

## Mosquito Control in England.

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Mosquitoes nowadays are amongst the plagues of an English Summer. Except in two or three places, nothing is done to control them; and this is the more remarkable because so much is done with conspicuous success in other countries. An account of what might be done in any of our towns or suburbs may be of interest. The first step is to obtain a systematic and scientific record of the different species of mosquito found in the locality, and of their breeding grounds. Of twentyfive species found in the United Kingdom, some are rare, and only seven are really important from a "nuisance point of view". One breeds exclusively in holes in trees; another breeds in woodland pools, especially in pinewoods; another lays its eggs most frequently in water-barrels, tanks, and empty tins; another selects the shallow margins of weedy waters; another breeds in stagnant salt water; another in fresh, saltish or salt water; and the seventh breeds in swamps and ditches, and often in abominably foul water.

Until a mosquito has been identified, one does not know where to look for its breeding places. Two instances of this will suffice. At a children's Hospital, which was opened a few years ago for "open air" treatment, it was found that the children were so bitten out-of-doors that the cure could not be carried out. The hospital authorities screened all the water-butts and garden tanks with no effect. At last they sought expert advice. The mosquito was identified, with the immediate result that a pine-wood, hitherto un-suspected, was searched for breeding grounds. Several small ponds, all swarming with mosquito larvae, were found. They were filled in, and since then the children have had the open-air treatment, by night as well as by day, without further annoyance. In the second instance, a large Government institution on the south coast was suddenly infested with myriads of mosquitoes. The authorities examined all the fresh water within miles, but found nothing. Eventually, on expert advice, the mosquito was identified, with the result that stagnant salt water close to the building was searched, and found to be literally alive with larvae. It was put under control, and the nuisance thereupon abated.

When the mosquito is identified, its range of flight is known. It varies from only a few hundred yards for one species to three miles for another.

In America, where they have a far-flying mosquito, some municipal authorities control their nuisance by treating breeding-grounds twenty miles away from the town. Fortunately, we have not that difficulty.

In England, the first step to be taken by any municipal authority desiring to control mosquitoes systematically, is to have a 'Mosquito Survey'. It is an easy matter, and in many countries is carried out on a large scale. The whole of Singapore Island, for instance, covering 217 square miles, has been completely and minutely 'surveyed' for mosquitoes. In an ordinary English town, the Health Officer or Chief Sanitary Inspector would be appointed an officer in charge, Mosquito Survey. He would collect a staff of perhaps a dozen assistants, of whom many would be unpaid volunteers, and would allot a subdivision of the area to each. After a short course of instruction in identifying adult and larval mosquitoes and in keeping the necessary 'Registers' and after some practical field demonstration, the party is able to locate and examine all mosquito breeding-grounds, to record all necessary information relating to them, and to register the capture of adult and larval mosquitoes. If adult mosquitoes of the three-miles-range-of-flight species are found in any place it is necessary for the 'Survey' (and later for the 'Control') to cover a three-miles radius from that place. It is unnecessary to go into the details of the methods of survey. They will be found in many health journals, especially those published in America. Let it suffice to say that what is done in America, on the Continent, and in many British Colonies, as a matter of ordinary routine, can be done in England.

Armed with the information derived from the Survey, the municipal authority is able to prepare its schemes for the control of the various breeding-grounds. Frequently, of course, it may happen that investigation shows that the cost of remedial measures over an extensive swamp would be prohibitive. Even when this is the unfortunate result, the Mosquito Survey has not been wasted; the facts of the case, hitherto unknown, have been ascertained.

The Control operations take the form of filling, draining, oiling, and larvicing. Filling is generally expensive, and can be recommended only in respect of small areas. The cost and difficulty of draining depend entirely on local circumstances. Both filling and draining are in the nature of 'radical cures'; and afterwards maintenance, though essential, should be easy. Instead of filling in a swamp it is sometimes more convenient, and generally much cheaper, to convert it into comparatively high ground by the simple expedient of digging a pond in it, and spreading the excavated earth over the surface of the surrounding ground. An artificial pond with clean-cut edges, is easily oiled or larvicided. In Siam, many of the gardens in the European residential area around Bangkok have in this way been literally raised up from swamp rice-fields. The ponds are of ornamental shape, and are filled with water-lilies or lotuses; and the new-comer who expresses surprise at so many gardens having ponds is informed that, but for the pond, there would have been no garden, and that the soil for the tennis court was found by digging the pond a little deeper. In connection with any drainage scheme it is worth while to mention the increase to the value of the property. In the suburbs of Kuala Lumpur, the Federal capital of the Federated Malay States, drainage operations introduced solely for reasons of malarial control have resulted in wide areas of swamp being converted into building sites. In England, measures of mosquito control might provide, in many places, ground suitable for playing fields or for allotments.

