

FLIES AND FLEAS AS FACTORS IN THE DISSEMINATION OF DISEASE.

THE EFFECTS OF PETROLEUM AS AN INSECTICIDE.

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(*Concluded from page 245.*)

IN Auckland Province there were 353 cases of enteric fever for the year ending 31st March, 1908, of which 194 cases were in Auckland City and suburbs. Of these, 214 cases, or 60.6 per cent., were in the first three months of the calendar year, giving an average case rate of 71.3 per month, as contrasted with 18.4 for the previous nine months. The average temperature for the first three months was 66.8° Fah., for the previous nine months 56° Fah., and for the following nine months 56° Fah. In these months—January, February, and March—last year, flies were most prevalent.

The records of typhoid cases admitted to the Auckland Hospital, compiled for the last 50 years, indicate a steady rise from November to April, attaining its maximum in the latter month. Last year the epidemic reached its zenith a month earlier, thus repeating the experience of other countries, where "the hot, dry months show the heaviest enteric bill." Coincident with the spell of hot weather, we had a plague of flies. Although until recently no records have been made to show which month flies were most prevalent in Auckland, such have been made in New York, by placing cages at various parts of the city and counting the flies caught each day. Whenever flies became prevalent, the death-rate from intestinal diseases rose above the normal, and fell off with a slight lag at the time of the gradual falling off of the prevalence of the insects.

The filthy feet of faecal-feeding flies walking over meat, butter, bread, cake, the sugar, jam, or any food, as well as the predilection of flies for milk, show how easy is the acquirement of typhoid fever, when one knows that one fly can carry 100,000 organisms. To prevent this source of infection is to prevent the accumulation of any organic refuse in or near a house, and so minimize the material on which they can breed. Wherever possible, a water-carriage system of sewage should be introduced, and where this is not possible, and an earth closet or dry conservancy system must be retained, every attempt must be made to see that the ventilator of the privy is screened off from flies, and that petroleum is put either in the pan or mixed with the earth. All food in private houses should be screened, and no food of a perishable nature should be allowed to be sold unless it is kept secure from flies. The

Auckland City Council have decided to bring in regulations, chiefly with the view of preventing fly-infection in butchers' shops; and will probably also follow the lead of Sydney in refusing to allow milk to be kept in dairies other than in fly-proof safes.

With regard to petroleum as an insecticide, as everyone knows, it has proved most efficacious in the extermination of mosquitoes. By carrying out the crusade initiated by Major Ronald Ross, the incidence of malaria in Ismailia was reduced from 2,002 in 1903, to two cases in 1905. Under the supervision of Dr. Pressat of the Suez Canal Company, all sources of water—breeding grounds for larvæ—not removable, were covered weekly by a thin layer of petroleum. Thus Ismailia, at one time a place so unhealthy as to have caused the idea of its abandonment as the centre for the Canal engineering works to be entertained, has become one of the most healthy and habitable settlements on the Canal.

Whilst stationed at Port Said, in the Egyptian Quarantine Service, I was able to demonstrate the efficacy of petroleum in exterminating mosquitoes in our offices, and later, through the courtesy of the Editor of the *Egyptian Gazette*, who published five articles on the subject of the extermination of mosquitoes, to arouse public interest in the subject. Dr. E. J. Ross, a younger brother of Major Ross, inaugurated and successfully carried out the crusade, which, at an annual cost of £600, has practically freed the European quarter of the town from this pest. Other places where organised crusades have been successful, and where petroleum has been used freely, are Saigon, Hong Kong, Sierra Leone and New Orleans. Havanna, by destroying the mosquito, got rid of the yellow fever in 80 days, where it had previously been epidemic for 200 years. When the American floating dock for the Philippines came through the Suez Canal, the American naval surgeons were most interested in the work of mosquito extermination, and they, as also their comrades who visited Auckland with the American fleet last year, told me of the excellent work being done on the Panama Canal, where petroleum is also freely used in mosquito extermination.

It is with fleas, which, since the report of the Indian Commission, have now been proved to be the intermediary in the spread of plague from rat to rat, and from rat to man, that the use of petroleum suggests the greatest possibilities. Dr. Turner, Executive Medical Officer, Bombay Municipality, in a letter dated June, 1907, referring to the use on the floors of native huts of crude petroleum, to which the name of "Pesterine" has been given, says: "We are using pesterine freely in Bombay, and killing rats. Whether it is the pesterine, the rat killing, or both, I cannot say; but this is the mildest epidemic we have had. We use pesterine in the places after infected rats are found, and plague cases occur, and also in collections of water, and privies and stables."

When, in May, 1907, we had two fatal cases of plague in one building in Auckland, six tins of kerosene were used in swabbing the floors and other woodwork.

In this country, apart from rats, the presence of fleas in houses is due to the keeping of flea-infested dogs, and, in some cases, cats. With regard more especially to the former, a night spent in a Maori's whare would convince anyone of this. Fleas naturally live upon the animals which they infest, or upon man; special varieties being found on different animals. The eggs laid by the fleas may fall upon the floor, or the carpets of houses, and, after hatching, live for an indefinite period upon the dust which accumulates under carpets, and in crevices and joints in the flooring. Thus, to rid a house of fleas, attention should first of all be directed to any domestic pets, which should be treated by rubbing them with kerosene, mixed with three parts of some ordinary oil, such as linseed oil, to reduce the strength. Where it is not advisable to prolong the use of kerosene in houses after carpets and furniture have been replaced owing to the disagreeable odour, it is best to use a ten per cent. solution of creolin. As a substitute for creolin, which is not easily procurable in this country, one of the disinfectants introduced by the firms which have established reputations for sheep-dips (Little's, MacDougall's, or Quibell's), known by the trade names of Phenyl No. 5, or Kerol, should be used.

