tory and conflicting that we know but little about that. We should probably be more likely to find some variety of colon bacillus, because the condition is located in the lower ileum, though it seems that a few bacteriologists have asserted that they have found some cocci in these tumors.

DR. J. M. T. FINNEY, Baltimore: This tumor is very rare, the instance reported being the first that has been observed in this country. The chief interest centers in its etiology, and this will, for the present at any rate, have to remain unknown. Whether it is a tumor of distinct character or whether of bacterial or obstructive origin is as yet undetermined. Histologically the tumor is of great interest. The disease appears to be confined to no one locality, but is widely disseminated, cases having been reported from Norway, Russia, Japan, Italy, France, Germany and England, but only one or two cases from each country. If the tumor is of bacterial origin, and the bacteria giving rise to it are of the colon group which are so common, it would be interesting to know why it does not occur more frequently.

THE INOCULATION TREATMENT OF GONOCOCCUS VULVOVAGINITIS IN CHILDREN.*

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Gonococcus vulvovaginitis in little girls is a much dreaded disease, especially when it occurs as a hospital epidemic. Its obstinate nature and possibly serious consequences are too well known to need comment. All methods of treatment hitherto have been futile and we have had to be content to let the infection wear itself out.

The success of the inoculation method of treating certain forms of gonorrheal affections in the adult suggested the possibility that it might also be of value in the management of this form of vaginitis in little girls. Accordingly, during this last winter, we have been treating patients in our ward at the Cook County Hospital with injections of dead gonococci and studying the results. The main object of the study has been to determine whether or not this method of treatment would lessen the duration of the disease. Incidentally, observations¹ have been made on the opsonic index of children afflicted with this infection and on the effects of the inoculations on the index and vaginal discharge. The results of the study form the subject of this paper.

TECHNIC.

The estimation of the opsonic index has been done by the usual Wright method. The "pool" serum has been prepared from the blood of three healthy adults. The killed bacteria, prepared and standardized also by the Wright method, has been usually made from old strains of one organism. The dosage has, of course, been more or less a matter of guesswork; we have started with about fifteen millions, gone as high as one hundred and twenty millions for the oldest girls, and sixty or eighty millions for those about 5 years of age.

* Read in the Section on Diseases of Children of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

1. This part of the work has been done in the Memorial Institute for Infectious Diseases.

Forty-one patients in all have received the inoculations. Other therapeutic measures, douching, etc., have been omitted during injections. We have been able to treat continuously only eighteen patients. Of the others, most have been taken out of the hospital by their parents before treatment was completed; a few have died. A patient has been called "cured" when all discharge has ceased and when four successive bacteriologic examinations of smears taken from the vagina failed to show the specific organism, these tests covering a period of seven to fourteen days. We use the term "cure" advisedly, well knowing the tendency of this disease to recur, after long periods of apparent quiescence. In order to make our results as reliable as possible, we have attempted to follow up all our patients, but with little success. We have recent reports on only 9 of them, distributed as follows: Four in their homes, 3 in the hospital, 2 deaths. Of 13 patients followed to their homes, only 4 could be found. Three of these had positive smears on May 21, 1908, three weeks, 1 month and four and one-half months, respectively, after their discharge from the hospital. The fourth one had a negative smear on the same date, three months after discharge.

Three patients are now in the hospital for various reasons, having been free from vaginal discharge and gonococci two and one-half, three, and five and one-half months, respectively. Two died in the hospital twenty-one and twenty-five days, respectively, after the first of the four negative smears.

Thus, of 9 patients followed up, 6 have been found free from evidences of disease for periods ranging from three weeks to five and one-half months. Hamilton and Cooke had equally poor success in following their patients. They kept track of 7 patients for six or eight weeks; 3 only remained free from signs of disease, the other 4 relapsing within a week after leaving the hospital.

The causes for which the patients have been brought to the hospital have been varied. Three only were brought on account of a vaginal discharge which proved to be due to the gonococcus. Five others had such discharge at entrance, but came with the following diagnoses: One congenital dislocation of the hip, 1 typhoid, 1 malnutrition, 1 intestinal, and 1 tuberculous hip. The other 10 who developed the disease after admission came in with the following affections: Two pneumonia, 1 conjunctivitis, 3 tuberculous disease of joints or glands, 1 otitis media, 1 appendicitis, and 2 typhoid.

