1938 – 1939
no control of leprosy without anti-mosquito campaigns

Adolpho Lutz
O exercito da morte forma-se junto à casa

Os canos e as poças em que se acumula a água da chuva, os lodoações—esses são os criadouros em que se formam o exercito de insetos malvados que zumbem na casa e atacam o homem trazendo o contagio de febres mortíferas. É preciso repelir este inimigo, que além de incomodar transmite epidemias como a febre amarela e o paludismo. É preciso destruir todos os mosquitos imediatamente—acabar com todos sem demora, por meio do Flit.

Em poucos minutos o Flit pulverizado acaba com as moscas, os mosquitos, os percevejos, as baratas, as formigas e as pulgas, que infestam a casa e transmitem epidemias. Peneira esta fumaça em que os insetos se afogam e criam, destruindo-os com os seus ovos.

O Flit pulverizado para abraçar e assassinar larvas que comem e pungo e estragam a roupa. É fácil de usar e não deixa nódulos.

O Flit é um produto perfeito para o combate comuns de falas mundiais. É um veneno mortífero para os insetos, e consegue, é eficaz e seguro para o homem, sendo recomendado pelas autoridades sanitárias. A venda nebuliza está estabelecida em toda a parte.

DISTRIBUIDO POR STANDARD OIL COMPANY OF BRAZIL
Jorge compre (Bela e Lata de 475 c.c.) 15.000 + Bomba 75000
Lata de 475 c.c. (1 Lata) 75000
Lata de 946 c.c. (1 de galões) 125000
Lata de 3,781 Litros (1 galão) 43500

FLIT
DESTROE
MOSCAS MOSQUITOS FORMIGAS
PIOLHOS PERCEVEJOS BARATAS
TRAÇAS PULGAS

"A lava amarela sem o feio preto"
Propaganda do inseticida fabricado pela Standard Oil publicada durante a epidemia de febre amarela que ressurgiu na cidade do Rio de Janeiro em 1928, quando estava em curso a campanha contra a doença conduzida pela Fundação Rockefeller no Brasil e em outros focos americanos e africanos, visando sua erradicação (Revista da Semana, 15.9.1928).

Advertisement of insecticide produced by Standard Oil and published during the yellow fever epidemic that started in Rio de Janeiro in 1928, during the campaign Rockefeller Foundation organized against the disease in Brazil and other American and African foci areas, aiming at its eradication (Revista da Semana, 15.9.1928).
In the Middle Ages, leprosy was so common in Europe that countless places were assigned for the isolation of lepers, owing to the generally accepted belief in the contagiousness of this disease. In more modern times, leprosy became so rare in most of the civilized parts of Europe, that the medical class of seventy years ago ignored it almost completely. This decrease of leprosy cannot be attributed solely to the fact that most of the recognized cases were isolated, because in China, for instance, where this method has been practiced for more than 4,000 years, it has given no results. In Europe, there remained a few small foci, which, though isolated, were distributed over various countries. As in these foci leprosy generally existed in a very chronic and mitigated form and mostly affected poor people, continental medicine and public hygiene hardly took any notice of it.

Dermatologists in London, Paris and Vienna, who had more often the opportunity to treat patients coming from abroad, were somewhat more familiar with the symptoms of leprosy, and their observations led them to consider this disease as not contagious, though they did not expect to cure the patients.

The only European country where leprosy could not be neglected was Norway, because of its large number of lepers, and it was there that the modern literature on the subject began, with the publication of a treatise in French by Boeck and Danielssen (1848). In that country, for a long time, leprosy was generally supposed to be a hereditary disease. This theory could only be maintained as long as they ignored the experience of other countries where leprosy was a newly introduced disease, equally affecting natives and foreigners. In 1888, this idea was entirely destroyed, when Armauer Hansen visited numerous descendents of Norwegian lepers in the state of Minnesota (USA) and found no cases among them.

