

excluding Calcutta, only seventeen have framed by-laws and promulgated them. The urban areas are becoming very congested, especially those in process of industrialization, and there are large numbers of houses with no adequate ventilation, damp proofing, outlet for kitchen smoke, and suitable drainage. All these adverse conditions react unfavourably upon the health of the inhabitants, more so upon the pregnant mothers and the infants. This is further very seriously aggravated by the overcrowding in the individual houses, partly due to the low standard of living and partly to the lack of suitable accommodation. Not only do two or three families live in houses which are only adequate for single families, but two or three generations inhabit the same room, creating most unhealthy conditions. In the rural areas where more than forty-seven million people live, the absence of a Village Planning Act and the lack of desire and initiative on the part of the population itself have resulted in the haphazard growth of homesteads with innumerable breeding-places for mosquitos caused by excavating the ground indiscriminately all over the villages in order to obtain earth for building the huts. Each year about half a million deaths occur from malaria alone; tuberculosis is probably also increasing, especially in these malaria-infested areas. Even in the urban areas three million inhabitants live in such different types of buildings as those constructed entirely of bricks; partly of bricks and partly of corrugated sheets or tiles; entirely of corrugated sheets; daub and wattle; mud walls with thatched roofing; and bamboo walls with thatched roofing. It is therefore suggested that all the municipalities should adopt suitable by-laws, and that Village Planning and the Small Town Planning Acts should be brought into being.

#### The Punjab Epidemiological Bureau

Epidemiological work is prominent in the activities of the public health department of the Punjab. In his report on the public health administration Lieutenant-Colonel C. M. Nicol, I.M.S., records that five malaria surveys were undertaken in 1936 in different parts of the Province, and that these gave valuable information which could be utilized in organizing preventive measures. This work requires very specialized knowledge, and the accuracy of the observations is an important factor in the degree of success obtained by efforts directed against the development and spreading of malaria in the regions surveyed. The collection of data for the preparation of the annual malaria forecast, and the analysis of these data, is an essential piece of work which devolves upon the Bureau personnel each year. In this connexion the results of spleen examination in school children throughout the Province are examined, resulting in the compiling of valuable evidence about endemicity. The examination of blood films for the presence of the malaria parasite is a routine procedure. Advice is also given by the Bureau in respect of sites for proposed new buildings and institutions, particularly as regards the possibility of mosquito breeding in the neighbourhoods. In connexion with the Provincial hookworm survey material is systematically examined for signs of hookworm infection, —no fewer than 7,789 specimens were scrutinized during the year under review. The epidemiologist is responsible for the planning of field work for the Provincial survey and for the co-ordination of this work with laboratory investigations. Outbreaks of epidemic and other disease are investigated, and the necessary laboratory procedures are undertaken. Since 1932 much work has been done in connexion with the continued prevalence of cerebrospinal fever in the Borstal Jail at Lahore, particularly with a view to segregating carriers. An outbreak of suspected pneumonic plague was investigated. It is noteworthy that plague, which has been absent from the Shiapur district for seven years, reappeared in 1935—an indication that no false sense of security should be allowed to develop merely because this disease has not appeared

for even a comparatively lengthy period of years. In 1936 there was a fall in the incidence of plague in the Punjab, the three largest towns, Lahore, Amritsar, and Multan, being entirely free; that no marked degree of success attended the campaign against cerebrospinal fever was attributed to the wide distribution of carriers and the impossibility of determining which of them were capable of transmitting the infection. A special pamphlet on food was prepared in 1936, and there was a new set of magic lantern slides on tuberculosis. This disease continues to lurk unestimated, since notification is far from complete, and only mortality figures are obtainable on a large scale in the Province generally. Colonel Nicol remarks that there is great need for the extension of the campaign against this disease, the most hopeful line of attack being the multiplication of tuberculosis clinics. A leprosy survey was begun in 1931, and up to December, 1936, 5,574 villages, with a gross population of 1,719,960, had been examined; in 744 of these villages 1,814 cases of leprosy were found. At the end of the year there were eighty leprosy clinics, serving both as treatment centres and as centres of propaganda work. Since 1927 the birth rate per thousand has risen from 42.3 to 46.9, while the death rate has fallen from 167.5 to 158.4; thus the greater the success of the public health department the greater is likely to be the pressure of the population on the land. This will have to be countered by a steady improvement of agricultural methods such as will increase the output of the land. Some relief will be afforded by an extension of irrigation, though the field remaining for this is not large, and "the ultimate problem remains that of devising some means of birth control."

