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Medical Officer of Health, Glasgow.**

**Contributors**

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# THE CLINICAL VARIETIES OF PLAGUE.

BY

A. K. CHALMERS, M.D., D.P.H.(CAMB.),

*Medical Officer of Health, Glasgow.*

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# THE CLINICAL VARIETIES OF PLAGUE.

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The occurrence of several cases of Plague in Glasgow, and the total absence of opportunity of acquiring a clinical acquaintance with the disease in this country for over 200 years, has induced the Health Committee of the City to authorise the preparation of this pamphlet, with the view of placing at the ready disposal of medical practitioners descriptions of the disease which have been recorded by men who have had considerable personal experience of it abroad.

It has not always been possible to introduce into the text the name of each individual authority quoted, but a general acknowledgment of the sources of information is appended.

*Nomenclature.*—The variety of names conferred upon Plague in local epidemics, and by different writers, sufficiently suggests the diversity of the clinical features of this disease, *e.g.* :—

“Typhus, with Glandular  
Swellings.” (Tripoli, 1856.)

“Adynamic Typhoid Fever.”  
“Intermittent Fever,  
with Glandular Swell-  
ings.” } (Mesopotamia, 1856-85.)

- |                                                                                                          |                 |                      |
|----------------------------------------------------------------------------------------------------------|-----------------|----------------------|
| "Hæmorrhagic Fever."                                                                                     | (Persia, 1868.) |                      |
| "Intermittent Fever, with<br>Buboes."                                                                    | }               |                      |
| "Croupous Pneumonia, with<br>Buboes."                                                                    |                 | (Astrakan, 1877-79.) |
| "Typhus, with Glandular<br>Swellings."                                                                   |                 |                      |
| "A peculiar form of Mumps."                                                                              |                 |                      |
| "Polyadenitis" (pathologic-<br>ally accurate, although<br>clinically only one gland<br>may be apparent.) | }               |                      |
| "Malignant Adenitis."                                                                                    |                 | (Cantlie.)           |
| "Pustular Pest."                                                                                         |                 |                      |

All these terms suggest clinical conditions readily appreciated.

#### CLINICAL VARIETIES.

The term "bubonic" is misleading. "Buboes are by no means an essential sign of Plague" (Cantlie). In the fatal illnesses in Rose Street, early in August, the chief symptoms were diarrhœal (*Intestinal Variety*); the death in Rose Street was clinically a badly defined pneumonia (*Pneumonic Variety*). In all three buboes appear to have been absent as a feature attracting attention at least.

The cases which have come under observation in hospital have presented the following types:—

- (1) *Bubonic*, in the form of
  - (a) an affection of *one* gland only, or
  - (b) of several groups of glands, the glands affected being *cervical, axillary, or inguinal*.
- (2) *Pneumonic*, with tenderness of one or more glands.

- (3) *Septicæmic*, with no definite involvement of external glands.

Dr. Cantlie groups the several varieties as follows:—

1. In the *Bubonic*, buboes form in the groin, neck, or axilla, or the enlargements of the glands may be well nigh confined to the abdomen. As a rule, the first outbreak of plague in a community is bubonic in type, whatever it may become afterwards.

2. In the *Pneumonic*, the condition of the lungs plays the most prominent, or, it may be, the only part in the category of symptoms.

3. In the *Intestinal*, an intestinal flux occurs, consisting of diarrhœa at the onset, to be followed later by the appearance of blood, mucus, and epithelium in the stools.

4. The *Nervous* symptoms, always a feature in the disease, may be so pronounced as to put in the shade all other minor evidences of the disease, and justify the group being termed the *Cerebral*. Delirium, often of apparently a suicidal type, sets in early; but muscular twitchings, tonic and clonic spasms, especially in children, loss of consciousness and deafness, are more than occasionally manifest.

5. The term *Puerperal* has even been bestowed upon cases in which hæmorrhage from the uterus, and miscarriage, were the prominent features of an attack of plague.