DURATION.

It being impossible to determine how long the disease had existed in those brought in with the infection, and equally impossible to determine whether its appearance after admission was a primary attack or a fresh exacerbation of an old, chronic process, we have not attempted to estimate the total duration of the disease. Our main object has been to see what, if any, effect the inoculations had on the course of the disease. We have, therefore, noted the time from the first injection up to the day of the first of four negative smears. This has been done in all but two cases; in these, two negative smears and an absence of discharge for eleven days has been accepted as evidence of "cure."

The duration of the hospital treatment of all cases ranged from two to eighty-four days. The duration of treatment in the cured cases ranged from two to seventy-seven days, and their average was twenty-three days. Among these, 3 developed contagious disease while un-

der treatment; 2 varicella, 1 scarlet fever. This, of course, prolonged their stay in hospital, the time of these 3 cases being, respectively, thirty-eight, fifty and forty-nine days. Treatment was discontinued during their stay in the contagious ward. If these 3 cases be eliminated, it makes the average duration of the 16 remaining cases nineteen days.

Chart 1. Case 1.—Alice W., 14 months. Vaginal discharge and gonococci disappeared within two days after first injection; there was high initial index and subnormal index at end. In all charts, inoculation is indicated by a star.

Chart 2. Case 2.—Annie D., 10 years. This patient had initial normal index with considerable discharge, no drop but quick moderate rise, then gradual fall to normal with cessation of disease. This was a mild case.

We have watched the effect of the injection on the vaginal discharge. It was not constant; sometimes a profuse discharge was lessened within a few days, sometimes increased, and still again, no effect was noted. It can not be said, then, that the injections had any immediate effect on the chief clinical symptom, and we can not look for any immediate result in this direction from an individual dose.

Chart 3. Case 3.—Frances V., 8 years. This was a mild but persistent case, with index, as a rule, high or normal. The second and third injections failed to cause as high a rise as the first. The patient was "cured" in forty-three days.

A comparison of our results with those of other observers would be of interest, but data on this method of treatment are naturally few. Two series of cases have been reported, however, both having been studied also in the wards of the Cook County Hospital, one by Butler and Long,² the other by Hamilton and Cooke.³

Butler and Long report twelve cases, but give no sum-

2. Butler and Long: *THE JOURNAL A. M. A.*, March 7, 1908, 1, 744.

3. Hamilton and Cooke: *Jour. Infect. Dis.*, 1908, v, 158.

mary as to the average length of time under treatment nor any statement as to what they regard as a "cure." However, it is possible from the dates given in ten of the cases to estimate the duration, counting the time from the day of first injection up to the first of the two negative smears, which they evidently accepted as sufficient. On this basis the average duration of ten cases was forty-three days.

Chart 4. Case 4.—Ruth F., 4 years. This patient had otitis media and mitral endocarditis. The index was normal and there was profuse discharge. Attention is called to the slight drop, December 2, and equally slight rise even after two injections, also the increase in vaginal discharge from December 17 to 21, with a rising index, the great fluctuation without apparent cause, December 21 to 26, and finally, the marked effect of the third injection. The chart is discontinued from this point. There were four negative smears January 20-31. The patient developed scarlet fever February 1; died March 22.

Chart 5. Case 5.—Rosie S., 6 years. This patient had an initial high index and profuse vaginal discharge. This was a persistent case with varying discharge, yet constantly high index. The patient left the hospital uncured after thirty-five days of treatment.

Drs. Hamilton and Cooke studied a large number of cases, mostly in the scarlet-fever ward. They are extremely conservative, and make no attempt to state the duration of their cases. They divided them into two groups of thirty each, inoculating all patients in one group and none in the other. They found that of the inoculated group, eighteen left the hospital free from discharge and gonococci, while of the uninoculated group only eight left in such improved condition, strong evidence in favor of the treatment and warranting their

opinion that inoculation apparently does shorten the period of the disease.