## Correspondence

### Hepatitis after Prophylactic Serum

SIR,—A recent outbreak of poliomyelitis has aroused controversy as to the value of convalescent serum. In the *Journal* of September 10 (p. 588) Mr. G. R. Girdlestone advocates its use, and regrets the statement of Drs. Donald Paterson and MacDonald Critchley in the *Times* of August 8 that the disease does not yield to any known treatment applied within the first few days of onset.

It is not my object in this letter to discuss the efficacy of convalescent serum treatment for poliomyelitis, but rather to draw attention to dangers incurred in its use. These dangers appear to me to apply equally to the use of convalescent serum for the treatment of any virus disease.

Poliomyelitis has recently been epidemic in this area (North-East Essex), but I have not used serum treatment for the cases under my care because I have seen alarming, and in some cases fatal, results apparently follow the administration of measles convalescent serum; and I have felt that similar results might well follow the use of serum in poliomyelitis, particularly if given, as suggested by Mr. Girdlestone, without antiseptic preservation. That evil effects may follow the use of convalescent serum is a statement of sufficiently wide implication to require very full evidence before it is accepted, but I consider that the facts which I have observed merit a preliminary communication. Full particulars of the cases will be published shortly.

On June 1, 1937, seven children housed in one block of a large institution for mental defectives were inoculated with convalescent measles serum to protect them from the disease with which they had recently been in contact. Each child received 4.5 c.cm. of the serum, which came from the same batch and which was obtained from a well-known reputable firm.

After an interval varying between seventy-eight and eighty-three days these seven children developed jaundice and became gravely ill. No other child in the institution at that time had jaundice. The disease in its early stages or in its milder forms appeared to be indistinguishable from common infective hepatitis (infectious catarrhal jaundice), but of the seven cases three developed rapidly increasing signs of liver failure terminating in death. Material derived from post-mortem examination of the fatal cases showed a condition of acute atrophy of the liver. (Photomicrographs of sections of the liver in two of the cases are enclosed.)

Two months after the onset of the jaundice in the seven children who had been inoculated with convalescent measles serum two other children who had been in contact with the cases, but who had not been inoculated with serum, became ill with jaundice. Their illness did not appear to differ in any respect from common infective hepatitis.

The majority of the cases were fully investigated. Van den Bergh's test gave a biphasic or direct positive reaction. Blood culture was negative (three cases), and so also was Widal's agglutination reaction (three cases). Examinations of blood, urine, and post-mortem material for the spirochaetes of Weil's disease were negative. Blood counts showed a mild polymorphonuclear leucocytosis. Throat swabs were taken in four of the cases, and in all grew haemolytic streptococci on culture. Laevulose-tolerance tests were carried out on some cases, and showed evidence of impaired liver function.

The investigations did not give much clue as to the aetiology of the condition. The fact that all the original cases had had convalescent measles serum attracted our notice and was at first considered to be a remarkable coincidence, but this view was revised after reading recent articles by Findlay and MacCullum (1937, 1938) on the association of hepatitis with immunization against yellow fever. These authors noted that among 3,100 persons immunized against this disease with virus and immune serum eighty nine cases of jaundice developed. The average period between the time of inoculation and the development of hepatitis was between two and three months.

