Elimination of Malaria in Palestine 90 years ago

What didn’t General Allenby and the early Jewish pioneers do ...

... that Dr Kligler did.

Compiled by Anton Alexander for use at the conference entitled ‘Revisiting Malaria: Moving from Control to Sustainable Elimination’ taking place at the Hebrew University, Jerusalem, Israel on 9th December 2013
“Why has the Anti-Malarial work in Palestine been so successful?”

In 1925, the Malaria Commission of the League of Nations, after visiting Palestine, posed this question to itself.

To which their written reply in 1925 was:

“In the first place, because evidence was available to prove that it was so. That is principally due to the thorough anti-malarial survey carried out everywhere before the work begun.”

(League of Nations, Malaria Commission, ‘Reports on the Tour of Investigation in Palestine in 1925’, page 37)

Dr Israel Kligler arrived in Palestine in December 1920. He was a public health scientist, and he had developed an impressive reputation whilst working in the USA and South America with the Rockefeller Institute for Medical Research, New York.

Dr Kligler commented that he came to Palestine “… with a view to coming to grips with the malaria situation. …… unless something was done to check the ravages of malaria, the reconstruction of Palestine would be a costly if not altogether an impossible effort.” (“The Fight against Malaria” – Dr I Kligler -1925)

Dr Kligler’s task ahead of him must have appeared daunting. But, significantly, he had come to settle in Palestine – NOT JUST TO VISIT.

The League of Nations, Malaria Commission

In 1924, the Malaria Commission of the League of Nations (comprising some of the most senior and expert advisers in the world in anti-malarial work) admitted:

“In considering how the European malaria situation in general can best be met, we have to acknowledge in the first place that in reality we are not in a position to suggest any single plan for dealing with malaria which would certainly be permanently effective in actual practice”.

(League of Nations Malaria Commission – Reports on its Tour of Investigation in certain European Countries in 1924).

But in 1925, the Malaria Commission was alerted to successful malaria-eradication works in Palestine, and visited there to study what could be done against malaria in the way of an anti-larval campaign. The Commission explained in their subsequent report why their “visit to Palestine was of such special importance”.

The Commission inspected, and in the subsequent Report commented that the works and methods seen by them “..destroyed pessimism, raised hopes.” and concluded that the men involved were “…benefactors not only to the Palestinian population but to the world as a whole.”


The expert members of the Malaria Commission immediately after they had inspected the anti-malarial works in Palestine in 1925 and before their departure from Palestine were invited at a meeting to comment on what they had seen:-

Professor Nocht, the President of the Commission: “Palestine showed the fruits of an energetic and victorious campaign which would stimulate others to follow the methods there employed.”

Professor Ottolenghi from Italy: “He had gained in Palestine an interesting impression of the malaria problem and remarked that much of the work was first class. He was of the opinion that Palestine could be rid of malaria. …..” He “concluded by congratulating those responsible on the success of the antimalaria campaign in Palestine.”

Colonel James, of the Ministry of Health London: “It would be indeed difficult to encounter literally from China to Peru such satisfying, for the moment, antimosquito measures as could be seen in Palestine and he had to congratulate the Director of Health and all associated with him in bringing about this highly successful result.”

Professor Swellangrebel of Holland, had concluded his statement “by remarking on the admirable endeavours made to check results obtained in Palestine.”

Professor Nocht concluded the meeting by stating “…It was not the custom of the Commission to make comparisons but he would on this occasion, say that the interest that Palestine had provided was unsurpassed by that of any of their other (League of Nations) visits, and never had the Commission met with such preparations as had there been provided. The splendid data prepared was of the greatest value in that it could be taken away, read up, and thought over. ……. The Commission would never forget and would greatly profit by its visit to Palestine, and the world would surely benefit by what they had seen there, through the medium of the League of Nations.”

(Proceedings of the 11th Meeting of the Antimalarial Advisory Commission – May 19th 1925)

“Our visit to Palestine has shown us what can be done against malaria in the way of an anti-larval campaign: (a) if the work is done thoroughly and systematically and after an exhaustive preliminary survey; ………..
There is (in Palestine compared to the in other countries where previous inspection tours had taken place) … a remarkable difference. (In 1924) we were sometimes asked to believe that anti-larval measures (in other countries and other inspection tours) …… were responsible for a very marked reduction of the malaria rate. In such cases we could not accept the evidence as long as a spontaneous reduction (as a consequence of a declining epidemic) was possible. But here (in Palestine) we were shown very complete anti-larval measures ……. Their anti-malarial value had to be judged not in the first place by malarial statistics but by the fact that no actual or potential breeding places were in existence and that no adults (mosquitoes) were to be found in houses.” (Pages 35-37, League of Nations Malaria Commission – Reports on the Tour of Investigation in Palestine in 1925).

And the Malaria Commission subsequently reported in July 1927 that ….
“the … place in which anti-larval measures have been carried out on a large scale with very satisfactory and sometimes even perfect results is Palestine”
(League of Nations Malaria Commission – Principles and Methods of Antimalarial Measures in Europe- 1927)

The reputation of Dr Kligler became such that the Malaria Commission invited him to become an expert member and in June 1928 entrusted Dr Kligler’s laboratory to participate in experimental and epidemiological studies on behalf of the Malaria Commission.

