VACCINATION AGAINST FOOT-AND-MOUTH DISEASE.

By M. A. LÖFFLER, Professor of the University of Greifswald.

It has not yet been definitely established that measures of isolation, of surveillance, and disinfection are sufficient to prevent, in the long run, the propagation of foot-and-mouth disease. As regards small-pox among human beings, which may well, on account of its facility of transmission, be compared to foot-and-mouth disease, this object can be attained only by means of compulsory prophylactic vaccination. Consequently, an efficacious process of prophylactic vaccination might be, in equal measure, of inestimable value in the case of foot-and-mouth disease also.

The question of the prophylactic vaccination of pigs and sheep against foot-and-mouth disease has also been practically solved by the preparation of a prophylactic serum of high value. Horses treated with increasing quantities of virulent lymph furnish a serum which, administered in doses of 5 to 20 cc., according to the weight of the animals, preserves them from the malady during a sufficient length of time.

Horse serum is less efficacious for cattle, for it only immunises them for about a fortnight.

In treating cattle with increasing quantities of lymph, an efficacious prophylactic serum is obtained, which, administered in doses of 0.3 cc. per kilogram, renders the cattle immune during a period twice as long. The great expense, however, of manufacturing this serum renders it too costly in practice.

A process assuring a cheaper and more lasting prophylaxis has been arrived at by inoculating cattle four or five times, at intervals of eight to ten days, with moderate doses of 15 to 20 cc. of this serum. But, although it only requires 75 to 100 cc. of serum, this process is still too expensive.

A cheap process can only be obtained with what is called "active" immunisation—that is to say, by inoculation with certain quantities of living virus, attenuated as to pathogenic effect.

The attenuation of virulent lymphs has been achieved by means of agents, physical and chemical. At the same time, attempts made with a view to modify the virulence of the lymph, too violent for cattle, by passing it through the bodies of less sensitive animals, such as the full-grown or the sucking pig (as is done with the virus of human smallpox by cultivating it in the bodies of cattle), have given remarkable experimental results. But all these attempts have failed to secure a process of practical utility.

On the other hand, the systematic researches into the effects of mixtures of prophylactic serum and virulent lymph have recently resulted in the discovery of a new process of active immunisation, inoffensive and cheap.

This process is based on the following principles: (1) that mixtures of certain quantities of concentrated serum and virulent lymph are completely inoffensive when injected under the skin; (2) that the injected mixtures produce immunity, but only when a certain proportion is observed between the serum and the lymph; (3) that this immunity appears three to four weeks after the injection, and that it is at first not very pronounced; and (4) that, as a result of injecting increasing quantities of the mixtures aforesaid, this immunity may be rendered very complete, and equal to that acquired after recovery from the disease itself.

The method consists in inoculating a mixture of $\frac{3}{100}$ (0.03) cc. of virulent lymph and 0.5 cc. of concentrated bovine serum. At the end of three to four weeks $\frac{1}{300}$ cc. is inoculated under the skin in the same way; after twelve to fourteen days more, $\frac{1}{100}$ cc.; and after a new interval of twelve to fourteen days, $\frac{1}{25}$ cc. of virulent lymph. Cattle thus treated may be placed among

sick cattle without becoming so themselves. When the animals inoculated have received $\frac{1}{100}$ cc. of lymph they are already immune to a considerable extent.

The cost is 30 to 50 pfennig ($3\frac{3}{4}$ d. to 6d.) per head of cattle.

The different methods of prophylactic vaccination are all employed in practice, according to circumstances. One should use :—

1. On farms where the epidemic has broken out—

For pigs and sheep—injections of concentrated horse serum ; dose, 5 to 20 cc., according to the mixture.

For cattle—injections of concentrated bovine serum ; dose, 0.3 cc. per kilogram.

2. On contaminated farms, where no animal has as yet fallen sick : for cattle—

(a) Injections of moderate doses, 15 to 20 cc., of concentrated bovine serum, repeated every eight to ten days.

(b) The new method.

3. For healthy stocks, but living near contaminated farms—

Either the method of repeated doses of serum or the new method.

4. For healthy stocks into which animals of exterior origin have been introduced—

The method of repeated doses of serum.

For a general prophylactic vaccination, when the epidemic propagates itself in menacing fashion, only the new method need come into question, it being so cheap, and protecting for so long a time.

The vaccinations termed obligatory ought to be extended, because the amount of transmissible infectious virus is considerably augmented by these vaccinations.

The substances necessary for prophylactic vaccinations should be placed by the State *gratuitously* at the service of owners, for the suppression of epidemics is a question of general interest.

RECENT EXPERIENCES AS TO THE INFECTION OF MAN WITH ANIMAL DISEASES (WITH ESPECIAL REGARD TO MEN PURSUING DIFFERENT TRADES).

By Dr E. VON SZEGEDY-MASZAK, Budapest.

THE diseases shown by previous experience to be transmissible from animals to man are the following : tuberculosis, foot-and-mouth disease, anthrax, rabies, glanders, trichinosis, and, according to some recent experiences, swine erysipelas, and botryomycosis. Besides these, there are some other diseases which we observe in man only in isolated cases, and whose importance in human pathology has yet to be proved.

The transmission of tuberculosis from cattle to man is, as we know, admitted as a fact by the majority of investigators. The contrary view is held by Robert Koch and his followers. The question is a weighty one, not only from the point of view of sanitation but also from that of political economy. Experience goes to show that the tuberculosis of man and that of cattle are caused by the same pathogenic germ, for it has been observed in numerous cases that the disease may be transmitted from the animal to man in the following manners :

1. It has been remarked that cow-milkmen, and farmers having to do with cattle, fall sick of tuberculosis ; 2. tuberculosis may arise from injuries of the