Drainage completely alters the growing power of soil. Clover, for instance, which will not grow on wet or waterlogged soil, grows freely on it when it is drained. There was recently some interesting correspondence on a supposed connection between mosquitoes and malaria. Sir William Willcocks has suggested, in connection with engineering schemes, that the profusion of clover-fields in the Delta of Egypt was saving the country from the malaria-carrying mosquito to which Palestine, undrained and unirrigated, was a victim. Sir Ronald Ross, on the other hand, could not understand why the presence of clover should prevent the mosquito from carrying malaria. My own suggestion

is that with the introduction of drainage into the Egyptian Delta the clover came in and the mosquitoes went out simultaneously and for the same reason.

Oiling and larviciding, which are the methods commonly employed in mosquito control, represent an annual expenditure which never diminishes. The oil floats on the top of the water, making a very thin film, which kills the mosquito larvae by preventing it from coming up to the surface to breathe. A larvicide is distributed fairly equally through the cubic contents of the water, and poisons the larvae. In deep water, therefore, oil is the more economical. Its disadvantages are that in strong winds it is blown to the lee side of the pond or swamp, and that in weedy water it is not equally distributed. A larvicide must be cheap, and water treated with it must be harmless to human beings or animals. At Hayling Island a preparation containing 20 percent of soluble cresol is used. A gallon costs six shillings (less when bought in quantities), and will kill all the larvae in 28,000 gallons of water.

An example of what could be, but is not, done in so many English towns and suburbs is to be found at Hayling Island. At this well-known seaside resort the mosquito nuisance, which had increased year after year, became in 1910 so intolerable that the local residents were compelled to take action. A public meeting was called, and an association, which later developed into the British Mosquito Control Institute, was formed. For some years past the institute has kept the mosquito nuisance under complete control inside a radius of one and a half miles. Every possible breeding-ground inside this area is known, and regularly larvicided throughout the breeding season. I am informed by my friend, Mr. J. F. Marshall, the Director of the Institute, that the cost of the control (exclusive of office expenses) is now about £200 a year, and that the area under control is about six square miles.

Larviciding and oiling, which obviously are useful only when larvae are actually present in the water, may begin as early as the end of February with one species, and not until June with another. The eggs of most species first hatch out in March or April. One species generally

has one brood of eggs only; some species have two broods, or perhaps three; and others breed from spring until autumn. September, or sometimes October, sees the last of the larval mosquitoes. All the adults of some species die off with the short cold days of early winter, and the next generation spends the winter in the egg stage. One species lays its eggs on the stems of rushes and grasses in dried-up hollows, and trusts to these hollows being submerged in the water in which the eggs will hatch in due course. Adhering to the dry stalks, these eggs retain their vitality for two years or even longer. In some species all the males die off as winter approaches, and the females hibernate in warm dark places such as cellars and corners of kitchens and stables. The curiously diverse breeding-grounds have already been mentioned. This very brief account of breeding times and habits may serve to indicate how necessary it is identify the species before starting upon any systematic scheme of control by larviciding.

In a large municipal area any considerable swamp or any extensive system of open drains should be regarded as a separate 'Scheme Area'. Each should have its own working plan, setting forth.

- (a) A map of the area, with the breeding-grounds marked on it;
- (b) The nature of the work to be undertaken (i. e., filling, draining, oiling, or larviciding);
- (c) The initial expenditure (if any) on capital account;
- (e) The average cost per acre; and
- (f) The arrangement for defraying the cost.

