PLAGUE PREVENTION IN SHANGHAI.*

By ARTHUR STANLEY, M.D., B.S., D.P.H.,
Health Officer, Shanghai.

PLAGUE-INFECTED rats having been found in December, 1908, a complete plague survey of the settlement was maintained throughout the year: 17,364 rats were found dead and brought to the laboratory for examination, and of these 187 were plague-infected. The following number of plague-infected rats was found during each month: 27, 30, 40, 21, 10, 1, 2, 2, 1, 5, 20 and 28. The increase in the number of those found plague-infected towards the end of the year may be due to (1) a seasonal incidence, (2) the cessation of rat-poisoning operations during the hot weather, or (3) the re-introduction of infection from outside Shanghai. A system of rat-destruction was put into operation which was at first concentrated on areas within a hundred yards of where infected rats had been found dead, and, when these had been thoroughly worked, was made general throughout the settlement. For this purpose some 5,000 break-back traps were used. During the year nearly 92,000 rats were trapped and burnt: these, with the rats found dead and examined for plague, brought the total number visibly accounted for to nearly 110,000. In addition to the trapping, close on seven million phosphorus baits were laid, about three tons of poison being used, which proved a powerful method in dealing rapidly with infected foci. Poisoning on so large a scale carried with it certain risks. For instance, there were four cases of poisoning, fortunately not fatal, among children, and a few deaths among domestic animals. Since using poisoned cakes coloured bright blue, instead of the usual method of spreading the poison on bread, no cases of adventitious poisoning have, however, been reported. In the absence of any serious attempt at rat-proofing houses on the part of property owners, over 20,000 houses, not keeping cats, were temporarily rat-proofed and pulcridally disinfected, bedding, etc., being passed through the steam disinfectant. This temporary rat-proofing consisted in the plastering up of rat-holes, bricking up and wire-netting places permitting ingress of rats into houses, the furniture of the house being removed to permit of thorough examination for rat holes and runs. Four hundred and nine persons, mostly members of the Health Office staff, were vaccinated against plague by Haffkine's method.

The most dangerous places as regards plague preventive measures were Li Hongkew and Chapei, on the borders of the settlement, where plague-infected rats had been found. After considerable trouble the sanitary staff was permitted to extend rat-destruction operations outside the settlement into these insanitary neighbourhoods. No preven-

tive measures whatever were undertaken by the Chinese municipal authorities, although the methods used within the settlement boundary were fully explained and co-operation urgently requested. This circumstance clearly demonstrates the need of an extension of the settlement for purposes of sanitary safety, for were it possible to keep plague out of the settlement by energetic sanitary measures, there would under present conditions be constant danger of re-infection from the insanitary and populous places immediately outside the boundary, which are now unfortunately beyond sanitary control.

A noteworthy feature has been the absence of any marked degree of opposition from the native community, co-operation being given to a greater extent than would naturally be expected—a circumstance which is considered to be due to the use of tact and forbearance, and especially to the use of the Chinese language by the foreign staff, who thus get into much closer touch with the native community. In cases where exemption from temporary rat-proofing operations was claimed on account of the work having been done by the occupiers, more especially where it was found that cats were kept, the sanitary staff have invariably where possible carefully respected the wishes and feelings of native residents.

As the adoption of the above preventive measures was followed by a marked improvement in the general condition regarding plague-infected rats, as cases of plague in man are held to be almost entirely dependent upon its prevalence among rats, and as no cases of plague occurred among the human population, the community had every reason to congratulate itself on having escaped a danger the magnitude of which had never before been experienced in Shanghai so long as sanitary records have been kept. Having practically freed the settlement of plague-infected rats, it became necessary to see whether further steps could be taken to ensure that plague-infected rats would not again be introduced by ships from plague-infected ports. If nothing further could be done by the Port Health Authority—the Imperial Maritime Customs—it was considered advisable to make the plague prevention staff a permanent organization. It would, however, appear desirable that ships coming from plague-infected ports should be required to present a certificate of freedom from rats; that precautions be taken in the harbour in unloading such ships; and that a health officer, acquainted with modern port health work, be appointed to organize such preventive work in the harbour, in addition to the work at present being done at the Woosung Sanitary Station.

