

The interaction of scientific evidence and politics in debates about preventing malaria in 1925

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Introduction

Malaria parasites were identified by Laveran in Algeria in 1883, their cycle largely elucidated by Ross in India in 1895 and transmission of malaria by *Anopheles* was identified by Grassi in Italy in 1899.^{1–3} Very soon after the transmission of malaria had been elucidated, the first science-based approaches to preventing the disease were designed and implemented by Celli in Italy.^{4,5}

Italy had had a tradition of draining marshes going back to Etruscan times. In 1883, this strategy was officially implemented by an Italian Royal law and named Bonifica. Because of the role of water in the breeding of *Anopheles*, Bonifica was not unnaturally assumed to be a way of controlling malaria. Although anti-malaria prophylaxis based on intervening in the biology of *Anopheles* or on extensive land drainage could be seen as complementary procedures, they were curiously seen to be in opposition. The efficacy of Bonifica as an anti-malaria measure was challenged by experts in malaria prophylaxis and epidemiology. However, in 1925 the Italian government chose to favour Bonifica, and this shaped Italian anti-malaria campaigns for the next 15 years. In selecting Bonifica as the ‘official’ Italian policy of malaria prophylaxis, conflicts within the fascist movement⁶ played a more significant role than that of science and medicine.

Malaria in Europe in 1925

The year 1925 was certainly a significant one in comparing approaches to preventing malaria in Europe. During World War I (WWI), a dramatic epidemic of the disease had extended as far as Arkhangelsk, in Northern Russia,⁷ and it had expanded over subsequent years. This prompted the Commission of Hygiene of the League of Nations to survey malaria in the affected European countries in 1923. The survey aimed to compare the different methods being used to fight the disease and identify the

simplest ways of doing this. In March 1925, the Commission concluded that local prevention of malaria using simple methods was at that time the most effective approach, but that these would not lead to the eradication or even the control of the disease.^{8,9} Other methods had to be developed.

In October 1925, the First International Congress of Malariology was held in Rome. It gathered together internationally known malariologists, along with the experts who had contributed to the report of the Commission. The Congress brought some hope for progress with the Rockefeller Health Board’s presentation of preliminary results of the introduction of Paris Green and of larvivorous fishes in Spain and in Italy, both local actions.^{10,11} Apart from scientific papers presented at the Congress, Italian government officials emphasised Bonifica as Italy’s long-term policy for preventing malaria. The choice facing policy-makers can be summarized as either (i) invest in large-scale public engineering works like Bonifica to deprive *Anopheles* mosquitoes of their habitat, as the Italian government suggested; or (ii) invest in training populations in anti-mosquito procedures until some improved chemical or biological measures had been discovered, as the Commission and most malariologists recommended. This debate inevitably set in opposition those in favour of implementing broad social reforms, like Bonifica, with those who advocated anti-mosquito measures and treating patients.¹²

In fact, there was no convincing evidence supporting either of these approaches. The epidemics following WWI were interruptions in what had been a long-term decline in the morbidity and mortality from malaria in Europe since the second half of the 19th century.^{1,2} One or more of a number of reasons might account for this long-term trend,¹³ and the specific contribution of the anti-malaria measures in the Bonifica programmes was not easily discerned and certainly did not appear evident to members of the Commission and to Congress participants. What

was the basis for the virtually exclusive choice of Bonifica by the Italian government?

Italy as the model for the control of malaria

Malaria prophylaxis in Italy had developed as follows (see Ref. 13 for a detailed analysis). Soon after discovery of the mode of malarial transmission, the Italian government passed a law establishing a State monopoly for quinine trade and distribution. Quinine became widely and regularly distributed to workers and children. The Torino quinine factory, under the control of the Ministry of Finance, produced 60 tonnes of quinine a year (a further 27 tonnes were imported).¹⁴ The drug was sold at fixed prices and distributed either through municipal dispensaries or through charities. About 10,000 specialized physicians (*Condotti medici*) were responsible for malaria surveys and treatment, and the Directorate of Public Health was in charge of malaria sanatoria, as well as mobile and static dispensaries.