6. The names *Toxic* and *Siderans* are conferred upon a rapidly fatal class of cases in which the usual clinical signs are absent, and the symptoms indicate a severe form of toxæmia merely.

7. A *Typhus* type implies a resemblance between plague and malignant typhus fever. Although plague has been termed the typhus of the tropics, there is no ætiological affinity between the two diseases; but not infrequently the symptoms of the two are almost identical, even to the skin eruption.

8. *Pestis Ambulans* refers to a mild type of the disease, which is frequently included under the heading *Pestis Minor*.

9. *Pestis Minor* may precede, run concurrently with, or flourish after an epidemic of true plague. In Hong Kong, in Calcutta, in Alexandria, on the Volga, and in many other places, sporadic, or even epidemic, outbreaks of adenitis, going on to suppuration, disintegration, and death of a gland, or group of glands, have been recorded. Whether these are really affiliated with true plague is doubtful, but the coincidence is worthy of note, more especially if it be proved that *Pestis Minor* is a forerunner of plague infection.†

#### CLINICAL DESCRIPTION OF THE MORE IMPORTANT TYPES.

\* (1) *The Pneumonic form*.—This is lobular rather than lobar. Professor W. J. Simpson thus describes it:—

The pneumonic variety, which is very infective, has been demonstrated by Surgeon-Major Childe, I.M.S., to owe its infectivity to the fact that *the sputum frequently contains almost a pure culture of plague bacilli*, which get on to handkerchiefs, clothing, bedding, and other articles of furniture, as well as on to the floor of the patient's room. This form is particularly dangerous because the clinical

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† *The Practitioner* for November, 1899.

symptoms are not typical of ordinary plague, and it is more likely to be mistaken for bronchitis, broncho-pneumonia, or pneumonia. *Pain, tenderness, and enlargement of the lymphatic glands in the inguinal, femoral, axillary, and cervical regions, which are the most prominent external signs of bubonic plague, are absent;* and beyond cough and fever, and a prostration which is exceptionally severe, and *far exceeding that which ought to be expected from the small amount of lung mischief discernible*, there are few signs to raise suspicion that the disease is plague. The illness commences with a rigor, and symptoms of general *malaise, intense headache, nausea, vomiting*, and pain in the limbs and body, followed by fever varying in range from  $102^{\circ}$  to  $105^{\circ}$ . Cough more or less pronounced with dyspnoea sets in, and a quantity of watery sputum tinged with blood, and becoming profuse as the disease advances, is coughed up as a rule without effort. *The sputum has not the glairy, viscid, rusty character of acute pneumonia*, though on the clothes it may be readily mistaken for this. Moist sounds are heard at the base of the lungs and over the pneumonic patches; but however hurried the breathing and quick the rate of the pulse, there is not that disproportion between the pulse and respiration ratio which obtains in acute pneumonia. The symptoms become rapidly worse, the patient becomes delirious, there is gradual failure of the heart action with or without coma, and death occurs on the fourth or fifth day, or earlier. This form of plague, besides being the most infectious, is also the most fatal.

*\* (2) The Bubonic form:—*

The bubonic variety of plague, as its name implies, is always accompanied by buboes, which usually appear at the commencement of the illness in the *groin, armpit, or neck*, and occasionally in the *supratrochlear* or *popliteal* space. The most common site is the groin, and the next is the armpit; but more than one region may be affected, and often groups of neighbouring glands on the same course of

lymphatics become infected. The bubo varies in size, and is, as a rule, extremely tender and exquisitely painful. In cases which prove fatal early the glands may remain hard and painful, but in the majority, owing to the matting together of glands by a serous and sanguinolent infiltration, and by a mass of extravasated blood, the bubo enlarges and forms a doughy and bulky swelling. At times, owing to pressure on veins, a considerable amount of œdema of the tissues in the neighbourhood of the bubo occurs. The size of the bubo is not of so much importance as its position. When situated in the axilla or in the cervical region it is particularly dangerous when the exudation is extensive, because the effusion is apt to become organised and converted into a hard mass, which may press on some vital part, or may form a large slough. If the patient lives for seven or eight days the bubo either begins to resolve, or shows signs of softening and goes on to suppuration or to suppuration and sloughing. Examination of the lymph and blood of the glands and buboes show large numbers of the plague bacilli. A gland or bubo may be punctured, and a small quantity of the contents drawn off by suction with a sterilised pipette, closed at one end to protect the operator against accidental infection.