Royal Army Medical Corps

“….., a reference to the teaching courses which have been a particular feature in the army co-operation work of the Department of Health during recent months. Palestine has proved to be a very convenient field of study to the military hygienist, and, incidentally, a most important one from all points of view, past, present and future. Its malarial problem closely resembles others which may have to be faced by our Empire Forces.”
(Page 1, Dept of Health, A Review of the Control of Malaria in Palestine (1918-1941))

“The malaria research station at Rosh-Pina (Palestine/Israel) took part in malaria training for the British Army from 1939 to 1941. As the staff joined the British Army in 1942 and served as malaria experts until 1946, no research work could be done at the station itself, but members on active service were instrumental in surveying practically the whole of the Middle East and parts of Bengal and Burma.”
(Page 5, World Health Organisation, 20th October 1949, Malaria Control in the State of Israel.)
The British Mandate contribution

The Palestine Mandate on behalf of the League of Nations was operated from 1920 to 1948 by a British civil administration after the defeat of the Ottoman army in 1918.

Measures introduced by the British Mandate authorities in 1920 before Kligler arrived included:

“...arrangements for rectifying the existing confusion in regard to the land system of the country, and the state of undetermined or scattered ownership to which the bad cultivation of much of the land is due.”

(League of Nations - Reports on the Tour of Investigation in Palestine in 1925 – Page 25)

and,

the creation of a permanent Medical and Health Service.

After Kligler’s initial malaria control demonstrations/experiments in 1921 shortly after his arrival in Palestine, he set about in 1922 to eliminate malaria in Palestine, not just to control it.

By 1922, the British had already recognised Kligler’s expertise, and it was agreed “......only by placing all antimalarial work under the control of an organised Government Department that country-wide success can be obtained in dealing with a disease like malaria, .....” (page 33 of Department of Health. A Review of the Control of Malaria in Palestine 1918-1941) – ..... rather than each independent organisation conducting its own projects.

Kligler became part of the Mandate Health Department’s Antimalarial Advisory Commission which planned and co-ordinated these works. Kligler was therefore consulted and advised on the drafting of:
A. the Public Health Anti-Malaria Ordinance 1922
B. the Regulations under the Public Health Anti-Malarial Ordinance 1922. (Approved 1923) Article 10.
C. Routine Anti-Malarial Measures (Approved 1923).

(For the content of these Ordinances, Regulations and Measures, see below at page 16-21)
Malaria - a local problem

It is important to appreciate from the outset that Malaria control involved many questions requiring investigation for each site. The methods used to control by Dr Kligler were based on sound principles, and while not novel in practice, perhaps the degree of implementation and of attention to detail of such methods was unique in a number of ways.

“We have come to realize that malaria is eminently a local problem, and that a successful attack is possible only after a careful study of the local conditions combined with systematic experiments with the method or methods most likely to give the desired results.” (I Kligler’s 1930 ‘The Epidemiology and Control of Malaria in Palestine’ page 135.)

“If the work in Palestine differs from that which had been done previously in other parts of the world, the principal point of departure lies in the fact that investigation preceded action. …… A new point of departure was indicated, and it was apparent that the exact direction could be determined only after a thorough as well as comprehensive study of the problem.” (1930-Kligler ‘Fighting malaria in Palestine.’)

“The essential thing is to have a thorough knowledge of the type of breeding-places and the habits of the local mosquitoes, and to apply the appropriate method to the particular local set of conditions. Just as it is difficult to generalize about methods of control for a given country, so it is dangerous to assume that any one method of mosquito control is suitable under all conditions.” (I Kligler 1930 ‘The Epidemiology and Control of Malaria in Palestine’ – page 140.)

“In brief, then, the malaria problem in Palestine is in some respects easier than in other countries, but in many other respects much more difficult. If Palestine is less well watered, it has a longer breeding-season and more vectors than in either Italy or the United States. These facts must be borne in mind, if the results obtained in Palestine are to serve as a criterion for similar work elsewhere. We are firmly of the opinion that these results can be duplicated in other places having similar conditions, provided the local problem is carefully studied and analogous antimosquito methods employed. In fact Hackett has achieved equally good results in his demonstration areas in Italy.” (I Kligler 1930 ‘The Epidemiology and Control of Malaria in Palestine’ – page 162.)

Kligler explained that the initial campaign against malaria, begun in 1922, was carried out along these main lines:

(1). Detection and treatment of carriers.

(2). An anti-mosquito campaign aimed principally at the larvae.

and also, in particular ………..(3) EDUCATION

Kligler repeatedly stressed the significance of education in relation to malaria-elimination.

[“Quinine as a prophylactic measure was not used anywhere, except for experimental purposes or where it was required for reasons of expedience to win over the local physician or the people. Even in those places, it was abandoned once the work was well under way.”]

1 Kligler 1930 ‘The Epidemiology and Control of Malaria in Palestine’ – page 163
1. Detection and treatment of carriers.

“The distribution of the quinine was carried on personally by the malaria inspector in charge, or by the local nurse under the control of the inspector. The important considerations underlying this part of the work were the detection of all carriers and curing them by prolonged treatment under careful control.”

(Malaria Control Demonstrations in Palestine page 144 – I Kligler)

“Another important point to bear in mind is that a large part of the malaria in Palestine is due to inadequate treatment. Unfortunately, relatively few people realise the importance of prolonged treatment in malaria. The physicians treat patients only to remove symptoms and leave a large residue of chronic malaria that is constantly recurring.” — (Malaria Control Demonstrations in Palestine page 170 – I Kligler)

Examination of the entire population, regular systematic weekly reporting of all malaria cases, and “For the ultimate control and eradication of malaria, the systematic and prolonged treatment of malaria patients under proper control is just as important as systematic inspection and control of canals and other breeding places” — (Malaria Control Demonstrations in Palestine page 171 – I Kligler.) He wished to ensure he didn’t include relapses as new cases.