Compared with this Italian administrative and medical sophistication, the other states visited by the League of Nations Malaria Commission in 1924 appeared poorly organized. Actually, malaria was the disease of Italy^{13,15} and Italy had been referred to as the administrative and medical model for the control of malaria by the League of Nations, as was repeatedly pointed out in the report of the Commission (1925),¹⁶ and particularly in Raynaud's report on malaria in Italy.¹⁷

Since 1883, the traditional Italian approach to 'fevers' was the set of procedures known as Bonifica, which had been introduced to deal with land reclamation from water. With the identification of *Anopheles* as the vector of malaria, however, it soon became presented as a component of anti-malaria campaigns. The Commission explained that Bonifica:

...consists primarily in agricultural reclamation of large areas of land, upon which peasants can be settled permanently with a prospect of gaining a decent livelihood; and secondly, in the provision of these areas of progressive arrangements for adequate medical attention in sickness, for technical and elementary school education and for sanitary measures of housing, water supply, conservancy and general welfare.¹⁸

To achieve these anti-malarial goals, multiple laws and decrees were introduced building on the principles of Bonifica and these reached a high degree of legal sophistication. The persons authorized to intervene in Bonifica (private as well as public) were

clearly identified, and the local Society for Bonifica was in charge of coordination.^{13,15} For example, *Agro romano*, law 647 1905 refers to the part of Latium that extends south of Rome. It defined the aims and constraints of Bonifica and created a local commission to control the progress of land reclamation. In addition to the members of the Institute of Hygiene of the University of Rome, the local commission included two land owners who were interested in Bonifica, for example, representatives of the Principe Torlonia family. The law authorized colonization of lands belonging to the state, along with the transfer of populations from other parts of Italy. Law 491 dated 10 July 1910 defined the required attributes of doctors in the programme, the organization of dispensaries, each of which was directed by one of 16 physicians appointed by the central health administration.

A law passed in December 1923 had developed the text of the 1883 law into a complete theory combining improvement of land and agricultural settlements with eradication of malaria. This was designated 'Grande Bonifica' (or 'Bonifica Integrale').

With the arrival of fascist rule, substantial funds were invested in educating people, land reclamation, extensive drainage and construction of hydrological systems, under the direction of the Ministry of Public Works and of local consortia. Grande Bonifica (or 'land-based' prophylaxis of malaria) thus combined several diverse approaches. The efficient organization of quinine administration, which had been in place since 1900, came to be referred to as 'Human Bonifica'. Local anti-larval measures were called 'Small Bonifica'; although these were strongly supported by Grassi and other malariologists in the laboratory at Fiumicino, near Ostia, they were officially considered helpful but of relatively minor importance, probably because many malariologists were opposed to the Ministry of Interior of the fascist government. 'Land Bonifica' consisted in the agricultural development of reclaimed lands. Finally, training of specialized personnel was emphasized, for example, in the training station of Nettuno, near Anzio.

Lucien Raynaud, inspector general of the Algerian health services and the member of the League of Nations Commission who was responsible for the report about malaria in Italy,¹⁷ considered that this series of related laws reflected successive scientific discoveries. He suggested that Bonifica was a 'natural' long-term anti-malaria project. Although the choice of the places where the complete set of measures of Grande Bonifica (or Bonifica Integrale) would be applied was economic (Pô valley) and political (Pontine Marshes), Raynaud concluded that the

control of malaria was the primary goal of the substantial changes introduced to the lives of human beings and to the environment. Lutrario estimated that more than 500 million lire had been allocated to Bonifica since 1883 and noted that mortality rates had declined from 500 to 63 per million per year between 1900 and 1923 in the areas in which Bonifica had been applied, while remaining at about 400–500 per million per year in other parts of Italy.¹⁹

Nicholaas Swellengrebel's challenge to claims about the specific impact of Bonifica on malaria

Bonifica appeared to be a success; but what, in the complex context of Grande Bonifica, accounted for the decline of malaria mortality? The role of Bonifica as an effective anti-malaria programme was fiercely questioned at the League of Nations Commission on Malaria, particularly by Nicholaas Swellengrebel, a highly regarded Dutch malariologist and medical entomologist, who had long worked in the Dutch East Indies. Swellengrebel posed the following pertinent questions to Raynaud and the Italian officials: was it true that the Grande Bonifica policy was aimed at controlling malaria? Was it clear which elements of the policy were actually effective against the disease? Should the Commission recommend other countries to follow an Italian model based on the particular situation encountered in the Pô valley, Agro Romano and Pontino?³⁰

The discussion by Swellengrebel in the Malaria Commission's Report (1925) is a model of the epistemological approach to disentangling different components of a complex intervention like Grande Bonifica, which is needed to identify and implement appropriate prophylactic interventions. After a cautionary introduction, Swellengrebel stated that he was not convinced by official reports, numbers and logic. For him, the answer to all of the questions he had posed was 'No'. He first pointed out that land drainage and quinine distribution were not recent interventions and proposed the disaggregation of the interventions now covered by the term 'Grande Bonifica'. Malaria had been historically associated with marshes, but marshes were not endemic areas for malaria because few people lived near them. That applied to malaria-infested areas near Rome. (Snowden¹³ subsequently confirmed that, in 1928, there had been a maximum population of 1637 persons in the Pontine Marshes and no substantial permanent settlement).

