



size of the bacilli was $8 \mu \times 1 \mu$. No capsules were seen and many bacilli showed sub-terminal empty spaces probably representing spores which had not distended the bacterial outline. Typical rounded ends were present in all bacilli and many of them were slightly curved, others were at right angles to each other giving the impression of branching hyphal forms. Cultures from the drainage tube on the fourth postoperative day for anaerobic bacilli failed to produce any growth.

Immediately after receipt of the pathology report massive penicillin therapy was started with very favourable response. On the 16th postoperative day the patient was discharged after a minor lung infection had cleared up with broad spectrum antibiotic therapy. Liver function was normal except for slightly reduced serum protein (5.4 g/100 ml).

We were intrigued by the presence of the Gram-positive bacilli, since there was only mild bruising of the anterior abdominal wall and no bowel injury was found. Ascent of bacilli in the post-traumatic state up the common bile duct is the probable source of these organisms. Bacteria, especially anaerobes, have been found after death in human and animal livers at necropsy.¹ Cultures of liver biopsies are generally negative, but this is believed to be due to the bactericidal action of fatty acids. Bacteria entering the biliary tree or the portal circulation from the intestine have also been reported.¹ Experimental hepatic damage also leads to bacteria in the bile or lymph.

The exact classification of these bacteria was not possible because specimens for anaerobic cultures were not obtained during the surgical procedure. The morphology and gas formation would suggest *Cl. welchii* or organisms of the gas-forming anaerobic group.—We are, etc.,

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¹ Popper, H., and Schaffner, F., *Liver Structure and Function*, New York, McGraw Hill, 1957.

Neonatal Conjunctivitis

SIR.—Dr. D. J. Hansman (18 March, p. 748) described a case of neonatal conjunctivitis due to *Neisseria meningitidis* and rightly stressed the need for thorough bacteriological identification if such cases are not to be

confused with gonococcal infection. The following report of a case of purulent conjunctivitis, apparently caused by *N. catarrhalis*, may serve to reinforce Dr. Hansman's advice.

A healthy 11-day-old baby developed a purulent discharge from her left eye. Staining of the pus revealed large numbers of polymorphonuclear cells, some of which were packed with Gram-negative diplococci. Cultures yielded a heavy pure growth of *N. catarrhalis*, of which the identity was confirmed by the National Collection of Type Cultures, Colindale, London. The baby was treated with chloramphenicol eye drops and made a rapid recovery.

The possibility cannot be excluded that the conjunctivitis had some other underlying aetiology and that *N. catarrhalis* was a harmless superinfection. However, the organism was grown in pure culture from swabs taken on two separate days, and its location within pus cells might suggest that its presence was not welcome. Although *N. catarrhalis* is normally considered to be a harmless commensal it occasionally assumes a pathogenic role, particularly in the young. For example, Cocchi and Olivelli¹ described a case of meningitis caused by *N. catarrhalis* and cited 17 similar cases from the literature, and Graber *et al.*² attributed three cases of urethritis to infection by this organism.

It seems likely, therefore, that *N. catarrhalis* may at times be responsible for neonatal conjunctivitis and this problem will only be elucidated by careful investigation.—I am, etc.,

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¹ Cocchi, P., and Olivelli, A., *Acta Paediatrica Scandinavica*, 1968, 57, 451.

² Graber, C. D., Scott, R. C., Dunkelberg, W. E., and Dirks, K. R., *American Journal of Clinical Pathology*, 1963, 39, 360.

Asymptomatic Bacteriuria—a Serious Disease?

SIR.—Asymptomatic bacteriuria is a common finding in children¹ as well as adults.² Its clinical significance, however, is presently unknown, but might be elucidated by a few observations from our studies of urinary tract infections.

The frequency of *E. coli* in the R phase varies between different categories of patients with urinary tract infection. The Table shows that R phase bacteria are uncommon in primary infections, but increase in frequency with recurrences to be common in chronic pyelonephritis. In 48 children with

Type of infection	% R phase <i>E. coli</i>	No. of urinary isolates
First known infection, girls	3	119
Recurrent infection, girls	6	63
Infection in pregnant women	29	302
Asymptomatic bacteriuria, women	40	121
Chronic pyelonephritis, women	44	34
Asymptomatic bacteriuria, girls	22	48

asymptomatic bacteriuria we found R phase bacteria in 22%. In addition 28% of the strains showed a broadened agglutination pattern suggesting partial S-R degradation.³ This suggests that asymptomatic bacteriuria in childhood might be a finding indicating that the patient has had previous attacks of

urinary tract infection. Further, the frequency of *E. coli* of O groups less common in urinary isolates also was higher in the children with asymptomatic bacteriuria than in those with their first known infection, which is possibly a result of repeated infections which have induced immunity to the more common O antigens allowing only less common bacteria to invade the urinary tract.

In our experience one third of the patients with a first recurrence after acute primary pyelonephritis are asymptomatic, whereas twice as many of those with further recurrences are asymptomatic.⁴ Thus, the frequency of asymptomatic infections increases with the number of recurrences. This would suggest that asymptomatic bacteriuria mainly occurs in patients with previous attacks of urinary tract infections, although many of these might have passed unrecognized.

In our material more than 15% of the children with asymptomatic bacteriuria have signs of renal damage, in accord with the observation of Kunin.¹ We believe that the renal damage is not the forerunner of the urinary tract infections in most of these cases, but a sequel of the infections since such lesions develop in about 10% of the children who have a history of acute pyelonephritis.^{5,6} The highest frequency is seen in patients who have had many, often asymptomatic, recurrences.

These findings suggest that asymptomatic bacteriuria might be considered a potentially dangerous disease in many cases and not a harmless invasion of the urinary tract, although in a few of our cases the bacteriuria has vanished spontaneously. Longitudinal studies of patients with asymptomatic bacteriuria may hopefully define the characteristics of the patients at risk.—We are, etc.,

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¹ Kunin, C. M., Zacha, E., and Paquin, A. J., *New England Journal of Medicine*, 1962, 266, 1287.

² Sussman, M., *et al.*, *British Medical Journal*, 1969, 1, 799.

³ Bettelheim, K. A., Taylor, J., *Journal of Medical Microbiology*, 1969, 2, 225.

⁴ Bergström, T., *Acta Paediatrica Scandinavica*, 1967, Suppl. 177, 45.

⁵ Bergström, T., in preparation.

⁶ Lindblad, B. S., and Ekenstam, K., *Acta Paediatrica Scandinavica*, 1969, 58, 25.

D.T.P. Immunization by Intradermal Jet Injection

SIR.—With reference to the article by Professor J. P. Stanfield and his colleagues (22 April, p. 197) the following may be of interest. I described in 1944¹ a small investigation into the feasibility of using the intradermal route of administration of diphtheria aluminium precipitated toxoid (A.P.T.). The series consisted of 75 children mostly under four years of age, who were all originally Schick-positive. They were all treated one week after the test with a 0.1 ml syringe-administered intradermal dose of A.P.T. This was followed 28 days later by an identical injection. Schick tests performed