many of these ailing children would be reclaimed from the slough of ill-health; many of them would become self-supporting adults, of value to the State. Therefore economy indicates that the scheme is expedient. There comes also the voice of Humanity appealing to us to lighten the burden of the little children who have done nothing to deserve its continuance, whose heritage too often is sorrow, and whose path through life is the weary path of ill-health.

ON THE ADMINISTRATION AND DOSE OF STAPHYLOCOCCUS VACCINE.

By BRUCE C. KELLY, M.B., M.R.C.S.,
BURNHAM, SOMERSET.

HAVING for some time past been in the habit of employing bacterial vaccines, I venture to record the notes of one case which has in particular convinced me that the doses of staphylococcus vaccine commonly employed, namely, 100 to 500 millions staphylococci, are often too large, and therefore harmful. The case I refer to is one of chronic fronto-ethmoidal suppuration of many years' duration, which has been under treatment with a vaccine for eighteen months. There was in addition antral suppuration, on which Dr. Watson Williams of Clifton operated with entirely satisfactory result eighteen months ago. This operation was followed by a very acute exacerbation of the frontal sinusitis, which was treated by daily irrigation of the sinus for a month. Much improvement resulted, but a large amount of purulent discharge continued.

Staphylococcus in pure culture was found by Dr. Munro of Bath in pus drawn from the frontal sinus and a vaccine made by him.

The first hypodermic injection of vaccine was given on April 7th, 1907, and between this date and October 21st, 1907, the patient had sixteen injections varying in dosage between 500 and 100 millions staphylococci. Many of these injections were controlled by opsonic index determinations made both before and after injection. It was always found that the opsonic index corresponded closely with the clinical signs, enabling one after a time to dispense with the determination altogether. Frontal sinusitis, in most patients at all events, is a condition in which index determinations may be safely dispensed with. In this case a low index means frontal headache and increase in the amount of discharge, and vice versa. After each of the above injections there was a negative phase marked by pain, increase in the amount of purulent discharge, feeling of illness, and sometimes enlarged cervical glands, lasting four or five days when the larger doses, for example, 500 millions of cocci, and two or three days when smaller amounts, for example, 100 millions, had been given.

At the end of October, 1907, the patient was much better, both locally and generally, than she had been for more than a year, and there was great improvement in the general septic condition in which the patient had been some months previously. The discharge was much less, and pain, except during the negative phase produced by the menstrual periods, quite infrequent. The patient remained well till February, 1908; during that time no further injections were given. Then the sinusitis again became active and remained so, with periods of less activity, till April, when, as there were no signs of improvement, vaccine treatment was resumed. The dose of vaccine was much reduced, so as to abolish the troublesome negative phase, and was given about once a week. Further, following Dr. Latham,¹ I commenced to give the vaccine by the mouth, on an empty stomach, in normal saline solution. The same clinical effects were produced as when the hypodermic method was employed—for example, 60 million staphylococci by the mouth gave my patient slight frontal headache for about a day and a half with increase of discharge lasting a day or two longer; while, if this amount is given hypodermically, the negative phase lasts decidedly longer. Doubtless, the positive phase lasts longer after hypodermic injection than after oral administration. The doses were further reduced to 20 million, and sometimes 10 million staphylococci by the mouth, and these smaller doses were found to cause no subsequent headache, though there is always slightly

more discharge for one day—the second or third after the administration of the 20 million cocci doses of the vaccine. Since April this patient has been steadily treated with the vaccine in doses of 10 to 20 millions; sometimes a dose has followed on the last with an interval of a week, and sometimes only four days. During this period she has been in better health in every way than she has been for several years past. She has rarely had any frontal pain, except during a menstrual period, and at times days have elapsed without any purulent discharge.

It is difficult to resist the conclusion that the improvement is due to the vaccine, and, further, that small doses, that is, of 10 or 20 millions of cocci, have answered best, and, moreover, that oral has been as efficient as hypodermic administration, and entails less time and trouble.

While a cure in such a case seems to be too much to hope for, any method of treatment which might obviate the necessity for a radical operation is worth attempting. Further, though the improvement has been slow, it has been marked, and still continues, accompanied by a continuous levelling-up of the patient's general health and lessening of the general septic condition which existed before treatment by vaccine was commenced.

REFERENCE.

¹ *Proc. Roy. Soc. Med.*

"FLIES" AS CARRIERS OF THE BACILLUS TYPHOSUS.

By E. KLEIN, M.D., F.R.S.,

LECTURER ON ADVANCED BACTERIOLOGY, ST. BARTHOLOMEW'S HOSPITAL MEDICAL COLLEGE.