\* (3) *The Septicaemic form* :—

The septic variety of plague is a virulent type in which the lymphatic glands show no special enlargement during life, and consequently the bubo is absent, but after death the glands are found to be generally affected, being somewhat enlarged and much congested. In this form of plague the bacilli early invade the blood in large numbers, and are easily detected. The chief characteristic is its rapidity. The patient is profoundly affected by the amount and strength of the poison received. Usually ushered in with high fever, there is at times no power in the patient for reaction, and the temperature does not reach 100° F. The

countenance is pale, and the expression apathetic. Extreme nervous prostration, muscular weakness, delirium, picking of the bedclothes, stupor, and coma follow quickly on one another, and the patient dies on the first, second, or third day. In these cases there may be bleeding from the nose, kidneys, and bowels.

\* (4) *The Ambulant or Mild form:—*

The ambulant or mild variety of plague, which is a non-fatal form, is *even more likely to escape attention than the pneumonic*, because of the slight constitutional disturbance which it may produce, and because it is often taken for some other disease. *Pestis minor or pestis ambulans is, if anything, more insidious and dangerous to the community at large than the pneumonic*, for its mildness produces no sense of danger. Further, it is not discernibly infectious, the cases appearing to crop up unconnected with one another, and it is generally mistaken for *mumps, syphilis, the result of a strain, scrofulous glandular affections, and malarial disease*. The clinical symptoms are ill-defined or well-defined fever; pain, tenderness, and enlargement of the lymphatic glands, in the groin, armpit, or neck; weakness, a tongue which is coated with a creamy white fur in the centre, and is angry and red at the tip and edges; the eyes may be slightly congested and the speech may be a little thick. This is the acute form, which may only last a week, the bubo resolving rapidly or quickly suppurating. In the more chronic form, which may last *two or more months*, the bubo or buboes are indolent, and they undergo a slow process of suppuration and sloughing, constituting a serious drain on the general health of the patient, producing anæmia and debility. These mild or benign forms of plague have been observed in nearly all plague epidemics. The most recent example of this form of plague, unmixed with other varieties, was the glandular sickness, as it was called in Astrakhan in 1877. In this city an outbreak which

affected more than 200 persons occurred without a single death, and without being followed by the virulent form. Those affected suffered from fever more or less acute, with swellings and inflammation of the lymphatic glands, which in most cases ended in abscesses. Beyond the inconvenience and discomfort caused by the buboes, sometimes in the neck, sometimes in the armpit, and at other times in the groin, the general symptoms were not such as to prevent the patient from moving about.

(5) *The Cutaneous form.*—Very rare.

It consists of pustular lesions which leave scars, and have been noticed apart from buboes. The symptoms begin with violent pain at a point which becomes brown to about the size of a split pea.

(6) *Convulsive form.*—In young children the attack may be introduced by a convulsive seizure, and death may rapidly follow without the development of any characteristic symptom.

GENERAL DESCRIPTION OF SYMPTOMS COMMON TO ALL THE SEVERER VARIETIES.

*Invasion.*—Except in mild cases, this is usually sudden, with shivering, followed by fever, which may be mild, and accompanied by vomiting, frontal headache, photophobia, and pain in epigastrium.

Professor Simpson, in the article already referred to, says:—

“There are *certain symptoms common to all forms of plague of the severer type*: these are the peculiar expression of the face, the halting speech, and the appearance of the tongue. The *countenance generally portrays in the early stages*

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\* These descriptions are taken from an excellent article on “Plague” by Professor W. J. Simpson in *British Medical Journal*, September 16th, 1899.