The first report of hepatitis associated with immunization against a virus disease is that of Theiler (1919), who refers to it in connexion with immunization of horses against horse sickness. Of 1,148 animals inoculated twenty-seven developed acute necrosis of the liver, in most instances after an interval of sixty-two to seventy-eight days. Among Army horses immunized against horse sickness there was a mortality of 4 to 5 per cent. in one group of 1,411 animals, and 20 per cent. in a second group of 1,154 animals. An interesting point is that seven non-immunized and apparently healthy horses died from hepatitis in the same area and during the same time as the illness occurred in the same group of 1,154 animals mentioned above.

Marsh (1937) has recorded the development of hepatitis in horses inoculated with immune serum alone or with mixtures of immune serum and virus for the treatment of equine encephalomyelitis. Of 5,933 horses treated symptoms of hepatitis followed inoculation in eighty-one cases after an interval varying between thirty-two and ninety-two days. In addition, eight horses that had not been immunized developed similar symptoms.

Findlay and MacCullum also record a communication to them by Dr. W. S. Gordon noting the occurrence of necrosis of the liver following inoculation of serum antitoxic to *Clostridium welchii*.

The possible theories explaining these recorded facts are fully discussed by Findlay and MacCullum, who summarize them as follows: (1) a hepatotoxic virus is introduced with the virus inoculum; or (2) two factors combine to induce the hepatitis—(a) a hepatotoxic substance present in the sera or tissue extract injected; (b)

an infective agent which, in the case of human beings, is probably the causal agent of common infective jaundice. The last theory appears to me to be the most likely after consideration of the present cases. It would explain satisfactorily the occurrence of secondary cases of jaundice in individuals who have not been inoculated with serum.

In conclusion, it is perhaps as well to mention that such serious sequels to the use of immune sera must be rare, for I have not been able to find any other cases recorded in the literature of hepatitis associated with convalescent measles serum.—I am, etc.,

Colchester, Sept. 16.

S. A. PROPERT.

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### Convalescent Serum in Infantile Paralysis

SIR,—I am sorry that Dr. F. M. R. Walshe (*Journal*, September 17, p. 633) is so confirmed an unbeliever in convalescent serum. So far as the negative evidence available is conclusive it disproves the efficacy of serum as it was prepared and used. In some of the reported series the cases were not fully alternate or truly comparable in severity; the serum was often not from donors recently convalescent from poliomyelitis; the pre-paralytic stage was often not accurately assessed; there was often delay between the diagnosis and the administration; and doses were often small.

Furthermore, the evidence is not all negative. I mentioned Macnamara and Morgan. Jackson and Donovan, reviewing the 1936 epidemic of poliomyelitis in Manitoba (*Canad. publ. Hlth. J.*, August, 1937), give the following table.

End Results of 131 Cases with Positive Spinal Fluid Findings

Result	Serum administered within 36 hours of onset	Serum after 36 hours; or after paralysis; or not administered
	Cases	Cases
Recovered without paralysis ..	51 (92.7%)	43 (56.6%)
Recovered with residual paralysis	3 (5.5%)	28 (36.8%)
Died .. .. .	1 (1.8%)	5 (6.6%)
Total .. .. .	55 (100%)	76 (100%)

My plea is that convalescent serum has been condemned on insufficient evidence, and that there are grounds for an appeal and for a further trial.

I have been asked how a doctor is to recognize the pre-paralytic stage of poliomyelitis. The period of the year and the existence of a local epidemic may be suggestive. The child has, or has recently had, a brief feverish illness, commonly pharyngitis. All such patients should be taught to give their knees a "good morning" and "good night" kiss. During the fever, or associated with a secondary rise, the patient complains of stiffness in the neck or back, and when asked to carry out the morning and evening kissing of his knees cannot do so. Poliomyelitis is suspected, *the patient is not moved*, but with the least possible delay pathologist, serum, and microscope are brought to his bedside; lumbar puncture is carried out and 5 or 10 c.cm. of cerebrospinal fluid withdrawn, and the needle is left *in situ* while the fluid is examined. At this stage the characteristic "polio" finding is a raised cell count (polymorphonuclear and mononuclear) in a clear or slightly opalescent fluid, and