Schools can be kept free of fleas by using sawdust, saturated with such disinfectants, sprinkled on the floors, and a weekly scrubbing, using water in which a disinfectant has been dissolved.

Sprinkling animals with Pyrethium powder will also keep fleas away from them.

I have not yet had an opportunity of experimenting with Izo-Izal, which is said to combine the virtues of both a pulicide and a disinfectant, but this ought to prove invaluable.

With regard to bugs in Auckland, at one of the receiving cells at the Prison we were able to get rid of these pests by swabbing with kerosene. In connection with these insects an interesting point has come under our notice recently consequent on the successful extermination of cockroaches by the use of a substance invented by Mr. Pruden of Tauranga. We have found on some old ships where cockroaches have been exterminated that bugs have come into evidence. We know now that the best way to keep down the latter is to introduce the former, and when the cockroaches become so numerous as to become a nuisance, attack them with Pruden's preparation.

With regard to the use of kerosene to keep down flies, my attention was first drawn to this by Surgeon-General Hamilton, I.M.S., Umballa (with whom I had been drawn into a controversy in the *B.M.J.*, on the

extermination of mosquitoes by petroleum). Whilst acting as *Medecin des Hospiteux* at the great Hadjaz Pilgrimage Camp at El Tor in 1906, where we had in one hospital during two months 110 deaths from Bacillary Dysentery, I was so impressed with the persistent way in which the flies hovered round the dead and dying that I enquired of Col. Hamilton as to whether they had any way of dealing with the pests of flies in India. Although he pooh-poohed the idea of the use of petroleum against mosquitoes on a large scale, he was the first to suggest the syringing of latrines with kerosene, telling me that the incidence of flies and also typhoid had been much less since he introduced this practice into the Indian cantonments under his charge.

Last year my attention having been drawn to a plague of flies which congregated so thickly on the Rangitoto Wharf as to make the lower surface of the structure black, advantage was taken of a visit of some parliamentarians to Motuihi to demonstrate the effects of kerosene as a fly exterminator. Inspector Grieve of the Health Department spent an hour syringing the wharf with kerosene. The bottom of the boat from which he operated was over an inch deep with dead flies, and except in places where the kerosene had not reached, the flies disappeared.

Owing to the fact that kerosene evaporates so quickly there is no danger from fire.

In one of the largest butchering establishments in Auckland it was found that, although the rubbing of a cloth damped with kerosene would keep the flies away from a mirror for twelve hours, owing to its rapid evaporation, to get any continuous benefit, it was necessary to apply the oil twice a day. In combating flies, therefore, petroleum for practical purposes has its limitations. Wherever there is a night-soil system, however, it should be used. Recently, a special pan, known as the "Farmer Sanitary Pan," has been introduced, by which oil is distributed over the contents of the receptacle each time it is used. We have found, however, as the result of experiments carried out by Mr. Symons, of our Department, to whom I am indebted for much assistance in investigating the habits of flies, and watching the experiments in the laboratory, that the sprinkling of earth over which kerosene has been poured acts perfectly in keeping flies away from night-soil pans.

The introduction of stringent regulations to protect meat, milk, butter, and other perishable foods, as well as the regular cleansing of stables and daily removal of manure; the encouragement of motor traffic, and the removal of fowlhouses from towns, will go far to remove this pest from round our dwellings.

Everyone is familiar with the fact that petroleum is now the most efficient remedy for the removal of gnats and *pediculi capitis*. Those

who are troubled with ants of any species can also get rid of them by its use

The use of the patent oil broom, with an oil reservoir, either for sweeping rooms, or, by the adoption of a larger size street sweeping, is also to be commended.

A point noted at Motuihi was that the encouragement of the breeding of fly-catchers such as the fan-tail, considerably lessened the number of flies. The introduction of insectivorous birds into Australia and New Zealand, such as the sand-martin and the pied fly-catcher, for which the country is well adapted, in my opinion, based on observations of their habits when my chief object in life was the collection of birds' eggs, would probably keep down the number of flies, mosquitoes and culices. If for no other reason, than to allow us to grow vegetables without having them fly-blown, such an experiment from an economic point of view should receive a trial, say at Tauranga Experiment Farm, where the climate is suitable for such birds.

As again illustrating the truth that there is nothing new under the sun, the fact that oil was poisonous to insects was known to the ancients. Thus Lucian of Samosata, a contemporary of Trajan, speaking of the fly, wrote : " It is in man's company as long as it lives, and takes the freedom to taste of all his food, oil only excepted, because it is poisonous to him. For him are the goats milked, and the bees make honey for the flies as well as for man. For him do the confectioners make their sweetmeats, and he tastes them before the kings themselves, with whom he feasts, marching about the table, and eating with them in all things."

HER ULTIMATUM.

Mistress : Bridget, we cannot eat cakes, pies or puddings, or anything fried, or—

Bridget : Well, then, what yez need is a doctor an' no cook, so I'll be leavin' yez to-day, mum.

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