and the chest was examined by the x rays. Four weeks after admission the patient died rather suddenly with practically no symptoms except the occasional quick breathing, the pallor, and the abnormal blood count. Shortly before his death another differential count was made with the following result: Red cells 4,310,000, polynuclear 46 per cent., eosin 1.2 per cent., small lymphocytes 45 per cent., large hyaline 4.8 per cent., neutral myelocytes, 2.2 per cent., eosin ditto 0.8 per cent., total leucocytes 73,600.

Necropsy.—The necropsy was carried out by Dr. Newman Neild, to whom I am indebted for the following notes. The body was considerably wasted and anaemic. There was slight oedema of the hands and well-marked oedema of the legs and feet. A growth of fine hair appeared over the whole skin, most marked about the shoulders. The tonsils were normal, the larynx, trachea, and large bronchi were slightly injected. On opening the thorax the anterior mediastinum was found to be full of organizing lymph still somewhat gelatinous. Over the lower lobe of the right lung were thickly distributed masses of soft green lymph. In some places over the lower lobe there were adhesions to the chest wall. On section the whole of the middle and lower lobes showed signs of broncho-pneumonia apparently progressing towards recovery. The upper lobe showed a similar affection to a much less extent. In the left lung the lower lobe showed also broncho-pneumonia in the resolving stage, especially at the base. Thick flakes of green lymph were entangled among the large vessels at the base of the heart. The blood in the heart was fluid, but a large straw-coloured clot was lying in the right ventricle. The valves and the heart muscle were normal to the naked eye. The pericardium contained about half an ounce of greenish serum with flakes of lymph. The right auricle was somewhat dilated. The stomach, oesophagus, and intestines were normal. The lymphatic glands at the angle of the jaw were enlarged, those elsewhere were normal. There was very slight injection of the peritoneum, and a few flakes of lymph were found in the peritoneal cavity. The kidneys were congested, but otherwise normal. The urine showed a cloud of phosphates. The spleen was firm and not enlarged. The Malpighian bodies were translucent and enlarged. The marrow in the ribs was macroscopically normal, that in the femur was rather paler than usual. Cultures taken with due precautions from the pericardium and the heart blood gave a pure growth of the pneumococcus.

Pneumococcal septicaemia is, of course, a common occurrence. In pneumonia, especially if we examine the most severe cases and take the blood shortly before death, it is very frequent, and even in the course of ordinary attacks it can sometimes be found. Prochaska, the latest observer I have noted, found it in 38 out of 40 consecutive cases. It is found, too, in other diseases due to the pneumococcus, such as arthritis, tonsillitis, otitis, empyema, and peritonitis. Foulerton and Dieulafoy found it in their remarkable cases of phlegmonous gastritis, and G. Blumer notes that a general infection of the blood is often present, not only in pneumonia but also in simple oedema and congestion of the lungs. The difficulty raised by Durck's discovery of the pneumococcus in the lungs of some healthy individuals need not trouble us here, for there were ample evidences of its pathogenic virulence in the various organs and cavities. It does not seem certain where the primary entrance of the infection took place.

The lesions outside the lungs are at least as marked as those within them. The broncho-pneumonia may have been a late complication of the original trouble. Some 75 per cent. of the cases of empyema in children are pneumococcal, and Foulerton has shown reason for thinking that many of these are primary and without any lung affection. Indeed, Washbourn proved that the pneumococcus can pass through the healthy lung without injuring it and set up lesions elsewhere. In peritonitis, too, there may be no lung affection, and the disease may simulate typhoid or appendicitis, and commence with an attack of diarrhoea.

A recent case under my care was admitted as appendicitis, and was found to have a large amount of pus free in the peritoneum, which gave a pure culture of the pneumococcus. In this patient, as in G. B., I was struck with the very slight effect on the general activity of the patient which the infection produced, though marked pyrexia existed in the former case and a nearly normal temperature in the latter.