“One of the first tasks of the Malaria Research Unit at the commencement of its activity was to organize regular, systematic weekly reporting of all malaria cases. Before work was started in a given section, the physician’s records, the laboratory findings, if any were available, and the personal history of each inhabitant were obtained. In this manner it was possible to establish a composite and fairly reliable record of the malaria cases during a greater or lesser period prior to the commencement of the work.”

(Dr I Kligler 1930 ‘The Epidemiology and Control of Malaria in Palestine’ - page 98).

2. An anti-mosquito campaign aimed principally at the larvae.

- Principle points when considering Breeding Places and Types of Anopheles: — (extracts from I Kligler’s “Malaria in Rural Settlements in Palestine, 1923)
  A. Influence of Topography on Breeding Places.
  B. Classification of Breeding Places:
     (i) Uncontrolled springs and seepage areas, and their resulting wadis.
     (ii) Irrigation canals (including the long, overgrown, open ditch).
     (iii) Accumulation of stagnant rain or ground water, holes in winter wadis, etc
     (iv) Breeding places along receding shores of natural streams and lakes and natural low lying swamps.

(Kligler commented that malaria caused by the breeding places of (i) and (ii) and some of those belonging to (iii) can be readily controlled, and will be completely eradicated as soon as the level of intelligence of the native population is raised, and as soon as the country is so well developed that all the spring waters are properly and intelligently exploited. (iv) can only be controlled by radical drainage. For Kligler’s complete commentary on this item, see below at pages 22 and 23.)
C. Types of Anopheles.
D. Character of Breeding Places.
E. Distribution of the Various Types of Anopheles.
F. Seasonal Prevalence.
G. Active period of Anopheles.
H. Flight of Mosquitoes.

“… in Palestine as in other malarious countries, the maintenance of anti-malarial engineering work is at least as important as the original project.”

(Page 13, League of Nations Malaria Commission, ‘Report on the Tour of Investigation in Palestine in 1925’)

The malaria inspector should ideally live locally.

“The inspector lived in his district and had complete supervision of the breeding places, actual and potential.” (Kligler and Shapiro – page 308 – Malaria in rural settlements in Palestine (1924).)

“Perhaps the important cause of this variability (in the efficiency of the control) is the difference in the effectiveness of the work of the local inspectors.” (I Kligler 1930 ‘The Epidemiology and Control of Malaria in Palestine’ – page 160.)

“The fourth important step in the effective organisation of a control area was the constant supervision. The work of the inspector, as well as that of the physician, had to be checked at frequent intervals, particularly during the early stages. This also had an educational value because it kept the question alive, ….”

(Dr I Kligler 1930 ‘The Epidemiology and Control of Malaria in Palestine’ - page 139).

“On examining the list of important breeding places found in the areas where the demonstrations were carried out, we find the significance of natural swamps is small when compared with the artificial breeding places. First in order of importance are those breeding places which arise from human carelessness and the general neglected condition of the country. ……… Another important factor is the neglected condition of the wadis and drainage canals which have been allowed for years to become overgrown. In comparison with the large number of artificial breeding places, the few natural swamps did not loom so large. The latter were not of primary importance. It is well to remember that no amount of drainage will overcome human negligence and ignorance, and that even drainage canals become a menace if not properly looked after.” (Malaria Control Demonstrations in Palestine, 1924 – page 169 – I Kligler)

It may be appropriate at this point to mention a comment made by an expert member of the Malaria Commission of the League of Nations immediately after the Commission had inspected the anti-malarial works in Palestine in 1925. The expert members before their departure from Palestine were invited to comment on what they had seen. Professor Ottolenghi of Italy said inter alia:

“The indiscriminate application of large drainage schemes (in Italy) had not been proved to have the desired effect, involving as it did much money and labour. Such schemes might perhaps serve to recall the attention of a population to dangers existing in marshy areas, but they were frequently too expensive to form a practicable measure. The ideal method of drainage, to quote an example from Palestine, was of the kind carried out at Balfouria.” (Proceedings of the 11th Meeting of the Antimalarial Advisory Commission – May 19th 1925)

There didn’t appear anything more in this report of the proceedings to indicate what was meant by ‘the method of drainage of the kind carried out at Balfouria’ but eventually the following came to light, and which I hope will assist. It is an extract from Dr Kliglers Nov 1923 report on progress of the Malaria Research Unit:

Re Balfouria.

“The highest malaria incidence occurred in the new settlement in the valley of Jezreel. Epidemics broke out in all of the places and most of them were directly due to the
drainage operations which were carried out there. Early in the spring work was started in this area; wadis were cleaned, springs regulated and practically all the breeding places brought under control. Then the drainage operations commenced and in the course of the work there developed a series of new man-made swamps which were impossible to control. The engineers were under the influence of the local tradition that drainage work cannot be carried out without a trail of malaria (perhaps to emphasise the effect of the drainage) and consequently paid little attention to the demands made of the Malaria Research Unit. Moreover, according to the original plans the work was supposed to be finished by the end of July, but only began in earnest at that time, and was not yet completed when the rain started in November. Water deflected from canals was not supposed to remain on the land more than 5 days, but from time after time it was allowed to stay 2 or 3 weeks, because it was impossible to complete the work in the time originally estimated.

The high malaria rate in these settlements is consequently no indication of the effectiveness of control in these areas. On the contrary it was a lesson on the value of co-ordinating engineering and anti-malaria requirements in the course of drainage. And this lesson has borne fruit. This year when drainage was started in the new settlements of Balfouria, and arrangements made to complete the work in Nahalal, Ein Harod etc., special clauses were inserted in the contracts requiring the engineers to arrange the work in accord with antimalaria requirements.”