The discrepancy between the cases studied by Butler and Long and those studied by us is interesting, the duration being forty-three days in theirs, nineteen days in

Chart 6. Case 6.—Josephine C., 6 years. Three injections of 32, 56 and 20 millions given, before taking index, on February 14 and 26 and March 13 respectively, probably account for fairly high, though falling index on March 16, and subsequent rise to a high point seven days after injection. Her case was an obstinate one; there was persistent profuse discharge, yet on the whole high index. The patient is still under treatment.

Chart 7. Case 7.—Eva St. C., 8 years. The patient had a high initial index even with much profuse discharge. There was a "double" drop after first and second injections followed by the rocket-like rise to an extreme degree; then another drop checked by a third injection and followed immediately by a still higher rise; then the negative phase and fluctuation; a fourth injection followed by a steady decline to an extremely low point, just before the development of scarlet fever. Did the incubative stage of this infection play any part in causing this persistent drop. Compare Chart 8 (varicella). The patient returned from contagious ward January 21 and received a few injections. The index was steadily low. She went home after eighty-four days of treatment without results.

ours. The children in the two series were drawn from the same class of society, were living in the same ward under exactly the same conditions as to general surroundings, food, nursing, etc. Obviously, the difference must be due to some detail of technic, by which we mean

everything pertaining to the vaccine, preparation, age of culture, dosage, etc., of the bacteria used. Butler and Long used a young culture, six or eight hours old, taken, apparently, in most of their cases, from one strain. We used old cultures, likewise taken from one strain. The difference in the results of the two sets of cases probably lies in this factor, that is, the difference in age of the cultures from which the material injected was prepared. In this connection the investigations of Hamilton and Cooke are interesting and striking. They experimented with both old and new strains, with the following results: In five severe cases treated with fresh strains the average duration of the purulent discharge was twenty-four days; in twelve severe cases treated with old strains the average duration was fourteen days. It also may be noted that in their more chronic cases the average duration of the vaginal discharge was about three weeks, practically the same as in our own. The killed cocci used in our cases were prepared in the same laboratory as theirs and often from the same strain. We believe, then, that the shorter duration of our cases as compared with those of Butler and Long, is due to the fact that our cultures were old ones, while theirs were fresh.

Chart 8. Case 8.—Annie K., 3 years. The initial index was normal, and there was profuse discharge. There was a drop and then an immediate rise after the first injection. The patient was in quarantine with varicella from November 22 to December 7. From the time of this infection the index did not rise, in spite of repeated injections until a month later. Was this persistently low index due to the varicella? Compare with Case 7, also a low index just before and after a contagious infection.

THE OPSONIC INDEX.

This has been taken in 17 cases, 10 of the cured, 7 of the uncured. Observations have been made on the index at the beginning of treatment, on its general course, on its relation to vaginal discharge and finally on its relation to injections.

The index at the beginning showed nothing characteristic. The children were in a more or less debilitated condition, and one might have expected to find the index as a rule low. Such, however, was not the case. The indices ranged as follows:

	Normal.	Below normal.	Above normal.	Average.
Cured.....	1 patient.	4 patients.	5 patients.	1.1
Not cured.....		3 patients.	4 patients.	1.2

Thus the index showed a tendency to range about normal in the cases taken as a whole. As between the cured and not cured, no difference is noted, the tendency to run at normal being just as marked in one group as in the other. The initial index, therefore, is of no

prognostic value, and gives no hint as to whether the case will clear up easily or be an obstinate one.

The general course of the index was as follows:

	Generally above normal.	Generally below normal.
Cured	6 patients.	4 patients.
Not cured	6 patients.	1 patient.

That is, with the progress of the disease, the index showed a tendency to run above, rather than below normal, and this tendency, somewhat curiously, is more manifest in the cases failing of a cure, six of these running above normal and only one below. In the cured cases, the index manifested a decided tendency to approach the normal toward the end of the infection.