ON September 4th I received from Dr. Heywood Wilshaw a box containing a large number of flies. Twelve of these (living) were minced in a sterile dish with $\frac{1}{2}$ c.c.m. of sterile salt solution. The whole of the resulting turbid fluid was used for cultures: (1) To demonstrate the presence of *B. coli communis*; (2) to search for the presence of microbes belonging to the typhoid group. Phenol broth, litmus lactose bile salt peptone water, and two large plates containing Drigalski-Conradi medium were used for the purpose.

In all of these cultures copious *B. coli communis* was easily identified. In the Drigalski plates, besides numerous colonies of *B. coli communis*—red colonies with red halo—there were present also a number of blue colonies, but only two or three of these blue colonies in each plate presented the appearances which might indicate the *B. typhosus*—namely, blue colonies with slightly irregular filmy margin, thicker raised centre, finely granular, and, under the microscope, composed of cylindrical mobile bacilli. An emulsion of a particle of such a

Characters and Cultures.	Laboratory Stock of <i>B. typhosus</i> .	Microbes Isolated from the Flies.
Morphological	Cylindrical, very mobile	Cylindrical, very mobile.
Gelatine streak	Translucent band after 48 hours	Translucent band after 48 hours
Glucose gelatine shake	Good growth, no gas	Good growth, no gas.
Neutral red broth	No change in colour	No change in colour.
Litmus milk	Slow acid formation, remains fluid	Slow acid formation, remains fluid.
Litmus, lactose, bile salt, peptone water	Bleached, no gas	Bleached, no gas.
Litmus, glucose, bile salt, peptone water	Acid formed, no gas	Acid formed, no gas at first, very slight gas after 3 days.
Phenol broth	Cloudy growth, no pellicle	Cloudy growth, no pellicle.
Indol formed in broth after six days	Negative	Negative.
Drigalski-Conradi medium	Blue finely granular colonies with raised conical centre, irregular filmy margin	Blue finely granular colonies with raised conical centre, irregular filmy margin
Agglutination of broth culture 24 hours old with typhoid serum, dilution 1 in 50	Distinct within 10 minutes	Distinct within 10 minutes.

colony tested with typhoid serum gave distinct evidence of agglutination. We had, then, here sufficient evidence for considering these particular colonies with suspicion as being those of *B. typhosus*. Subcultures were now made, and all the usual tests were applied in order to compare the microbe with the true *B. typhosus*.

The tests are summarized in the accompanying table, and it will be seen therefrom that this fly microbe compares in practically every point with our laboratory stock *B. typhosus*; it gave all the negative tests, it gave the important positive tests on Drigalski-Conradi medium and in agglutination with typhoid serum; the only difference between the two appears to be that the laboratory stock, while producing acid in litmus-glucose-bile-salt-peptone does not produce gas, whereas the fly microbe produces acid, no gas during the first two or three days, but very slight gas after three days.

The conclusion that can be justly drawn from these experiments is that the flies examined contained besides a great number of *B. coli communis* also in limited numbers a species of microbe which is not distinguishable from *B. typhosus*, the insignificant difference just stated may be a difference due to different race. The actual demonstration of *B. typhosus* in the flies lends, therefore, strong support to the conclusion arrived at from the epidemiological data*—namely, that the contagium in the cases of enteric fever dealt with in Dr. Wilshaw's report was conveyed by the flies of the locality.

SEVENTY-SIXTH ANNUAL MEETING

OF THE

British Medical Association.

Held at Sheffield on July 24th, 25th, 27th, 28th, 29th, 30th, and 31st.

PROCEEDINGS OF SECTIONS.

SECTION OF MEDICINE.

W. DYSON, B.A., M.D.Lond., M.R.C.S., J.P., President.

DISCUSSION ON SPLENIC ENLARGEMENTS OTHER THAN LEUKAEMIC.

INTRODUCTORY PAPER.

By WILLIAM OSLER, M.D., F.R.C.P., F.R.S.,
Regius Professor of Medicine, University of Oxford.