(3) EDUCATION

[Hygiene and Cooperation. It will probably be noted that the following quotes relating to education of people deal with the transmission-of-malaria and thereby hopefully secure the “cooperation” described below required for malaria elimination. Hygiene is the usual assumption made when health matters are considered within the topic of health and education. Hygiene is a positive virtue in the context of general health but it must not be confused with malaria transmission and the “cooperation” described below when considering education in the context of malaria elimination.]

“The work will be initiated with an illustrated public lecture; printed illustrated pamphlets on malaria will be distributed, and if possible posters and exhibits will be prepared. In this way general and individual education will be an integral part of the campaign.” (Survey of Migdal and Surroundings - March 1921)

And from 1922 onwards:

“Other villages …..have, under the direction of the Antimalarial Sub-Inspectors, cleaned up the wadis and got rid of stagnant pools in the wadi bed ….; and it has been encouraging to note the eagerness many villages, which originally did not appreciate the value of such measures, showed in carrying out this work. ………

With a view to popular education illustrated notices written in simple language and

Swamp area after control measures
giving information on the causation and prevention of malaria have been printed and posted in villages, and pamphlets for use in schools have been also issued.

……… The (Antimalarial Advisory) Commission was instrumental in drawing up the Antimalarial Ordinance which came into force in April (1922) and which defined and gave great powers for dealing with mosquito breeding places.” (Page 49- Annual Report of the Dept of Health for the year 1922.)

“This is not the place to describe the technical details of the (malaria control) work. It involved first of all training of personnel; then a study of the epidemiology of disease in man, a survey of the nature and distribution of the breeding places of these anopheles mosquitoes which act as the intermediary host between the sick and the healthy; studies of the habits and peculiarities of these anopheles, and finally comparative tests on a large scale of the effectiveness of different methods of control. It involved a more difficult task, namely education. It was necessary to remove a variety of prejudices both on the part of the heterogenous population of the country and on the part of the members of the medical profession. Moreover, the success of the work demanded the cooperation of various agencies – medical and colonizing – whose passive resistance would have rendered the early work difficult and without whose active assistance full success would have been impossible. The educational aspect of the work was certainly as important, if not more so, as any other.” (‘Fighting Malaria in Palestine’, IJ Kligler, Sept 1930)

“After the survey was completed, the real task, the organisation of effective control, began. Most often this involved a preliminary period of education. It was necessary to educate and win support of the local physician or nurse, chief of the village, or the administrative committee. As a rule, there was no trained personnel, and people had to be trained to do the work. Finally, it was important to enlighten the population and win their support.” (I Kligler 1930 ‘The Epidemiology and Control of Malaria in Palestine’ – page 138.)

“The education of the inhabitants was … by no means the least important element which conditioned the success of the work. Without active co-operation on the part of the people, the work would have been only partially successful. It was possible to obtain their active co-operation only after they understood fully the significance and value of the work.” (Page 139, ‘The Epidemiology and Control of Malaria in Palestine’ Dr I Kligler 1930)
“Education is as important in malaria control as in other phases of Public Health Work.”
(Page 172. ‘Malaria Control Demonstrations in Palestine’ Dr I Kligler 1923)

“These (Malaria Control Demonstrations) ….. also served as an excellent means of practical education of the public at large in the value of malaria control. The educational value of the demonstrations is perhaps equal in importance to the immediate practical results obtained.”
(Dr I Kligler 1924 in the introduction to the 1923 Annual Report of the Malaria Research Unit, Haifa.)

And Kligler provided examples of what such education could include:

“…… illustrated lectures on malaria, its causes, prevalence and modes of prevention; by illustrated pamphlets; and by personal interviews and visits to delinquent families by local malaria inspectors. Palestine had its own Health Day with lectures, visits to breeding places and demonstrations of methods of control.” (“The Fight against Malaria” – Dr I Kligler 1925)

“….. the doctor spoke to each individual explaining the purpose and import of the work. Throughout the year the malaria inspector would visit various delinquent families and impress them with the dangers resulting from their carelessness. A special Health Day was set aside on which lectures on malaria and other infectious diseases were given to the school children. After the lecture the children made an inspection tour … in company of the teacher and the malaria inspector, in the course of which the latter pointed out breeding places and demonstrated methods of control. In brief, every opportunity was taken to keep the issue alive.” (Page 145. ‘Malaria Control Demonstrations in Palestine’ Dr I Kligler 1923)

Education was absolutely essential because:

“The only practical solution to the problem in these places ….. is Continuous and Systematic control. By means of continuous control, the wadis and canals can be gradually put in condition ….. and kept so at very little cost. Slowly the man in charge can drain one small swampy area after another, prevent the development of artificial swamps near springs, irrigation canals, and bath houses, and check mosquito breeding in water reservoirs, barrels, and other receptacles where water is habitually kept. The important thing is slowly to develop the habit in the settlers to carry on the work themselves.”

(‘Malaria Control Demonstrations in Palestine’, 1924 I Kligler – page 170)

“The remedies for the malaria situation in Palestine are briefly; (1) the cooperation of the various settlements in the cleaning of their respective long-neglected and consequently overgrown wadis. ……. ; (2) the improvement and control of the method of irrigation. ……..; (3) the gradual drainage of the swamps resulting from underground seepage, overflowing springs, etc., by the inhabitants in cooperation with other agencies. ….. ; (4) the constant supervision of all these places to protect the inhabitants against their own negligence and indifference and inculcate the habit of proper self-care.”

(‘Malaria Control Demonstrations in Palestine’, 1924, I Kligler – page 172)

“The control of malaria is a task which calls for intensive and detailed supervision to a special degree. It is therefore clear that a unique test in the efficiency of the methods of antimalarial control, as practised in Palestine, has resulted.” (page 1 of A Review of the Control of malaria in Palestine (1918-1941))
The fruits of education – cooperation.