Knowledge of leprosy took a new turn after the discovery of its agent, which was commonly considered to be a bacillus. This occurred at a time when bacteriology was still in its infancy. The higher powers of microscopic systems were not yet in general use and the study of leprous tissues was not at all easy before the introduction of better cultivation and staining methods. It was only after the discovery of the agent of tuberculosis and the improvement of the technique of staining it, that the germ of leprosy, which reacts in the same way and is extremely abundant in leprous nodules, became a favorite object for study and demonstration.

In 1886, I made a careful investigation of the leprosy germ and found that, after intense staining with aniline dyes, it appears in the shape of small acid-fast rods, either...
homogeneous or granular. When other methods of staining are used, it takes the form of small coccoid bodies, connected with each other by lighter threads. More intense discoloration causes the threads to disappear and then they may be stained in a contrasting color. (All the acid-fast bacilli have the same structure and may pass through porcelain filters, probably in the coccoid form, as it was first shown by Fontes for the tuberculosis bacillus.) I then (1886) proposed, for both the germ of leprosy and the germ of tuberculosis, the generic name Coccothrix, which has undoubted priority over the name of Mycobacterium now in general use.¹

The fact that acid-fast rods are easily demonstrated, at least in part of the cases, helps to confirm diagnosis, but does not explain the way in which the disease spreads.

In opposition to the closely related germ of tuberculosis, it has not been possible to obtain leprosy cultures, which can be passed through several generations. Quite a number of experiments mentioned in the literature have shown that even enormously rich suspensions made from leprous nodules do not produce infection in man or in the usual laboratory animals. It is, therefore, not justified to speak lightly of contagion by nasal secretion, saliva, expectoration or any other secretion or excretion of lepers containing acid-fast rods, as the usual way of transmission.

Every doctor treating leprosy knows quite well that this is not the case. Having a leprous cook or body servant, or buying foods consumed raw from a leprous caterer, does not infect. Officers and crews of passenger-ships and railway-employees are not especially subject to acquire the disease outside lepra-infested countries. In London, Paris and Vienna, hundreds of leprous patients have been treated in general hospitals, without ever infecting anyone. No known dermatologist treating these cases come from abroad has been infected by direct contact, in opposition to what happens when he treats really contagious diseases. Only in leprosy-ridden countries, doctors and nurses may acquire leprosy, when living on the same premises or near leprous patients. One can perfectly distinguish between countries where leprosy is endemic and in which new cases appear continually, and other countries which are free from the disease and where even a considerable number of incoming patients fail to spread it.

There is another important point as to the transmission of leprosy, i.e., that in leprosy-ridden countries people may get infected without having ever met or known any lepers, as verified, not only by me, but also by other observers. This is analogous to what commonly happens in yellow fever, the transmission of which by mosquitoes no one doubts. The lesions which may reasonably represent the first localisation of the disease are especially frequent on the face, hands and arms, and were observed by me many times on girls who led quiet sheltered home-lives, in their homes, under healthy conditions. These parts of the body are most apt to be stung by mosquitoes. Such infections only happen where leprosy is endemic.

Thinking it over carefully, one will find that the same rule applies to yellow fever, malaria and other undoubtedly insect-borne diseases. When a disease proves infectious in one country and not in another, one can safely conclude that in the latter there is a link missing. This can only be a blood-sucking animal, and a non-ubiquitous one at that.

Fleas, bugs, lice and other cosmopolitan, temporary or permanent, parasites cannot be accused of transmitting the disease.

Now, there is only one kind of blood-sucking animal wanting in the capitals cited above and found but seldom in large countries where leprosy is rare, i.e., blood-sucking Diptera, the presence of which depends on certain ecologic and climatic conditions. Among these, there are two species whose introduction into Hawaii could be traced and was followed by the archipelago becoming a most intense focus of leprosy. When I was there, they were very numerous, so that people not using mosquito nets might be bitten thousands of times a year. Both the species in question have domestic habits and are very widely spread. In fact, Culex quinquefasciatus and Culex pipiens and a very small number of other species are quite sufficient to explain the prevalence of leprosy in all endemic foci which have been examined so far. In other places, in which, like in Hawaii, mosquitoes were formerly unknown and had not even a native name, leprosy often spreads very quickly and intensely after the introduction of domestic mosquitoes.