It is not a little remarkable that the ductless gland, to which for several centuries the attention of the profession has been specially directed, is the one of whose functions we are most ignorant. Of the physiology of the spleen we know really very little. That it is concerned with the process of blood scavenging; that it acts as a sort of warehouse for blood pigments; and that its structure in parts indicates haemopoiesis—these are about the only functions which are recognized. It is quite possible that in the economy of nutrition it plays other equally important parts. The sensitive reaction of the spleen in infective and chronic toxic processes indicates that it may have duties in connexion with the internal protective mechanisms about which we are just beginning to find out. One point standing out clearly separates the spleen from the other ductless glands, the suprarenals and the thyroid—it is not an organ essential to life. This was one of the earliest demonstrations in practical physiology, and was made in the days when the spleen filled a very important chapter in humoral pathology. No less distinguished a philosopher than the Hon. Robert Boyle demonstrated at Oxford that a dog could live comfortably after removal of the organ. It is a gland with

* After the occurrence of a case of enteric fever in a house forming one of a row, a number of typhoid cases made their appearance in the neighbouring houses. All known channels of transmission, for example, personal contact, defective drainage, polluted water or milk, could be excluded. The only condition common to all the houses of the row was this—that they were swarming with flies.

very few diseases of its own. The time was when men wrote monographs on the spleen, and in the eighteenth century a fine folio was issued by Stukeley the antiquary, from which all the ancient lore may be gleaned; even as late as 1854 Gray, the author of the well-known anatomical textbook, wrote an essay on its structure and use. We have come to recognize that nearly all the diseases of the spleen are of a secondary nature, and this is particularly the case in connexion with the conditions which we are to discuss to-day. We meet with chronic enlargement of the organ in many different states which may be grouped under disturbances and anomalies of nutrition, infections, disturbances of the blood-forming organs, conditions of chronic blood stasis in the portal system, neoplasms, and there are certain obscure forms the nature of which is as yet unknown. I have attempted here a clinical grouping which may serve as a basis for discussion. It does not profess to be complete.

1. In children disturbances of metabolism and in chronic intestinal affections: Rickets, amyloid disease, and in a large but ill-defined group of intestinal disorders, particularly in the tropics; the pseudo-leukaemia infantum.

2. In the infections: Syphilis, malaria, kala-azar, and other forms of tropical splenomegaly, Hodgkin's disease and tuberculosis.

3. In primary disorders of the blood-forming organs: Leukaemia, pernicious anaemia, chlorosis, haemachromatosis; polycythaemic splenomegaly.

4. In cirrhosis of the liver: Syphilitic, alcoholic, hypertrophic of Hanot.

5. Hereditary and family forms of splenomegaly: (a) With the congenital acholuric icterus; (b) with constitutional disturbances, dwarfing, etc.

6. New growths and parasites: Sarcoma, primitive endothelioma of Gaucher (?), echinococcus, and the schistosoma of Japan.

7. Splenomegaly not correlated with any of the above or with any known cause: Banti's disease, with its three stages of (a) simple enlargement, (b) splenomegaly with anaemia, (c) splenomegaly with anaemia, jaundice, and ascites.

I.

I do not propose to discuss the enlargements met with in this group, as Dr. Robert Hutchison has agreed to speak more particularly about them.

II.

In the acute infections, enlargement of the spleen is the rule, even the mildest fever is accompanied with slight swelling, but in the ordinary fevers the organ does not reach a very large size. Occasionally in typhoid fever and in acute malaria the lower border of the spleen may reach to the level of the navel, but this is exceptional. In the chronic infections enlarged spleen is very common. In syphilis it is frequent in children, but in adults it is rare apart from gummata and the syphilitic affections of the liver. In malaria the spleen is always involved, and in the chronic forms of this disease the organ may be permanently and greatly enlarged. We rarely see it reach the maximum size met with in leukaemia and Banti's disease. The tropical splenomegaly is also associated with chronic infections, and one group has been isolated by the studies of Leishman, Donovan, Rogers, and others on kala-azar and its parasites. There are forms, however, in the tropics that belong neither to malaria nor kala-azar, as shown by the observations of Musgrave, Wherry, and Woolley in the Philippine Islands and Darling in Panama.

In tuberculosis we rarely meet with great enlargement, but a few cases of splenomegaly have been described in which the disease has been primary in the spleen, and associated with a remarkable condition of polycythaemia.

It seems probable that Hodgkin's disease should come among the acute infections, and some little confusion exists about the state of the spleen in this affection. In a majority of cases the organ is enlarged—sometimes in a chronic hyperplasia, sometimes by the growth of lymphadenomatous masses. The point in dispute is as to the existence of a special splenic variety of Hodgkin's disease in which the lymphadenomatous growths are confined to the organ. Personally, I have never met with a case. Many of the older reports of the splenic variety of pseudo-leukaemia were in reality of cases which have nothing to do with Hodgkin's disease.

III.

The most interesting of the chronic splenic enlargements are those associated with primary disturbances of