A high temperature is, of course, the rule in adults and older children. Nuthall and Billington,¹ in reporting 13 cases of pneumococcal infection, refer to its markedly remittent character and the "typhoid state," which marks the later stages of the disease. Newton Pitt, however, in a recent discussion, pointed out that with infantile empyema the temperature may be normal throughout the whole course of the disease in certain cases. It is not clear what is the cause of this apyrexia, but it is not likely that the degree of virulence of the special coccus has anything to do with it. If we suppose that in the present patient the acute attack was over before admission, still a month is a long while for

the pneumococcus to remain in the blood and lymph with little or no pyrexia.

The blood counts do not seem on the whole to disagree with the *post-mortem* findings, though I was disposed at first to regard the marked lymphocytosis with apyrexia as due to some form of leukaemia. In the pneumonia of adults a marked leucocytosis occurs in all but the most severe or the very mildest cases, as is well known, and is due to an increase of the polynuclear cells, which amount to 80 or 90 per cent., while the lymphocytes are reduced to 4, or even 2 per cent. However, in children under 1 year all this is changed. A leucocytosis is made up chiefly by an increase of lymphocytes, except perhaps in severe intestinal disturbances, when the adult type is seen. Even in healthy children of this age, the statistics of Alf. Japha, of Berlin, show that the small lymphocytes are normally 54 per cent. and the large ones 4, while the polynuclear are only 42 per cent. Thus our count of 73,600 white cells made up of 49 per cent. lymphocytes and 46 polynuclear ones is not out of the way, and Cabot somewhere records a case of pneumonia in a child where the white cells amounted to 94,600 and lymphocytes to 66 per cent. Even the slight excess of large lymphocytes is a common feature in childhood, though it occurs also after the defervescence of pneumonia in adults, where Turck has found them numbering 16 per cent. The eosinophile myelocytes have been looked upon as peculiar to leukaemia, but of late have been found in pneumonia also. On the whole, the blood counts, remarkable as they were, did not aid us much, and unless a culture had been made from the blood during life it is hard to see how the condition could have been determined. Possibly the iodine reaction which has been recently used in pneumonia might have given some indication.

REFERENCES.

¹ *Birmingham Med. Rev.*, January.

NOTE ON THE ABSENCE OF B. COLI, ETC., FROM THE NORMAL OYSTER.

By R. TANNER HEWLETT, M.D., M.R.C.P., D.P.H.,

Professor of General Pathology and Bacteriology in King's College, London.

UNLESS it can be shown that the bacillus coli and allied forms, and the bacillus enteritidis sporogenes are not present in shellfish living in uncontaminated waters, the bacteriologic examination of shellfish for evidence of sewage pollution can be of little value, since it is based upon the search for, and detection of, these species of bacteria. The researches of Professor Boyce and of Dr. Klein, however, seem to have proved that, contrary to what obtains in the higher vertebrates, these microbes are normally absent both from the exterior and from the digestive tract of the principal edible molluscs, and make their appearance only as a result of sewage pollution.

I am able to confirm Dr. Klein's observations, and have no doubt that the presence of organisms of the colon or enteritidis (Gaertner) group is indicative of sewage pollution, and that the presence of the bacillus enteritidis sporogenes is further confirmatory evidence of this.¹

I have recently examined some 32 oysters from various sources (the majority from the Roach River, a few "Mumbles," "Portuguese," and "Anglo-French"), and with the exception of two—a Portuguese and a Mumbles—not one contained any of the above-named organisms. The method of examination was to scrub the shells in clean water, dry them, and then to open with sterile instruments. The oyster was next cut up with sterile scissors, and two to four drops of the milky fluid were sown into (a) two Durham's fermentation tubes, containing litmus, glucose, bile-salt peptone water (McConkey); (b) one Parietti broth tube (0.2 c.cm. Parietti); (c) two milk tubes, which were heated and incubated anaerobically; (d) one surface carbol-gelatin plate. The tube cultures and plates were incubated and examined, and subcultures from suspicious tubes and colonies were made and examined. In a few instances carbol-gelatin plates and bile-salt tubes were inoculated from the contents of the digestive tract alone.

From my observations I have no hesitation, therefore, in concluding that oysters from waters uncontaminated with sewage do not normally contain the colon or allied bacilli or the bacillus enteritidis sporogenes.

¹ *BRITISH MEDICAL JOURNAL*, February 21st, 1903, p. 417.