*anxiety and distress, later resignation and apathy ; the eyes are red and congested, and the patient has the appearance of being under the influence of a hypnotic, and yet unable to sleep, the eyes remaining wide open. Unless delirious, when the face is flushed and the physiognomy wild, the expression in advanced cases is apathetic or vacant, masking the approaching dissolution. The speech is peculiarly hesitating and broken, being more or less staccato in character, each syllable being pronounced by itself in a thick and husky tone like that of a drunken man, or only half the sentence may be spoken, the rest being forgotten. The tongue is early coated with a creamy white fur, except the tip and edges, which are clean and red ; later it is dry, covered with a yellowish or whitish-brown fur, the tips and edges remaining red and irritable.*

"The characteristic physiognomy, speech, and tongue with the presence of a bubo are unmistakable signs of plague. The general symptoms of a typical case are shivering, high fever, nausea, vomiting, intense general or frontal headache, painful and tender bubo, staggering gait, suffused and congested eyes, anxious expression, coated tongue except on tip and edges, restlessness with uncontrollable desire to wander aimless to some distant locality, dyspnœa, increasing disturbance of the nervous and circulatory systems, manifesting itself in high and noisy delirium or coma, and in gradual or sudden failure of the heart's action. The pulse, which is quite soft and easily compressible at the onset, becomes intermittent and dicrotic and often difficult to count, and there is a tendency to collapse, the patient's extremities becoming cold and clammy. After the sixth or seventh day the patient's chances of recovery are much increased, and the temperature usually reaches the normal about the tenth day."

In the cases now in hospital the anxious apprehensive expression, with suffused conjunctivæ and halting speech, suggestive of typhus fever, during the earlier

stages of the disease, followed by a condition of apathy later on, attracted attention.\*

#### ÆTIOLOGY.

Kitasato discovered and described the *bacillus pestis* in the blood, excreta, and organs of plague patients during the Hong Kong epidemic of 1894. It is present in abundance in the sputum of patients with the pneumonic form of the disease, and in the buboes, but, after supuration is frankly established, it is displaced by other organisms. It may also be voided in the vomit, urine, and fæces, especially in advanced stages of the disease, and is with difficulty recovered from the blood except in septicæmic cases.

#### PERIOD OF INCUBATION.

From 36 hours to 11 days, but generally under 5 days. This period is not characterised by any symptoms, and is apparently to be regarded as non-infectious.

#### METHODS OF INFECTION.

(1) *Inoculation*, first and chiefly through wounds or abrasions of the skin and mucous membranes; or by the bites of infected insects. The buboes which result are in definite relation to the point of entrance of the infection, although this can rarely be discerned. Cuts and scratches on the hands and feet should be protected against accidental inoculation.

(2) *Respiratory tract* (including nasal and buccal mucous membrane), by the inhalation of dust and suspended particles of expectoration from pneumonic patients.

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\* See "Clinical Aspects of Cases" now under treatment by Drs. Brownlee and M'Clure in *Lancet* and *British Medical Journal*, September 8th, 1900.

(3) Ingestion of food has been stated as a possible mode of entrance, but no evidence has been found *post-mortem* that the bacillus had entered through the stomach or intestines. (Bombay Plague Report, p. 89.)

(4) Infection through lodgment of sputum of Pneumonic Plague in conjunctival sac has been observed.

#### VEHICLES OF INFECTION.

*Dust.*—Kitasato has demonstrated the presence of the microbe in dust from the walls of a room occupied by a plague patient.

*Air.*—Transmission by air is not known, but Neisser has shown that from Pneumonic Plague particles of expectoration may be in suspension in the atmosphere which surrounds the patient.

*Insects.*—In the digestive tract and excreta of flies, Yersin and Nuttall have shown the presence of the microbe. Fleas, lice, and ants are also capable of conveying it. (Ogata, Hankin, and Simond, &c.)