The relation of index to vaginal discharge has been noted. There is a certain correspondence between them, at least in the latter part of the disease, the index manifesting a tendency to approach the normal with the disappearance of discharge and organisms. But individual observations from day to day by no means show this correspondence, and the index can not be inferred from the character of the discharge; that is, a high index was not always accompanied by a slight discharge, nor a low one with a profuse one. Thus out of 46 observations on this point in the cured cases, this correspondence was present 26 times; it was absent 20 times; and among the not cured cases it was present 13 times and absent 13 times. Obviously, then, we can not infer the index from the character of the discharge; obviously, also, the discharge alone can not be taken as a guide to time of injection if our object in giving an injection be to "raise" a falling index and thus, presumably, increase the individual's resistance to disease.

THE EFFECT OF INJECTIONS ON THE INDEX.

After the first injection there was almost invariably a drop in the index for a day or two, followed by a rise. Sometimes the drop was considerable, at other times not; likewise with the rise. Subsequent injections acted in a similar manner, sometimes producing a more marked rise than the first, sometimes less. There was nothing constant about this.

It would be desirable to know the average number of days elapsing between the date of injection and the date of the height of the positive phase, that is, the day on which the index begins to fall. This average, however, must be based on a large number of observations, and the data at present available are not sufficient to determine this point. When a sufficiently large number of observations have been made, and we thus can determine approximately how long the effect of the inoculation lasts, we may perhaps dispense with the index, and give the injections at stated intervals until the vaginal discharge and organisms have disappeared. Indeed, as far as our own limited observations go, they would seem to indicate even now that the index is not necessary, for the average time of those cases with an index was twenty-one days, that of those without index was eighteen days. In the latter group the character of the discharge or persistence of gonococci, or both, were the guides to injections. However, the number of our cases is so small, that on the general principles governing opsonic treatment, it seems desirable to continue to take the index, for the present at least.

The accompanying charts show the relation of the opsonic index to the injections and also to the vaginal discharge, and illustrate some of the points mentioned in the body of the paper.

SUMMARY.

The inoculation treatment of vulvovaginitis apparently shortens the stay of patients in hospital. Whether or not it actually lessens the total duration of the disease, as compared with other methods of treatment, future investigations must determine.

Old strains are more effective than fresh ones.

It is desirable, though apparently not absolutely necessary, to take the index while pursuing the treatment.

There is no correspondence between the index and the vaginal discharge.

Our thanks are due to our colleagues on the staff of Cook County Hospital, who kindly allowed us to inoculate their patients, and to the Visiting Nurses' Association for their help in tracing patients. We also are under special obligation to Dr. Hektoen and Dr. Hamilton for much valuable help and suggestion in the opsonic work.

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VACCINE AND SERUM TREATMENT OF GONORRHEA IN FEMALE CHILDREN.*

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A clinical experience of ten years with institution epidemics of gonorrhea, occurring at not infrequent intervals, has convinced us that gonorrhea in female children is quite as intractable to treatment as it is in women, though not apparently presenting the many complications seen in the latter. It is not the domain of this paper to consider the causes and prevention of the development of such epidemics, nor to take up the general therapy of gonorrhea in children, which in our experience has been most unsatisfactory.

It was with a full appreciation of the latter fact that we undertook to investigate the merits of vaccine therapy in this infection. Being somewhat encouraged by earlier work in this direction, we have carried our investigations to other cases. We have likewise broadened our work to include serum therapy for gonorrhea, and will mention below the results of its use.

In view of the numerous articles lately appearing on the immunity question, we feel that we can dispense with any discussion of the theoretic basis of vaccine and serum therapy and likewise the question of the advantages of one over the other. The claim of Wright that vaccine therapy affords a more rational mode of treatment in local infections than the local use of antiseptics, while strongly sustained by theoretic considerations, requires substantiation, by the attainment of convincing clinical results. However, it has been with a conviction of the advantages of reinforcing the forces of immunization as a local therapeutic measure over other methods of local treatment that we began this work.

In our first paper on the subject we confined ourselves to narrating the results obtained in the cases treated, without any effort at analyzing them, believing also the number insufficient to draw any broad conclusions beyond suggesting that vaccine therapy seemed to be a suitable method of treatment in gonorrhea. We might state in advance that we see no reason, after con-

* Read in the Section on Diseases of Children of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.