

**MALARIA AS A FACTOR IN ITALIAN ENVIRONMENT.**

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Italy has long been the classic land of malaria. From whence it came or when introduced is not known but that it was well established in the Peninsula long before the Christian era, is certain. For at least twenty-five centuries it has taken a heavy annual toll of life,<sup>1</sup> and the economic loss through decreased efficiency of labor and reduced utilization of areas subject to the disease have been enormous.<sup>2</sup> Even today one-third of the total area and 40% of the population of the entire Kingdom are in communes officially "malarial." The number actually living in the infected parts of such communes is about 12% of that of Italy or about four million people. The number of cases "officially reported" annually runs over two hundred thousand and it has directly or indirectly affected the social and economic welfare of the whole population.

In the centuries following its introduction into Italy devastating wars both civil and foreign, by discouraging agriculture and especially by their destruction of the irrigation and drainage systems, caused much of the cultivated land to revert to pasture and marsh, thus providing favorable conditions for the spread of malaria. Extensive deforestation by aggravating the flood problem added to the difficulties. It is well known that certain sections of south Italy which, in the eighth century, were sites of large and prosperous communities have since been rendered desolate and barren by the ravages of malaria. The increase in the area affected in the southern part of the Peninsula since 1860 has been extraordinarily rapid. In 1880 only six of the sixty-nine provinces of Italy were entirely free from the disease; in 1885 there were only two; in 1902-5 there were eleven and in 1923, seventeen.

The close connection between malaria and marshes was early recognized; indeed, long before the relation of the disease to the mosquito was known. The name itself (mal-bad; aria-air) owes

<sup>1</sup> However, the death rate in recent years from measles, from typhoid or from tuberculosis is larger than that from malaria. The mortality from tuberculosis in 1923 was over sixteen times that from malaria.

<sup>2</sup> It has been suggested as an important contributing factor in the national decadence of Spain and in the fall of Greece and Rome. See Regnault, Dr. Felix;—The Role of Depopulation, Deforestation and Malaria in the Decadence of Certain Nations, Annual Report, Smithsonian Institute, 1914, pp. 593-7.

its origin to the common belief that the foul air from swamps carried the infection. Naturally the first measures of protection undertaken involved the drainage or filling of overflow lands or, failing in this, the abandonment of the vicinity as a human habitation, at least during the summer season. At this time of the year drought turns many streams into chains of stagnant pools which with the high temperatures then prevailing, provide the optimum conditions for mosquito breeding.

*Remedial Measures*—The reclamation of poorly drained land has always been in Italy one of the two most important lines of attack on the malarial problem. When Italy became a united Kingdom in 1870 there were over 4½ million acres of land with drainage so bad as to be a menace to health. A vigorous campaign of state reclamation begun in 1880 has to date restored to use about one-half of this acreage. Of the total which required improvement over ¾ was in north Italy, although the warmer central and southern parts of the Peninsula and the islands have always been the worst infected with malaria. Agricultural development has quickly followed the completion of the government drainage projects in the north; in the central and south it has lagged. The reclamation work has not only reduced the breeding of anopheles but by improving living standards it has increased the physical well being and resistance of the people to malarial attack.

A second and no less effective measure in the antimalarial campaign has been to make quinine, the principal specific, available to all. Though the virtues of this drug had been known since the 17th century it was not until the government took over its manufacture and distribution as a state monopoly in 1902 that it was placed within the reach of even the poorest peasant. Its distribution free or at small cost has been a tremendous boon to rural Italy and the enforcement of the "quinine laws" have been marked by sharp declines in the malarial death rate.

The real modern anti-malarial campaign in Italy dates from the beginning of the present century. The discovery of the role played by the anopheles mosquito as the transmitter of the malarial parasite gave a tremendous impetus to the fight and high hopes were entertained for the speedy elimination of the disease. Needless to say, they have failed of realization. True, the discovery placed additional weapons at the disposal of the campaigners. The oiling of stagnant waters, the introduction of

mosquito-eating fish, the screening of dwellings, all came to be a part, though a minor part, of the campaign. The major credit for the reduction of the malarial menace still rests upon the drainage and quinine measures.