Swellengrebel also pointed to the lack of evidence supporting the proposition that extensive hydrological works and drainage resulted in decreases in

malaria. On the contrary, engineering works often increased the number of mosquitoes and increased endemicity of the disease because of the influx of agricultural workers into the reclaimed land. Because the population became wealthier, people developed milder forms of the disease: thus, although overall lethality decreased, endemicity did not.

Swellengrebel noted that he had observed similar developments in the Netherlands and in the Dutch East Indies (where there had been no bonifica-like initiatives), and he assumed the same held true in Italy. It was thus not correct to define Grande Bonifica as an anti-malaria strategy. Whenever sanitary conditions had genuinely been improved, the anti-malaria effects were likely to have been due to better housing and to a variety of improvements in hygiene, such as occurred with the creation of small new towns in the centre of the improved land. In addition, Swellengrebel suggested that it was not correct to claim that everyone in Italy agreed with the purported anti-malaria role of Grande Bonifica procedures: most Italian scientists and physicians had concluded that anti-larval measures (Small Bonifica) were the real achievements of modern science, and that they were the only genuinely helpful interventions for populations living in infested areas, including in areas to which Bonifica had been applied. For Swellengrebel, Grande Bonifica had had no direct effect on malaria endemicity. However, he did note that 'The exception of course are hydraulic works of such a kind as to prevent all larval growth, in which case its hygienic value may stand quite apart from its economic merit.'

For Swellengrebel, an effective fight against malaria should comprise two phases: first an individual (local) phase aimed at reducing deaths associated with malaria, but not necessarily reducing morbidity; second, a general sanitation phase, which could be associated with Grande Bonifica, but with other strategies as well, all aimed at improving the economic conditions of the population and, as a result, its health and resistance to infection. For example, the clearance of malaria from the upper Jordan valley had been achieved using simple drainage combined with the introduction of carp as larvivorous fish, and by giving quinine only to sick people.^{20,21}

Swellengrebel concluded that the Italian Grande Bonifica was not the model for controlling malaria, but instead was a complex, costly and lengthy process aimed at coupling economic development with improvements in health conditions, ultimately associated with some control of malaria. In his opinion, organization of the medical infrastructure and the 1900 law on quinine were the basis for good malaria management in Italy, and had been the foundation of

the rapid recovery of Italy from the post WWI epidemics.

Grande Bonifica as politics

The report of the First International Congress of Malariology, along with the study of the archives of Emile Brumpt, a French parasitologist who participated in the Congress, brings a very different light on the emphasis placed on Bonifica by the Italian administration. Bonifica was not only a showcase for Italian public health policy; it was clearly a political issue. In his inaugural address to the Congress, Benito Mussolini himself pointed to Grande Bonifica as the key issue for malaria control. Despite Il Duce's introduction, however, the results of Bonifica were not discussed at the Congress. During congress tours, the Italian organizers of the meeting did their best to convince participants that the 'novel' Bonifica was the answer to the malaria problem. Members of the Malaria Commission and people attending the Congress were taken on study tours, but only to Bonifica areas. These were places where the government had invested the most and where Grande Bonifica and large hydrological works were considered to have been (or to be in the future) beneficial – Pô valley, Agro Romano and the Pontine Marshes – and to the hydraulic plants in Ferrara in the Pô valley. They also visited training stations such as the one of Nettuno, near Rome. Heavily infected Sardinia, Sicily and Campania were excluded from the itinerary.

At the end of the Congress, Professor G Gosio (Director of Health in Rome) asked participants to adopt a resolution supporting Grande Bonifica:

'Le congrès international de malariologie, tandis qu'il applaudit l'oeuvre merveilleuse de tant de bonificateurs et de tant d'agriculteurs qui ont bien mérité à l'hygiène et à la civilisation, considérant que la Bonifica intégrale constitue un pas très vrai et très stable contre le paludisme, émet le voeu qu'elle soit de plus en plus intensifiée en accord avec les connaissances étiologiques modernes'.²²

[The International Congress of Malariology, welcoming the marvellous achievements of so many 'bonificateurs' and of so many land cultivators who have benefitted hygiene and civilisation, considering that the Bonifica intégrale represents a true and stable path against malaria, resolves that it should be increasingly intensified to reflect modern aetiological knowledge]

The resolution was not discussed during the Congress itself, however, and was merely examined in a later,

closed meeting. The participants had been impressed by the results of the changes introduced by Grande Bonifica, but they did not overtly support the proposed resolution.