Of the rats examined in the laboratory, about 70 per cent. were *Mus rattus* and the remainder *Mus decumanus*—the *rattus* being the black or ship rat,

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which usually lives in houses, and the *decumanus* the brown or sewer rat. There was a large proportion of the *rattus* among those plague-infected. Of the fleas, *Pulex cheopis* and *Ceratophyllus fasciatus* have been identified, the former being the flea usually associated with the spread of plague from rat to man.

In formulating anti-plague measures the rat has been the chief objective, as it is held that the rat is the essential cause of epidemics, the flea being the carrier of infection from rat to rat and from rat to man, infection from human cases, which is practically limited to the few pneumonic cases that arise, being comparatively rare. The dictum "No rats, no plague," has been taken as a working basis, and a house that is rat-proof has been considered for all practical purposes plague-proof.

The following is a summary of measures put into operation:—

PUBLIC MEASURES.

1. Plague survey by collection of rats, found dead throughout the settlement, for examination in the laboratory in order to locate plague among rats.
2. Rat-destruction in infected areas, beginning at the periphery and working towards the centre.
3. Plague-proofing of houses—
 - (a) Temporary, by service of notice on occupiers asking for co-operation in cleansing, pulicidal disinfection, demurization and rat-proofing by minor repairs, etc.
 - (b) Permanent, by service of notice on owners requiring solid basements, removal of stair linings, hollow ceilings and hollow partitions, so as to deprive rats of accommodation.
4. Preventive inoculation with plague vaccine, beginning with the sanitary staff.

INDIVIDUAL MEASURES.

No rats, no plague.

A house that is rat-proof is plague-proof.

1. Keep cats.
2. Rid your house from rats also by trapping and poisoning.
3. Make your house as rat-proof as possible.
4. Provide no food for rats. Keep all food in places inaccessible to rats. Grain and such-like food for ponies, fowls, etc., should be kept in covered galvanized-iron receptacles. See that your servants keep their rice-bags where rats cannot get. Keep house refuse in properly covered galvanized-iron receptacles, and see that they are covered, especially at night. Keep the kitchen and its surroundings very clean; let no refuse lie about.
5. See that the gratings into the space below the ground floor keep out rats, and that the brick-work of the basement is impervious to rats.
6. See that all openings into covered drains are

kept in good repair to prevent egress of sewer rats. Carefully inspect all corners of the house from top to bottom once weekly, moving furniture where necessary. Do the same in the stable, fowl-house and other outhouses. Arrange for the plastering up of rat-holes or any place that may afford ingress to rats and mice.

7. All rats trapped or poisoned should be burnt. Other rats found dead in or about the house should not be touched with the hands, but should be picked up with tongs, put into Jeyes' fluid and water (1 in 20), and sent to the health officer for examination for plague.

8. Get vaccinated against plague in September in each year that plague threatens.

9. If you have any difficulty in carrying out the above measures communicate with the health officer in writing.

CERTIFIED FARMS.—The sanitary authority continue to grant certificates to farmers who comply with certain conditions as to air-space and general cleanliness of byres, and who keep only cows which have been tested with tuberculin and found satisfactory. One of these farmers has adopted the practice of clipping the hind quarters and tail of his cows, and of grooming them daily, so as to lessen the amount of undesirable pollution in the milk. It is interesting to note that before this practice was adopted, samples of milk from this farm showed *Bacillus Coli* to the extent of 10,000 in 1 c.c. (about 17 drops). In a sample taken after clipping and grooming there were only 10 bacilli belonging to the *Colon* group in the same quantity of milk. There is no doubt that very much may be accomplished by the energetic up-to-date dairyman towards securing comparatively clean milk.—*Annual Report of Dr. Renney, Medical Officer of Health, Sunderland.*

OBJECTIONS TO MEDICAL INSPECTION.—The objectors consist practically of three classes: First, those whose objection is due to ignorance or misconception of the reason or necessity for examination. The number of these varies in different schools, due very largely to the influence of the head teacher, a few words of explanation to the parents generally at once removing the objection. The second class object because they know the condition of their children is open to criticism. The third consists of those peculiarly constituted people who object to anything and everything; they might be termed professional objectors, and apparently the gratification of their peculiar prejudice is more important to them than the condition of their children. Why any sane parent should object to the free examination of his child, properly conducted in the parent's presence, it is difficult to conceive.—*Annual Report of Dr. Sowden, Medical Officer of Health, East Ham.*