*The Campagna.* The work of "bonification" or improvement, by which the malarial districts are being gradually re-



FIG. 1.

claimed may be illustrated by the Roman Campagna, for centuries one of the most notorious of malarial districts.

The Campagna is a vast plain about the capital city, underlain by impervious clays. The soil is fertile, the climate good, and the presence of an excellent market in the capital seemed

to furnish all the requisite conditions for a prosperous agricultural region. Indeed, in ancient times, this section supported a dense population, but for centuries it has been desolate and all but forsaken.<sup>3</sup> Less than 10% has been under cultivation. Without forest, towns or permanent homes it has been inhabited in winter by scattered herdsmen but even these retreated with their charges to the mountains in summer. For the past half century the government has repeatedly tried to colonize the region but until recently with little success. Of late the prospects have been more promising. In addition to general reclamation works and quinine legislation various economic inducements have been included, e. g. the building of roads, introduction of electric power, extension of long time loans to settlers, exemption of buildings from taxation, and the providing of agricultural experts as teachers. From 1900 to 1906 the proportion of the inhabitants affected by malaria was reduced from 32% to 4% and the agricultural revival is changing the whole appearance of the Campagna.

*Distribution.* The distribution map of malarial zones, Fig. 1 shows a striking resemblance to the physical map. The dependence of the disease upon the anopheles mosquito as the carrier naturally confines it largely to the plains region where favorable conditions for the propagation of mosquitoes exist. This is especially unfortunate for Italy since with a dense population still chiefly agricultural it needs every acre of soil available for food production, doubly so since the area of lowland is so limited. It is estimated that for Italy as a whole only one-fifth of the surface is plains, the remainder being equally divided between mountain and hill land. Assuming that the mountain areas are free from malaria, this means that more than one-half of the plains and hills, the most productive of Italy's lands, are malarial zones.

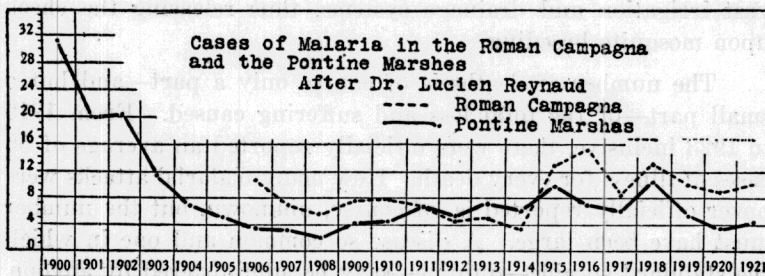


Fig. 2

<sup>3</sup> Depopulation that set in with the fall of the Empire apparently reached its lowest stage in the 17th and 18th and first half of the 19th centuries. Ashby, T. *The Roman Campagna in Classical Times*, London, 1927.

In north Italy the P<sup>o</sup> valley and north Adriatic coast, in central Italy, the low lying coastal plains, are favorable malarial areas. The mountain streams checked in their descent from Alps and Apennines, deposit their silt, clog up their lower courses and provide extensive overflow lands. Dunes aid in lagoon formation along the coast and even in the hill and mountain country, open quarries and crater lakes have been prolific centers of infection. In south Italy and on the islands the infected area includes considerable upland as well as the valleys and coastal plains. Here the higher temperatures and more marked seasonal irregularity of the river regime are more favorable for mosquito breeding. It is in this southern portion of Italy that the disease carries with it a large proportion of fatalities while in the north it is very mild. Thus Basilicata in the extreme south had from 1901 to 1905 an average malarial death rate in proportion to the number of inhabitants, fifty times that of Lombardy in the north. Malaria may well be charged with a considerable share of the responsibility for the retarded development of this southern part of the Peninsula and the Island.

