepted by the Government to nominate Kardamatis as Hygienic Assistant in the Ministry of Transportation and later as Sanitary Inspector of the Ministry of Health. Representatives of the

11 Decharme 1884, 508.

12 Celli 1899; Snowden 2006, 27–52.

13 Savvas 1907.

League visited Italy, Algeria, and Corsica in order to get the experience and request organizational assistance from related Societies against malaria. During the first visit of the Greek physicians to Italy, the representatives were impressed by the organization of the anti-malarial fight and new knowledge on the relation of ichthyology with malaria. In 1906, Italian scientists decreased the mosquito index from their lakes with the help of the fish *Gambusia affinis*, which destroyed the larvae. Actually, the concurrent multiplication of the *Gambusia* with *Anopheles* multiplication during the summer led to the minimization of mosquitoes, as the fish were effective in eating the larvae¹⁴.

In order to improve data accuracy, the League initiated missions throughout the country aiming to collect the figures on patients and deaths registered in hospitals and by private physicians. The methodology was primitive and the archive was incomplete, but this became the starting-point for more scientific means of data collection during the period 1908–1914. The League's goal was to compare malaria infection in the population before and after use of quinine according to hematological studies and splenomegaly measurements.

The year 1905 was a dramatic one, rife with epidemic. Heavy rains in 1904 had created many more areas with stagnant water and consequently an increase of malaria cases during 1905. Even the primitive epidemiological data of that era show that 1905 was the worst period after 1850. A few months after the League's founding, the first alarm for help sounded from villages around Athens.

The League sent Kardamatis and Dr. Diamesis, who discovered during their visit to the area of Oropos, northeast of Athens, an over 95% malaria prevalence, whereas they availed only one microscope and 1000 grams of quinine for 1370 patients¹⁵. In response to an emergency telegram sent by the physicians to Athens for provision of more quinine, this time the Greek Government understood the tragic situation and immediately ordered the Greek Army to send its quinine stock. The two physicians distributed quinine to all patients door-to-door in the surrounding villages; as a result, they succeeded in limiting the epidemic. In celebration of this first victory, the League's members readied themselves for their second mission. As a by-product of this success, the League was also given the opportunity for small-scale experiments concerning the effective dose of quinine, that were thereafter used for the development of therapeutic plans¹⁶.

14 Snowden 2006, 27–52.

15 Vladimirov 2006, 93–110.

16 Savvas 1908.

A few days later, Kardamatis and Diamesis received instructions from the League to combat the new epidemic had broken out in Avlida. As they had only 500 grams of quinine for 400 patients, however, and they received no additional quinine from the Army, the mission failed completely¹⁷. The members of the League understood that except malaria, they had more enemies, namely the lack of quinine and the lack of collaboration with the Government. In the market, everybody imported quinine, the price was extremely high and some unscrupulous people tampered with the drug. Consequently, a third component was added to the League's strategic targets, namely to establish a state monopoly over the sale of quinine. According to the League, every Greek citizen should have the right to buy cheap quinine or receive it at no cost. Finally, on the third anniversary of the League's founding, their proposal became Greek law after three years of complicated negotiations (Assembly of February 18, 1908, "Law for State quinine")¹⁸.

One year after the League was founded, the Scottish epidemiologist Sir Ronald Ross visited Greece at the invitation of the Lake Copais Company, which had taken on the drainage work of the lake. Ross, the Nobel Prize winner of 1902 for his malaria research, organized missions to develop and implement mosquito control measures worldwide. His presence in Greece was an opportunity for action and immediately he joined forces with Savvas and Kardamatis. Ross confirmed the high prevalence of malaria among the workers at the British Lake Copais Company and the area's children; actually, 65% of children suffered malaria with excessive splenomegaly¹⁹. Ross proposed to the League drainage of all swamps in the area and use of quinine for all citizens living around the lake. According to his instructions, petrol was used as a major insecticide against mosquito larvae.

After returning to Great Britain, Ross described the dramatic situation in Greece in a lecture delivered at the Oxford Medical Society; apart from scientific assistance, he also supported financial aid for the Greek League. Ross ended his speech on a very emotional note, and the impact upon the British scientists was significant, for they felt historically linked with Lord Byron's sacrifice during the Greek Revolution and sensed Britain's duty to help Greece once again in this struggle. In the meantime, the League had translated into Greek and distributed to both physicians and civilians 3000 copies of Ross's paper concerning protection from fevers and mosquito eradication.