Where mosquitoes are present in such numbers as to become a 'nuisance', the liability for taking action is on the proprietor of the land on which they breed. This is established by Section 91 of the Public Health Act, 1875, which, in the definition of a 'nuisance', includes "any pool, gutter, watercourses, sink, cistern, cess-pool, or drain so foul or in such a state or so situated as to

be a nuisance or injurious or dangerous to health." Under Section 92 of the Act, a definite duty is imposed on every local authority to cause to be made from time to time of inspection of its district to ascertain what nuisances call for abatement, and to enforce the provisions of the Act in order to abate them. The only court case of which I am aware was one in 1927 under a corresponding section of the Scottish Act. Certain ditches were in close proximity to a residential suburb of Glasgow, and it was proved in the Sheriff's court that in them mosquitoes breed in large numbers. The learned Sheriff found that the "bites of the said mosquitoes caused pain and swelling, occasioning in some cases temporary incapacity, and followed in some cases by septic scores, and that their presence caused reasonable apprehension and diminution of comfort in the community." The proprietor of the property was ordered by the court to clear the ditches of the silt and the vegetable growth, and thus to remove the nuisance from mosquitoes to which such conditions gave rise.

There seems, therefore, no doubt regarding the liability of the proprietor under one section and the duty of the local authority under the other. It is manifestly, therefore, a case for combination and co-operation.

Any 'Scheme Area' in respect of ground of any extent near any town or suburb will almost certainly affect a number of land proprietors; and, whether they be few or many, it is clearly essential that they should co-operate. Any action by one proprietor, so long as no action is taken by his neighbour, is obviously a mere futility if the same swamp or ditch is covered by both properties. It is suggested that if any local authority is satisfied that *prima facie* case has been made out for a 'Scheme Area,' a typed or printed memorandum should be prepared to set forth the facts established by the Mosquito Survey; the detailed proposals relative to the scope and estimated cost of the Mosquito Control in the Scheme Area under contemplation; and suggested allocation of the cost between the proprietors. In many cases the local authority, in order to gain a ready response, would be well-advised to offer to give, free of cost, the services of its own staff for the supervision of the work,

and to bear the entire cost of any office expenses connected therewith. An officer should then be deputed to interview the proprietors. He would inform each proprietor that the local authority was satisfied that there was a *prima facie* case, and that, having prepared a constructive scheme for dealing with it, it desired to have the views of the proprietors concerned regarding the merits of the scheme. Whilst the officer would refer to the duty imposed on the local authority by the law, he would make it absolutely clear to each proprietor that his instructions went no further than to ask for criticisms, and, if possible, to obtain a promise of support of the scheme, if it had the support of the other proprietors. If the case were well and tactfully put, there would seem to be no reason why favourable replies should not be received. Possibly alterations to the scheme would be suggested by certain proprietors, and would lead to an improved or modified scheme; but, somehow or other, the probabilities would seem to be in favour of something being done, with the practical certainty of the result being not only advantageous to the proprietors and the local authority, but most beneficial to the community affected by the 'Scheme Area'. In this article I have designedly laid stress upon the logical sequence of systematised action, leading up from the Mosquito Survey to the Mosquito Control, and thence to localised action in Scheme Areas. In doing so, I may have given the impression that it is inadvisable for an individual proprietor to take any action in respect of his own property until a long series of facts have been established. I would like to correct that impression. Any one who finds mosquitoes breeding near his house can be assured that he can add materially, and sometimes immeasurably, to his comfort by exterminating the breeding-grounds without worrying about a mosquito survey of his neighbourhood.

A municipal authority is in an entirely different position. It has to deal with a large area and many proprietors and interests. It must satisfy every one concerned that all the facts have been ascertained and studied. In any public scheme, therefore, a Mosquito Control must always be preceded by a Mosquito Survey.

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(R. D. A.)