Figure 3 shows the decline in death rate. The decrease is most striking. Thus from 1887 to 1902, the period preceding the quinine legislation, the mortality averaged 15,000 annually; from 1903 to 1905 with the enforcement of the malarial laws, the average fell to about one-half that figure. Fluctuations are of course to be expected, partly in response to climatic differences, partly as a result of human activities. The latest recrudescence, it will be noted, came during the war period when the exposure of vast numbers of men and their movements from place to place were bound to spread the disease. In addition war activities not only interrupted the antimalarial campaign but actually destroyed vast irrigation and drainage systems, thus releasing the check upon mosquito breeding.

The number of deaths is of course only a part—and but a small part—of the total loss and suffering caused. From 1919 to 1923 inclusive, there were officially reported an average of 56 cases of illness for every death. How many malarial attacks were never officially reported is, of course, unknown, but the number must have been large. A disease so common and one in which the standard specific—quinine—may be administered by anyone, together with the fact that many of those affected live in isolated

sections would indicate that the numbers officially reported are far under the real figures.<sup>4</sup> Prof. B. Goss estimates that the average annual death rate of 15,000 from malaria between 1903

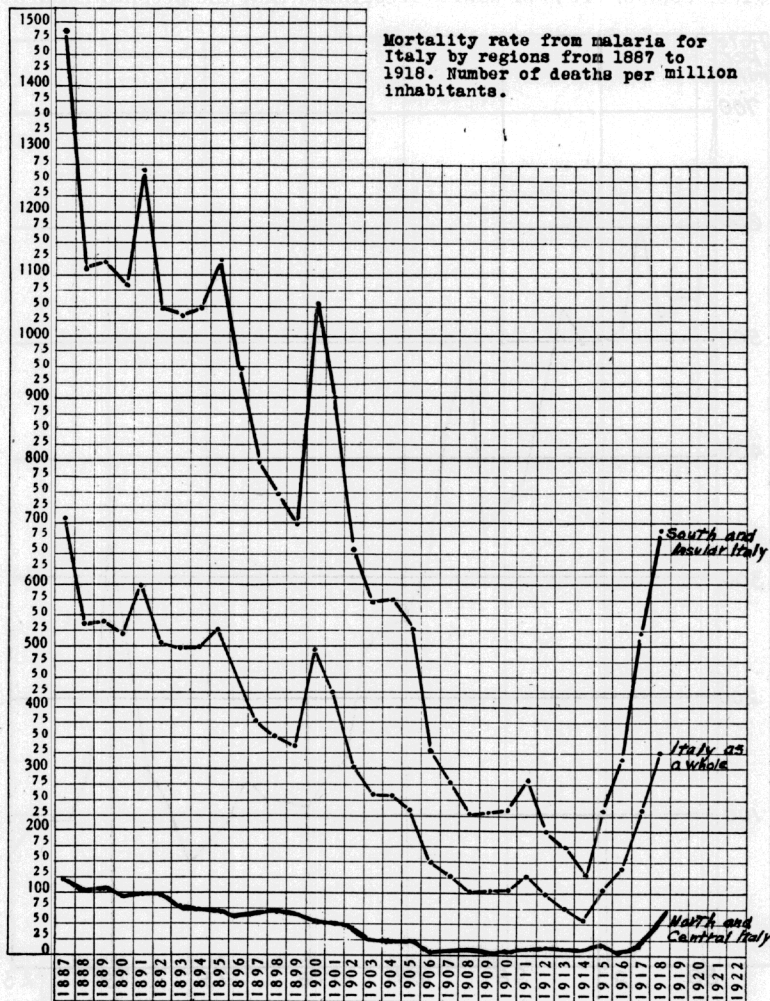


FIG. 3.

and 1905 represented some two million cases, or a ratio of one death to one hundred thirty-three attacks.