*Animals.*—The rat is notoriously susceptible to plague, *and may readily become a means of propagating it.* This is quite universally recognised, a disease among rats having frequently preceded and accompanied the spread of plague; in Formosa it was known as the "RAT SICKNESS." Hence the necessity for ascertaining the habits of rats in any district, particularly whether they are dying in larger numbers than usual, and hence also the value of *active efforts for the destruction of rats, as a prime element in suppression and prevention.* *Special importance, indeed, should be attached to the discovery of dead rats as an*

*element in diagnosis*, and an unusual fatality among rats, with illness of a doubtful nature in man, should at once raise the question of plague. Although properly belonging to the question of personal cleanliness, attention may be here drawn to the danger of handling rats dead of the disease. The present custom adopted in Glasgow by the rat-catchers, is to lift the body of the animal with tongs, wrap it in cloths soaked in a solution of bichloride of mercury (1 in 500), and thereafter convey it in a box for bacteriological examination. After this it is burned.

*Clothing.*—When definite exposure to infection has taken place. Hence the risk in old clothing and rags therefrom.

*Food.*—There are no data pointing to the probability of transmission by water or food.

#### THE CONDITIONS FAVOURABLE TO ITS SPREAD.

*Direct transmission from man to man* is rare under conditions where thorough ventilation, good lighting, and scrupulous cleanliness of persons and surroundings are obtainable. But there is a striking similarity in the physical conditions which favour the spread both of typhus fever and of plague. In Bombay the disease increased notably during the cold season, when the poor live under less sanitary, because more overcrowded, conditions than during the warm months. Overcrowding, bad ventilation, imperfect nourishment, uncleanness of person, dwelling, and surroundings are the handmaidens of typhus fever; and accumulating experience demonstrates them to have a similar relationship with plague.

*Infection of Dwellings and Soil.*—For practical purposes there is undoubted value in distinguishing

between *imported*, *indigenous*, and *endemic* plague. In this last the connection between cases ceases to be direct. Endemicity in typhoid fever is established in conditions of great pollution of the surface of the soil, and plague would seem to have a similar affinity for surface uncleanness.

Under these conditions the bacillus may lead a saprophytic life — its presence in a non-virulent form in the soil has, indeed, been demonstrated by Yersin, but what the conditions are which have the power of restoring its virulence is matter for conjecture.

Experience of the disease elsewhere helps to confirm this.

Of the gang of dustmen appointed to carry out disinfection in Bombay, only those became infected who lived in houses, as the poor do, of bad sanitary conditions.

*Except for the accidents of exposure to gross and probably prolonged contagion, it is necessary to live the life of the inhabitant in order to incur his perils. And peril exists wherever the surroundings are of a character so grossly insanitary as will afford the bacillus a suitable soil for saprophytic growth.*

*Bacteriological Enquiry.*—In a certain number of cases the presence of the disease can be verified bacteriologically either in the sputum or in fluid obtained by a carefully-sterilised hypodermic syringe from an affected gland. On application to the Medical Officer of Health apparatus will be supplied for obtaining material for bacteriological examination.

*Serum Inoculations.*—Yersin's serum in 20 c.c. doses as prophylactic *after* exposure is recommended.

*Haffkin's Prophylactic*, it is stated, should not be used in persons who have been definitely exposed to infection. A constitutional reaction follows its introduction into the system, and a temperature of 102° F. is regarded as a

necessary indication that the full protective value has been obtained.

#### PROTECTION OF INDIVIDUAL

*Cleanliness.*—The most rigid attention to detail of personal and domestic cleanliness is demanded.

*In persons attending the sick,* or dealing with infected houses and material, this is imperative. The discharge from the patient, and the dust of the household are infectious; all articles on which either may lie should be wetted with a disinfectant before being disturbed. On leaving, the hands should be most carefully disinfected, preferably by immersion in a solution of bichloride of mercury (1-500), *and afterwards washed.*

*Scratches and abrasions of the skin* afford a ready means of inoculation, and should be carefully protected.

