

day. In all about twelve hundred people were affected. An immense majority of all the cases were in the part of the town which received water from the infected reservoir.

Milk also may be the source of infection. One of the most thoroughly studied epidemics due to this cause was that investigated by Ballard in Islington. The milk may be contaminated by infected water used in cleansing the cans. In fresh milk it has been shown that the germs grow rapidly.

Filth, bad sewers, or cesspools can not in themselves cause typhoid fever, but they furnish the conditions suitable for the preservation of the bacillus and possibly for its propagation.

(c) *Contamination of the Soil*.—Pettenkofer holds that the poison is not eliminated in a condition capable of communicating the disease directly, but that it must first undergo changes in the soil, which changes are favored by the ground-water.

It does not seem probable that typhoid fever is communicated by the air alone, as by the medium of sewer-gas.

Once in the intestinal canal the typhoid germs probably do not like the cholera bacilli increase in the secretions, but penetrate the epithelial lining and reach the lymphoid tissue, upon which they exert their specific action, causing a cell proliferation greatly in excess of the physiological process. The necrosis may be regarded as the result of the maximum intensity of the action of the bacilli—an action not confined to the lymphatic apparatus of the intestinal wall, but also met with in a typical manner in the enlarged mesenteric glands and in the liver and spleen.

It has not yet been definitely determined whether the constitutional disturbances in typhoid fever depend upon the toxalbumins produced in the growth of the bacilli, though this is in the highest degree probable.

Morbid Anatomy.—The statistical details under this heading are based upon sixty-four autopsies, a majority of which were performed at the Montreal General Hospital, and upon the records of two thousand post-mortems at the Munich Pathological Institute.*

Intestines.—A catarrhal condition exists throughout the small and large bowel, and to this is due, in all probability, the diarrhoea with the thin pea-soup-like stools. Associated with this catarrh there is during life some epithelial desquamation.

Specific changes occur in the lymphoid elements of the bowel, chiefly at the lower end of the ileum. The alterations which occur are most conveniently described in four stages:

1. *Hyperplasia*, which involves the glands of Peyer in the jejunum and ileum, and to a variable extent those in the large intestine. The follicles are swollen, grayish-white in color, and the patches may project to a distance of from three to five mm. In exceptional cases they may be still more

* Münchener medicinische Wochenschrift, Nos. 3 and 4, 1891.