“……. The lasting effects of swamp and marsh reclamation, … filling and clearing stream beds, have so impressed the people by the resulting improvement in health, …… that their prompt and energetic co-operation is one of the most remarkable features of the antimalaria campaign in this country.”

(page 33 of A Review of the Control of malaria in Palestine (1918-1941))

“Above all, it has succeeded in inducing the people of the country to take an interest in health problems and to co-operate in measures for the prevention of disease.”

(League of Nations – ‘Reports on the Tour of Investigation in Palestine in 1925’ – page 24)

“Thus public cooperation was an essential and early feature. In rural areas, headmen, both Arab and Jewish, were soon, with little persuasion turning out squads of villagers and settlers to clear and drain small wadis …… in the vicinity of their homes, a procedure which was rapidly developed into an annual seasonal occurrence on the cessation of the spring rains, to a set plan. The most ignorant of villagers appeared to rapidly appreciate the work of the Department of Health.”

(page 19 of A Review of the Control of malaria in Palestine (1918-1941).

“That this disease has not produced any actual increased damaging effect on the community as a whole in spite of existing troubles is therefore a matter for satisfaction. That this result is due to the system of observation in force, and to the prompt action taken on any evidence of increased incidence in any area, may be accepted as reasonable explanations.” (1938 Annual Report, Dept of Health. Page 50.)

“All members of the (Malaria) Commission were much impressed with the activity of the Gvt. Health Dept. in relation to anti-malarial work and with its success in enlisting the help of … the voluntary services of the people themselves. In the opinion of the Commission, what measures of anti-malarial success has been attained in Palestine is due primarily to the creation and development of this Public Health Service, which, while not neglecting other branches of work, has devoted its energies very largely to the systematic control and prevention of ……malaria in particular.”


“….any (mosquito) breeding danger can be eliminated from every village and settlement community. This is achieved …. by a wider application of that unique co-operation from both Arab and Jew which is a distinctive feature of the Palestinian campaign against this important disease.”

(page 34 of A Review of the Control of malaria in Palestine (1918-1941)

And if there was a lack of co-operation:-

“Rarely was it found necessary to revert to definite coercive measures. When this was so, the Antimalarial Ordinance already noted proved to be a progressive factor of the first importance. In addition, this enabled clearing and channelling to be enforced where this was resisted. Thus minor drainage and reclamation schemes which had previously been considered to be an impossibility could, and were, rapidly completed by free labour under specialised supervision. This action had the further excellent propaganda result of opening up waste land to fertile cultivation.”

(page 19 of A Review of the Control of malaria in Palestine (1918-1941)

An Acceptance of Malaria.

Education was also necessary to fight an acceptance of malaria, a fatalism or a sense of inevitability of the disease.

“……. It has to be remembered that a considerable section of the population tends to ignore malaria in areas in which it is common.” (page 12 of A Review of the Control of malaria in Palestine (1918-1941)
“The Arab peasants ….. have lived in their present condition for generations … They have no physician, and seek none except in extreme cases. ….. They consider illness a decree from heaven and death the will of Allah.” (Page 114 The Epidemiology and Control of Malaria in Palestine. I Kligler. 1930)

Since the commencement of the anti-malaria work “ …. malaria has been robbed of its mystic attribute, its inevitability: it has been revealed as a preventable – and eradicable – disease.”

(The Fight against Malaria 1925 – J Kligler)

“In the beginning of the work, many difficulties were encountered, but by patient instruction and demonstration, most of them were gradually overcome and at present the people, whether urban or rural, Arab or Jew, are ready and willing to carry out requirements of the Medical Officers of Health both in respect of their private premises and on communal lands.”

(League of Nations, Malaria Commission, Reports on the Tour of Investigation in Palestine in 1925 – pag15)

“The present widespread organisation of antimalarial measures throughout the country has resulted in even the most backward sections of the rural communities having some general knowledge of malaria ….”

(Page 26 of A Review of the Control of malaria in Palestine (1918-1941) Co-operation despite disturbances 1936-1939

“Under (the heading of) Public Security, it is said that for some time past Palestine has been the most peaceful country of any in the Middle East.”

(League of Nations Malaria Commission ‘Reports on the Tour of Investigation in Palestine in 1925’, page 22.)

Palestine Royal Commission – 1937- Report into the causes of the disturbances which broke out in April 1936 :-

“1926-1929 ……. It is significant that these years of depression had been years of peace. …….. (The Government) kept the forces available for maintaining order at the very low strength to which they had been reduced in 1926 …” Page 64.

“The Civil Police Force in Palestine had been reduced from 78 officers and 1,159 other ranks in 1922 to 73 officers and 966 other ranks in 1925. Sir Herbert Samuel, in his survey of the five years (to 1925), referred … “For some time past Palestine has been the most peaceful country of any in the Middle East.”” Page 187.

“An unfavourable feature of the year, as a whole, was the disturbed political situation which rendered the regular supervision of mosquito breeding places a matter of danger and difficulty to the staff of the department both in town and country. It is a pleasant duty to record the loyalty which the staff of the department and temporary employees displayed in carrying out the important service which is for the general benefit of the community. ….. In spite of these difficulties it is satisfactory to record that the year passed without serious epidemic recrudescence in any locality.” (Page 29 Dept of Health, Annual Report for 1936.)