Faced with such overt skepticism, why did the Italian government place such exclusive emphasis on extensive public works? Control of malaria has never been (and still is not) either only a medical or only a technical issue. Emphasis placed on the training of people to act individually and collectively on malaria vectors and breeding places involved education about personal and social responsibilities, thus introducing changes in social relationships which were not all welcomed by authorities. Snowden¹³ has shown that campaigns against malaria around 1900 led to the development of trade unions in Italy, initially unions of rice-weeders in the Pô valley, and that these soon spread to other parts of the country. A similar association of unions with malaria campaigns had also occurred in Spain among mine workers.²³ Corsican land owners opposed malaria prophylaxis among the shepherds living on their land on the east coast of the island.²⁴ Malaria campaigns thus had complex consequences which explain why they became a critical social and political issue in democratic Italy. No wonder they were also critical issues for Mussolini's government when a break with democratic times was clearly asserted in Mussolini's speech on 3 January 1925.⁶

Fascist Bonifica could not be an extension of democratic Bonifica. Maybe Swellengrebel and most of his malariologist colleagues had perceived that the philosophy underlying Bonifica in 1925 at the onset of the fascist era was profoundly different from Bonifica in earlier times: the triumph over malaria by the fascist state would certainly be a major achievement in public health, but it would be presented primarily as a success of fascist society over Nature (identified with malaria). Caprotti has observed that fascist publications showed that the success of Bonifica was considered a triumph of fascist views on Nature – which was taken to be intrinsically bad – through to its transformation into a new, 'domesticated' Nature, which would permit a kind of regeneration of mankind.²⁵

The philosophy of fascist Bonifica needed extensive public works to create an 'ideal fascist landscape' out of the marshes,²⁶ a kind of fascist Utopia.¹³ Indeed, wherever Bonifica had been pushed to the level of permanent settlements (such as those around the cities of Pontinia and Latina), the landscape had been profoundly reshaped, much more than was needed for drainage of marshes, and 'ideal towns' had been built. This discourse on Nature might have merely been a 'philosophical way' of

emphasizing the initiatives of the powerful Ministry of Public Works against those of the more socially oriented Health Directorate, which favoured a multiplicity of local measures and regulated, efficient quinine distribution.

The administration of Bonifica also needed to reflect the ‘mood’ of the fascist era. No doubt the technical tools of Bonifica used under fascist rule were the same as in earlier times. The point is that they were now inserted into rhetoric consistent with Mussolini’s style, that of all out war against malaria. The success of that war involved the transformation of Nature, and could only be won through substantial investment in large public and hydraulic works. Malaria was a challenge for engineers and technique; physicians came second. Wars needed machines, heavy equipment and technicians. A debate between engineers and physicians about malaria is neither new nor specific to Italy.¹² The manner it was conducted in Italy was in tune with the increasing place of engineers and technicians. Grande Bonifica was incorporated as early as 1925 into Mussolini’s grandiose project for Italy, three years before the law of December 1928, personally endorsed by Mussolini, which initiated the fascist campaign to abolish malaria in the Pontine Marshes.¹³

Despite Mussolini’s personal interest in malaria, the role of Il Duce may have been overestimated. The choice of malaria prophylaxis methods were still being debated in Italy in 1923–1924, but not in 1925. The choice made in 1925 was based on criteria far removed from the analysis of the results research done by the League of Nations’ Malaria Commission. It is tempting to correlate the orientations decided in 1925 with the evolution of the balance of power between different factions within the fascist party, which led to major changes in the conduct of Italian internal affairs. At the end of December 1924, fascist and nationalist hardliners presented Mussolini with a kind of ultimatum to install a genuine fascist government. After fruitless discussions, Mussolini was forced to obey the hardliners, as indicated on 3 January 1925 in a speech considered the birth of the fascist dictatorship. Giovanni Giuriati, a nationalist hardliner who had actively participated in the coup d’état in Fiume in 1922, became the Minister of Public Works, replacing Gino Sarrocchi, a liberal democrat.^{6,27,28} That ministry became one of the most powerful elements in Mussolini’s government. As a result, the position of the Health Directorate was weakened, as well as that of foreign organizations working with it, such as the Rockefeller Foundation. Despite the Foundation’s initial, highly celebrated, positive results with Paris Green and larvivorous fish, it rapidly became

unable to work in Italy, except for funding the Institute of Malariology in Rome and financing some scientific and medical material.^{1,29}

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