### The Reform of Indian Land Tenure.—(Continued)

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The status and rights of the tenants on the permanently and temporarily settled estates should gradually approximate to those of the ryotwari cultivators. A permanent and heritable right of use and occupancy of land will gradually accrue, either by continuous occupation for 12 years combined with regular payment of rent, or by a specific grant of the State as in the case of the Central Provinces cultivator. Such a permanent right was enjoyed by the cultivator under time-honoured customs in India. The present condition of agriculture demands, however, a modification of the occupancy status in one or two directions. Undercultivation and misuse of the land are too common in the case of permanent tenure-holders and occupancy tenants who are entrenched within their own rights; and cases are also frequent where landlords, desirous of making a permanent improvement of the land, cannot undertake such a measure on account of the ignorance or perversity of the tenant, who refuses to recognise such an improvement and pay an enhanced rent for it. In the interests of scientific agriculture, the occupancy system should be altered so that the tenant may not acquire a permanent heritable right to neglect and impoverish the soil. Perhaps the recent share tenancy agreements of Italy, which defines the duties of both landlords and tenants might be helpful in prescribing the conditions of permanent tenure. The agricultural drawbacks of a system in which the legally protected peasant becomes a mere rent-receiver, are also obvious. At present the occupancy status can be enjoyed only by one person in a long chain of sub-infeudation. We have seen already that the right frequently passes into the hands of a person other than the cultivating tenant resulting in friction and economic wastage. The framers of the Bengal Act of 1885 contemplated the ryot to be a person who would actually till the soil. They laid down that there should be one grade of ryot, the genuine cultivator. Measures were devised to discourage subletting by ryots, but these have failed in their object. As a result of the license given for subinfeudation, there is a great danger of the extinction of all occupancy privileges



with the genuine ryot class. The so-called ryots have been converted virtually into middlemen and the actual cultivators into underrryots without any security, almost into tenants-at-will in the eyes of the law as it now stands. The practice of subletting and subinfeudation has grown considerably, not merely in Bengal but also in all zamindari provinces, in spite of various restrictions imposed upon this practice. The capture of occupancy privileges by the middle and money-lending classes and the lowering of the status of the peasantry now have social as well as political significance. The situation can only be remedied by more thorough-going measures for the prevention of subletting and by the recognition of the inferior class of underrryots and agricultural partners as occupancy tenants with all the privileges belonging to them. Occupancy rights thus should accrue to several grades of tenants simultaneously. An excellent precedent is afforded by the Central Provinces Tenancy Act.

*Restriction Of Lease, Mortgage And Sale:*—One of the chief causes of agrarian complication has been a policy of drift with regard to the transfer of protected tenant right. Unrestricted transfer is a newly acquired right imported from the West and is entirely opposed to ancient tradition and custom. On the permanently and temporarily settled estates, the privilege of the landlord to refuse his consent to transfer and withhold recognition of the incoming cultivator's status has encouraged illegitimate exactions as well as litigation. Such legal restriction as exists has contributed only to lower the money value and lessen the security of the protected tenant right. For example, while an arbitrary enhancement of rents is checked by the civil courts in Bengal and Bihar and the settlement operation in Agra, Oudh and the Central Provinces, the landlord has everywhere sought to defeat the tenancy law by allowing rents to continue at a low figure and to exact premiums on new leases of surrendered holdings or on the leasing of the land for the first time. Such premiums represent capitalised rent, and the opportunity of premium-hunting varies with the privileges of the landlord. Thus a periodical tenancy or the right of the landlord to refuse transfer or lease has been accompanied by the practice of levying illegal, exactions. This practice is now well-nigh universal but has

grown with the new protective tenancy legislation. On the other hand free transfer has led to agricultural unsettlement in the Deccan, Punjab Chota Nagpur and the Central Provinces. As long back as 1879, the Deccan Agriculturists Relief Act was passed to cope with agrarian discontent in 4 Deccan districts—Poona, Satara, Sholapur and Ahmadnagar. The Act provided for the appointment of a special judge and numerous councillors who were empowered to investigate mortgages and similar alienations of land, to revise the terms of contract and to arrange for an equitable settlement of claims with a view to restore the original rights of the occupants. The greater part of the Act was extended to the remainder of the Presidency in 1905. Reports indicate that the Act has had the desired effect of protecting the revenue-paying classes from the encroachment of non-agriculturists and that although it had restricted credit, it has not done so to the extent of hampering agricultural operations. The Bombay Land Revenue Code Amendment Act of 1901 created a special tenure known as the restricted or non-transferable tenure. Under this Act the Collector is authorised to grant the occupancy of lands to limited periods or on such conditions as he may think necessary, the principle of these being that the occupant cannot alienate his land without the previous permission of the Collector. The conditions of the non-alieable tenure are designed to meet the circumstances of the wild tribes, the depressed castes and other classes of cultivators who are known to be backward or improvident. The Panjab Land Alienation Act, the Central Provinces and Chota Nagpur Tenancy Acts all seek to check the serious evil arising from the transfer of the land from the agriculturist to the money-lending and professional classes. In the Panjab Agriculturist money-lenders however have grown in proportion and the Act has not served its entire purpose. The measure has been extremely popular among the agriculturists and unpopular amongst others. In the Central Provinces, occupancy right can be transferred to certain heirs only. Transfer to others requires the *malaguzar's* consent, and if made without such consent is voidable. It can also be annulled through the Deputy Commissioner on application by the heirs of the transferring tenant. Though sublet-