It may be alleged by those who do not accept this view that numerous experiments have been made with both these mosquitoes. I must point out, however, that such experiments were not properly conducted. The fact that acid-fast rods may or may not be found in the gut of the mosquito shortly after biting sucking lepers is of small importance. We cannot accept infection to take place immediately. A period of incubation in the mosquito, such as it is known in yellow fever, for instance, should be allowed for. Nor must one expect the excrements of the mosquito to spread leprosy, as they contain the germ in the same, non-infectious form, used in the unsuccessful experiments of transmission from man to man. It must not be forgotten that the germ consists also of a granular form (perhaps not always acid-fast), which may prove to be the more infectious. As far as I can see, the ulterior development of the leprosy-germ in the mosquito has never been properly investigated.

Evidently, leprosy is not a good object for such experiments. But if the transmission by mosquitoes can be shown for other Coccothrix diseases, like the so-called leprosy of rats, or of water-buffaloes, or the lepra-like disease of small singing birds, or avian tuberculosis, or even the bacillus of Calmette and Guérin, there is no doubt that the same process may take place in human leprosy. No other modes of transmission have been demonstrated until now.

On other occasions, I have given indications as to the methods through which these experiments might be approached. This will prove to be an arduous task, which must not be undertaken by persons who are not sufficiently trained for it. The investigation and solution of this problem might be greatly helped by the granting of prizes by public authorities and cultural or philanthropic organizations interested in furthering medical progress and scientific research.

**Conclusions**

The transmission of leprosy by mosquitoes once accepted or at least allowed for – and I must reaffirm my conviction that to me it is the only plausible explanation for the

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2 Stegomyia (Aedes) aegypti and Culex quinquefasciatus.
remarkable behaviour of this disease – prophylaxis must be reorganized, so as to avoid all new cases of infection.

Of course, this can only be done by a regular and general anti-mosquito prophylaxis, such as it is carried out or has been attempted for other diseases in many places. All leprosy-infested countries should consider this as a major method, much more promising of results than the treatment of already diagnosed cases.

I would lay down the following rules:

1. The local fauna of blood-sucking Diptera must be carefully studied in all foci of leprosy.
2. Lepers, whether kept in their own homes or in hospitals and settlements, must not be suffered to be bitten by mosquitoes. The windows and doors of their dwellings must be carefully screened by irremovable wire-netting.
3. Patients with fever, and rapidly developing cases, must be isolated in special screened wards.
4. Every establishment where lepers are admitted must have on its staff a specially trained medical person, or entomologist, responsible for the suppression of all domestic mosquitoes found on the premises and their surroundings. This applies, of course, to all stages of evolution of the mosquito and might profitably be extended to all sorts of blood-sucking parasites. A register of all blood-sucking Diptera found in the vicinity must be kept, after correct determination of the species.
5. Incoming patients must be questioned as to the conditions relating to mosquitoes in the places where they probably contracted the disease, and their statements must be carefully investigated.
6. No human habitation must be allowed in the neighborhood of leper hospitals or settlements, within distance attainable by the flight of mosquitoes. If such habitations already exist and cannot be abandoned, they must be included in the anti-mosquito prophylaxis.
7. Facts observed and results obtained should be published periodically.

It is useless to lock doors on lepers if windows are left open for possible or even certain transmitters to fly in and out.

Owing to the long period of incubation, leprosy will naturally not vanish as quickly as yellow fever did. Gradually, however, results will appear and finally lead to the suppression of this dread plague wherever anti-mosquito prophylaxis is carefully maintained.
MEMORIAS DO INSTITUTO OSWALDO CRUZ

Rio de Janeiro - Brasil