*Clothing,* especially underclothing, should be changed frequently.

*Dwelling-houses.*—(1) Absolute cleanliness of walls and floors, and of the surfaces of furniture, &c., is necessary.

(2) Soiled clothing should not be retained, but immediately immersed in a disinfectant and washed, or boiled for 15 minutes.

#### STRENGTH OF DISINFECTING SOLUTIONS.

Bichloride of mercury (1-1000) kills the bacillus immediately.

Chloride of lime (1-100) kills the bacillus in 15 minutes.

Caustic lime (1-100)	do.	30	do.
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Carbolic acid (5-100)	do.	1	do.
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Formaldehyde (2-100 solution of formalin) is a good disinfectant for surfaces.

## IMPORTANCE OF RECOGNISING PLAGUE IN ITS Milder FORMS.

Of special importance at present is the *mild or ambulant form* of the disease, which is thus referred to by the late Sir R. Thorne\* :—" *Fever, with glandular swellings*, prevailed in Bombay before it was recognised that plague had reached that city; and it is impossible to read the medical history of this disease in almost every part of the world without being impressed with the frequency with which recognised plague has been preceded by ailments of such *slight severity, involving some bubonic enlargement of glands, and some rise in body temperature* so as to mask the real nature of the malady. In this respect plague would appear at times, if not commonly, to resemble other specific epidemic diseases in their pre-epidemic behaviour; and just as seemingly simple sore throats or slight diarrhoeal attacks, both of them so trivial in their nature as to allow the subjects of them to move about freely amongst their fellow subjects, turn out ultimately to have been the means of sowing broadcast the infections of diphtheria and typhoid fever respectively, so does the *ambulatory plague patient, who feels somewhat out of sorts, and has some commencing enlargement in his groin or armpit*, often constitute a grave danger to public health. Indeed, if plague differs from the diseases referred to in this sense, it would be by the frequency with which indolent buboes form a solitary outward indication of mischief, and by the facility with which these otherwise ominous symptoms evade detection.

And again, "The mild and ambulatory attacks of plague . . . . (see Appendix to above report)

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\* 28th Annual Report of the Local Government Board (England). Supplement containing Report of Medical Officer.