“…..although the generally unsettled state of the country probably rendered control of malaria conditions in the rural districts more difficult in this disease than in any other. Nevertheless, routine measures were well maintained and general incidence continued to be negligible. ….. The work of previous years, the system of observation in force, and the prompt action taken in any increase in incidence in any area must receive due regard in this respect.” (Page 51, Department of Health, Annual Report for 1938.)
“Antimalarial clearance throughout the country was carried out as usual in spite of the disturbances and the rural population contributed free labour under terms of the Antimalarial Ordinance to the extent of 74,594 labour days, and cleared 1,000 kilometres of water course. There was more difficulty than usual in obtaining free labour.” (Page 11, Department of Health, Annual Report for 1939.)

“……….the main adverse factor (in some increase in malarial incidence in the country as a whole during 1939) was the continued unsettled state of the political situation. This state of affairs particularly affected certain rural districts, and thus led to delay and difficulty in obtaining the usual seasonal routine control over streams, and other water holding places, by villagers and landowners under the supervision of the Department. Localised epidemics resulted which had to be dealt with by mass treatment. Nevertheless the wide and detailed scheme which has been developed in Palestine over a decade again prevented any real damaging effect on the community in general. Thus the incidence of the disease continued to be negligible in urban areas, and low in most rural districts.”

(Page 44, Department of Health, Annual Report for 1939.)

“As the general scheme has gradually advanced in scope, so the community self-help which has been stressed already as a particular feature of the antimalarial scheme here has come more and more to the fore. …….. In rural areas, all headmen, and villagers and settlers, must cooperate in the cleaning and channelling of the more important streams and other water holding places adjacent to their dwellings, under skilled government supervision. This is now a seasonal procedure after the April rains. ……… Until the recent political upheaval such co-operation was willingly, and even enthusiastically, given. For as the health of villagers and settlers improved from year to year: as dunum after dunum of waste land was gradually added to the use of farmers and shepherds, so did this co-operation steadily increase in volume and energy. Even during the ‘bad years’ only certain districts could be said to be really adversely affected in this respect. ………… Where feeling was intense, however, delay and difficulty in obtaining the usual seasonal routine control, combined with the danger and difficulty in regular supervision, did have a serious effect. …….. The increase in malaria in various areas up to 1940 has therefore a close association with political activity and unrest. That no actual and serious damaging effect on the community as a whole has resulted from these troubles is a matter for satisfaction: a result due, without doubt, to the system of observation, and wide and detailed control of the disease, now practised in all the most populous and important sections of the country.” (page 24 of Department of Health - A Review of the Control of Malaria in Palestine (1918-1941))

Malaria eradication was only one facet to this diamond, Dr Kligler, and his other scientific activities in other areas could be the subject of several other papers and conferences. He assumed responsibilities and was prepared to assist for the benefit of mankind wherever his help was requested, and he was even awarded one of Poland’s highest honours from the Polish government-in-exile for developing a vaccine against typhus for thousands of refugees in Eastern Europe during World War 2. He continued to give his attention to all details in all the activities he undertook, to ensure successful outcomes. His was a passion for applied logic in all his endeavours, and to these ends, he was rigorous and demanding in his pursuit of data that was correct, checked and relevant.
In 1925 the question asked was:-

“Why has the Anti-Malarial work in Palestine been so successful?”

and the answer then was:-

“In the first place, because evidence was available to prove that it was so.”

(League of Nations, Malaria Commission, ‘Reports on the Tour of Investigation in Palestine in 1925’, page 37)

Today for the same question, the answer is:-

A visit to Israel now, in 2013 will also show and emphasise that the anti-malarial work of 90 years ago was so successful, because evidence, namely the obvious and apparent robust state of health of Israel, is available to prove that it was so.
Annex 1.


Whereas it is desirable in the interests of public health to authorise measures of precaution to be taken against the spread of malaria by the prevention of the breeding of mosquitoes:

Be it hereby enacted by the High Commissioner for Palestine, after consultation with the advisory council, as follows:

Occupiers to take precautions against breeding of mosquitoes.

1. Every occupier or, in the absence of the occupier, every proprietor of a house, garden or land, within the areas to be defined by this Ordinance, shall take all necessary precautions in accordance with this Ordinance or the regulations that shall be issued under it by the Department of Health to prevent the breeding of mosquitoes. In the case of two or more persons being registered as joint occupiers or joint proprietors, each of them shall be deemed an occupier or proprietor for the purposes of this Ordinance.

Application of Ordinance.

2. The Ordinance or any part of it, and the regulations or any part of such regulations as shall be made under the Ordinance, shall be made applicable by order of the District Governor to the whole or part of any municipal area or to any place within three kilometres of the municipal boundaries or to other town or village or special area.

Prohibition of rice-growing in certain areas.

3. The growing of rice is prohibited within three kilometres of any boundary of any municipal area or of any other area which has been proclaimed under Article 2 as an area for the purposes of this Ordinance.

Occupiers of irrigated lands to take measures to prevent breeding.

4. The occupier or proprietor of irrigated lands or gardens shall take measures necessary to prevent his drains, private canals or irrigation channels from providing breeding-grounds for mosquitoes. Such necessary measures may be communicated
by the Department of Health or may from time to time be published in the form of
a General Regulation. Any new drain on such lands shall be so constructed as to
comply with the provisions of this Ordinance and the regulations made thereunder.

Drainage of marsh lands.

5. Where a main drain or other reasonable facilities for drainage exist in the
neighbourhood, the occupier or proprietor of any land may be called upon by the
Department of Health to make such connections as shall result in the drainage of a
marsh land which is declared by the Department of Health to be a source of malaria.

Streams and water-courses to be kept in proper condition.

6. The Department of Health may require the occupier or proprietor of land
through which streams or water-courses pass to keep such streams or water-courses
in such a condition as will not allow of mosquito breeding. For this purpose the
Department of Health may require such occupier or proprietor to comply with
its regulations and with any instructions in accordance therewith which it may
issue in any specific case.