17 Vladimirov 2006, 93–110.

18 Cofinas 1909; Savvas/Kardamatis 1928, 12–15, 17.

19 Ross 1906; 1907.

Fig.4: Sir Ronald Ross (1857–1932).

The epidemiological study of malaria following the massive use of quinine was one of the League's first priorities. Kardamatis started a pilot program with quinine in the villages around Marathon, the area of the famous ancient battle against Persians, from 1907 until 1909. The annual decrease was impressive and the prevalence of malaria dropped from 100% to 47% in 1907, to 13% in 1908 and then to 2% in 1909²⁰. In addition, Kardamatis systematically studied child morbidity from the disease in Athens which in 1910 approached 0% in comparison with 93% in 1901²¹. In 1915, the League was ready to present a 30% malaria prevalence data on a national level. Only 29 municipalities out of the 476 in the entire country were declared free from the disease. Of the remaining 445, 76 had morbidity rates ranging between 51–100%, 254 between 11–50%, and the rest 115 below 10%. Areas with morbidity rates of 50–60%, 40–50%, and 30–39% during the period 1907–08 showed a corresponding decrease to 10–20%, 3–17% and 3–13% (1911)²².

Through medical efforts by the members of the League morbidity was minimized, but eradication of malaria necessitated also environmental measures, which lagged behind. Indeed, swamp drainage was a very slow process, as shown by another statistical study related to the number and extent of the swamps indicating 639 swamps extending over 88 000 hectares in a total area of 60 000 km² of the Greek territory in 1915.

Of note is the awareness raising component of the League's action plan. During the period 1905–1908, local committees were created in 30 major

²⁰ Kardamatis 1914.

²¹ Kardamatis 1909.

²² Savvas/Kardamatis 1928, 413–414; Kardamatis 1914.

Greek cities as a response to the Greek Red Cross' initiative and the League's members started a campaign giving presentations in numerous villages²³. The audience, ignorant and hungry for knowledge, became informed about the nature, first symptoms, and protection from malaria by asking questions to the visiting physicians. A visit by physicians was considered as an event of high importance in each village as it was substituting for the lacking interest of the official Greek state. The priests were an indispensable ring in the chain of target audiences of the League, as they facilitated during Sundays the gathering of the local population in the church for the presentation. The poor villagers felt enormous gratitude toward the League and the hospitality they offered visiting physicians on every occasion was deeply moving. During the following years, the League, this time with the help of the Ministry of the Economy, distributed 150 000 manuals to teachers and students, and extra 300 000 copies of the pamphlet "Ten Simple Instructions against Malaria" addressed to the public at large²⁴. The impact of the Greek Army in the anti-malaria fight was also important. Most the members of the League were military physicians, as the president Savvas (Head of the Military Sanitary Services), with great interest on malaria study. Most of them had close collaboration with the military physician Ross and Dr. Zografidis of the Army Navy, translated in Greek Ross's paper on malaria²⁵.

The League during the 1920s

In 1924, Kardamatis published the study "Statistical maps of swamps and frequency of malaria in Greece". The following year, the League and the Greek Red Cross published the study "Actions in Macedonia and Thrace" and divided the Greek territory into two parts, Old Greece (the country before the Balkan Wars) and New Greece (the newly liberated Greek territories).

According to the data, during 1924 the mean frequency of malaria in Greece was 23% (Old Greece 26%, New Greece 20%). Seventeen municipalities and 617 villages in both Old and New Greece were free of the disease corresponding to 348 722 persons, i.e. 1/16 of the total population. Infected municipalities and villages of Old and New Greece totaled 836 (prevalence 10–49%) and 403 (prevalence 50–100%) respectively. The annexation of the new territories after the Balkan Wars and First World War increased

²³ Savvas 1908.

²⁴ Savvas 1908.

²⁵ Balfour 1935; Ntafoulis 2008.

the number and extent of swamps on the national scale to 1769 swamps (400 000 hectares out of a total of 127 000 km² of Greek territory in 1924)²⁶. A few months later all this statistics became eventually useless as the incidence of malaria rose dramatically once again.

The Greek-Turkish War started with major victories for the Greek Army in Asia Minor in 1922 but two years later, the Greek Army suffered great defeats during its retreat. The loss of the war meant further changes in the borders, but the greatest tragedy was the back-wave of one million three hundred thousand Greek refugees from Asia Minor to Greece. The State was unable to provide housing for the refugees, thousands of whom built new homes in highly inappropriate places. Dysentery, typhus, and malaria were the common diseases of refugee settlements. Accordingly, the League began planning for a new medical topography and the new Government by Eleftherios Venizelos (1928–1932) decided to carry out a profound reform of the Greek Sanitary Services. Nevertheless, until the end of the decade,

26 Savvas/Kardamatis 1928, 489–496.

Greece continued to undergo malaria outbreaks and the death toll increased year by year (Table 2), suffering much higher rates compared to neighboring or more distant European countries (Table 3).