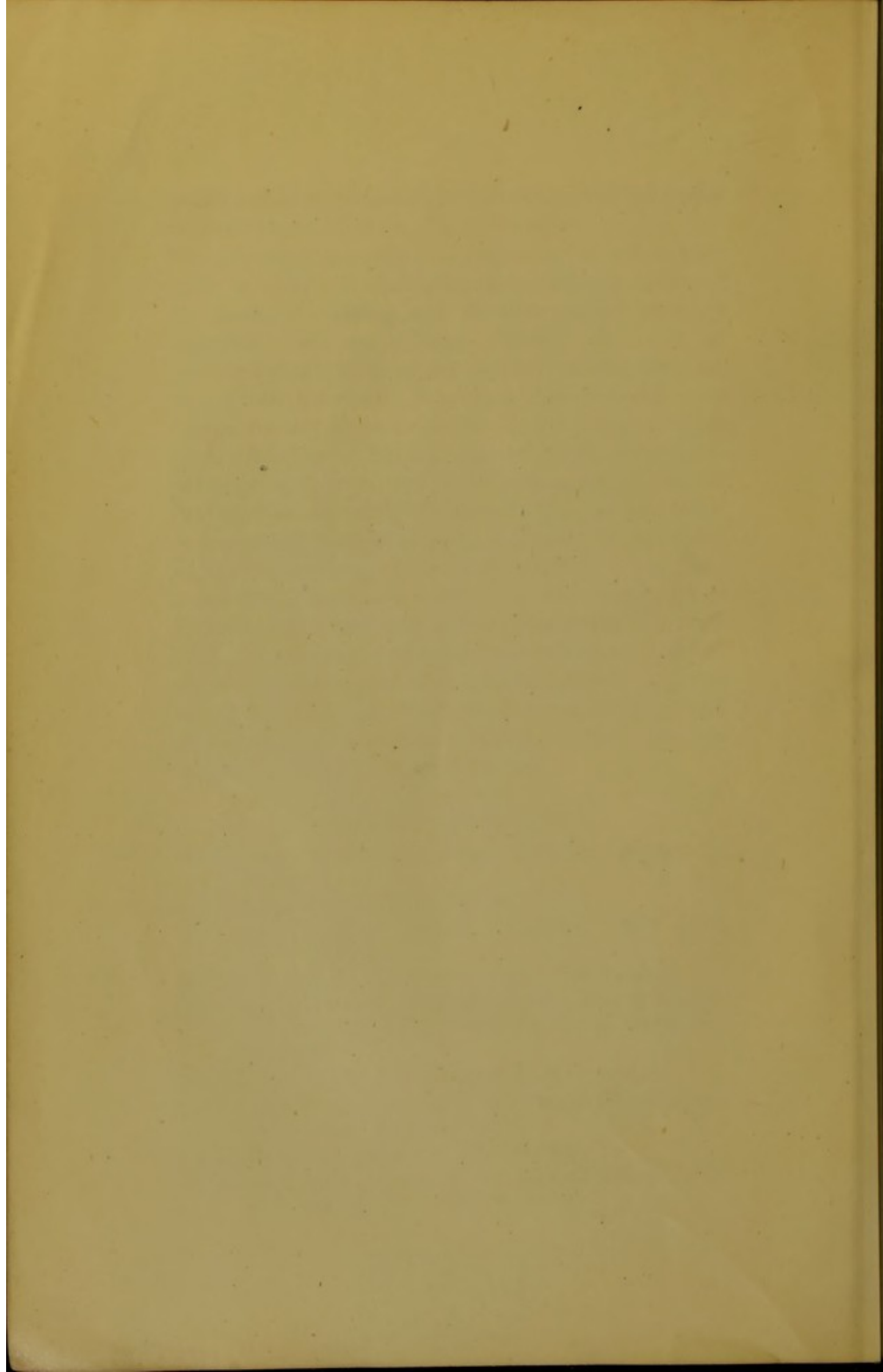
which obtain so commonly in connection with epidemics of this disease, have a further interest. . . .

The recognised prevalence of plague in one and another place or country is often set down to infection conveyed by means of clothing, and of other articles that are imported from an infected district. It must be admitted that certain articles, notably clothing, bedding, &c., *which have been in contact with the sick*, may unquestionably serve as vehicles for the communication of the infection of plague, and it is of the utmost importance that such articles should always be either destroyed or efficiently disinfected. But, as the result of increasing knowledge as to the methods by which the infection of plague is communicated from one place to another, *I have no hesitation in venturing to assert that the individual who suffers from Pestis Minor or Pestis Ambulans, and whose movements no one has found cause to control*, is an infinitely greater danger as a vehicle of infection than even infected clothing; and this, especially when it is a question of conveying the disease to a hitherto healthy country."

#### SOURCES OF INFORMATION.

- (1) Indian Plague Commission, 1898-9. Minutes of Evidence.
- (2) Bombay Plague Report, 1900.
- (3) British Medical Journal, September 16th, 1899. Prof. Simpson.
- (4) The Practitioner, November, 1899. Dr. Cantlie.
- (5) Transactions of the Epidemiological Society of London, N.S., vol. xvi., 1896-7. Dr. Cantlie on the Spread of Plague.
- (6) Bubonic Plague. Montenegro, 1900.
- (7) Bubonic Plague. Treasury Department (Washington). Dr. Wyman's Pamphlet, 1900.
- (8) La Peste et son Microbe. Netter, 1900.
- (9) Twenty-eighth Report of the Medical Officer of the Local Government Board (England).





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