been definitely established, but infection through the mouth by means of fingers, instruments, and bath water must be guarded against; bacteria may also enter through the alimentary canal, the external ear, and the Eustachian tube. The susceptibility of infants to infections with micro-organisms otherwise only slightly pathogenic may be explained by the feeble production of antibodies during the early months of infancy. The greater resistance of breast-fed infants as compared with those artificially fed is probably due to the compensation of the passive immunization by the breast milk for the active immunization which is still deficient.

Fildes, P., and Baker, S. L. MENINGOCOCCIC CARRIERS AND MENINGITIS. [Br. Med. J., Oct. 5, 1918.]

A valuable report upon the seasonal outbreak of cerebro-spinal fever in the navy at Portsmouth, 1916–17, has recently been made to the Medical Research Committee by these authors. Their conclusions as to the epidemiology of the disease, based on an enormous number of routine examinations, modify in some respects the current views on the subject, and deserve careful consideration. With the object of minimizing the incidence of cerebro-spinal fever in the service, Surgeon-General Sir Arthur May, the late Director-General of the Medical Department of the Royal Navy, ordered that the throats of all new entries should be examined so as to detect meningococcic carriers. In accordance with this regulation, an average of 270 new entries were examined weekly at Portsmouth during 1916 and 1917, and an opportunity was thus provided, and utilized to the full, of throwing fresh light on problems associated with the disease. The probably unique experience of examining swabs from the throats of twenty-six cerebro-spinal fever patients, at intervals of from two to seventy-five days before the onset of symptoms, gave a negative result in every instance, and among 485 known carriers no case of the disease, or of slight meningeal symptoms suggesting a mild meningococcic meningitis, occurred. These observations are important in controverting the rather widespread assumption that a carrier stage precedes the onset of the disease, and in proving that the interval between infection of the throat and systematic generalization, or the incubation period, may be very short. Further, the throats of the patients a few days after the onset of symptoms were as often as not free from meningococci, and were seldom so heavily or persistently infected as ordinary carriers; for this and other reasons it is highly probable that a patient is not responsible for the presence of carriers among his contacts. No direct evidence was forthcoming of infection of an individual from a patient, and it appears that a case is more unlikely than a carrier to spread the disease. A close relation is shown to exist between the frequency of meningococci in the throats of the general population and the incidence of cerebro-spinal fever; both are high in the winter and spring, and low in the summer. During a transient epidemic of carriers an individual occasionally develops cerebro-spinal

means of diagnosis agglutination tests with the patient's blood serum appear to be valueless. Staff Surgeon Adshead gives a good clinical account of 71 cases treated almost entirely by Flexner's serum with a mortality of 19, or 26.7 per cent., but an attempt to discover if there was any conformity between the type of meningococcus found in the 46 cases mentioned above and the clinical symptoms and mortality did not lead to any conclusion.

Bradley, D. E. MENINGOCOCCUS CULTURES. [J. A. M. A., June 15, 1918.]

Bradley reports her experiments made as to the prolongation of life and viability of meningococcus cultures. Her attention was called to the subject by the apparent affinity of these organisms to nervous tissue. Both deep brain and deep blood mediums were used. "The deep brain medium, according to von Hibler, is thus prepared: Beef brain is chopped fine, and one third the volume of distilled water is added. The mixture is tubed in lots from 12 to 15 c.c. and sterilized, preferably in the Arnold sterilizer, three successive days. Before we plant into this medium, it is customary in our work to transfer a loop of brain to agar medium and incubate twenty-four hours to detect any contamination." A table is given showing the viability of meningococcus cultures in days at 37° C., room temperature, and ice-box temperature, which has been considered as slight by authorities. The method and technic of testing is described. She finds, however, from her tests, as far as she has gone, that even in deep brain cultures which are the most favorable, meningococcus is longer lived at 37° C. than at room temperature or in the ice box, but that the fact that deep brain cultures can be kept alive for many days at lower than body temperature is important.

Shearer, C., Crowe, H. W. THE RÔLE OF THE PHAGOCYTE IN CEREBRO-SPINAL MENINGITIS. [Proc. Royal Soc. Biol. Sci., Series B, Vol. 89, No. B, 619.]

These experimenters have sought to obtain light on the mode of entrance of the meningococcus into the spinal canal. The membranes enclosing the spinal fluid appear impenetrable to this organism nor has any filterable virus form been found for it, in which it might penetrate. The absence of meningitis as a frequent complication of streptococcal septicemia disproves that the blood or lymph streams are the means of passage. Leucocytes however pass readily through the spinal membranes. In cerebro-spinal fever there are many polymorph leucocytes present in the spinal fluid and these are found frequently to contain many meningococci, which show no obvious signs of degeneration or digestion but which stain as readily as those lying free without the phagocytes. The literature points to the fact that under certain conditions meningococcus like other organisms can remain alive within the phagocytes.

The object therefore of these experiments was to demonstrate the viability or non-viability of these meningococci within the leucocytes