ting for a year is permitted, occupancy tenancies cannot be mortgaged. Both in the Central Provinces and Chota Nagpur the Act in the main has succeeded though there has been some contraction on the cultivator's credit. In the new agrarian legislation which has created small family holdings in Central and Eastern Europe, sale or transfer has been restricted most rigidly. The law of Prussia makes state approval compulsory for transfer of real properties. In many cases in order to create a charge on the family holdings the consent of the State is necessary. Mortgages and land debts may only be entered in the form of debts repayable by instalments and not capable of being called in; the mortgage of land debt as a rule is discouraged or its amount limited by legislation. The grantee of the family holding may require the consent of the State to the entry of a right of Usufruct (tenancy), a land easement, a limited personal easement or a real encumbrance, when it is compatible with the rules of normal working and it does not diminish or impair essentially the effective character of the family holding. A limit of indebtedness may be entered for mortgages, land debts and land revenue encumbering the family holding. Distraint on the family holding in respect of a personal debt may be disallowed.

In Bombay the restricted or non-alienable tenure has already been created by the State. In the Central Provinces the subletting of land is prohibited as drastically as in the Russian Agrarian Code. The prohibition of mortgages containing a foreclosure clause is already a part of the Punjab Land Alienation Act. The Usurious Loans Act of 1917 and other measures have enabled the civil courts to go behind the contracts and mitigate the hardships of the indebted peasantry. In different provinces the transfer of the cultivator's holding is sought to be restricted to agriculturists of the same village. In Bengal as far back as 1880, the Rent Law Commission recommended that occupancy holding should not be mortgaged and that the right of occupancy though saleable in execution of a decree for its own rent should not be saleable in execution of any other decree.

Gradually but surely measures restricting transfer, mortgage and lease will be deemed necessary in every province if the small cultivating proprietor is not to give

place to a non-cultivating, rent-receiving and moneyed class. The distribution of land among the several classes, the character of the people, the facilities of credit to which the cultivators have access all these will determine both the form as well as the character of such restrictions. In the ryotwari tracts the legislation to protect small holdings by means of restrictions on lease and transfer and by agricultural loan grants and subsidies will be in keeping with the theory of State Landlordism. In a country inhabited by dense population economic adjustment can be brought about only by intense small farming. The State can assist a great deal through agricultural associations, credit banks and direct subsidies. But small farming cannot thrive unless and until we accept the principle that no one may own any greater area of land than he can cultivate by the labor of his own family. This is the dictate of agricultural economics to which we must listen if we wish to rescue our agriculture from its present stagnation.

*Reform versus Revolution* There is a growing recognition by means of varied political and economic predictions that changes in the Indian land system are imperative. The opinion has now spread to all classes of society. Under the pressure of an enormous population upon the land the holdings have come to be so small and fragmented that they can neither utilise the full labor of a family nor can support it even under the existing low standard of subsistence. At the same time the landlord has become a rent-receiver rather than a wealth-producer having ceased to play his old and honorable part in the agricultural combination. Today he neither supplies agricultural capital nor controls farming operations. Below him are developed a class of intermediaries who have profited from the complexities of the present land system and make the difficult position of the actual cultivator still more precarious. This is no criticism but a summary of the facts. The old system has broken down and it is imperative that a new system be created in its stead which is adapted to the present conditions and requirements of agricultural and social life. To delay the process of adaptation, whether from fear of angering "vested interests" or from apathy towards the unvoiced classes, is to sow the seeds of drastic reform and it may be even of revolution.—(From Indian Jour. of Ecms. Jan. '29).