In addition to the marked success of the anti-malarial meas-

<sup>4</sup> Malarial illness began to be officially reported in 1902. After reaching a high point of 323,000 in 1905 they declined and in recent years have usually been less than 250,000.

ures in saving life there have been notable economic results. The national government spent in the work from 1900 to 1920 about \$100,000,000. The improved land has an estimated value of \$400,000,000. It is of course recognized that the accomplishment

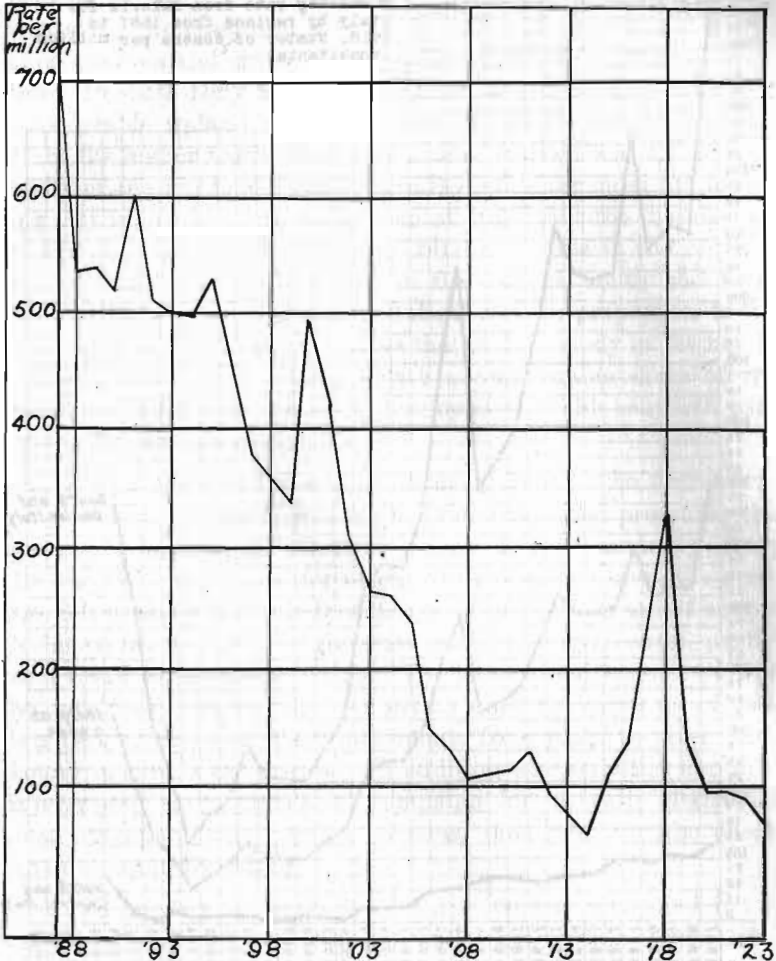


FIG. 4.—Death rate from malaria and malarial conditions in Italy. From Commission du Pauldisme "Rapport sur Son Voyage d'Etude dans Certains Pays d'Europe en 1924."

in stamping out the disease has not been everywhere satisfactory or commensurate with the cost.

The most common effect of malarial infestation has of course been depopulation and the reversion of land to waste or to pastoral use. This change in the type of land utilization has

resulted in a modification of agricultural methods, of land ownership, of population distribution, and of emigration. For example, since the anopheles works at night and chiefly in summer, the agriculturist must spend that part of the day or season in the hills. This has favored the grouping of the population into towns in the uplands, rather than in scattered rural homes on the cultivated land. Thus in south Italy where malaria is at its worst, though a non-industrial region, the percentage of the inhabitants, in towns is greater than in the industrial north. As a consequence of such an arrangement much labor is lost through the workers having to walk long distances to and from their fields. Intensive agriculture, favored by a dense population is correspondingly handicapped. Latifundia and absentee landlordism have been fostered and a strong impetus given to the emigration of the hungry population to more favored lands. Thus though primarily a rural or agricultural problem its effects are directly or indirectly felt throughout the whole social and economic scheme.