Table 2: Annual number of deaths from malaria in Greece (1925–1930) (Source: Public Health in Greece, Proceedings of the Directorate of Health, Ministry of Health 1933).

Year	Deaths (N)		Total
	Urban centers	Rural centers	
1925	1126	3493	4619
1926	898	3126	4024
1927	872	3979	4851
1928	1014	4827	5841
1929	1093	5331	6424
1930	844	4798	5642
Total	5847	25 554	31 401

Table 3: Annual mortality from malaria in Greece (/10 000 inhabitants) 1925–1929, compared to other European countries as derived from the reports of the Directory of Health (League of Nations) (Source: Public Health in Greece, Proceedings of the Directorate of Health, Ministry of Health 1933).

Country	1925	1926	1927	1928	1929
Belgium	–	0,030	0,030	0,020	0,030
Bulgaria	–	–	–	1,420	1,740
Denmark	0,030	–	–	0,010	<0,01
Ireland	–	0,010	0,020	0,010	0,020
France	–	0,004	0,045	0,050	0,040
Germany	0,010	–	0,010	0,100	0,010
Greece	7,940	6,810	8,050	9,410	10,240
Italy	–	–	–	0,070	0,650
Spain	–	–	–	0,330	0,250
U.K.	–	0,020	0,010	0,010	0,010

In 1928, Savvas organized formal training of a Greek scientific team at the High School of Malaria in Rome and the School against Malaria in Nettuno, Italy, as well as at the School of Tropical Diseases in Hamburg, Germany. The experience from the specialized anti-malaria institutes and the administrative structure of the Italian Sanitary Services and the famous Roman

School of Malaria gave Savvas the idea for a similar proposal to the Greek Government²⁷.

The League decided to inform the Greek Authorities about a new model of administrative structure for anti-malaria institutions with the Ministry of Health overseeing the Directorate of Defense Against Malaria. The Directorate had collaborations with the Rockefeller Foundation, the National Institute, and other local Societies in Venice and Sicily. The contribution of the Department of Malaria of the Italian Red Cross with Hospitals for Malaria and local Diagnostic Centers was also valuable. The proposed modification of this structure for Greece by Savvas and Kardamatis was a high quality concrete plan (Table 4). Since 1905 a private League had assumed control of the sanitary needs of the Greek population but time had come for the State to assume its responsibility as the veterans and the League, without further economic resources, decided that the fight against malaria needed a new leader: the Greek State. In 1928, Savvas and Kardamitis noted in the Proceedings of the League *Malaria in Greece*, that the fight against malaria must be the duty of the State. The enemy of the nation did not come from without but from within the country and it was far deadlier than bullets and cannons.

Fig. 6: K. Savvas and I. Kardamitis, *Malaria in Greece and the Proceedings of the Anti-Malaria League (1914–1928)*, Athens 1928.

²⁷ Cappana 2008.

Savvas and Kardamitis very clearly described the League's proposal for the sanitary reform. According to this plan, the Ministry of Health had the duty to control two types of anti-malaria Centers, urban and provincial. Both types of Centers needed to be headed by a malariologist, together with a water resources engineer, an agriculturist and an economist. The country side with the provincial centers was divided into five geographical zones and the Ministry was to nominate five inspectors/malariologists. The provinces were in the first rank and for this reason the five inspectors would head up local Microbiology laboratories and local anti-malaria Committees assisted by the Greek Red Cross. The School of Malariology and Laboratory of Microbiology were to be under the Urban Anti-Malaria Center. According to the League, the Ministry of Economics should found two autonomous funds, the Central Fund for Malaria and the Fund for Water Resources, to avoid the bureaucratic difficulties that often hampered drainage works and new water supply networks. Savvas also proposed to the Greek Government to collaborate more closely with the Rockefeller Foundation in order to modernize the fight against malaria. In 1925, the Rockefeller Foundation actually sent to Greece Drs. Balfour, Wright, Shanon, and Barber in order to train Greek malariologists and observe the seasonality of the disease. Complementary proposals were also made including education of committees of railway workers and Greek refugees through malaria lessons for public at large prepared by the School of Nettuno in Italy. The League proposed a law for social work on drainage works in high endemic areas. Impressively, it also proposed a new law for prisoners, in accordance to which prisoners who volunteered to work on swamp drainage projects would be able to reduce their sentences. The League requested extra legislative changes, including a stricter law on the state monopoly over quinine, and proposed that the drug be provided free of charge to all Greeks. Savvas and Kardamatis also made educational proposals such as the founding of a School of Malaria and of a Military School of Malaria. They also proposed the use of Röntgen apparatus to better study splenomegaly²⁸. From their program we can understand that the League was updated on all new developments and that its members believed in the use of the insecticide Vant de Paris (also known as Vert de Paris, Paris Green or Schweinfurt Green)²⁹.

