A NOTE ON THE ORGANISATION AND CONDUCT OF PLAGUE LABORATORIES.

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THE pathologist and bacteriologist, in the course of their ordinary work, run certain dangers, which are also shared by the surgeon. Considering the number of those who are engaged in the investigation of infectious diseases, it is perhaps astonishing that so few have become infected. This fact may be explained in several ways. In the first place the bacteriologist always handles cultures of pathogenic bacteria with care; secondly, knowing something of the methods of infection by the different bacteria, he takes appropriate precautions in dealing with infected animals; lastly, the cultivation of pathogenic bacteria results in a loss of virulence, and it is possible that he may become infected from time to time with attenuated cultures and acquire a partial immunity.

Most of the infectious diseases are now sufficiently well understood to ensure that with proper care the danger of infection may be reduced to a minimum. If, therefore, a bacteriologist inoculates himself with some pathogenic germ, he does not become a source of great danger to his fellows. With plague, however, the case is very different; comparatively little is known as to the methods of infection; more than this, the disease is extremely infectious, or, in other words, man is extremely susceptible to the disease. The mere handling of a rat dead of plague has been sufficient to cause death, and flies and fleas are quite capable of conveying sufficient virus to cause the disease.

As this is so no precautions can be too elaborate, and the minutest details in the construction and furnishing of the laboratories, and in the technique of the *post-mortem* examinations upon man and animals, must be attended to.

A laboratory for the investigation of plague should consist of three rooms: an anteroom for the preparation of media, cleaning of used vessels (after sterilisation), and for the many other duties which devolve upon a laboratory assistant; the laboratory proper; and a room wherein to keep all infected animals. It is preferable to have a special building for the purpose, but if that is impossible, and the laboratory forms, or is to form, part of a larger building, it should be isolated, as regards communication, from the rest of the building, and so arranged that the only ingress to the laboratory is through the anteroom, and to the animal room through the laboratory. Each of the rooms should be sufficiently large to allow the work to be done with ease. The walls and ceilings should be made of non-porous material, and should have a glazed surface without break; the floor should be of cement or of grooved tiles well set in cement. The windows must be large, and so arranged that the lighting is uniform, the window sashes of iron, and not projecting into the room. All corners must, of course, be rounded off. The ventilation of each room should be separate, the outgoing air being made to pass a gas flame. The source of heat should be, whenever possible, a gas stove, the source of artificial light gas or electricity.

Every endeavour must be made to prevent the formation and collection of dust, and to this end it is advisable to have the floor moistened with a solution of corrosive sublimate containing a little glycerine.

The amount of furniture necessary is not great, and consists of a porcelain sink, a slate or glass bench for microscopic and cultural work, a similar bench for performing necropsies on animals, a muffle for burning the dead bodies, an autoclave, small shelves for keeping the disinfectant solution, a small metal cupboard for keeping syringes, instruments, and a small stock of media, and an incubator.

The infected animal room might with advantage have a slate or glass shelf about 2 feet wide and 3 feet from the ground running round the room, upon which to place the cages containing the animals.

In the anteroom would be the ordinary sterilisers, sink, etc., and a similar shelf to that in the infected room along one side upon which to keep the stock animals. No shelf, bench, cupboard, or other article of furniture in any of the rooms should have sharp corners or edges; everything should be carefully rounded off in order to eliminate the chance of scratching the skin. All the instruments should be in the

best possible order; the syringes (with asbestos plungers) should work easily and the needles should be sharp; the knives and scissors should all be very sharp and the forceps strong and certain. If the last named do not grip securely they may slip, and small particles of infected material or drops of infective fluid may be projected upon the clothes or skin of the operator; the same may happen if the knives or scissors are blunt.

In the conduct of the laboratory the bacteriologist himself should alone handle the infected material, cultures, and animals, even to the extent of feeding the animals. Both the principal and assistant should wear mackintosh overalls, which must be frequently washed with strong disinfectant solution.

The media should be all prepared in the anteroom; the assistant should go into the laboratory as seldom as possible, and never in the absence of the principal; for this reason there should be only one key, and that in the possession of the bacteriologist.

When an animal is to be inoculated it should be prepared in the anteroom, only the actual inoculation being performed in the laboratory. During the inoculation both principal and assistant should wear indiarubber gloves, which can be easily disinfected. Unless the hands are covered they would have to be thoroughly disinfected after every inoculation; in dealing with plague bacilli this should be done as seldom as possible in order to prevent the peeling and cracking of the skin, which is the usual sequel to the constant use of disinfectants.

After the inoculation the syringe must be at once placed in boiling water or a strong disinfectant, and the animal—rat or mouse—placed in a cage. Special cages are necessary, and those used by Professor Paltan¹ are convenient.

A cylindrical glass jar is provided with a hole in the centre of the bottom, and rests upon a stand in a jar of disinfectant solution. A disc of wire gauze or perforated zinc is supported upon legs about an inch above the bottom of the jar. The lid is also a disc of wire gauze weighted in the rim. Any excreta voided by the animal will fall through into the disinfectant, thus preventing any danger from its drying or falling on the shelf.

Upon the death of the animal it is removed with forceps and fastened on a suitable block of wood, carrying small wooden plugs at the side, by means of string or wire. The cage should be at once placed in the autoclave and sterilised.

In making the necropsy gloves should be worn. The instruments having been boiled should be ready for use, and the small steriliser on the bench should be kept boiling while the necropsy is being made, so that any instrument which is finished with, either permanently or temporarily, may be at once placed in the boiling water.

Upon the completion of the necropsy the principal should sterilise all the instruments, calcine the animal in the muffle (the wood block should be placed in the muffle, no attempt being made to free the animal from it), and thoroughly disinfect the bench with disinfectant solution.

All discarded cultures must be at once placed in the muffle and incinerated, or sterilised in the autoclave before leaving the laboratory.

Lastly, the laboratory should be used only for the investigation of plague, no other work of any description should be undertaken.

It follows from what has been said above that the same scrupulous care must be taken in making a necropsy upon the human subject.

REFERENCE.

¹ Markl. *Central. Bakt. u. Parasitenk.* May 4th, 1900.

PLAGUE AND INFLUENZA: MIXED INFECTION IN HOUSES.

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(With a Bacteriological Report by Dr. J. NIELD COOK, Health Officer, Calcutta.)

DURING the months of March and April, 1900, I was making systematic efforts to obtain confirmation by cultures of the existence of an obscure form of plague pneumonia described as existing in Calcutta in the cold weather epidemic of 1899.¹ For various reasons, afterwards to be gone into, the confirma-