Right of entry.

7. Any official of the Department of Health of the rank of Sub-Inspector or of
higher rank may at any convenient time in the daytime enter upon any premises
situated within an area to which this Ordinance applies for the purpose of ascertaining
whether any breach of this Ordinance or of the regulations made thereunder is being
committed thereon.

Provided that no entry shall be made into a dwelling-house without the consent
of the occupier or an order of a magistrate.

Penalties.

8. Any person who contravenes any of the provisions of this Ordinance or of the
regulations that shall be made under it shall be liable, on conviction by a Magistrate,
to the penalties provided in the addendum to Article 99 of the Penal Code for the
breach of regulations of the Government concerning infectious diseases, provided that
in the case of a first conviction no fine greater than £6.5, and no term of imprison-
ment exceeding fifteen days shall be inflicted.

Power of Department of Health to carry out preventive measures.

9. The Department of Health, after having served due notice upon a person
requiring him to carry out the necessary measures, and after a failure of compliance
with such notice, shall have the power, with the approval of the Governor, to carry
out such measures itself and to recover the costs from him.
Regulations.

10. The Director of Health, with the approval of the High Commissioner, may make regulations for the better carrying out of the Ordinance. Such regulations shall come into force from the date of their publication in the Official Gazette.

Citation.

11. This Ordinance may be cited as the Public Health Anti-Malarial Ordinance, 1922.

Government House, Jerusalem.           Herber Samuel,
March, 1922.                        High Commissioner.

(Published in Official Gazette No. 64, dated April 1st, 1922.)

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Annex 2.

REGULATIONS UNDER THE PUBLIC HEALTH Anti-MALARIAL ORDINANCE 1922, ARTICLE 10.

1. Within any area to which the Anti-Malarial Ordinance (hereinafter referred to as the "Ordinance") shall have been made applicable, all wells and cisterns shall be registered by the occupiers or, in the absence of occupier, by the proprietors at the District Health Office in the aforesaid area.

2. All wells and cisterns within any such area shall be kept properly covered or provided with pumps, so as to be mosquito-proof.

3. All cisterns or tanks shall be provided with proper mosquito-proof covers, which shall be kept closed and in good repair, or with pumps, which shall be maintained in working order, to the satisfaction of the Public Health Authority. All zirs, barrels and other movable water receptacles shall be similarly covered and completely emptied at least once each week.

4. All fountains or artificial ponds shall either (i) be so constructed as to be completely emptied by the removal of a plug and shall be emptied and dried weekly or (ii) be dealt with to the satisfaction of the Department of Health by such means as shall keep them free from mosquito larvae.
5. In the construction of valve pits for water-pipes all reasonable means shall be employed to render them incapable of retaining water.

6. In all casual collections of water in gardens, courtyards or elsewhere, all reasonable precautions shall be employed to prevent the breeding of mosquitoes. Specific precautions for such purpose may be issued by the Department of Health to any individual occupier or owner.

7. All ventilation shafts shall be covered with wire mesh in such a way as to prevent the exit or ingress of mosquitoes.

8. The inlets to water-storage cisterns shall be plugged during the dry months.

9. All cesspits shall be provided with mosquito-proof covers and shall be kept in repair to the satisfaction of the Department of Health.

10. In the case of irrigated lands or gardens, every occupier or owner shall keep any canals, irrigation channels, water-courses or drains, which are on his land or in respect of which he enjoys a servitude or easement, clear and free from obstruction, and repair the banks thereof so as to prevent leakage of water. He shall keep clean and free from obstruction existing drains and such drains as may be subsequently made.

11. All disused wells, cisterns, cesspits, drains or gullies shall be filled in or removed.

12. All pits, holes, borrow pits on private land, by the side of roads or railways, or other excavations containing water, whether during the rainy season or at any other time, shall be filled in. In the case of excavations for the foundations of buildings actually in the course of construction, the proprietor of the land or, if he is not known, the occupier by whom or by whose order such excavation shall have been made, shall take such steps to prevent the breeding of mosquitoes as will satisfy the Department of Health.

13. Where cellars or basements are flooded at any time, the occupier or proprietor may be required by the Department of Health to raise the floor of the basement or to treat the water in such a way as shall prevent the breeding of mosquitoes.

14. Anything which would on land be an offence against these regulations shall be an offence if committed on any steamer or boat moored within the area to which the Ordinance is applicable.

15. If, as the result of inspection under the above article, or in any other case, any condition is found requiring to be remedied by the occupier or proprietor, written notice of the result of the inspection shall be served either at the time of or after the inspection, requiring the person responsible to carry out the necessary measures within such reasonable time as shall be determined by the Department of Health.
16. Every occupier leaving his house temporarily unoccupied shall take precautions to prevent the breeding of mosquitoes within the house and gardens during his absence.

G. W. HERON,
Director of Health.

Approved:
Herbert SAMUEL,
High Commissioner.

May 23rd, 1923.

(Published in Official Gazette No. 93, dated June 15th, 1923.)

Annex 3.

Routine Anti-Malarial Measures.

1. All oiling of wells or other measures must be performed under the supervision of the Medical Officer of the District.

2. No oil or larvicide will be issued except under authority of a Medical Officer. Receipts will be kept for each amount issued.

3. In towns the area of the whole district will be divided into six sections. Each section will be dealt with only by the staff detailed for this work. One day a week no work.

4. The whole of the staff detailed for this work will work in the same section and complete this section in one day.

The Mukhtar of district or his representative will accompany the anti-mosquito staff throughout the day, when his presence is required.

5. Every effort must be made to supply or repair covers of cisterns, and to repair and close openings or crevices in the masonry of cisterns.