28 Savvas/Kardamatis 1928, 731–765.

29 Barber/Hayne 1921.

Table 4: The organization proposed to the Greek Government by the League for Malaria Restriction.

The end of the League and the development of the national Hygiene Policy Plan

The League lost its leader and heart when Savvas died in 1929. His passing away was greatly mourned by the scientific community, and even more so by lay people. At the end of the decade the State finally decided to organize the fight against malaria and members of the League were placed at the service of the new Sanitary Services, despite the fact that during the first two decades of the twentieth century, public health was not a high priority for government policy. To many politicians' conservative outlook, the Sanitary Services were philanthropic institutions and not a part of an organized medical system³⁰. It may sound odd or even incredible, but in 1930 one of the main accusations against Prime Minister Eleftherios Venizelos was the fact that he spent public money for Public Health.

The Proceedings of the Directorate of Health (1933) refer to major changes at the administrative level of the Sanitary Services in the fight against malaria. In 1925, within the framework of Venizelos's reforms, the Hygienic Department of the Ministry of Transportation moved as a distinct Department in the Ministry of Health³¹. In 1929, there was a decision (Law 4233/29) to found the Hygienic Center of Athens with six departments, one of which was the Department of Malaria³². The School of Hygiene in Athens was established in the same year (Law 4069/29), along with the Chair of Hygiene of Athens Medical School, which organized the teaching of physicians and medical students about malaria. The School of Hygiene also became the base for the Rockefeller Foundation in Greece with two departments, the Department of Malaria and the Department of Hygienic Engineering. In 1930, the State nominated a 12-members committee to direct the new anti-malaria campaign (Law 4555/30)³³. According to the Directorate of Health, the main causes of malaria in Greece included the country's special climatic conditions, its primitive water supply network, human "barbarism" imposed upon nature (e.g. changing the course of rivers), the arbitrary nature of new settlements, and of course the impunity of those who violated the hygienic laws. The systematic malaria control in Greece, however, was defined by the seasonal nature of the disease and was also dependent on political circumstances.

30 Jones 1909, 9–21.

31 Savvas/Kardamatis 1928, 731–765.

32 Snowden 2006, 27–52.

33 Savvas/Kardamatis 1928, 731–765.

As the third decade of the twentieth century dawned, Greece was ready for its second battle against malaria. The new structure of the Sanitary Services, the knowledge of the Rockefeller Foundation, and the legacy of the League's experience served as the starting-point for the new campaign. This period was characterized by new methodology and control. Malariologists had accurate epidemiological data and they composed accurate maps for every part of Greece according to the plasmodium and splenomegaly indexes. A few years before Greece entered World War II, the anti-malarial service was mostly organized by the Rockefeller Foundation's Greek trainees. In 1942, Kardamatis died in Athens and once again there was great mourning at his passing. Lastly, after the end of the Second World War and during the chaotic years of the Greek Civil War, the anti-malarial project fell within the operations of UNRRA (the International Health Department of the Rockefeller Foundation) and the Greek Government.³⁴

Conclusion

From 1905 until 1930 the Greek Anti-Malaria League led by visionary and competent public health scientists was a privately led initiative aiming to provide services for prevention and control of malaria in Greece, mainly through awareness raising campaigns and massive use of quinine at a national level. The eradication of the disease, however, would be impossible without environmental measures pertaining to drainage of the multiple swamp areas. The experience of 25 years in action was translated into the League's proposal for a new administrative structure to battle malaria with the Greek State undertaking the lead. The plan provided the main points for the sanitary reform of the anti-malaria campaign in Greece and formed the basis for the new campaign and action during the 1930s that were thereafter led by the Greek State and Rockefeller Foundation.

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34 Gardika 2008; 2010.

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