6. (a) All cisterns will be numbered by permanent distinguishing marks in paint. They will receive the following treatment: 15 cc. of Solar oil or of the following mixture: four parts of paraffin to one of crude oil to each square metre of surface. Application will be made once fortnightly. If previously treated, half this amount will suffice.

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(b) All cess-pits to be numbered.

All cess-pits which have any external opening, through ventilator, latrine seat, or pan or crevice, to be oiled with Solar oil or a mixture of equal parts of paraffin and crude oil, 15 cc. to each square metre of surface.

(c) All ponds or water collections that cannot be drained to be cleared of weed and edges ringed.

(d) Privies within the city that are choked to be oiled with equal parts of paraffin and crude oil.

(e) Street gulleys to be raised and examined, and, if a collection of stagnant water is present, to be oiled.

(f) Zoors and tubs to be emptied of water.

7. Oil mixtures to be prepared at the District Health Office. Different mixtures to be supplied as required.

Issue register to be kept by storekeeper and amounts of each kind of oil to be entered. Sub-inspector to initial the entry daily on receipt of supply.

Convenient depots for additional oil mixture should be arranged.

8. Oil mixture to be measured into a litre tin by means of a quarter-litre tin, and water added to fill tin before the mixture is thrown into the cistern or cess-pit.

9. Arrangements should be made to drain pools by pumping into nearest sewer when possible. Pools that cannot be pumped dry to be cleared of weed, filled in or oiled. Large pools that cannot be drained or otherwise dealt with should be ringed with earth and edges cleared of weed and undergrowth, and small fish such as gold fish, “Bolti” or Cyprinodon introduced.

10. Medical Officer will supervise the work and arrange to inspect one subsection of the work daily.

11. A routine book is to be kept by each Sub-Inspector to show:

(a) Numbers of cisterns, cess-pools and ponds dealt with each day.
(b) Cisterns found uncovered.
(c) Cisterns or cess-pools repaired.
(d) Cisterns or cess-pools still requiring repair.
(e) Cisterns, cess-pools or ponds about which mosquitoes have been seen (showing variety of mosquito, anophelus or culex) or in which larvae have been found.

12. Regulations for the permanent closure of cisterns and wells by pumps and covers are detailed in special circular and in Anti-Malarial Ordinance.

13. Special drainage works will be dealt with as circumstances necessitate.
Malaria in Rural Settlements in Palestine

most extensive in Palestine and makes the surrounding plain at the headwaters of the Jordan and Lake Meron uninhabitable.

Classification of Breeding Places. Most of the anopheles breeding places are due either to century old neglect by man, or to man's carelessness. There are the numerous springs mentioned above, with an abundance of water which runs to waste and forms overgrown wadis (perennial wadis), and swamps, offering all kinds of ideal conditions for anopheles breeding. There are also numerous watering holes and primitive leaky irrigation ditches, which are responsible for a goodly portion of the malaria in Palestine. Large swamps in the true sense of the word exist as indicated above only in Huleh, in the low flat areas of the Jordan and in the Coastal Plain.

For convenience the principal breeding places have been grouped into four categories. These are given below, approximately, in the order of their relative importance, in so far as the causation of malaria is concerned:

1. Uncontrolled springs and seepage areas, and their resulting wadis.
2. Irrigation canals.
3. Accumulation of stagnant rain or ground water, holes in winter wadis, etc.
4. Breeding places along receding shores of natural streams and lakes and natural low lying swamps.

(1) The breeding places of the first category are found in practically all of the settlements located in the foot-hills. There is always a spring, or a larger, or a smaller seepage area (series of springs) which is partially or wholly uncontrolled. The excess water runs off in a wadi, seeps through gravel beds and zigzags for long distances; the wadi is shallower in some parts and deeper in others, is badly overgrown along its whole length and presents a variety of excellent breeding places more or less difficult to control.

(2) The irrigation canals present a serious problem. They are in reality poorly constructed ditches, too shallow to hold all the water they carry, and too pervious to exclude seepage along their entire length. In a short time the ditch itself becomes overgrown. The long, overgrown, open ditch, the swampy areas resulting at low lying points from seepage through the walls, and the marshes caused by the overflow of the canal, give rise to a large number and variety of breeding places. This problem has become more serious recently, since almost everywhere irrigation is being employed more extensively for vegetables, tobacco, etc.

(3) Stagnant accumulations of water exist almost everywhere, but are particularly abundant in the highlands and in the plain near the coast. These accumulations take the form of cisterns, wells or reservoirs, watering holes along dry wadis, deep erosion holes in winter wadis tapping ground water, accumulations of rain water which find their way to the sea blocked by sand dunes or other obstacles and others of similar character. Inland they are usually small and easily controlled by cleaning and diving, but near to the
coast they assume the characteristic appearance of the coastal swamps caused by the sand dunes, or sandstone outcroppings, and present serious difficulties. The Cabara swamps, the old Athlit swamps, Birket Atta, are examples of this type of breeding place.

(4) The breeding places of the fourth class are practically limited to the Huleh swamp, Lake Merom and the Jordan. They are a serious menace, and can only be got rid of by drainage.

From the standpoint of control we may say, by way of anticipation, that malaria caused by the breeding places of the first two and some of those belonging to the third categories can be readily controlled, and will be completely eradicated as soon as the level of intelligence of the native population is raised, and as soon as the country is so well developed that all the spring waters are properly and intelligently exploited. The large coastal marshes, however, can only be controlled by radical drainage. One of these swamps at Athlit, has already been drained by a company which has received a salt concession and the I.C.A. has agreed to drain the largest of them, the Cabara swamp, on the basis of a land concession given them by the Palestine Government.